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A.6 Chapter 5, Description of Figures

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Appendix B
List of Preparers

B.1 Preparers by Affiliation

The tables in this section include the preparer information provided by each agency or consultant for the purposes of this chapter. Preparation of this Draft EIS has relied upon materials provided by the applicant (California Department of Water Resources). For a list of preparers of the Draft Environmental Impact Report (EIR) see the Delta Conveyance Plan Draft EIR Chapter 35, *List of Preparers* (California Department of Water Resources 2021).

B.1.1 Lead Agencies

B.1.1.1 U.S. Army Corps of Engineers

Name	Title	Experience
Zachary Simmons	Regulatory Project Manager	M.S. Biological Conservation, 15 years' experience
Lisa Gibson	Chief, Special Projects Branch	B.S. Biology, 19 years' experience
Ryan Larson	Chief, Levees and Channels Branch	M.S. Environmental Engineering, 14 years' experience
Lisa Clay	Attorney	J.D., 33 years' experience
Deborah Lewis	408 Project Manager	B.S. Biological Sciences, 6 years' experience

B.1.2 Consultant Teams

B.1.2.1 ICF

Name	Education	Expertise	Experience	Project Role
Chris Elliott	BS, Landscape Architecture Professional	Landscape Architect	26 years	Program Director
Matilda Evoy-Mount	BA, Environmental Studies, 2009	NEPA compliance	12 years	NEPA Project Manager
Gregg Roy	BS, Political Economy of Natural Resources, 1982	NEPA/ CEQA compliance, economics (natural resource), water resource planning	31 years	Senior Advisor/Team Lead
Steve Centerwall	BS, Environmental Policy Analysis and Planning, 1986	NEPA/ CEQA compliance, regulatory compliance, water resource planning	36 years	Senior Advisor/Team Lead
Lindsay Christensen	BS, Community and Regional Development, 2004	Planning and environmental impact analysis	18 years	Public Services and Utilities Team Lead
Shay Humphrey	BA Political Science and History, 2006	Communications, public involvement	14 years	Team Lead/ Project Coordinator Public Involvement Consultation and Coordination
Barbara Wolf	MA, Anthropology, 2003 BA, Geography and Anthropology, 1997	Environmental Justice, transportation and climate change, technical writing	25 years	Team Lead Environmental Justice
Jan Aarts	M.A., Urban Planning, University of Washington B.A., Urban Planning, University of Washington	NEPA compliance, permitting	35	Team Lead Hazards and Hazardous Materials, Public Health, Environmental Justice, Climate Change, and Transportation
Jesika Allen	MS, Geographic Information Systems, Geography, 2018 BA, English; Minor, Anthropology, 2007	Geographic Information Systems (GIS)		GIS Support
Kasey Allen	BA, Economics, 2003	GIS, database design and management, spatial analysis	18 years	GIS Lead
Alex Angier	AA, Computer-Aided Drafting and Design, 2006	Computer-Aided Drafting (CAD), GIS	16 years	GIS Support
Jennifer Ban, LA	BLA, Landscape Architecture, 1999	Visual resources and shade/shadow analysis, habitat restoration projects	22 years	Aesthetics and Visual Resources

Name	Education	Expertise	Experience	Project Role
Dave Buehler, PE	BS, Civil Engineering, 1980	Noise and vibration impact and mitigation assessment	39 years	Noise
Joel Butterworth	MS, Geography, 1987 BA, Geography, 1985	Geology and soils impact assessment, soil resources evaluation, erosion and sediment control	33 years	Geology and Seismicity Soils
Edward Carr	MS, Atmospheric Science	Air quality impact studies, conformity analysis, dispersion modeling	35 years	Air Quality and Greenhouse Gases
Gary Clendenin, PG	MS, Geology, 1990 BS, Geology, 1984	Geology, hydrogeology, and hazardous waste management	36 years	Geology and Seismicity
Caitlyn Bishop	BS, Wildlife Conservation/Vertebrate Ecology	Wildlife biology, permitting specialist, ornithology, field surveys		Terrestrial
Katherine Carpenter	BA, Plant Biology	Wetland ecology, botany, certified arborist	19 years	Terrestrial
Jesse Benton Cherry	BA, Human Rights, 2018	Publications and ADA compliance	10 years	Lead Publication Specialist
Shannon Crossen	MS, Environmental Science, 2016 BS, Biology, 2011	Transportation ecology, field surveys, habitat assessments	14 years	Terrestrial
Christine Cruiess	MS, Historic Preservation, 2001 BA, Classical Archaeology and Anthropology, 1998	Architectural history, conservation, regulatory compliance	22 years	Cultural Resources
Susan Davis	MA, English Literature, 1995 BA, English Literature, 1990	Project management, technical writing	31 years	Land Use, Ch. 33
Lesa Erecius	MS, Pharmacology and Toxicology BS, Physiology	Water resources, aquatic toxicology, environmental impact assessment, project management	15 years	Public Health Hazards, Hazardous Materials, and Wildfire
Rachel Gardiner	MS, Wildlife Ecology, 2012 BS, Biology, 2011	Avian biology, wetland and riparian restoration, field surveys	20 years	Terrestrial
Jamie Genevie	MURP, Urban and Regional Planning BA, Sociology, Global Change	Climate adaptation and resilience, environmental impact analysis	12 years	Climate Change
Teresa Giffen	MS, Communications and Rhetoric, 2003 BA, English, 1999	Technical writing, editing, graphic design	23 years	Graphic Artist

Name	Education	Expertise	Experience	Project Role
Marin Greenwood	PhD, Fish Ecology, 2002 MS, Applied Fish Biology, 1997 BS, Aquatic Bioscience, 1996	Aquatic ecology, impact assessment, restoration benefit assessment	18 years	Fish and Aquatic Resources
Christiaan Havelaar	BA, Anthropology	Archaeology	26 years	Cultural Resources
Mike Hendrick	BS, Botany MS, Biological Resources	Fish Biology	21 years	Fish and Aquatic Resources
John Howe	MS, Environmental Biology, 2001 BS, Biology, 1993	Aquatic and wildlife ecology, wildlife surveys, habitat assessments	26 years	Terrestrial Biological Resources
Dennis Johnson	JD, 2008 BA, English, 2003	Editing, publications	22 years	Technical Editor
Ingrid Kimball	BS, Biology, 2000 MS, Forest Resources, 2006	Environmental impact statements, environmental assessments	15 years	Growth Inducement
Robert Lanza	M. Eng., Chemical Engineering	Environmental Assessment (EMS certification), cultural resources, geology, land use, recreation, noise, paleontological resources, public services	40 years	Senior Technical Reviewer
Susan Lassell	BS, Environmental Design MA, Historic Preservation Planning	Cultural Resources compliance	27 years	Cultural Resources Team Lead
Kristen Lundstrom	BA, English, 1991	Editing	16 years	Technical Editor
Stefanie Lyster	MPA, 2003 BA, Journalism, 1998	Communications, public outreach	24 years	Public Involvement, Consultation, and Coordination
Donna McCormick	BLA, Landscape Architecture California State Polytechnic University, 1987	CEQA/NEPA Visual Impact Assessment	Over 30 years in CEQA, NEPA, Visual Impact Assessment	Aesthetics and Visual Resources
Maggie Messerschmidt	MPA, 2014 BA, Anthropology, 2005	Climate vulnerability and adaptation solutions	13 years	Climate Change
Christine McCrory	BA, Anthropology, German, 2002 MPhil, European Literature, 2006	Technical editing, publishing	19 years	Technical Editor
Alice McKee	BLA, Landscape Architecture, 1994 BA, English and Political Science, 1990	Habitat restoration planning and design	27 years	Aesthetics and Visual Resources

Name	Education	Expertise	Experience	Project Role
Chris Moelter	MEM, Environmental Tourism, 2003 BA, Zoology, 2001	Environmental assessments, environmental impact statements	17 years	Land Use
Stephanie Monzon	MA, English, 2000 BA, English, 1998	Editing and publishing	16 years	Technical Editor
Jennifer Neumann	BA, Communication Studies	Editing, administrative record	8 years	Technical Editor
David Nicholson	MC, Anthropology, 2004 BA, Political Science and Anthropology, 1995	Archaeology, GIS	28 years	Cultural Resources
Ingrid Norgaard	BA, Political Science	Communications, public outreach	24 years	Document Delivery
Michelle Osborn	BA, Sociology	Communications, technology support	18 years	SharePoint Support
Erin Pace	BA, Geography, Environmental Policy, 2004	Environmental regulatory compliance, project coordination and management	15 years	Environmental Justice
Arin Phillips	BS, Environmental Science and Management, 2018	Wildlife biology	4 years	Terrestrial
Amy Poopatanapong	MS, Zoology, 2002 BS, Zoology, 1997	Wildlife biology, project management	19 years	Terrestrial
Robert Preston	PhD, Botany, 1990 MA, Botany, 1983 BA, Biological Sciences and Chemistry, 1981	Botanical surveys, wetlands delineations, wetlands permitting	30 years	Terrestrial Biological Resources
Beth Rodehorst	MS, Environmental Management	Climate resiliency	18 years	Climate Change
Jenifer Rogers	MA, Historic Preservation, 2018 BA, Anthropology, 2004	Architectural history and archaeology	21 years	Cultural Resources
Dan Schiff	BA, Geography, 2002	GIS, geospatial database design and management	17 years	GIS Support
Rebecca Sloan	MS, Environmental Studies, 2006 BS, Marine Science, 1995	Terrestrial and aquatic systems, conservation planning	17 years	Terrestrial
Tina Sorvari	MS, Environmental Studies, 2006 BS, Marine Science, 1995	Terrestrial and aquatic systems, conservation planning	20 years	Hazards, Hazardous Materials and Wildfire
Tom Stewart	PhD, Geography, 1988 MS, Geography, 1981 BA, Geography, 1974	Energy and hydroelectric development, watershed analysis	45 years	Minerals
Darrin Trageser	MS, Atmospheric Sciences, 2014 BS, Atmospheric Sciences, 2009	Air quality, greenhouse gas analysis	7 years	Air Quality and Greenhouse Gases

Name	Education	Expertise	Experience	Project Role
Shilpa Trisal	MCP, Community Planning, 2002 BPlan, 2000	Land use and planning, demographics, community impact analysis	19 years	Environmental Justice
Danika Tsao	MS, Ecology, 2007 BS, Wildlife, Fish and Conservation Biology, 2000	Avian surveys, wildlife surveys, habitat assessments, special-status species surveys	22 years	Terrestrial
Sophie Unger	Ph.D., Aquatic Ecology and Fisheries	Fisheries biology	45 years	Fisheries and Aquatic Resources
Ellen Unsworth	MS, Interdisciplinary Studies (geology, biology, and technical communication), 1997 BA, Geology, 1989	Geology,paleontology, technical writing,	22 years	Paleontological Resources
Stephen Unyi	BA, History, 1999	Publications and ADA compliance	17 years	Production Support
Jason Volk	BS, Mechanical Engineering, 2000	Noise modeling and analysis, air quality modeling and analysis	20 years	Noise
Kristy Weber	MA, Geography, 2017 BS, Atmospheric Science, 2014 BS, Aerospace Engineering, 2014	Air quality and climate change	5 years	Air Quality and Greenhouse Gases
Rick Wilder	BS. Biology Ph. D., Biology	Fisheries biology	17 years	Fisheries and Aquatic Resources
Sara Wilson	B.A. Classical Languages, 1994	Technical Editing, publishing	24 years	Technical Editor
Laura Yoon	MS Candidate, Environmental Management BA, Environmental Studies, 2009	Air quality impact studies, conformity analysis, dispersion modeling	12 years	Air Quality and Greenhouse Gases
Sally Zeff	M.U.P Univ. of Michigan	CEQA/NEPA, Land Use Planning	40 years	Land Use

B.1.2.2 RBI Consulting, Inc.

Name	Education	Expertise	Experience	Project Role
Paul Bedore	MS, Environmental Earth Systems Science, 2009 MS, Natural Resources and Environmental Sciences, 2007BS, Chemistry, 2005	Environmental fate and transport, water quality and water resources studies and impact assessments	15 years	Water Quality
Michelle Brown, PE	MS, Civil Engineering, 1996 BS, Civil Engineering, 1993	Water quality and water resources assessments related to CEQA compliance and NPDES permitting	25 years	Water Quality
Michael Bryan	PhD, Environmental Toxicology and Fisheries Biology, 1993 MS, Fisheries Biology, 1989 BS, Fisheries	Water quality, fisheries biology, aquatic toxicology research and CEQA/NEPA assessments	34 years	Water Quality
Ben Giudice	PhD, Environmental and Water Resources Engineering, 2012 MS, Environmental Engineering, 2007 BS, Civil Engineering, 2005	Water quality, environmental fate and transport, risk assessment, ecotoxicology	15 years	Water Quality
Cameron Irvine	MS, Ecotoxicology, 2003 BS, Biology, 1993	Water quality, ecotoxicology, pesticides and metals, fate and transport, ecological risk assessment	22 years	Water Quality
Dustin Lee	MS, Civil and Environmental Engineering, 2013 BS, Environmental Engineering, 2017	Water quality and water resources assessments related to CEQA compliance and NPDES permitting	3 years	Water Quality
Cyle Moon	MS, Engineering Science, Civil concentration, 2013 BS, Environmental Engineering, 2012	Water quality and water resources assessments related to CEQA compliance and NPDES permitting	8 years	Water Quality
Ellen Preece	PhD, Environmental and Natural Resource Sciences, 2015 MS, Natural Resource Science, 2010 BS, Environmental and Resource Economics, 2002	Water quality, harmful algal blooms, human health risk assessment, CEQA/NEPA assessments	15 years	Water Quality

B.1.2.3 ESA

Name	Education	Expertise	Experience	Project Role
Brad Allen	BA, Geography, 1997	Geospatial analysis and cartography	25 years	Geospatial Analysis and Cartography, Compensatory Mitigation Plan
Ann Borgonovo	BS, Civil Engineering, 1988	Engineering design	33 years	Compensatory Mitigation Plan
Dave D. Davis, AICP	MS, Geography, 1998 BS, Geography, 1986	Visual impact assessment	33 years	Visual Impact Assessment
Melissa Denena	MS, Wildlife Ecology, 2002 BA, Biology, 1999	Mitigation planning/implementation	20 years	Compensatory Mitigation Plan
Emily Dorrance	BS, Environmental Policy Analysis and Planning, 2017	Environmental planning and wildlife ecology	4 years	Compensatory Mitigation Plan
Erich Fischer	BA, Biological Sciences, 1998	Regulatory permitting, compliance, mitigation	31 years	Principal in Charge
Chris Fitzer	MS, Environmental Planning, 2002	Fisheries & aquatic ecology	26 years	North Delta Diversion Fisheries Field Studies and Adaptive Management Plan
Daniel Huang	BS, Aquatic Biology, 2007 MESM, Environmental Science and Management, 2011	Natural resources management, aquatic, and terrestrial wildlife biology	10 years	Agricultural Resources Analysis
Isaac Swanson	MLA, University of California, Berkeley BS, City and Regional Planning, Urban Design Specialization	Landscape architect, wetland design	8 years	Compensatory Mitigation Plan
Ramona Swenson	BA, Biology, 1986 Ph.D. Integrative Biology, 1995	Fish biology, ecological restoration, wetlands	26 years	Compensatory Mitigation Plan
Gregory Weissmann	BS, Civil Engineering, 2012 MS, Engineering Science, 2012	Engineering design	8 years	Compensatory Mitigation Plan

B.1.2.4 Fehr & Peers

Name	Education	Expertise	Experience	Project Role
Joe Anderson, EIT	BS, Civil Engineering, 2008	Traffic signal design, lighting design	6 years	Transportation
Gloria Brill		Contract administration, project coordination	23 years	Transportation
Carrie Carsell	BA, Geography and Environmental Studies, 2003	GIS, GPS, graphic design, cartography	11 years	Transportation
David Carter	MCRP, City and Regional Planning, 2008 BS, International Affairs, 2003	Transportation planning, environmental impact studies	6 years	Transportation
Fred Choa	MS, Civil Engineering, 1995 BS, Civil Engineering, 1992	Caltrans, CEQA, Transportation planning	20 years	Transportation
Daleingrid Domingo	BS, Civil Engineering, 2011	Transportation planning	4 years	Transportation
Robert Hananouchi	BS, City and Regional Planning, 2009	Traffic operations and impact analysis	2 years	Transportation
Ronald Milam	BS, Environmental Policy Analysis and Planning	Travel demand modeling, traffic operations analysis, transportation impact studies	20 years	Transportation
David Robinson, PE	BS, Civil Engineering	Traffic operations, travel demand analysis, environmental analysis	19 years	Transportation
Steven Rhyne		GIS, visual communications	23 years	Transportation
Kyle Shipley	BS, Landscape Architecture, 2010	GIS, Data visualization	5 years	Transportation
Amy Smith	MA, Geography and Regional Studies, 2009 BA, Geography and Regional Studies, 2006	GIS, visual communications	5 years	Transportation
JoLynn Souto	BS, Accounting, 1993	Administrative and accounting support	12 years	Transportation
Lindsay Soza		Accounting support	13 years	Transportation

B.1.2.5 Stantec

Name	Education	Expertise	Experience	Project Role
Andy Draper	PhD, Water Resources Engineering, 2001	System operation and modeling	37 years	System modeling and modeling appendix, consistency review
Gail Eaton	MS, Geochemistry, 1993	Combined technical and management expertise	21 years	Project Management
Thomas Fitzhugh	MS, GIS and Remote Sensing, 1999	System operation and modeling	25 years	System modeling and modeling appendix, consistency review for surface water and water supply chapters
Kirby Gilbert	MS, Water and Natural Resources Geography, Recreation Resources Minor, 1982	Recreation	32 years	Recreation chapter and analysis
Sarah Hamilton	MS, Civil Engineering, 2016	River temperature modeling	4 years	River temperature and egg mortality models
Puneet Khatavkar	PhD, Civil, Environmental and Sustainable Engineering, 2019	System operation, water resources modeling	4 years	Surface water, flood protection and water supply modeling, project management
Stephen Pang	MS, Marine Science, 2018	Fisheries ecology, resource management, water resources	4 years	Surface water and flood protection analysis
William Smith	BS, Forest Engineering, 1976	System operation, water quality, system power operation	42 years	System modeling post-processing, surface water, water supply, temperature, egg mortality, energy modeling and analysis
Yung-Hsin Sun	PhD, Civil and Environmental Engineering, 1994	System operation, water resource modeling, hydraulic modeling, flood management, water resources and water rights	34 years	Subconsultant contract manager, surface water, water supply, flood, energy, system modeling, hydraulic studies review
Heather Waldrop	BS, Environmental Studies, 1997	Water storage, conveyance, and permitting	21 years	Water supply and energy analysis

B.1.2.6 ERA Economics, LLC

Name	Education	Expertise	Experience	Project Role
Stephen Hatchett	PhD, Agricultural Economics, 1984 MA, Administration, 1980 BS, Forestry, 1977	Regulatory compliance, economics, water projects & transfers	35 years	Project manager, author
Harry Ferdon	MS, Agribusiness, 2016 BA, Economics-Mathematics, 2011	Regulatory compliance, economics, water projects & transfers	4 years	Analyst, author
Brooks Ronspies	MS, Agricultural Economics, 2019 BS, Natural Resource and Environmental Economics, 2017	Regulatory compliance, economics, water projects & transfers	3 years	Analyst

B.1.2.7 Woodard & Curran

Name	Education	Expertise	Experience	Project Role
Mesut Cayar	PhD, Civil & Environmental Engineering, 2008	Integrated surface water-groundwater modeling	13 years	GW modeling and review
Sercan Ceyhan	PhD, Civil & Environmental Engineering, 2016	Integrated surface water-groundwater modeling	4 years	Data preparation and GW modeling
Natalie Cochran	MS, Environmental Science, 2016	Water resources planning, funding, grants	5 years	Groundwater impacts
Andres Diaz	PhD, Civil & Environmental Engineering, 2019	Integrated surface water-groundwater modeling	2 years	Groundwater modeling and impact analysis
Leslie Dumas	MS, Civil & Environmental Engineering, 1986	Hydrogeology, water resources planning, environmental permitting	30 years	Groundwater impacts
Jennifer Kidson	MS, Environmental Science, Policy, and Management, 2016	Environmental science, water resources planning,	5 years	Groundwater impacts
David Liu	MS, Civil & Environmental Engineering, 2013	Data preparation	7 years	Data preparation and GW modeling
Saquib Najmus	PhD, Civil Engineering, 1990	Integrated surface water-groundwater modeling	31 years	Groundwater modeling and impact analysis
Reza Namvar	PhD, Civil & Environmental Engineering, 1993	Integrated surface water-groundwater modeling	29 years	Groundwater modeling and impact analysis
Frank Qian	MS, Civil & Environmental Engineering, 2014	Integrated surface water-groundwater modeling	7 years	Groundwater modeling and impact analysis
Josh Uecker	MS, Environmental Science, Policy, and Management, 2010	Environmental science, water resources planning,	11 years	Groundwater impacts
Jingnan Zhou	MS, Environmental Engineering, 2015	Integrated surface water-groundwater modeling	6 years	Data preparation and GW modeling

Appendix C
Description of the Proposed Project and Alternatives

The project description and alternatives described in this Appendix represent the Delta Conveyance Project proposed action and alternatives as provided by the California Department of Water Resources (the applicant). These alternatives are summarized and discussed in the context of NEPA in Chapter 2, *Project Description and Alternatives*; however, this appendix provides an enhanced level of detail for the reader as well as a complete picture of the applicant's project, including those portions outside of USACE jurisdiction, as described in the Delta Conveyance Project Draft Environmental Impact Report (California Department of Water Resources 2021).

The large-scale operation of the State Water Project (SWP), including the facilities proposed in this project, is outside USACE authority under Section 408, Section 404 of the Clean Water Act (CWA), and Section 10 of the Rivers and Harbors Act (RHA). Therefore, while the operations alternatives are included here in detail, the Draft EIS focuses only on those actions under USACE authority. Project operations are discussed briefly and qualitatively throughout the Draft Environmental Impact Statement (EIS) and readers should refer to the Delta Conveyance Project Draft EIR for a more in-depth analysis of project operations and associated effects on the environment.

Sections 3.1, *Introduction*, through 3.18, *Adaptive Management and Monitoring Program*, describes the alternatives development process and the alternatives which are evaluated in the EIS as provided by the applicant. Section 3.19, *Elements of the EIS Proposed Action Not Included in the EIR Project Description*, contains a list of all minimization measures proposed to avoid and minimize the effects of the project as well as a description of the draft compensatory mitigation actions that are anticipated to be implemented to compensate for the effects of the action. Section 3.20, *References Cited*, provides the references cited for this chapter. Mitigation Measures and Compensatory Mitigation are elements of the project for the purposes of the EIS; however, they are not included in the Delta Conveyance Plan Draft EIR Project Description. Descriptions of these measures can be found in Appendix C2, *Mitigation Measures*, and Appendix C3, *Compensatory Mitigation Approach*.

C.1 Delta Conveyance Project Draft EIR Description of Alternatives

The information in this Appendix is presented as provided by the California Department of Water Resources (the applicant) in the Delta Conveyance Project Draft Environmental Impact Report (Draft EIR) Chapter 3, *Description of the Proposed Project and Alternatives* and therefore is presented from the California Environmental Quality Act perspective. However, the U.S. Army Corps of Engineers relied on this information when preparing its Draft Environmental Impact Statement. All chapter references in this appendix are to those in the Draft EIR. Please refer to the Draft EIR for any information cross referenced. This information is summarized and included in Chapter 2, *Project Description and Alternatives*; however, this appendix provided an additional level of detail for readers.

Please note that the Draft EIR analyzes nine alternatives (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, 4c, and 5), the descriptions of which are included here for consistency with the information presented in the Draft EIR. However, the Draft EIS does not analyze Alternatives 2a, 2c, 4a, or 4c. The information provided in this Appendix on these alternatives helped inform the USACE decision to eliminate them from the Draft EIS analysis. Additional information on that process and reasons for elimination of alternatives is provided in Chapter 2.

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 Draft Environmental Impact Report* (Draft 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 Draft EIR.

For the Delta Conveyance Project (project), DWR is preparing a standalone Draft 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 Draft 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 Draft 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 Draft 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 Draft 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 Draft 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 Draft 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 Draft 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 channel margins and creating tidal wetland habitat for aquatic resources and special-status species on lands owned by DWR (I-5 Ponds 6, 7, and 8) or partners (Bouldin Island). Strategies in the CMP also include obtaining mitigation bank credits or establishing site protection instruments (such as a conservation easement) for mitigation sites. 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 compensatory mitigation. Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources*, describes the CMP in detail. The CMP is mitigation for impacts identified in the Draft EIR and not part of the project description, but is mentioned here because it is referenced in multiple 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 (CWF), described in Chapter 1 of this Draft 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 Draft 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 Draft 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 Draft EIR.

The project alternatives evaluated in this Draft 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 Draft 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 Draft 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 Draft 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 Draft 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 this Draft EIR. Identification of the Bethany Reservoir alignment as the proposed project for the Draft 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 Draft 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.

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

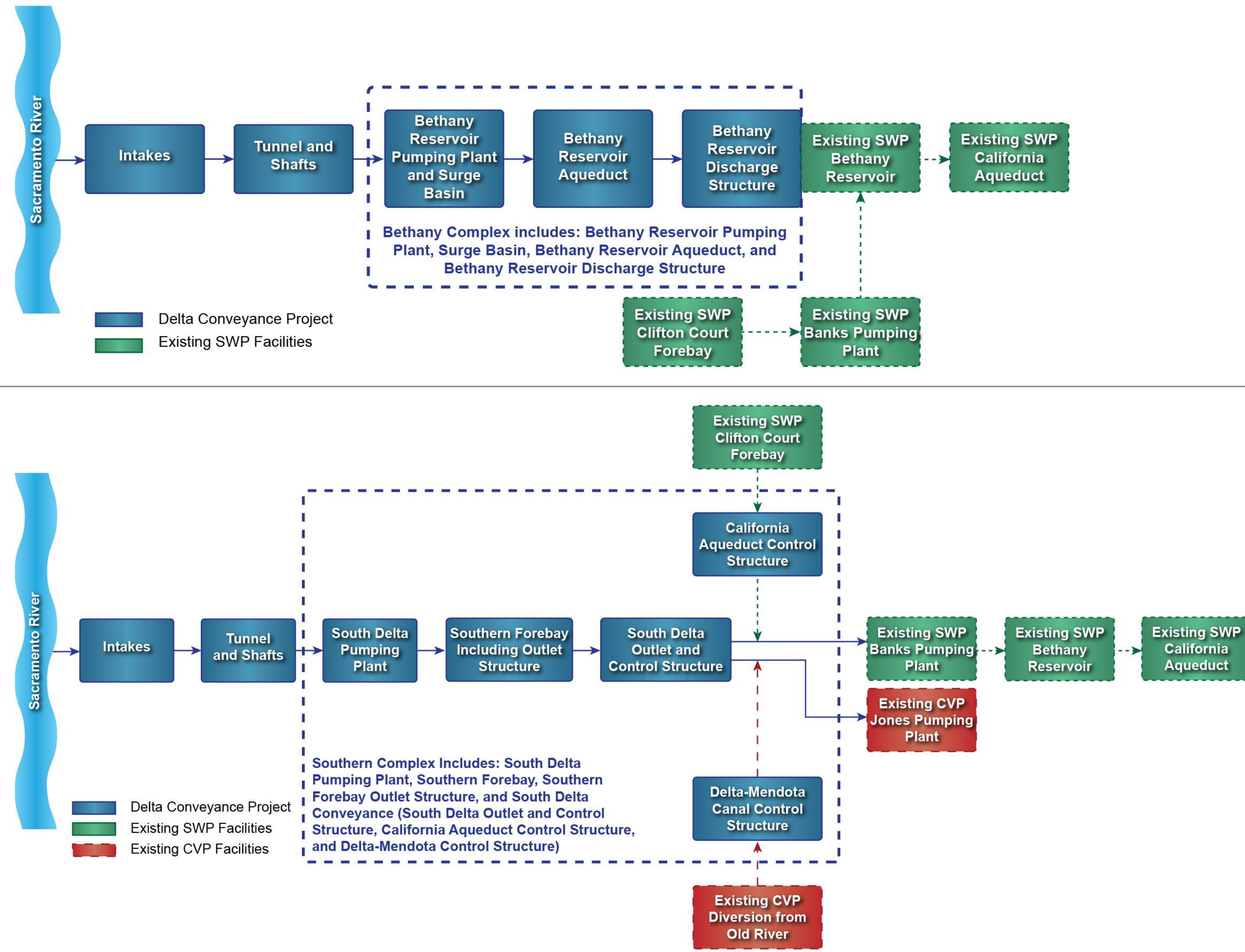

Figure 3-1. Schematic of Delta Conveyance Project Facilities for the Bethany Reservoir Alignment (top) and Central and Eastern Alignment Alternatives (bottom). CVP facilities would be used with central and eastern alignment Alternatives 2a and 4a only.

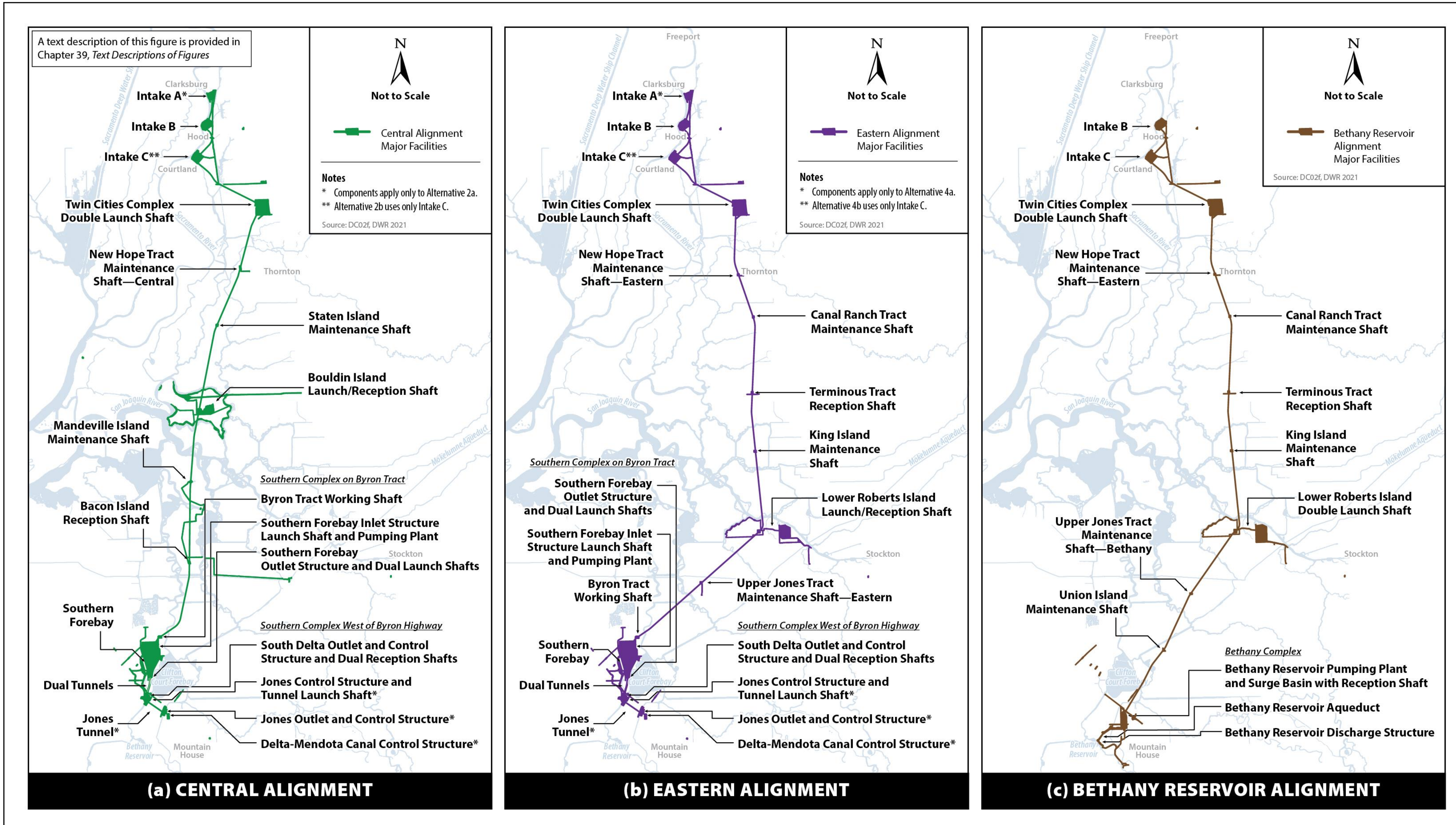

Figure 3-2. Alternative Alignments and Major Facilities

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 Draft EIR. The crosswalk in Table 3-1 provides a guide to the major terminology differences that may appear.

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 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 Interstate (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 RTM handling, which is described in Section 3.4.4, *Reusable Tunnel Material*.

1 **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	2 plants. 15 acres for construction; 14 acres post-construction.	2 plants. 15 acres for construction; 14 acres post-construction.	1 plant. 8 acres for construction; 7 acres post-construction.	2 plants. 15 acres for construction; 14 acres post-construction.	2 plants. 15 acres for construction; 14 acres post-construction.	2 plants. 15 acres for construction; 14 acres post-construction.	1 plant. 8 acres for construction; 7 acres post-construction.	2 plants. 15 acres for construction; 14 acres post-construction.	2 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	2 plants, approximately 11.5 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.	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.	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.	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.	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.	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.	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.	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	138 acres for construction; 63 acres postconstruction. Four pipelines, each 15-feet inside diameter, 15.2 feet outside diameter. 2.5 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	Hood-Franklin Park-and-Ride. Rio Vista Park-and-Ride. Charter Way Park-and-Ride. Byron Park-and-Ride. Bethany Park-and-Ride.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Hood-Franklin Park-and-Ride. Charter Way Park-and-Ride. Byron Park-and-Ride. Bethany Park-and-Ride.	Same as Alternative 3	Same as Alternative 3	Same as Alternative 3	Hood-Franklin Park-and-Ride Lot. Charter Way Park-and-Ride Lot.

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	2,808.84	3,048.60	2,477.10	2,679.74	2,336.38	2,699.45	1,974.41	2,206.10	1,313.75
Temporary Surface area	1,293.28	1,465.30	1,118.28	1,287.53	1,325.80	1,394.61	1,144.73	1,306.26	1,235.67

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 3I, *Intake Features and Road Improvements Summary Tables,* Table 3I-1 *Intakes Summary Table*.

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.

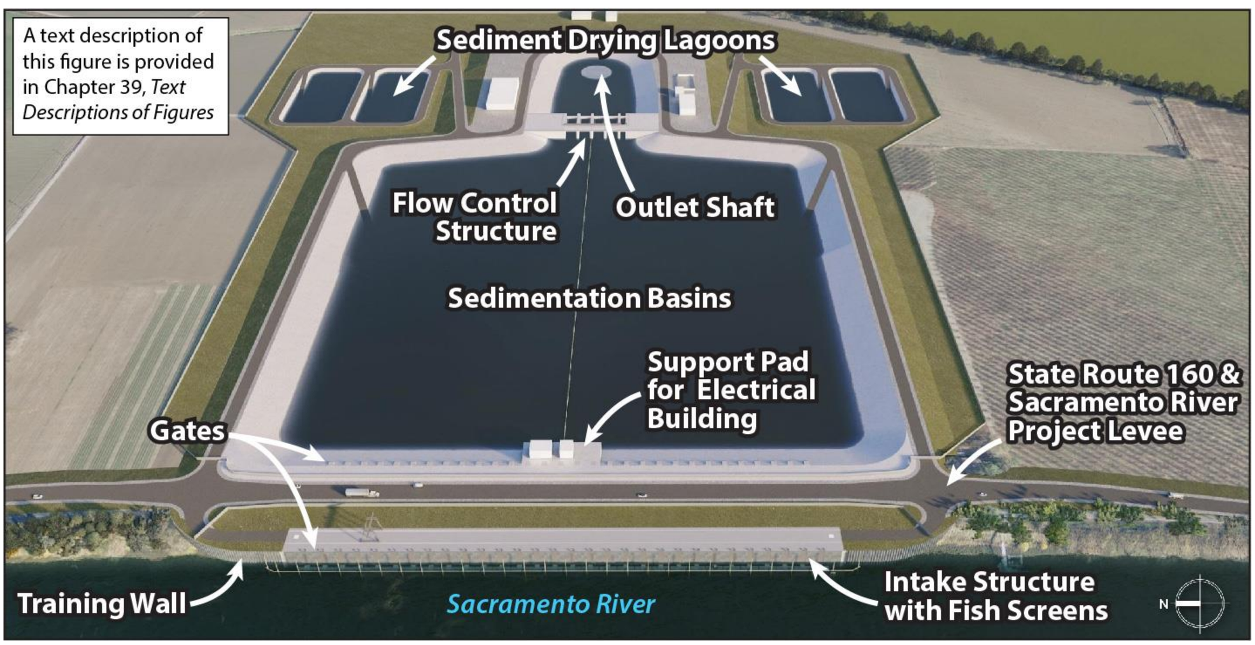

Figure 3-3. Typical Intake Configuration

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.

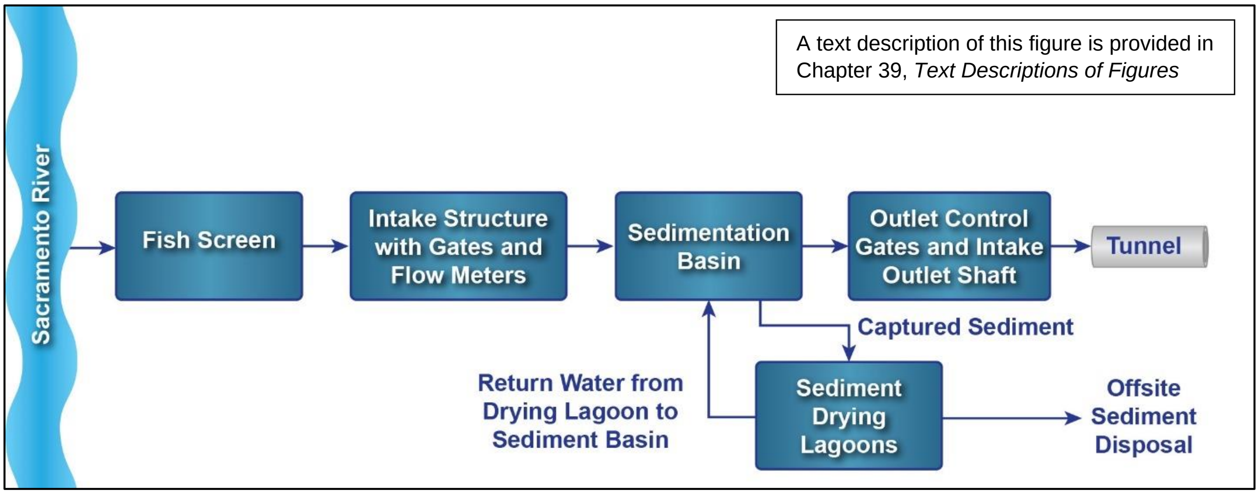

Figure 3-4. Schematic of Delta Conveyance Project Intake Facilities

Table 3I-1 in Appendix 3I 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).

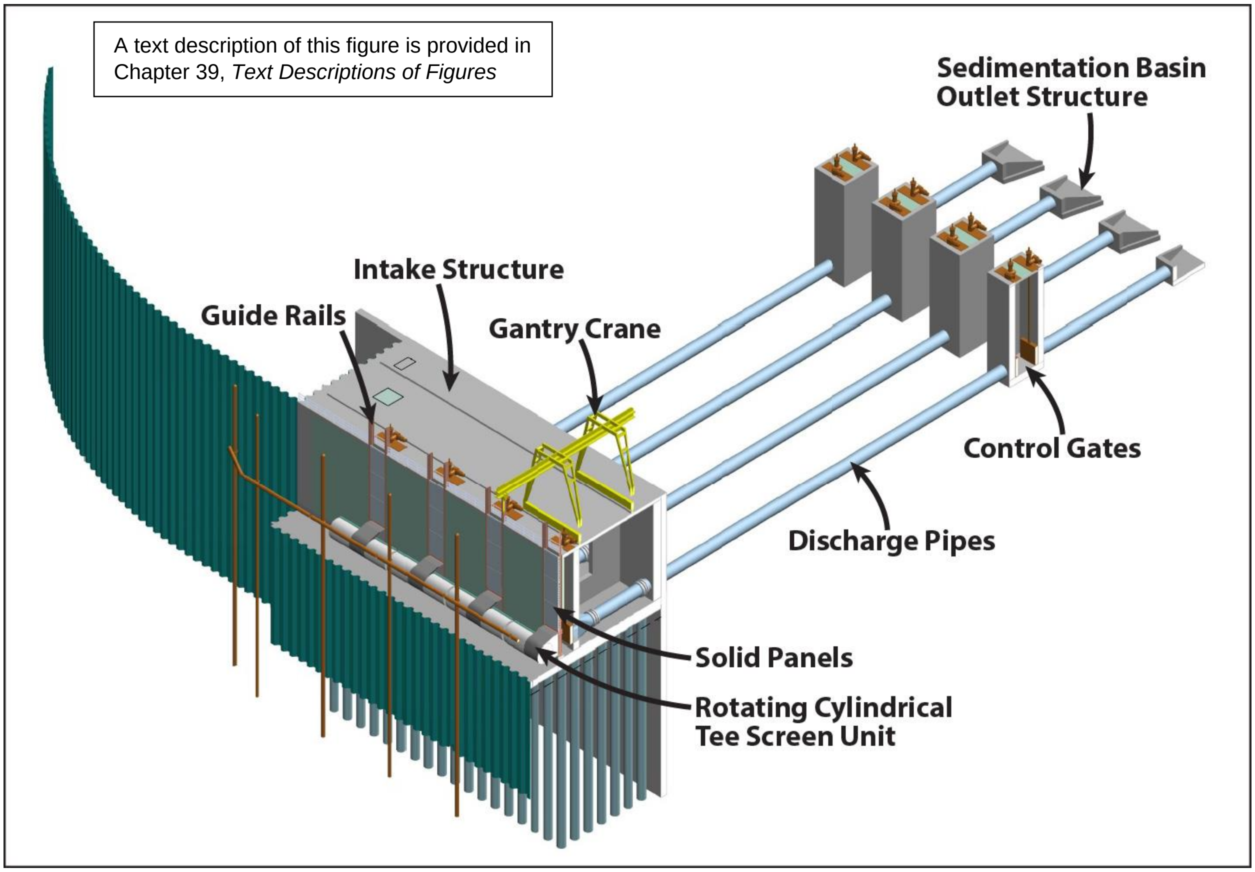

Figure 3-5. Cylindrical Tee Screen Facility

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 the 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 to the daytime hours between 7:00 a.m. and 7:00 p.m. and would not occur at night. 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. On average, each drying lagoon would fill about once every 4 to 8 days and contain up to about 1,800 cubic yards of sediment. 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 Draft EIR meets its standards of environmental documentation.

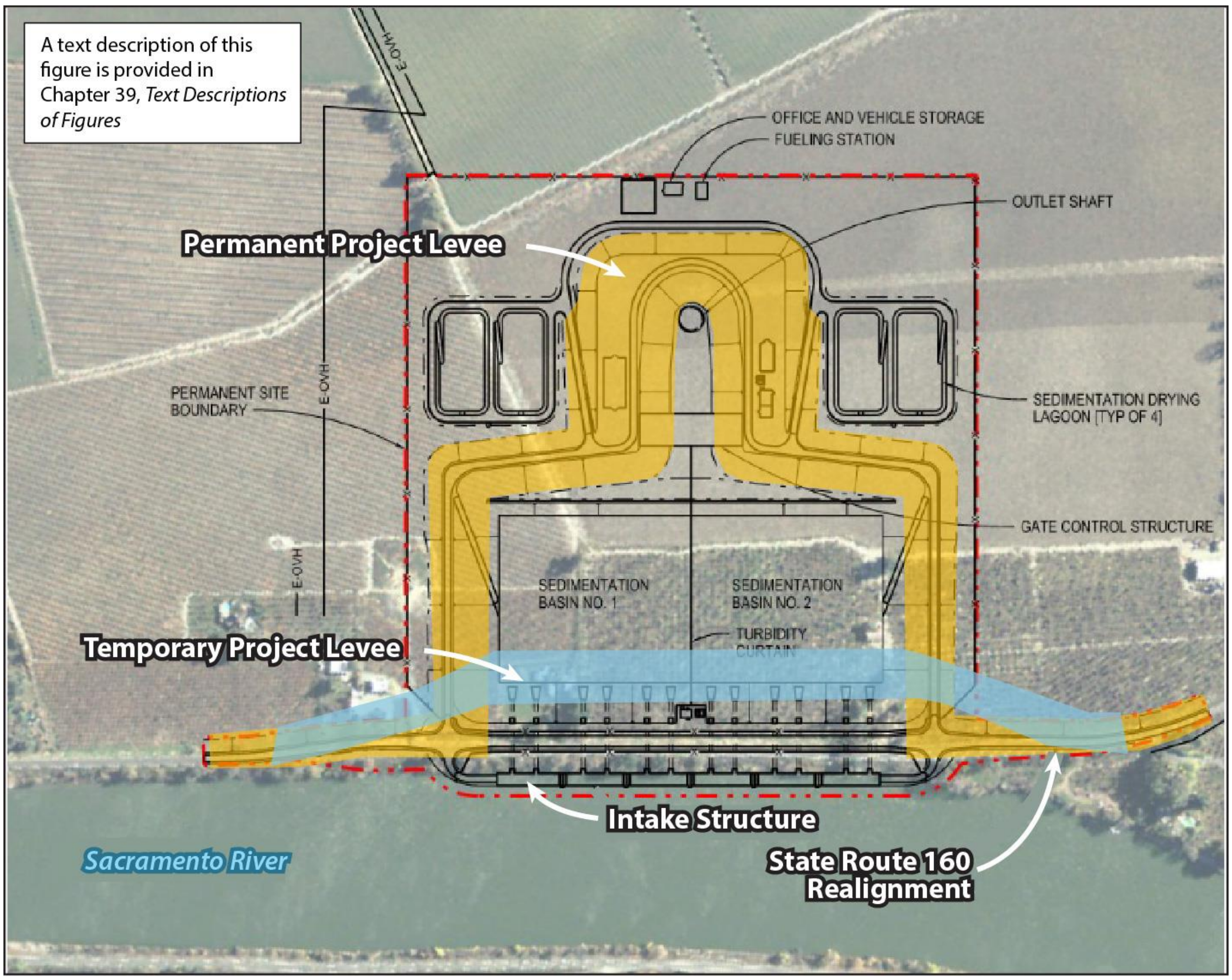

Figure 3-6. Schematic of Permanent and Temporary Levees

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 of this Draft EIR.

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,* and Section 3.11, *Alternative 4a.* 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, *Alternative 5*.

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.

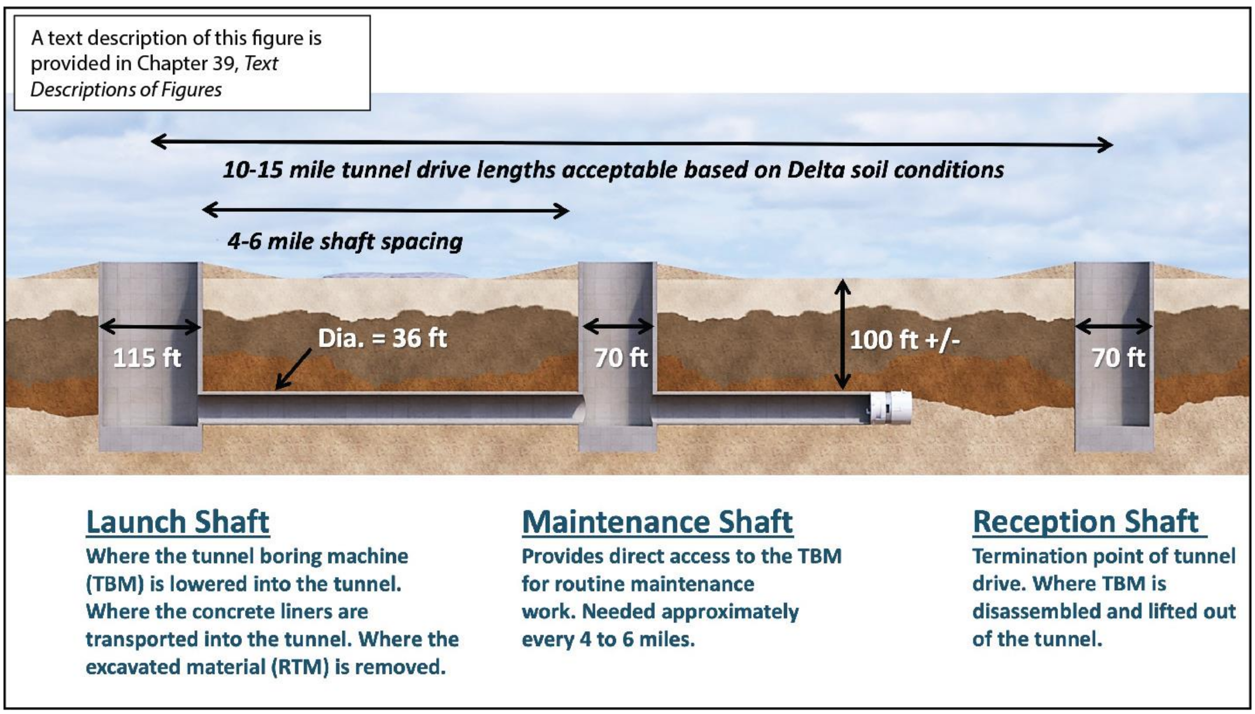

Figure 3-7. Key Components of a Tunnel Drive (6,000-cfs alternatives)

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 3I.

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 Section 3.6 through 3.16 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).

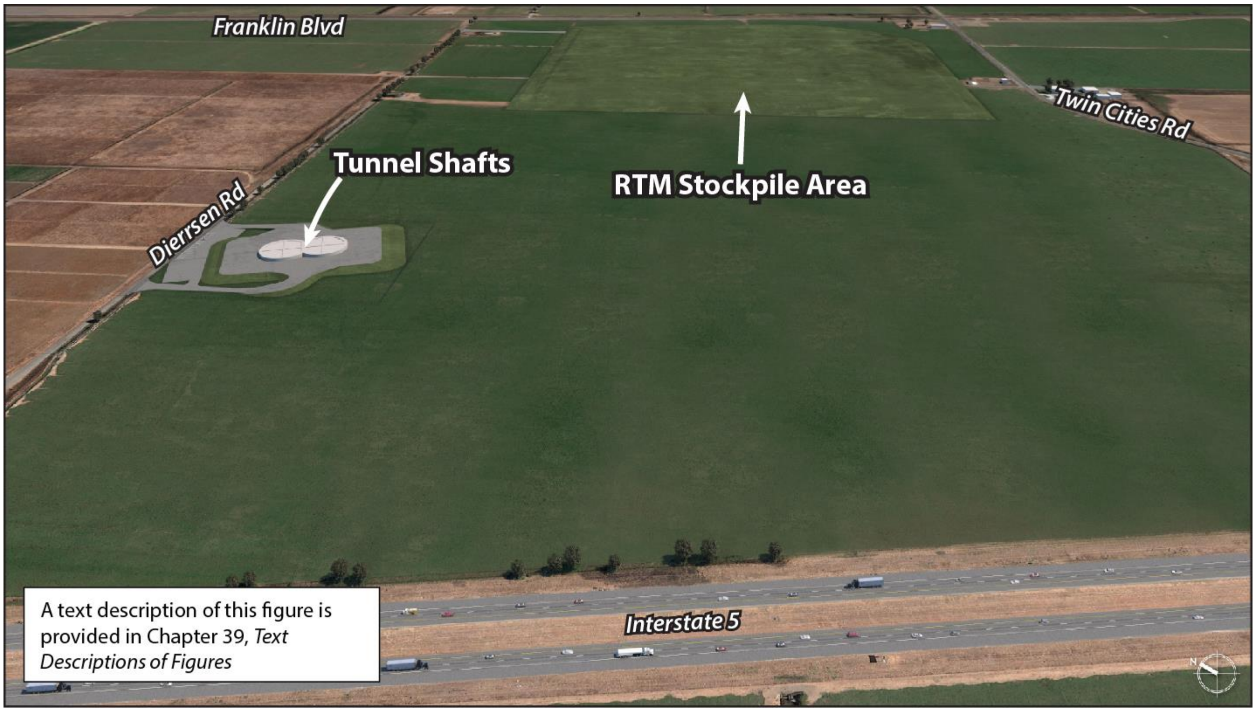

Figure 3-8. Twin Cities Double Launch Shaft Plan (permanent condition)

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.

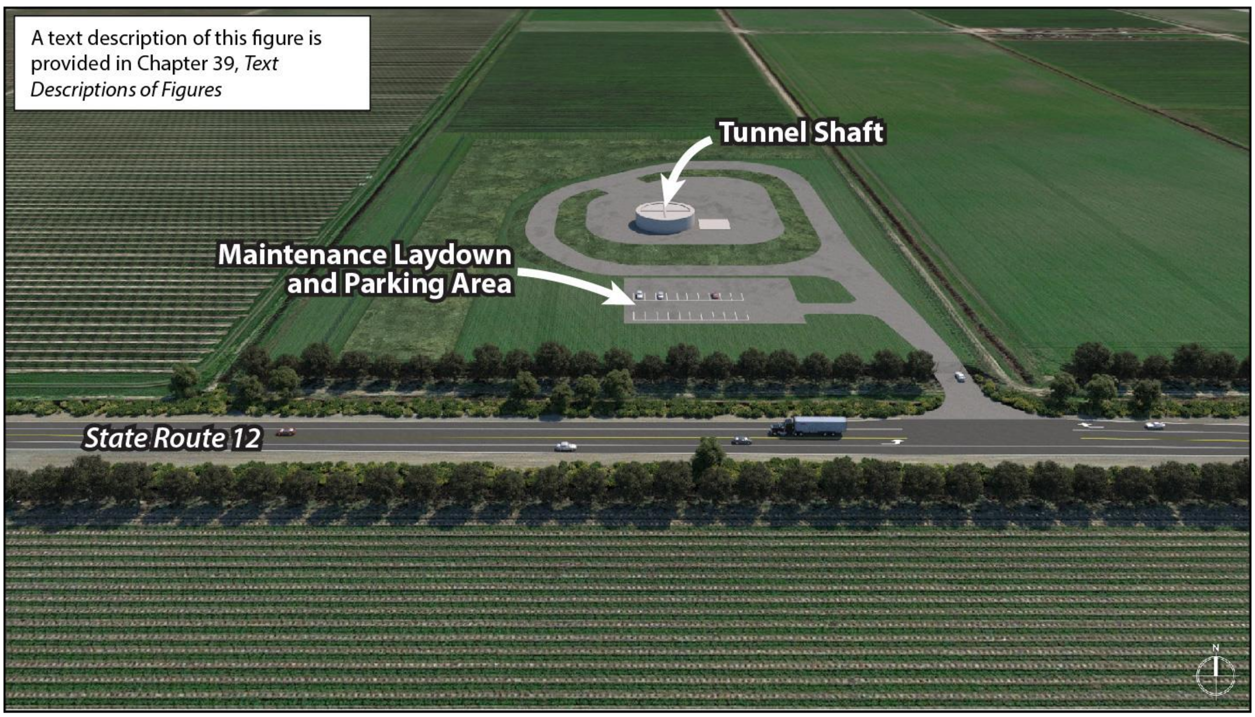

Figure 3-9. Typical Maintenance and Reception Shaft Site Postconstruction

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 would take place quarterly (mowing, weed maintenance) 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 less than 1% 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 Sections 3.6 through 3.13, 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.

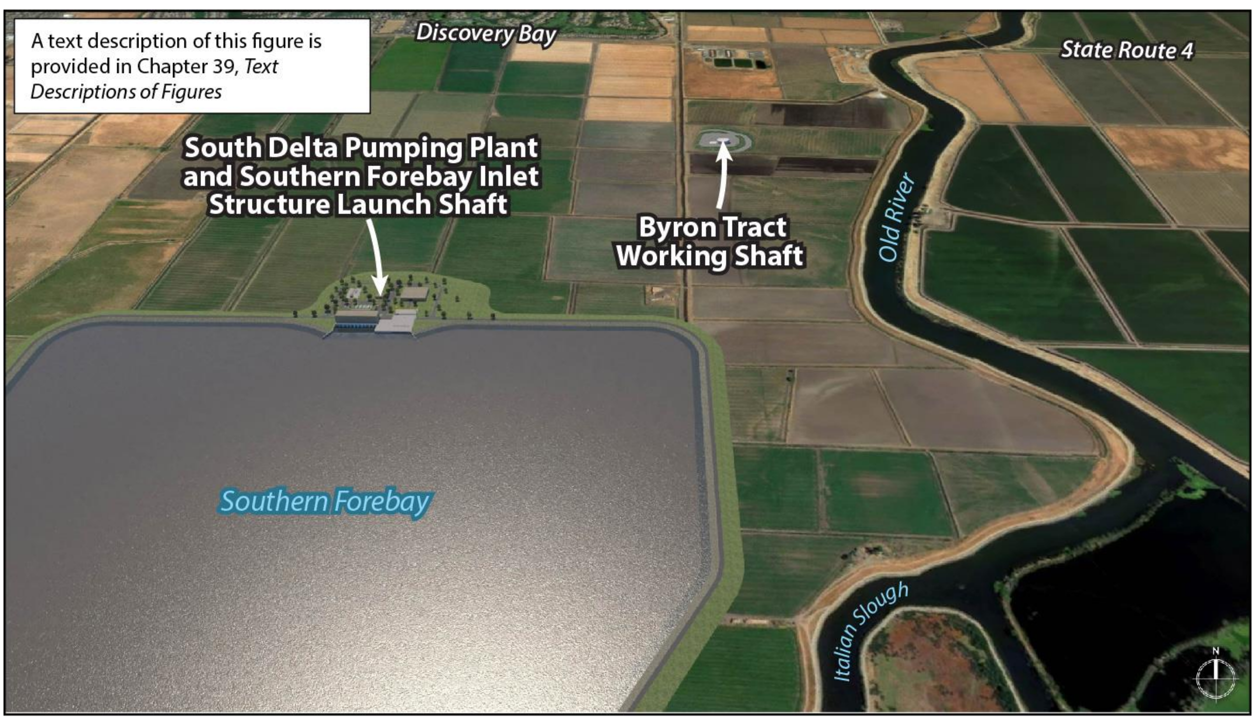

Figure 3-10. Southern Forebay Inlet Structure Launch Shaft and Byron Tract Working Shaft Site

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.

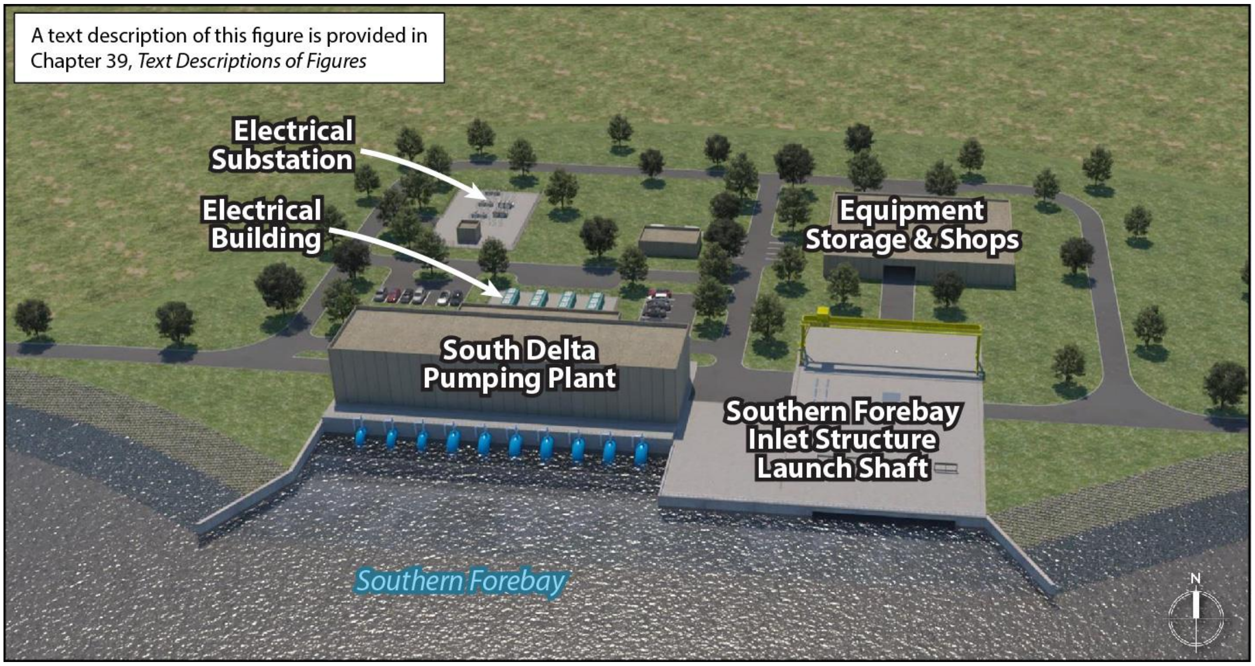

Figure 3-11. South Delta Pumping Plant Facilities

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 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.

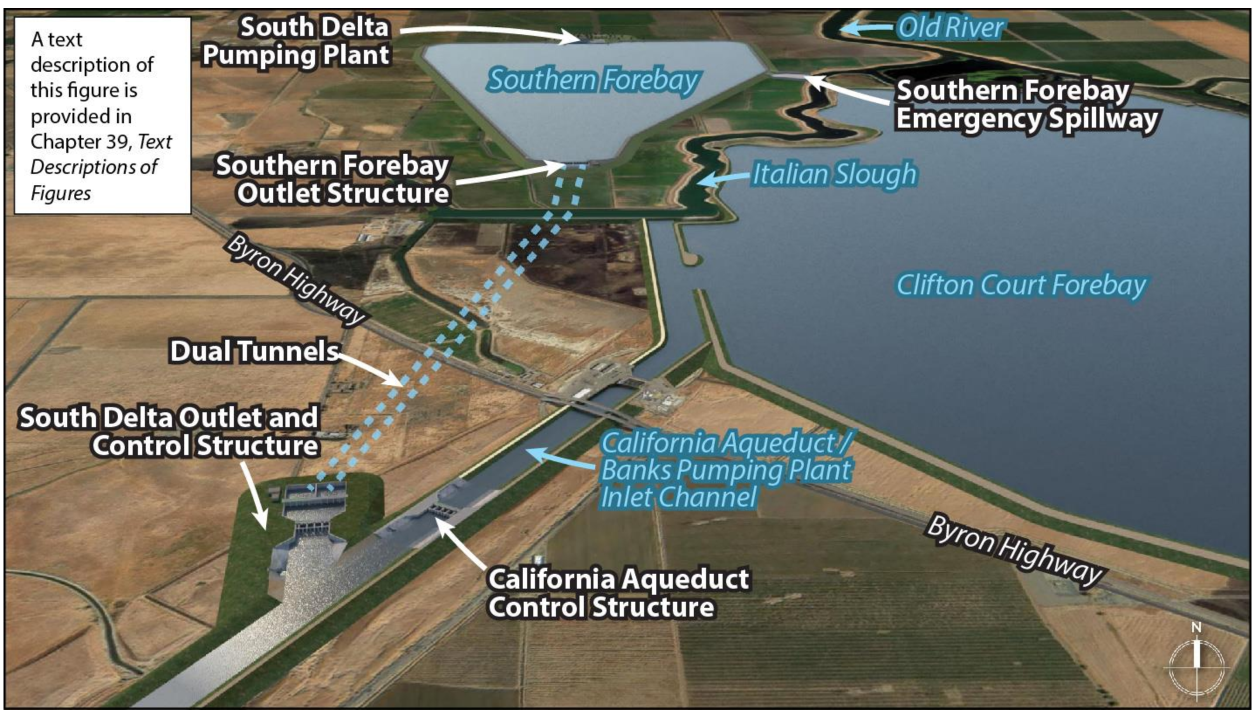

Figure 3-12. Southern Complex West of Byron Highway (Alternatives 1, 2b, 2c, 3, 4b, 4c)

The South Delta Conveyance Facilities would operate in one of three modes. In single mode from the Delta Conveyance Project, all flows to the SWP Banks Pumping Plant would come from the Southern Forebay only, with flows from Clifton Court Forebay stopped by gates at the California Aqueduct Control Structure.

In single mode from Clifton Court Forebay, all flows to SWP Banks Pumping Plant would come from Clifton Court Forebay, with Southern Forebay flows blocked by the gates at the South Delta Outlet and Control Structure.

In dual mode, flows would come from both the Southern Forebay and Clifton Court Forebay. Flows from Clifton Court Forebay would be regulated using gates at the California Aqueduct Control Structure and flows from the Southern Forebay would be regulated using gates at the South Delta Outlet and Control Structure.

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.

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

Under Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c, at the South Delta Outlet and Control Structure, each channel leading from the dual reception shafts would contain two sets of bulkhead gates for isolation of one or both tunnel flows. Double bulkheads would be used for worker safety during maintenance activities in the tunnel. Twenty stop logs would isolate the outlet tunnel for tunnel inspections and maintenance. Twelve stop logs would isolate the large radial gates for inspection and maintenance.

Under Alternatives 2a and 4a, the Jones Outlet and Control Structures would require sediment removal and cleaning. 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 3I, Tables 3I-2, 3I-3, and 3I-4.

Pavement conditions on existing county and local roads in the project area are predominantly classified as 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.

Road improvement activities would include widened and improved roads, new roads, and new or improved and widened 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. Modifications to existing roadways 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. Improvements to State Routes would be designed and constructed in collaboration with Caltrans. Project 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 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, based on the duration of work and expected commodities to be carried. Minimum requirements for truck routes are 12-foot-wide

[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).

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 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.

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.

The following assumptions for access roads to construction sites would be included in the design specifications for each key feature.

- No construction traffic would be allowed within Solano County except for I-80 and SR 12 in Solano County (between I-80 and Sacramento River) or for individuals traveling from homes or vehicles traveling from businesses in Solano County.
- No construction traffic would be allowed in Yolo County except for I-80 and for individuals traveling from homes or vehicles traveling from businesses in Yolo County.
- No construction traffic would be allowed on SR 160 between SR 12 and Cosumnes River Boulevard except for realignment of this highway at the intake locations or for individuals

traveling from homes or vehicles traveling from businesses in this portion of Sacramento County.

- No construction traffic, except the employee shuttle buses and small pickup trucks, would be allowed on Hood-Franklin Road. However, construction traffic would cross Hood-Franklin Road west of Snodgrass Slough bridge to access Intakes A and/or B, as applicable.
- No trucks with three or more axles would be allowed on SR 4 across Victoria Island.

Proposed transportation improvements are based on construction traffic analyses to reduce the daily effect of truck trips on local roadways; 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 so as to not affect overland drainage flows or groundwater seepage flows prior to construction and after construction.

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 for Alternative 3.

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 needed at 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 including gravel or aggregate base. Model results showed the volume of fill material produced on-site from excavation (including both RTM and surface soils), the volume needed on-site as structural fill, and 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 backfill of 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 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 EC-13 would achieve reductions in particulate matter and criteria pollutants.

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, depending on site-specific parameters, 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.

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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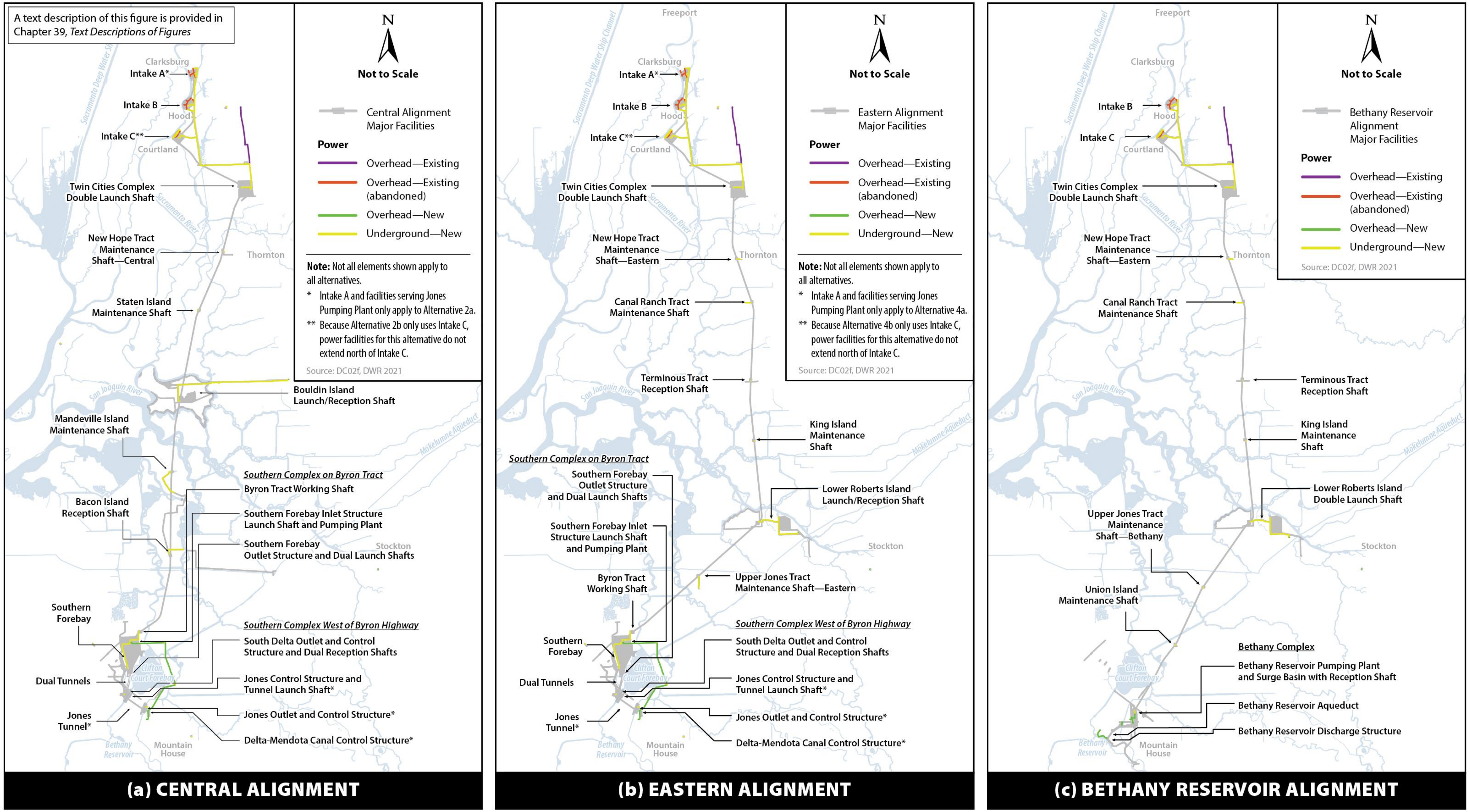

Figure 3-13. Power Lines

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. 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. 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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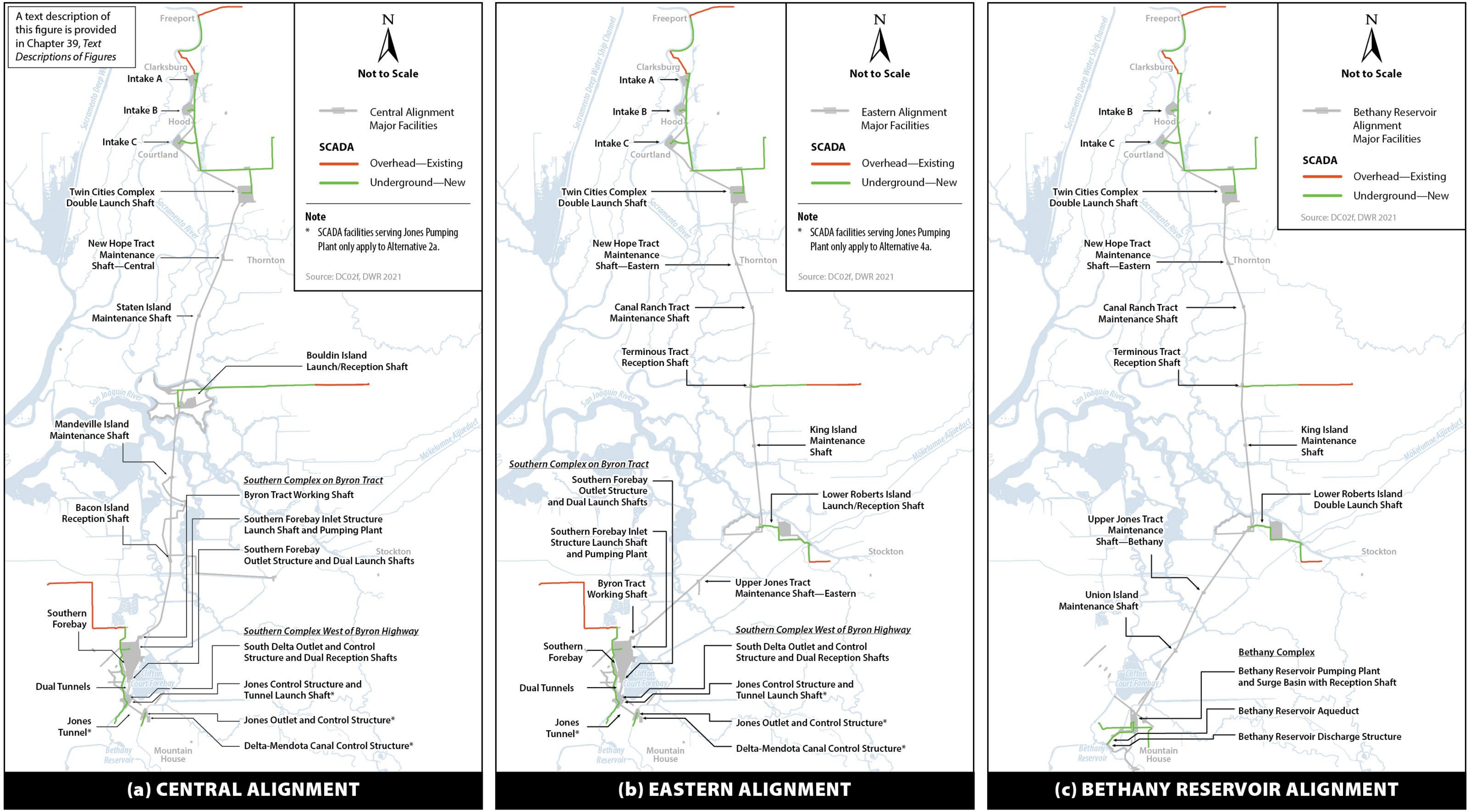

Figure 3-14. SCADA Fiber Routes

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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. After construction, park-and-rides and associated lighting would be removed. 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; the lots would be demolished at the end of construction. 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. 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 and equipped with electric vehicle charging stations. 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 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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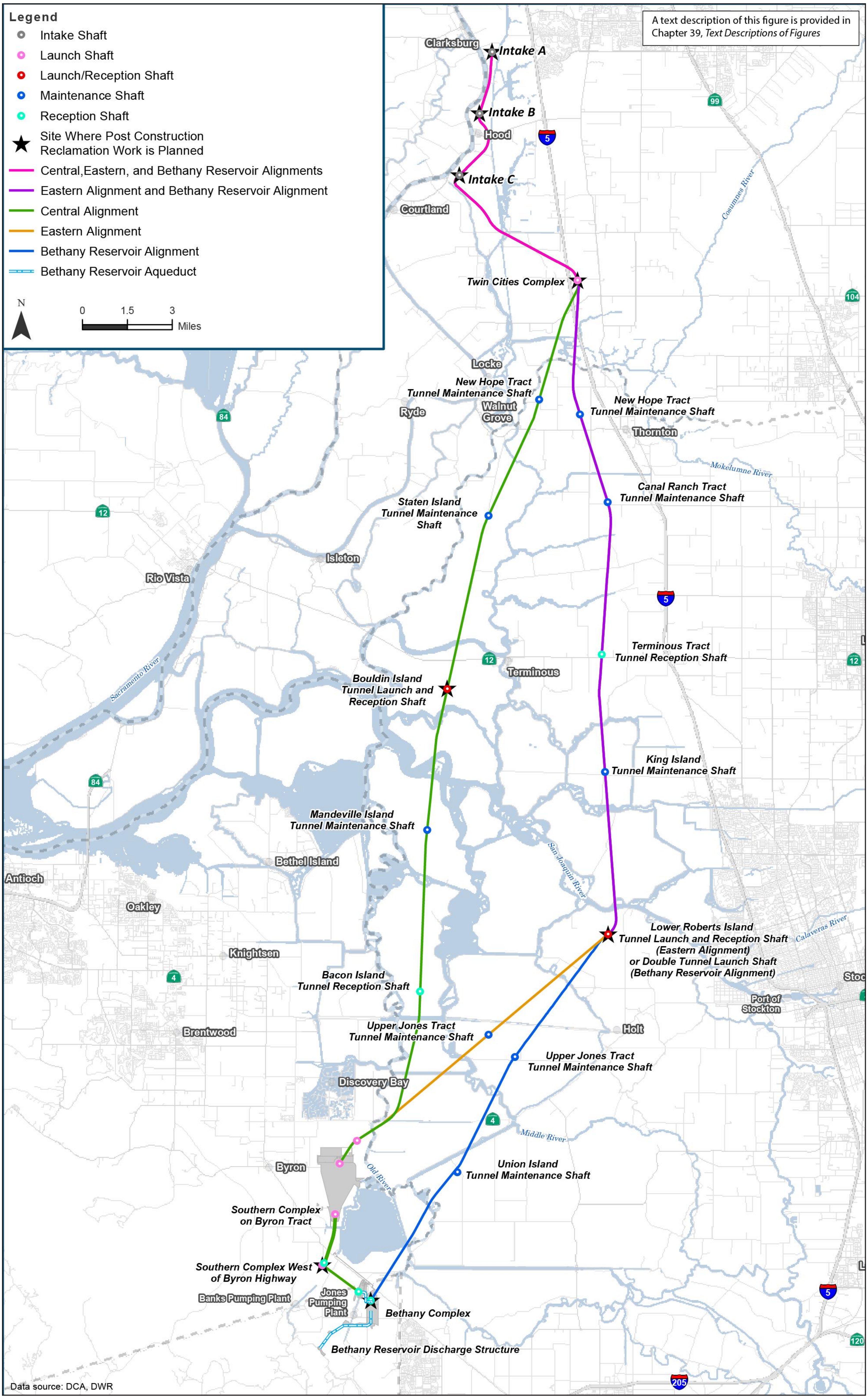

Figure 3-15. Land Reclamation Areas Overview

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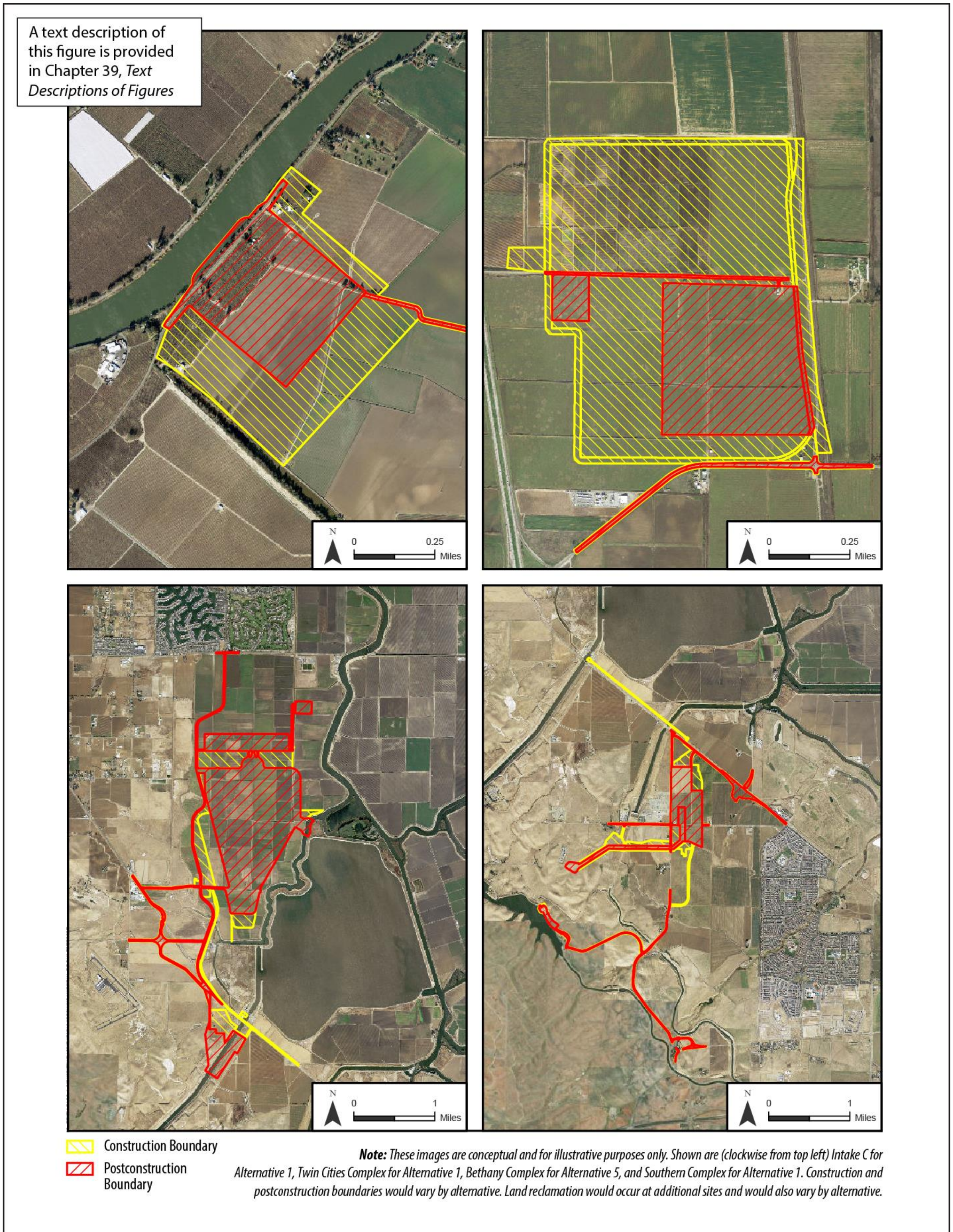

Figure 3-16. Potential Land Reclamation Areas

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 near the intersection 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 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. 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 used 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 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. 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.

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 Draft 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 Draft 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 Draft 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 Draft 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.

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.

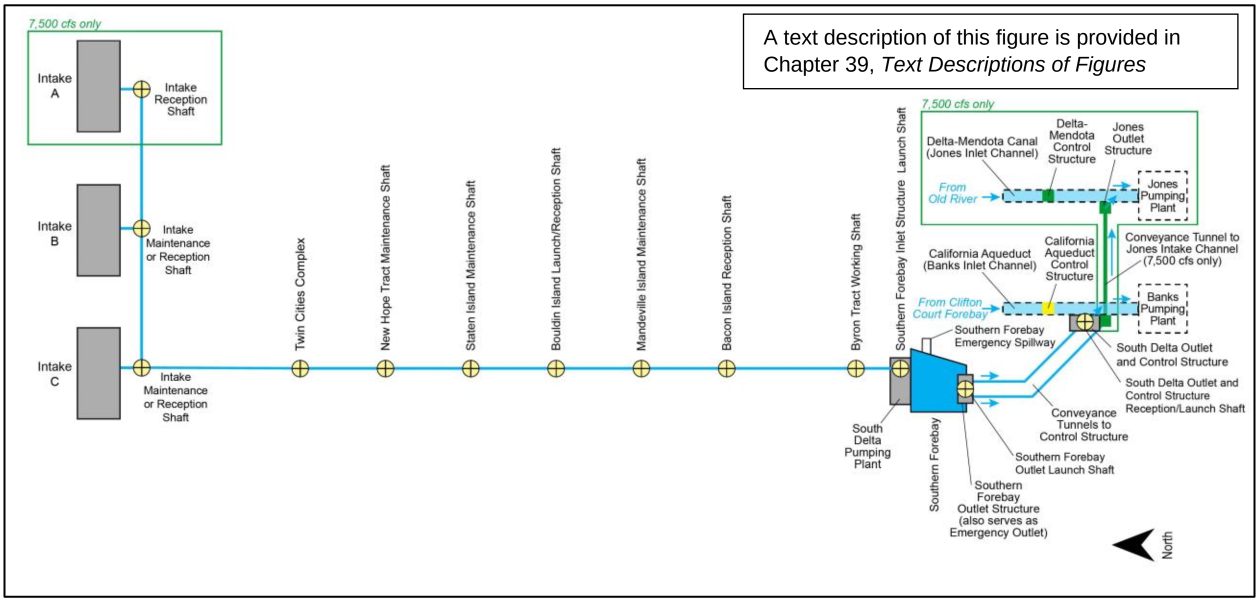

Figure 3-17. Project Schematic Central Alignment Alternatives

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 of 185 acres and 104 acres with stockpiles up to 6 feet high. It is not expected 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.

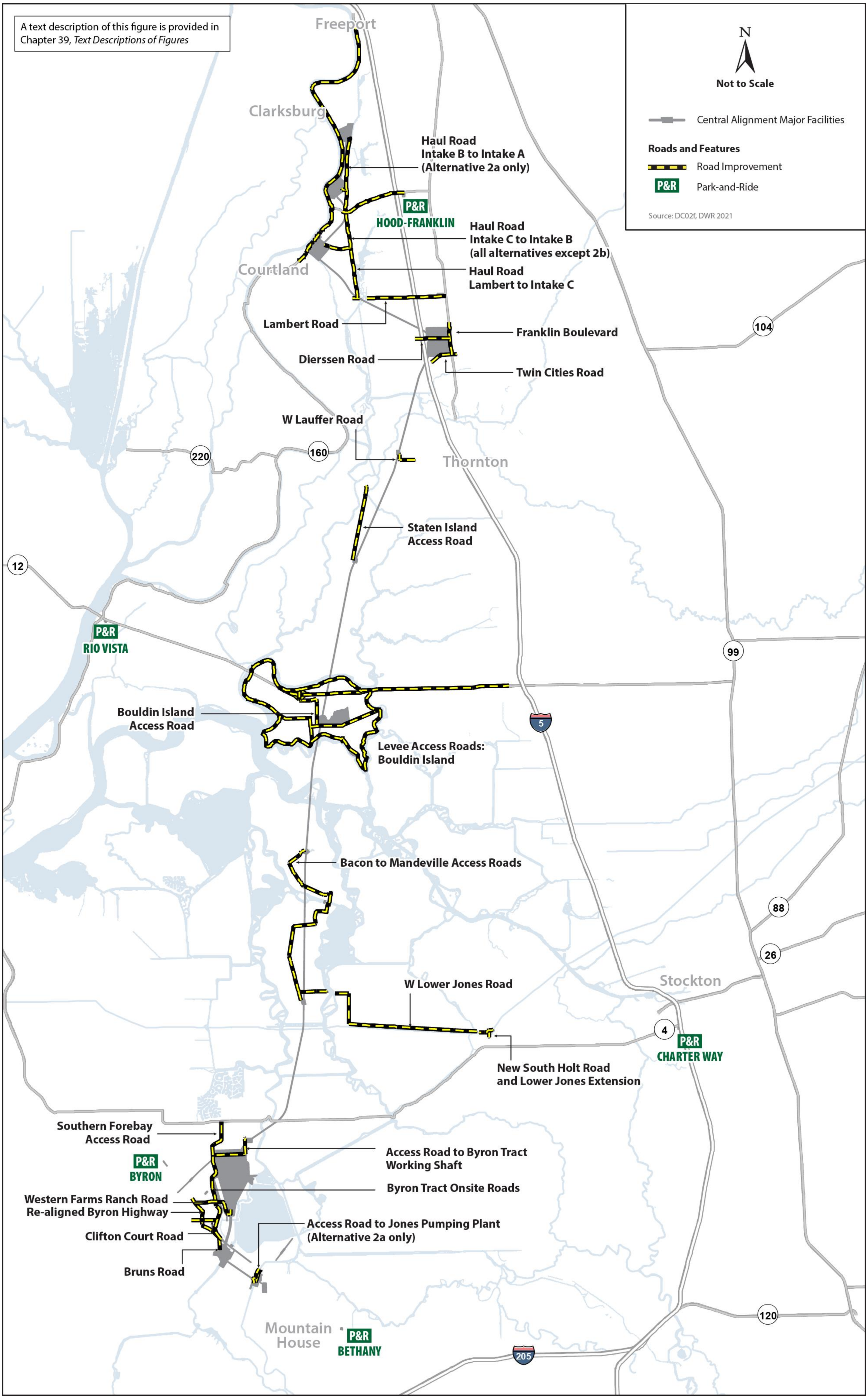

Figure 3-18. Road Modifications under Central Alignment Alternatives

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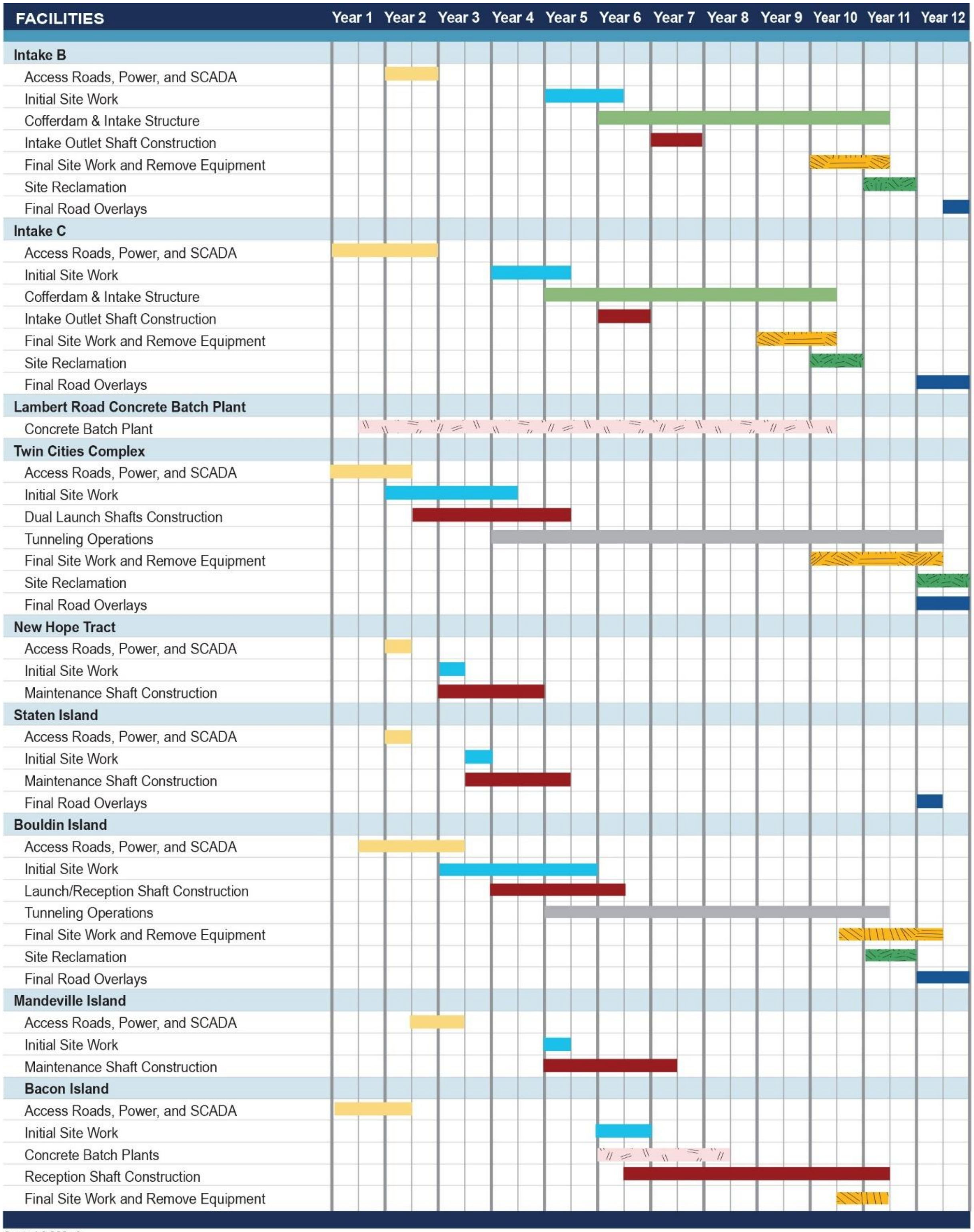
3.6.1 Construction Schedule

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.



Central 6,000 cfs

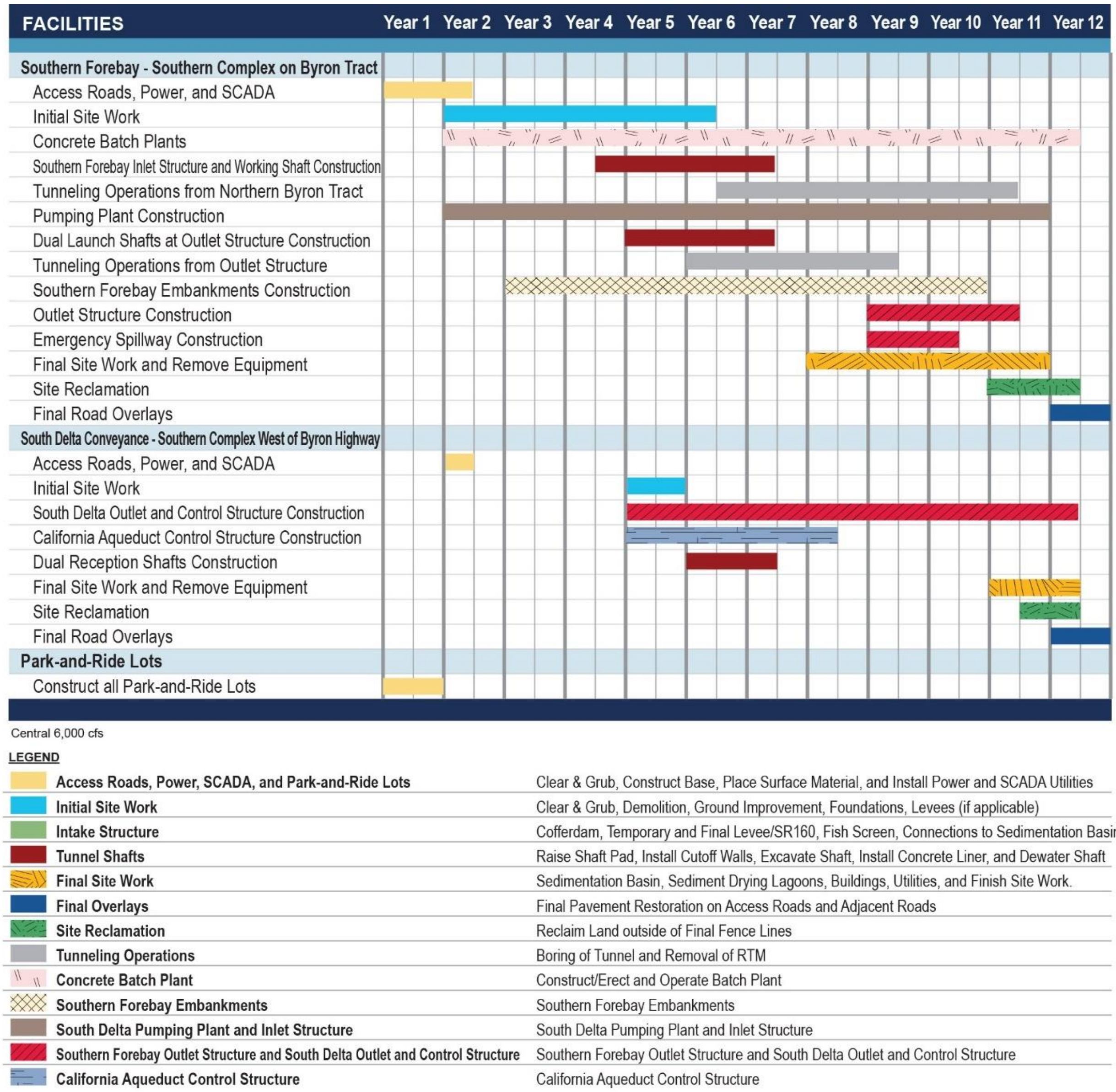


Figure 3-19. Alternative 1 Construction Schedule

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 of 193 acres and 96 acres with stockpiles up to 7 feet high. It is not expected 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*). 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. Assuming 25- and 40-foot permanent and temporary footprints, this 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.

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

Characteristic	Description [a]
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
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.

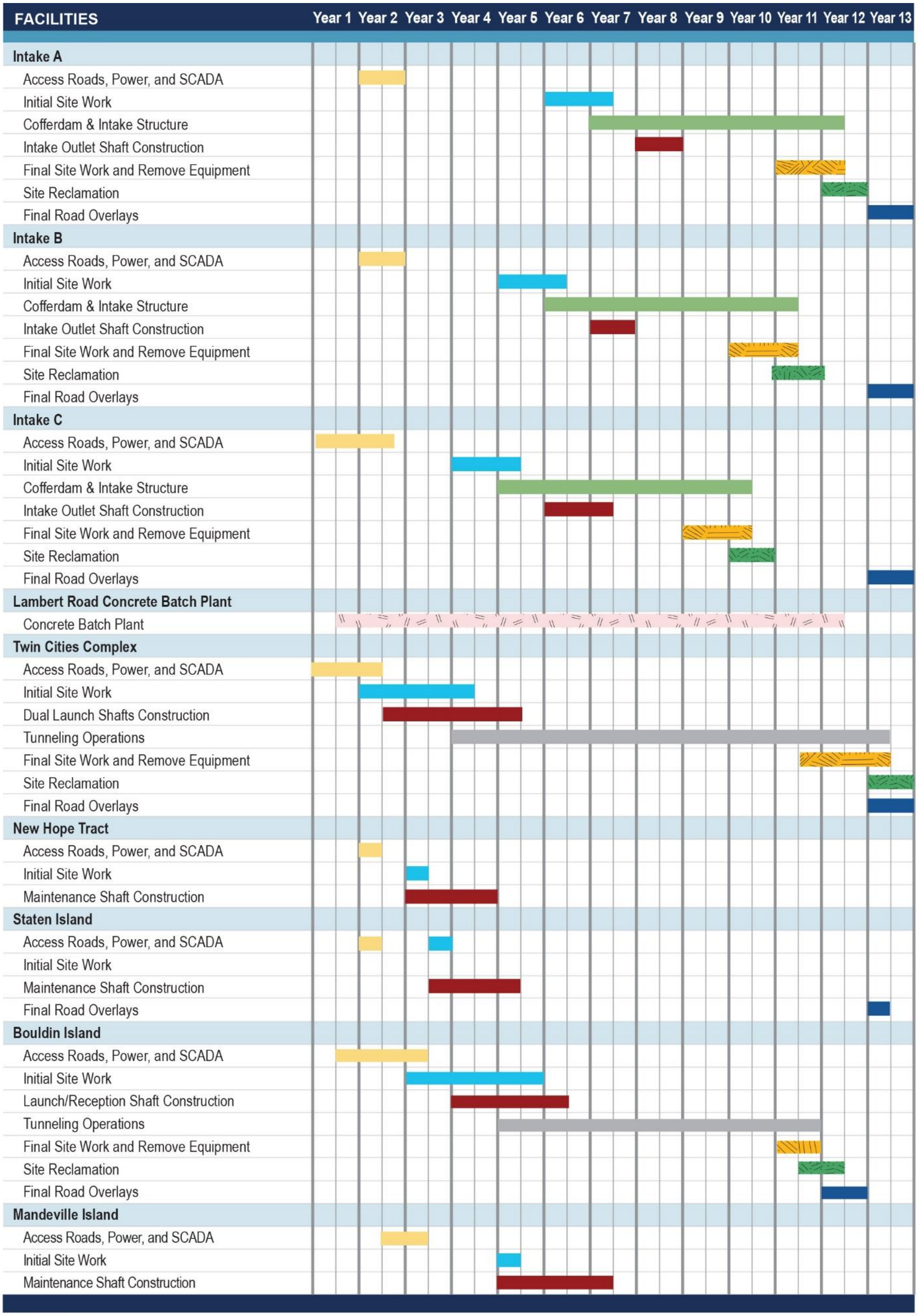
Figure 3-20 depicts these additional facilities.

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

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

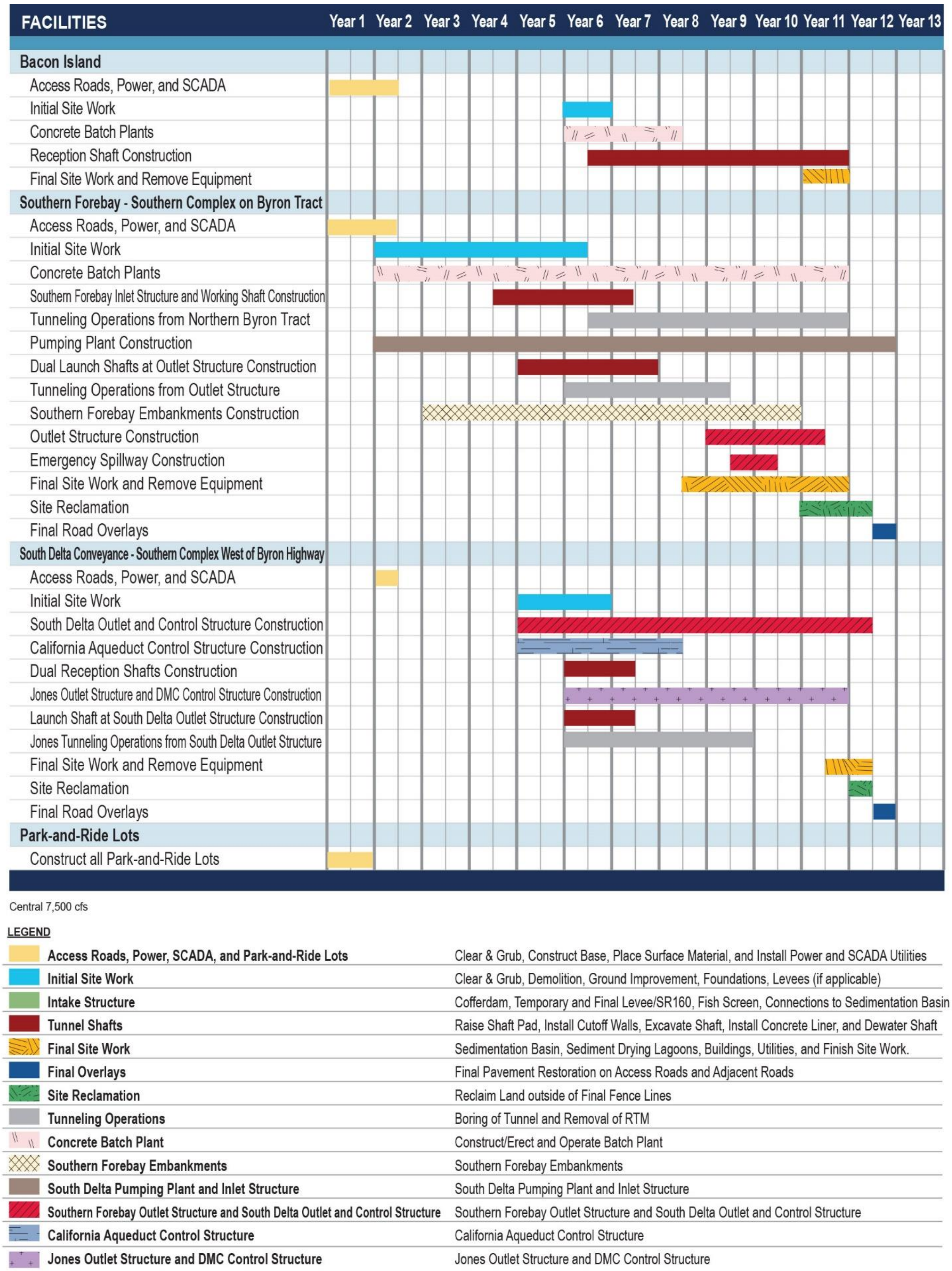


Figure 3-21. Alternative 2a Construction Schedule

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 of 140 acres and 159 acres with stockpiles up to 4 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.

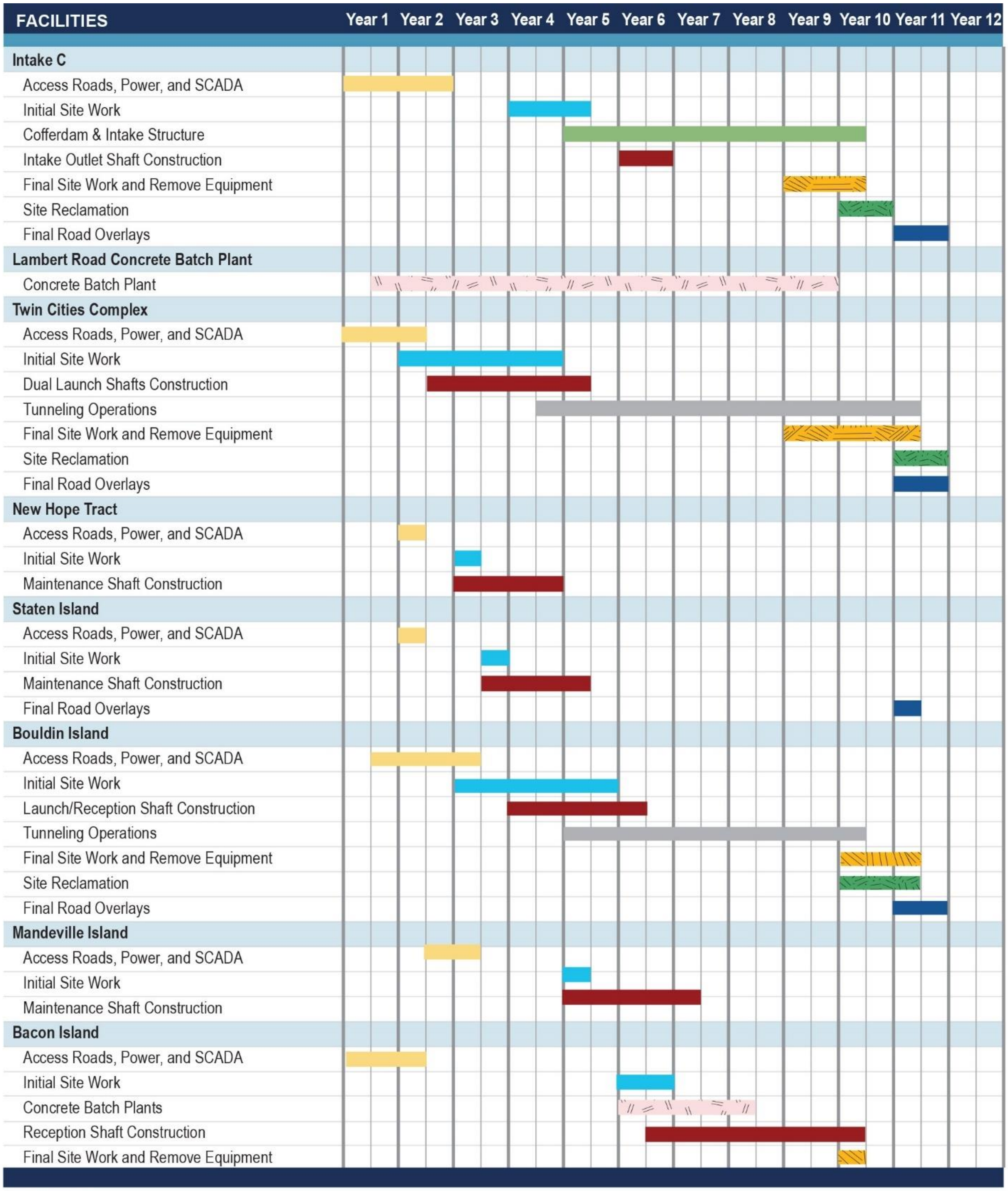
Locations of temporary and permanent electrical lines and substations would be the same as described in Section 3.4.10, *Electrical Facilities*, except that these facilities would not include power supplies to Intake B or a double-circuit, low-profile switching station at Intake C.

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

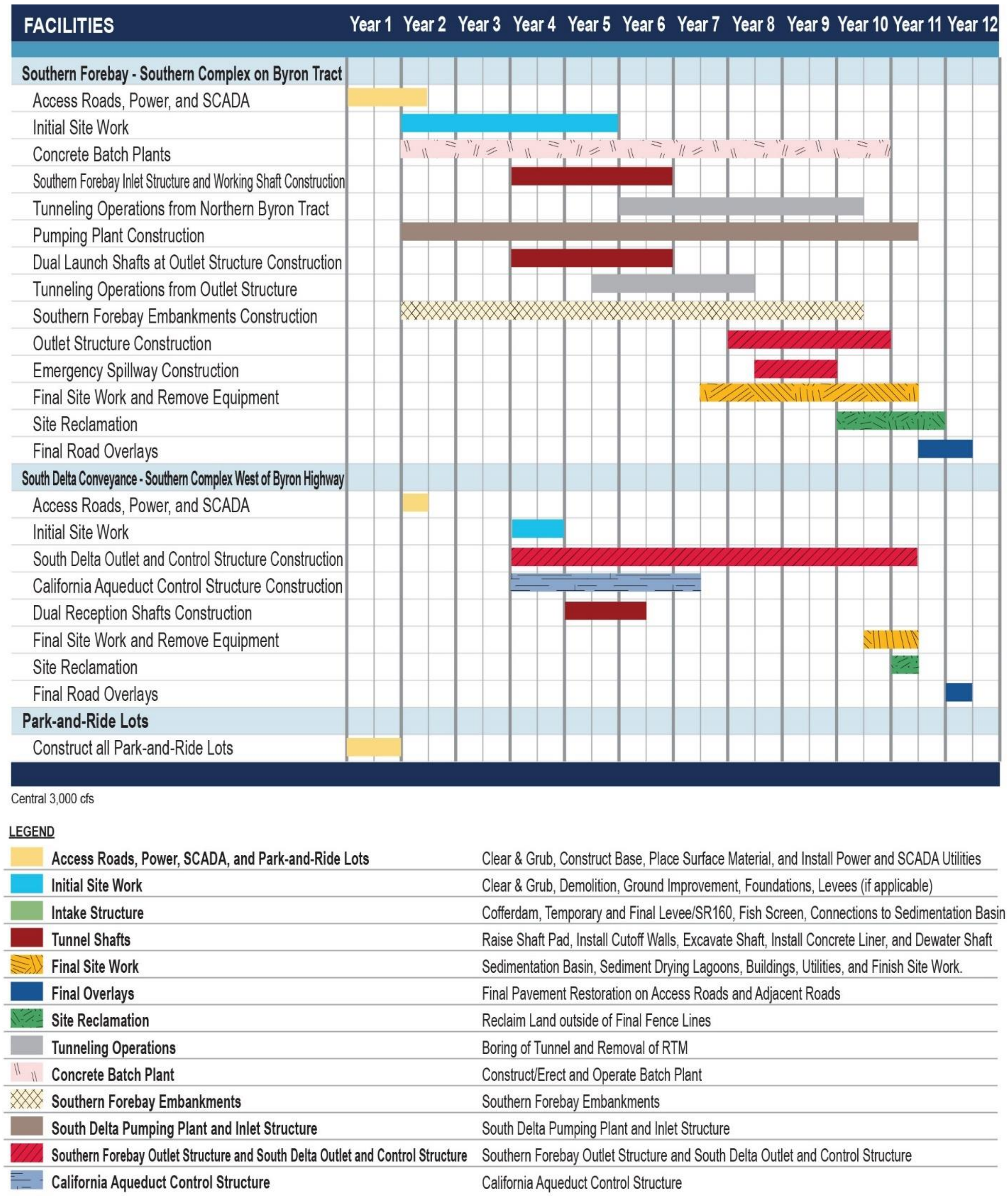


Figure 3-22. Alternative 2b Construction Schedule

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 of 165 acres and 125 acres with stockpiles up to 5 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

Characteristic	Description [a]
Reception and maintenance shafts diameter	63 feet inside
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

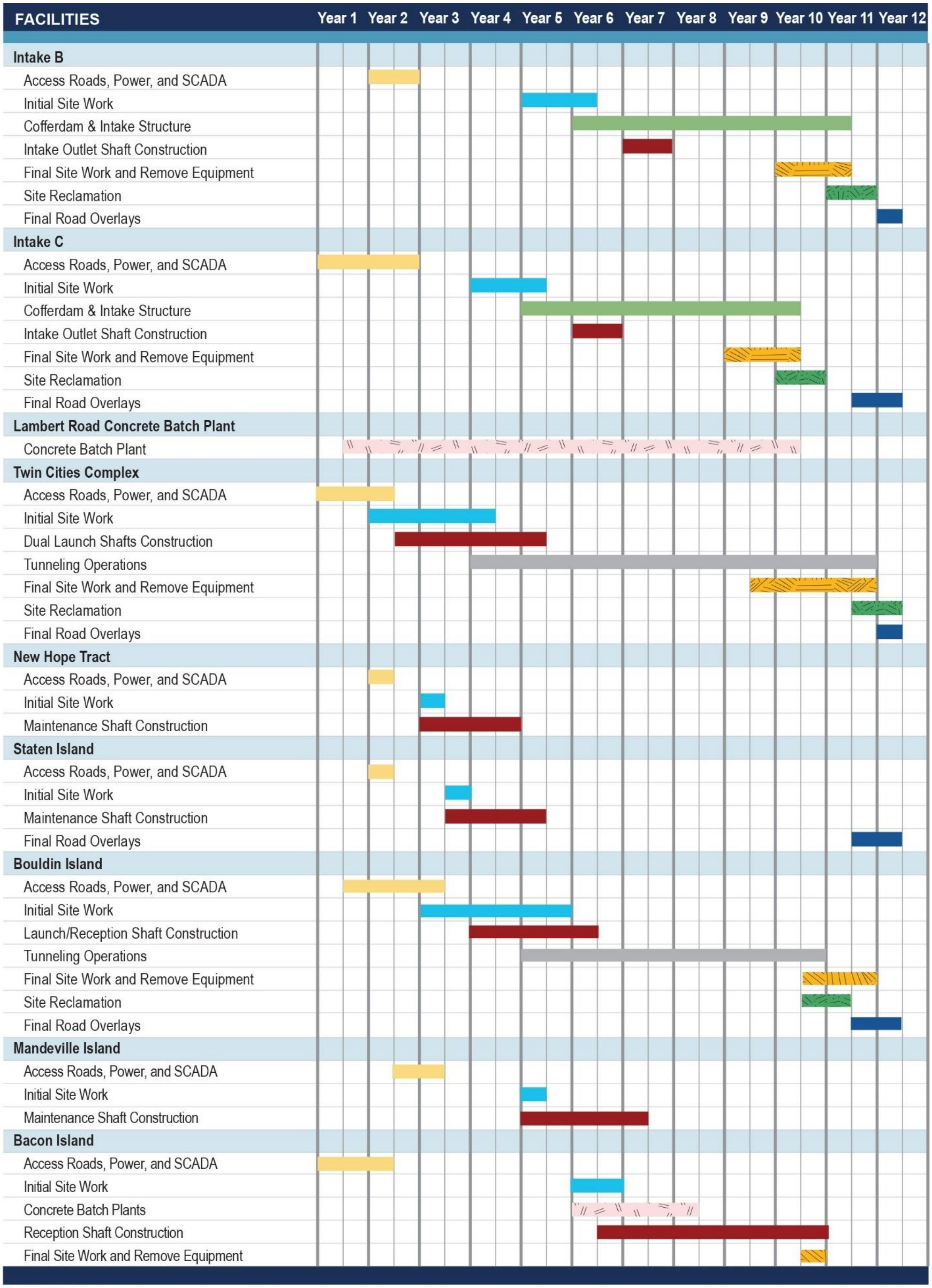
cfs = cubic feet per second; RTM = reusable tunnel material. The height of the RTM storage stockpiles would decrease as the RTM subsides into the ground over time.

[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

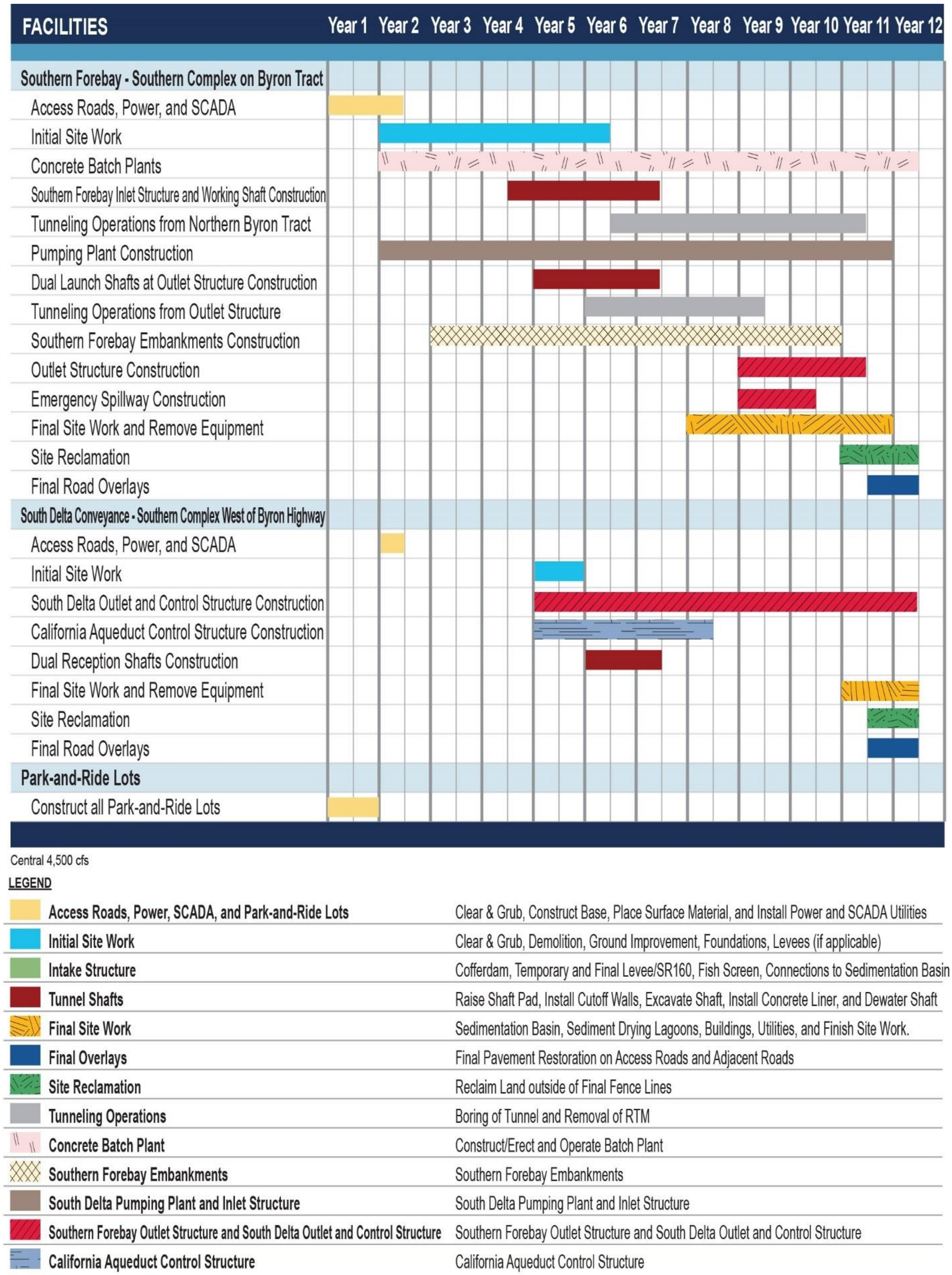


Figure 3-23. Alternative 2c Construction Schedule

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.

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.

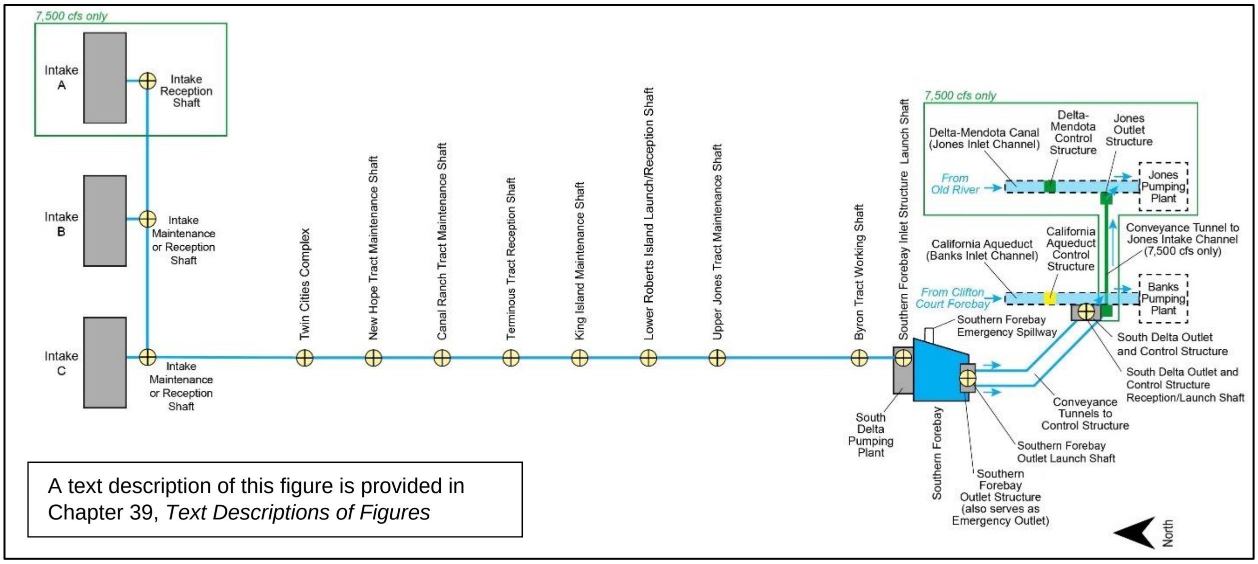


Figure 3-24. Project Schematic Eastern Alignment Alternatives

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 of 219 acres and 70 acres with stockpiles up to 9 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.

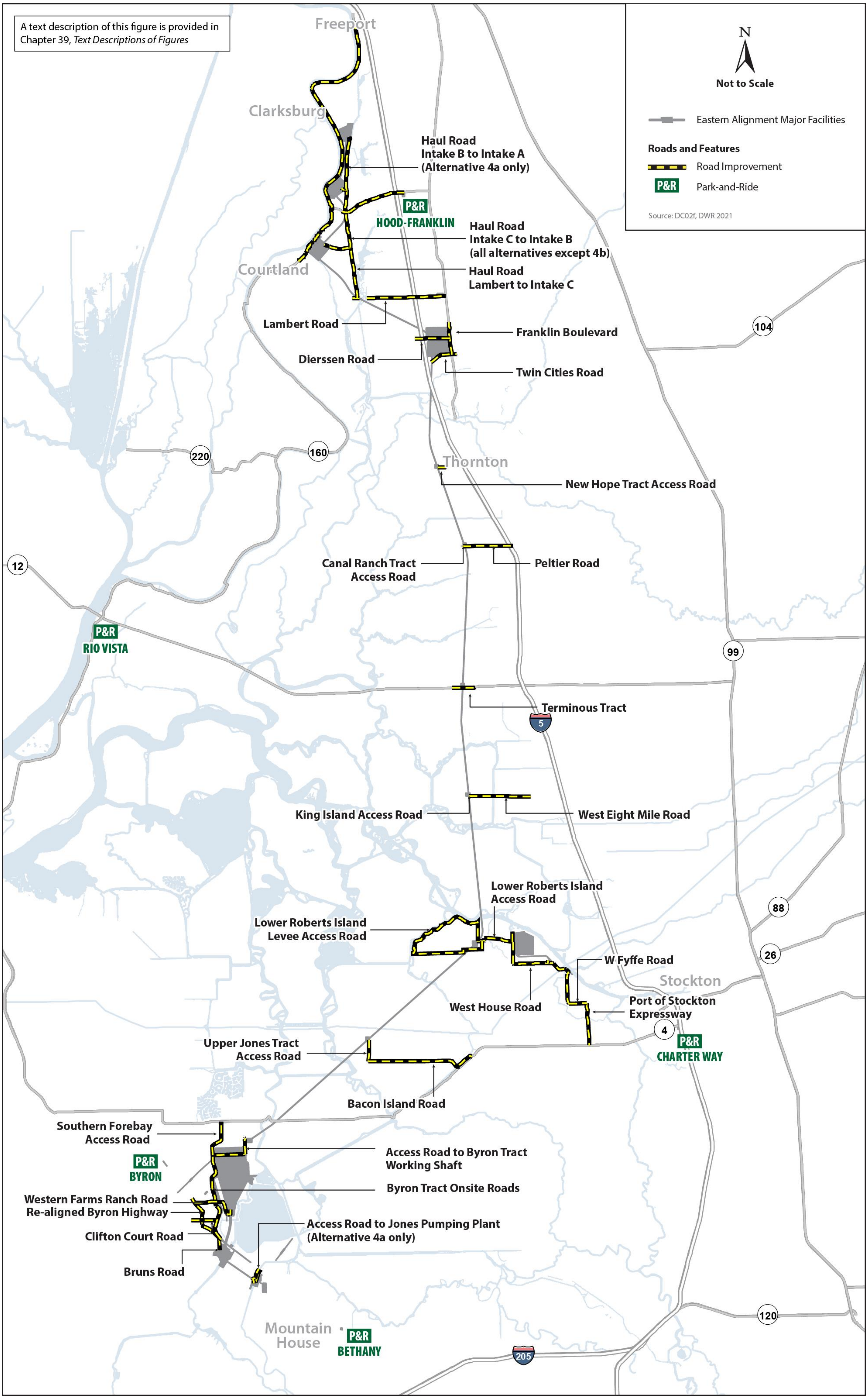


Figure 3-25. Road Modifications under Eastern Alignment Alternatives

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.

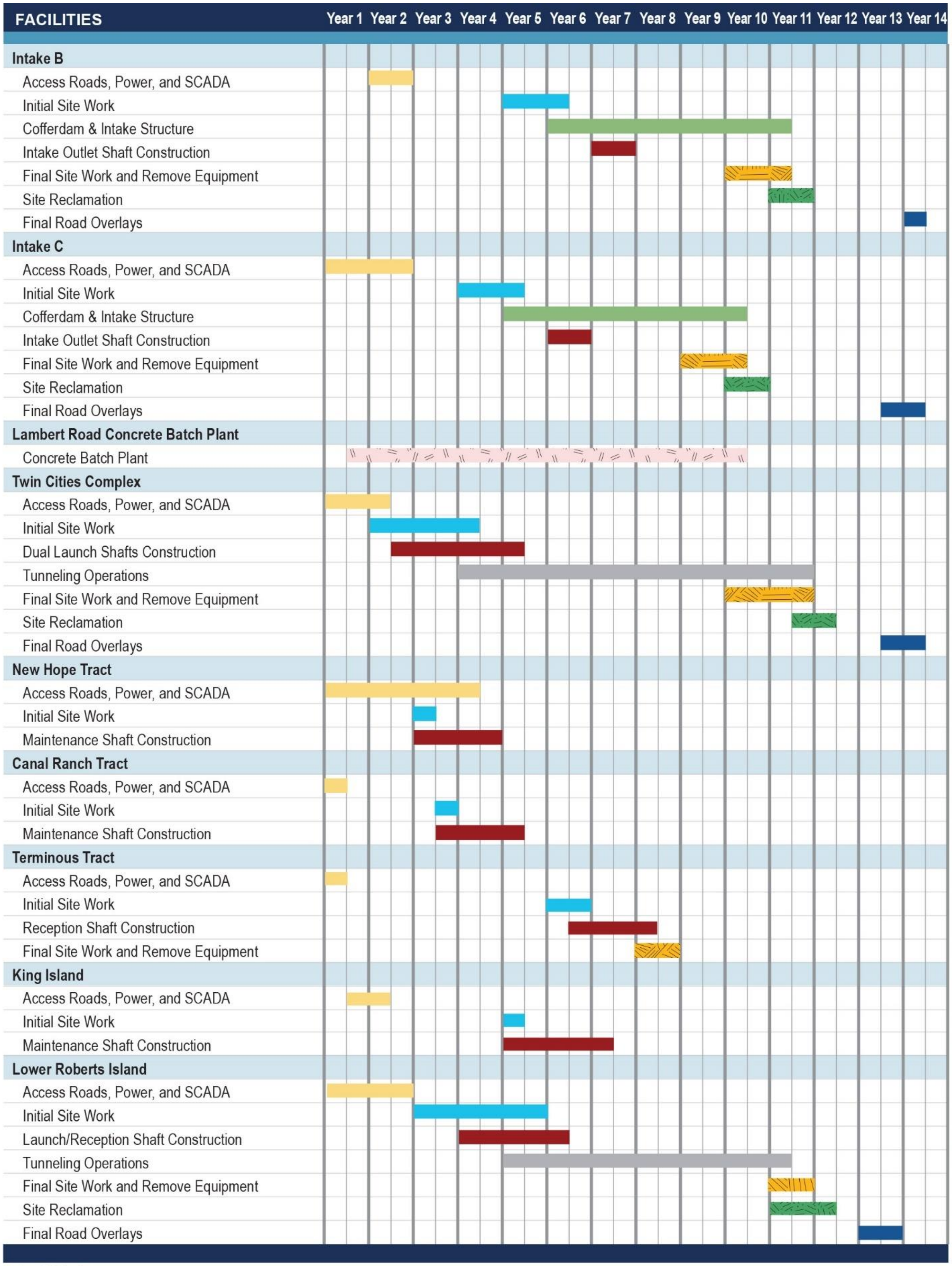
The same construction support facilities described in Section 3.4.15, *Other Construction Support Facilities*, would support Alternative 3. Support facilities described for Bouldin Island would be at Lower Roberts Island instead.

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

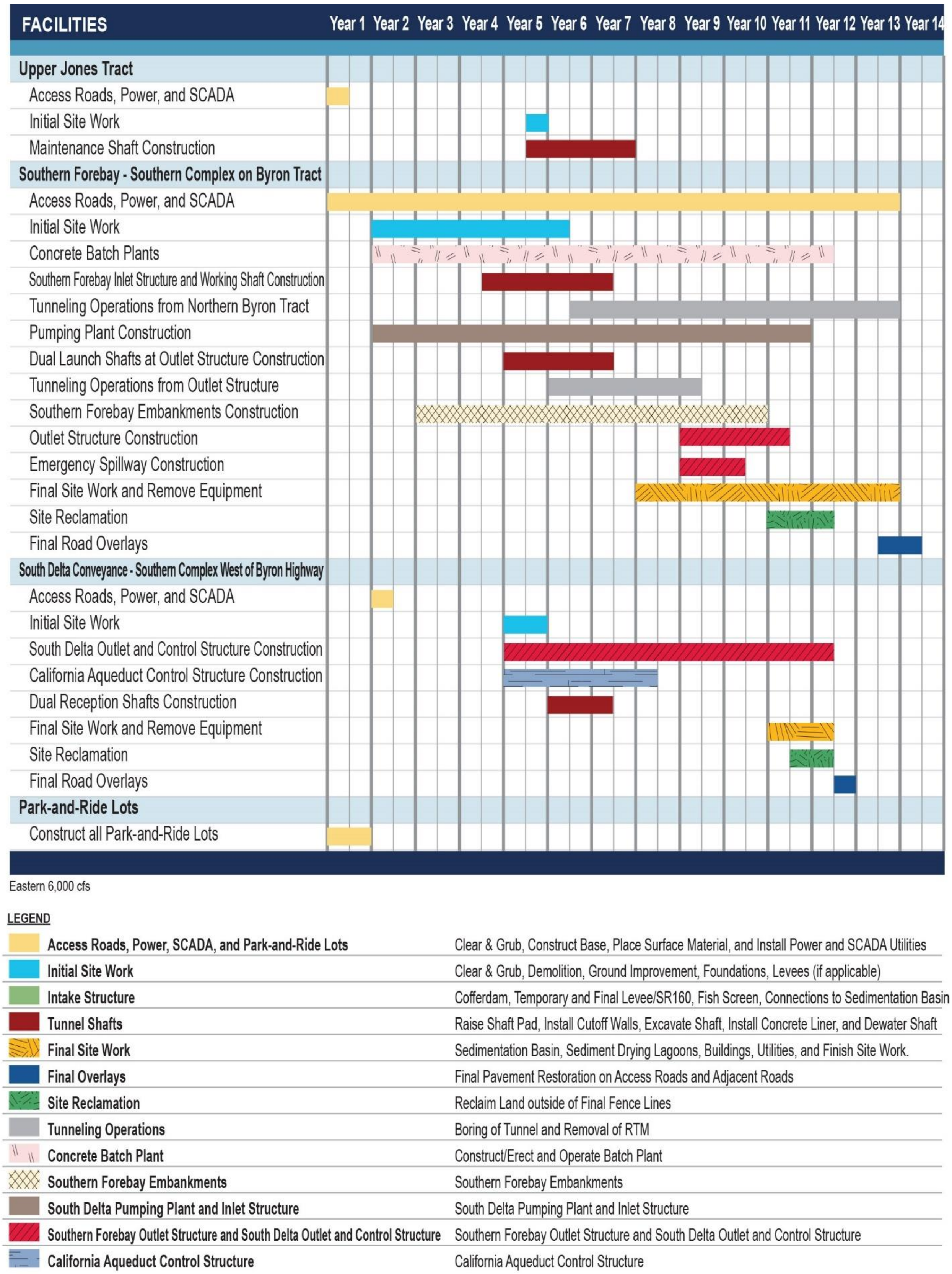


Figure 3-26. Alternative 3 Construction Schedule

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 of 225 acres and 64 acres with stockpiles up to 11 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
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

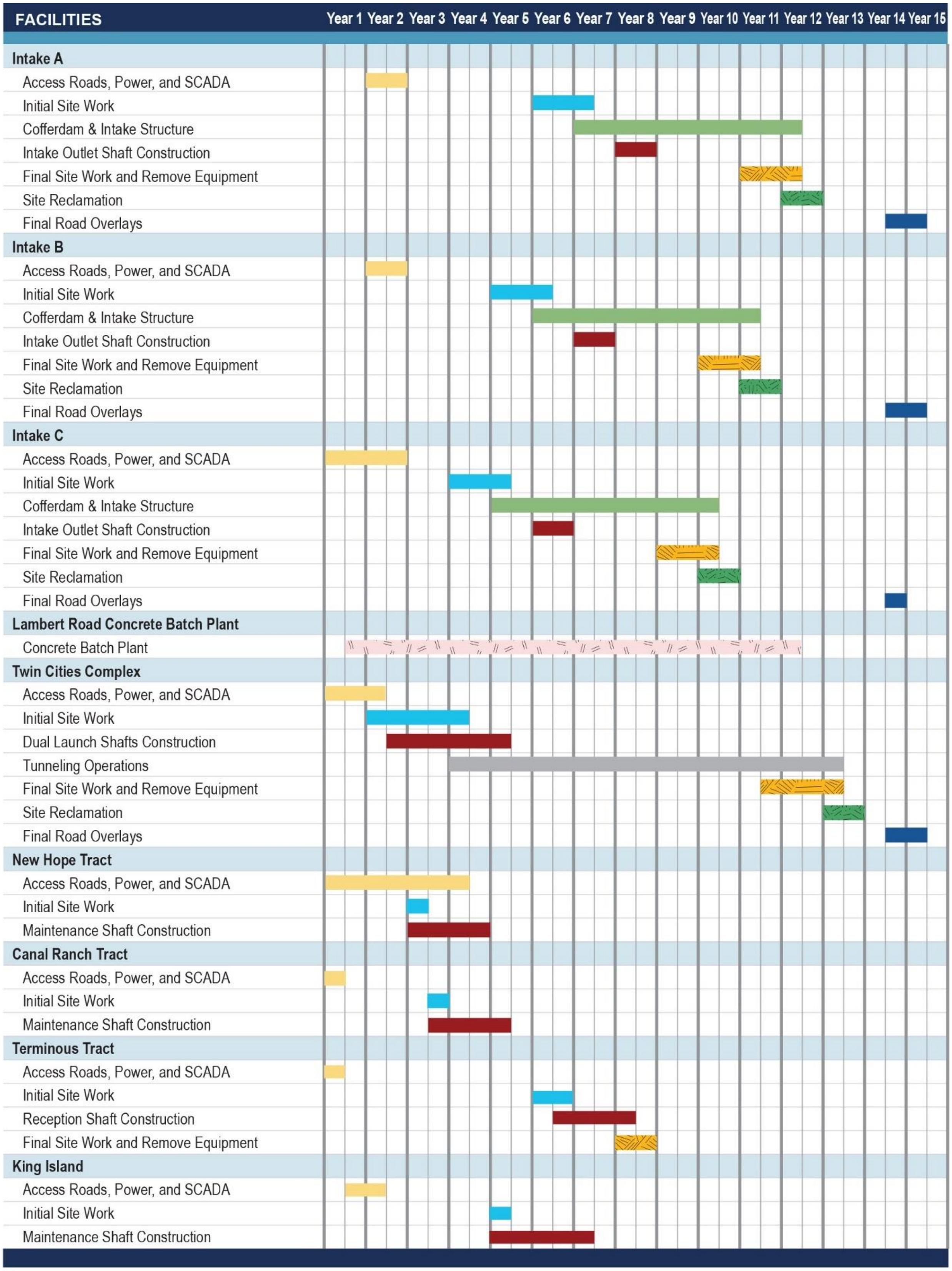
cfs = cubic feet per second; RTM = reusable tunnel material. The height of the RTM storage stockpiles would decrease as the RTM subsides into the ground over time.

[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.



Eastern 7,500 cfs

Page 1 of 2

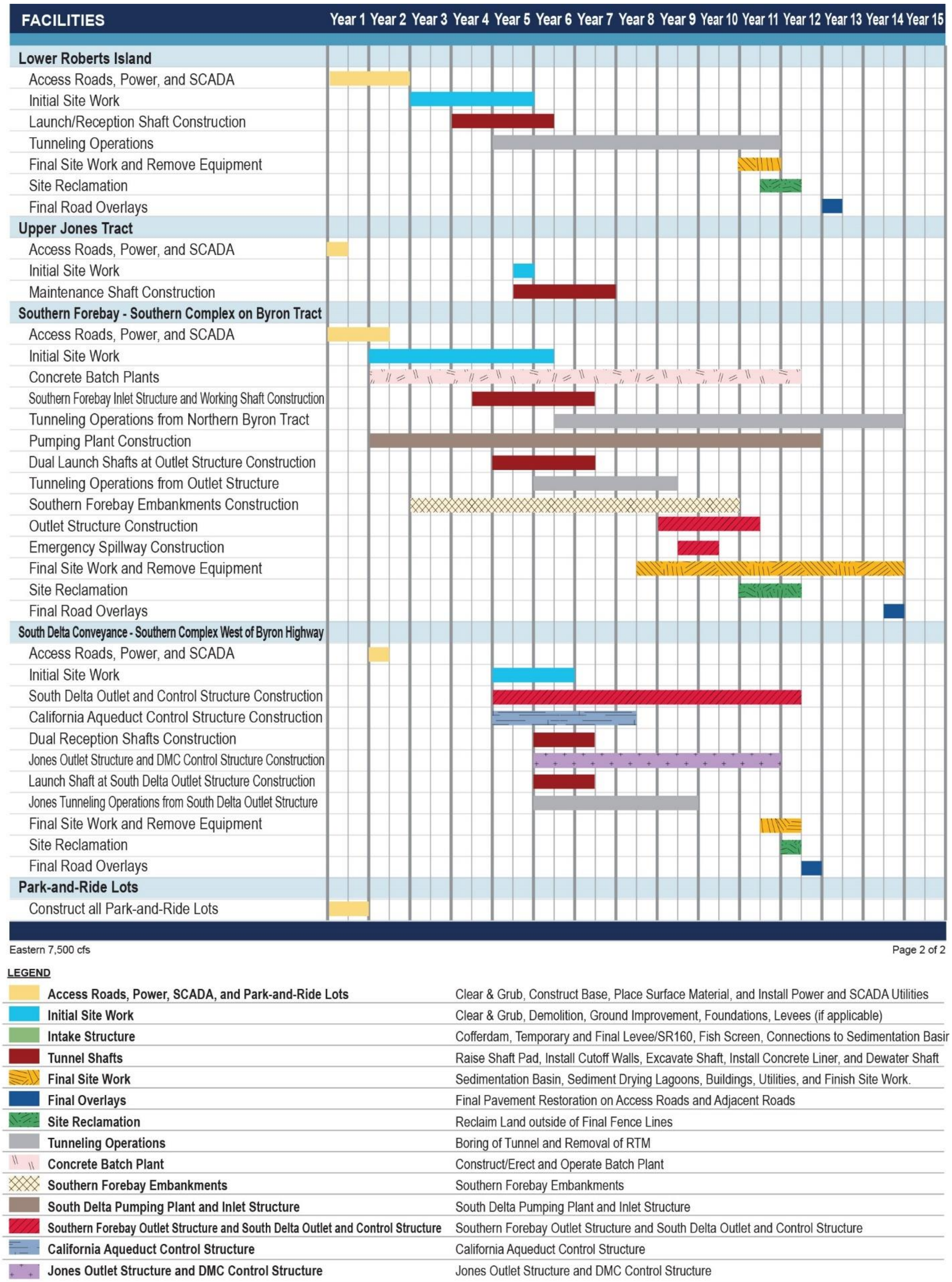


Figure 3-27. Alternative 4a Construction Schedule

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 of 180 acres and 109 acres with stockpiles up to 6 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
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

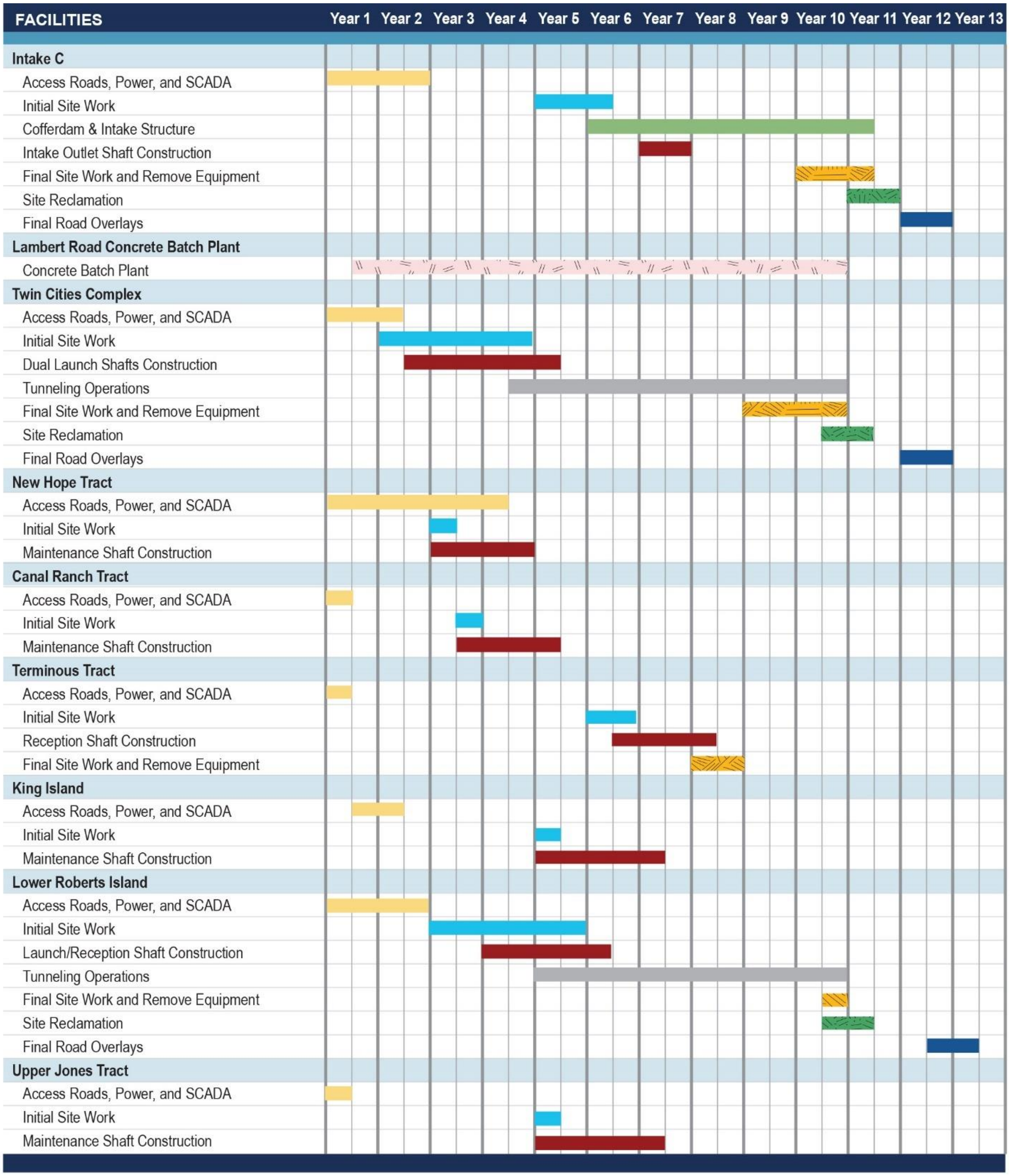
cfs = cubic feet per second; RTM = reusable tunnel material. The height of the RTM storage stockpiles would decrease as the RTM subsides into the ground over time.

[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

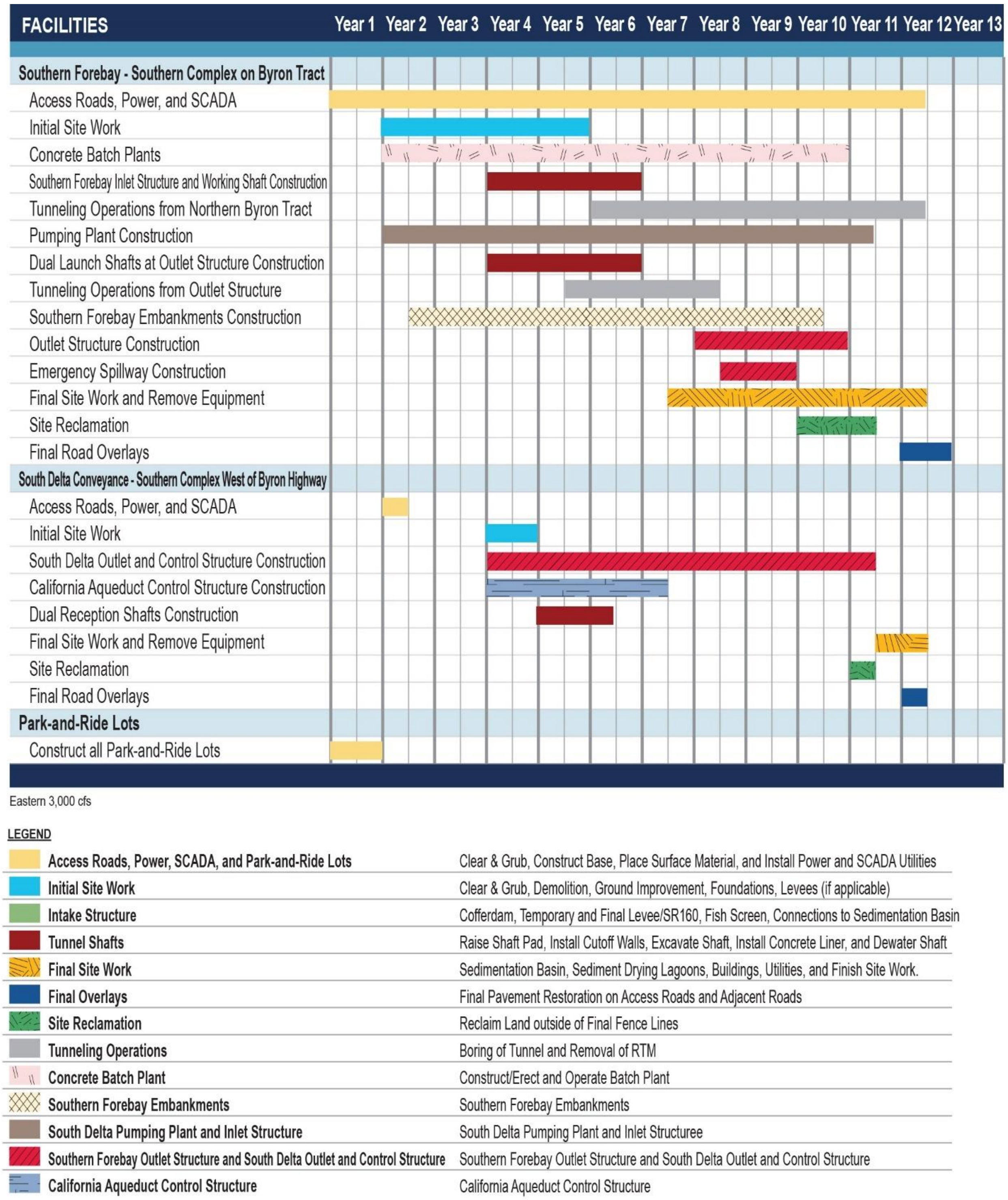


Figure 3-28. Alternative 4b Construction Schedule

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 of 202 acres and 86 acres with stockpiles up to 7 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

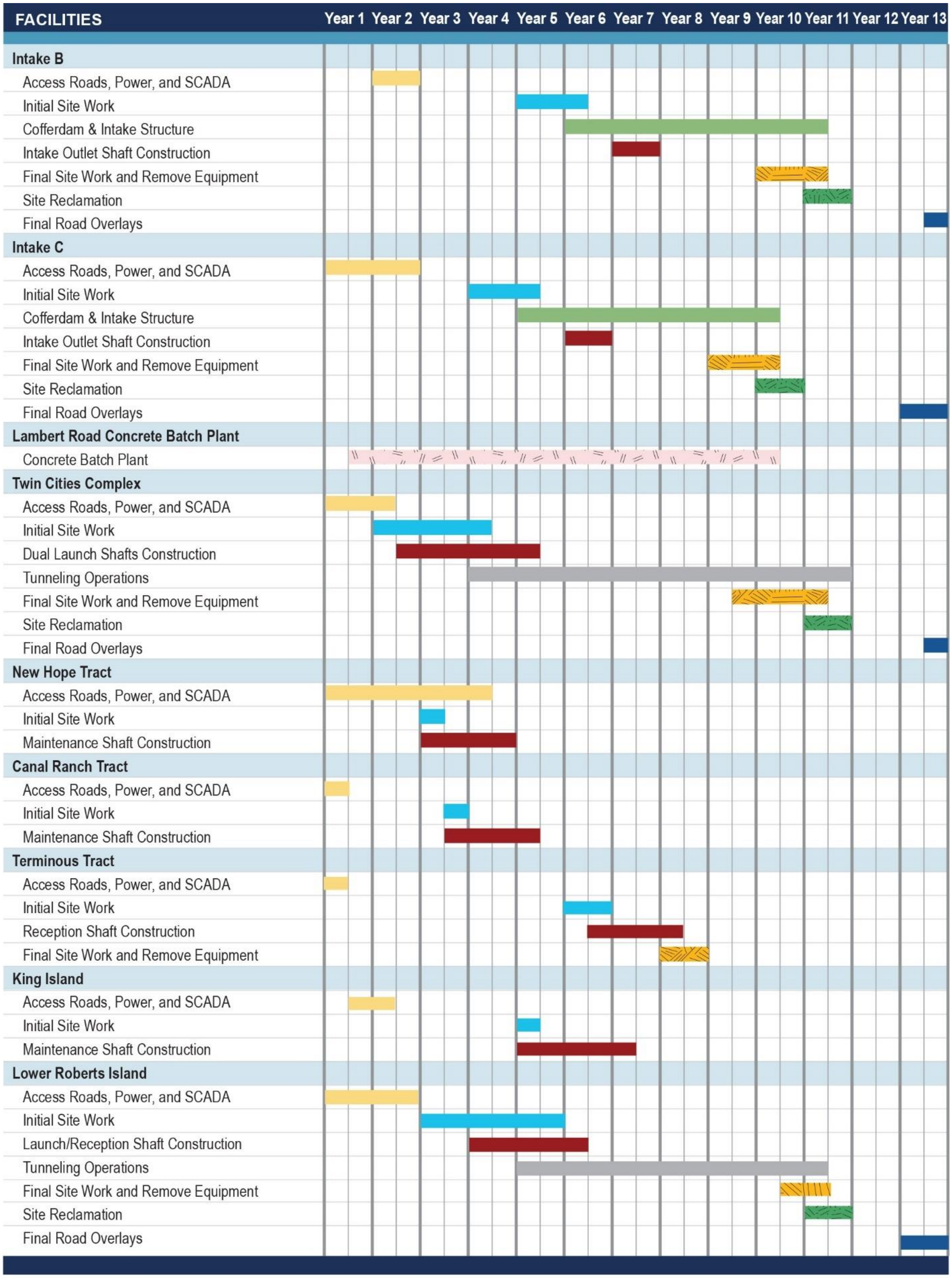
cfs = cubic feet per second; RTM = reusable tunnel material. The height of the RTM storage stockpiles would decrease as the RTM subsides into the ground over time.

[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

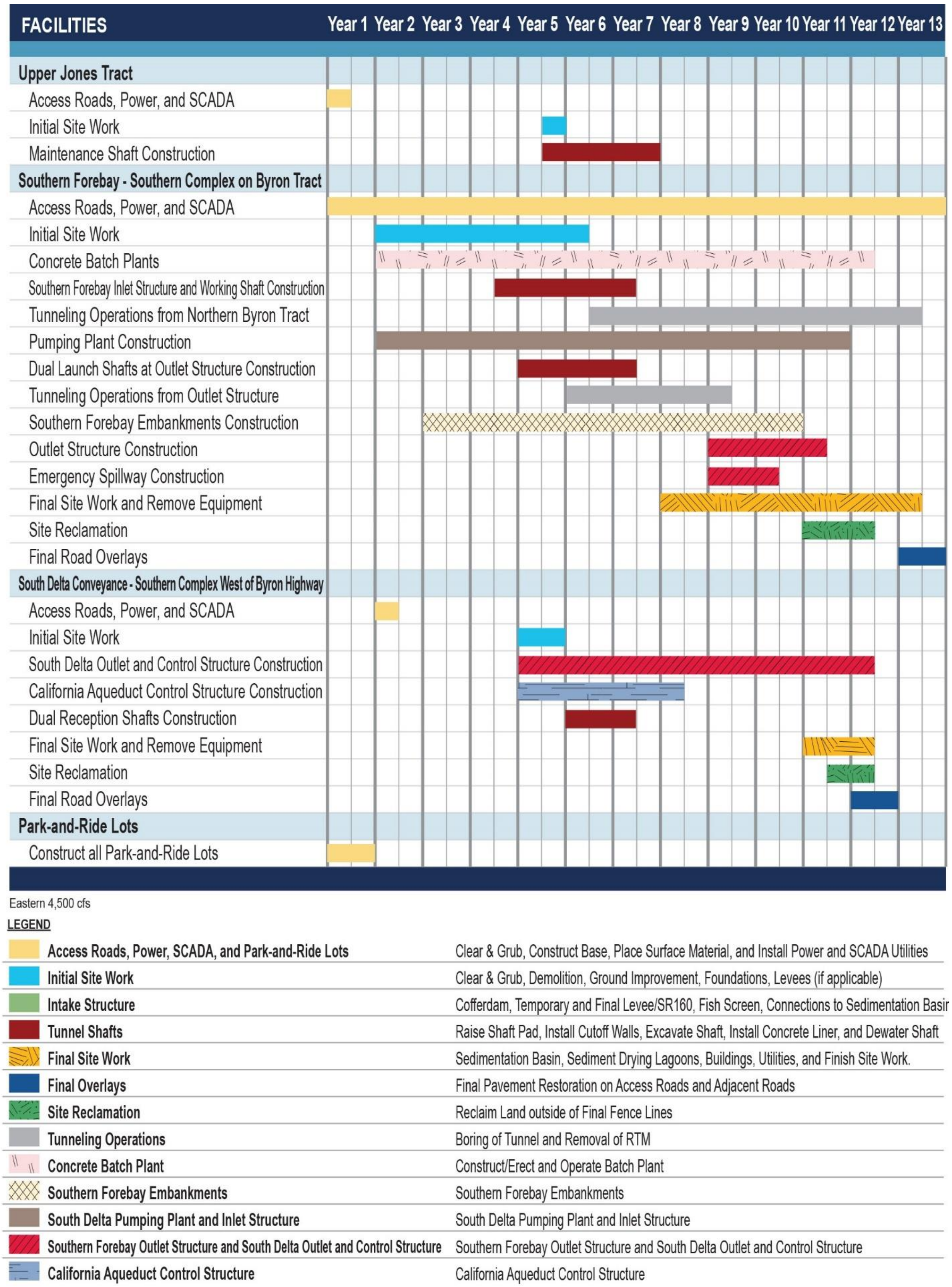


Figure 3-29. Alternative 4c Construction Schedule

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: 228 Permanent acres: 175
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 13,000 linear feet each Construction acres: 138 acres Permanent acres: 63
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.

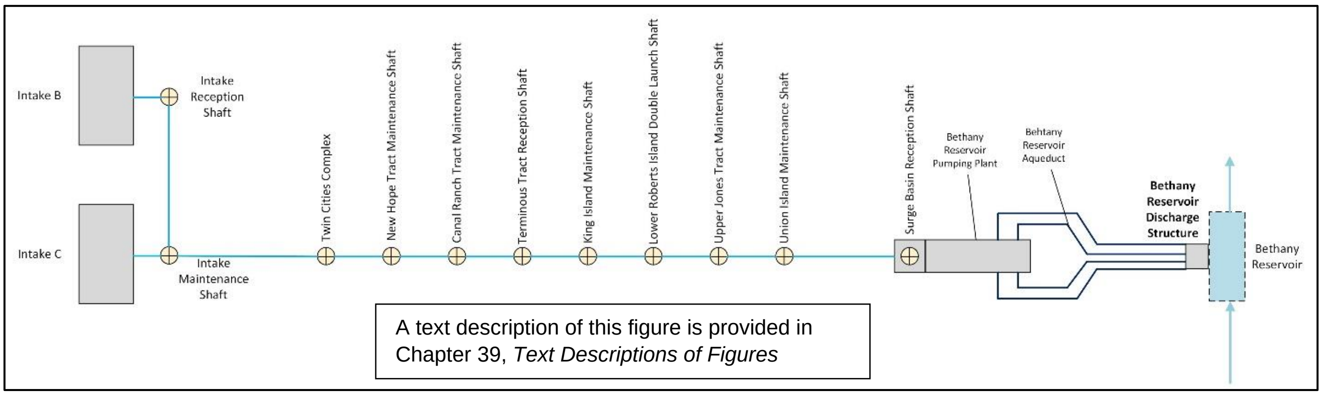


Figure 3-30. Alternative 5 Bethany Reservoir Alignment Schematic

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 four locations at the Bethany Complex. A permanent 33-foot high stockpile of excavated material from the Bethany Reservoir Pumping Plant and Surge Basin would occupy about 59 acres; topsoil from those features would cover about 7 acres up to 22 feet high for about 7 years. Temporary topsoil stockpiles from the aqueduct and discharge structure would cover 4.5 and 0.5

acres up to 22 feet high for 4 and 5 years, respectively. Each stockpile area would be cleared, grubbed, and stripped of topsoil before stockpiling. Topsoil from these locations and excess topsoil 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 at the intersection of Kelso Road and the new Bethany access road east of Mountain House Road. Each batch plant site would be approximately 600 feet wide by 600 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 30-31). The Bethany Reservoir Aqueduct would extend approximately 2.5 miles from the pumping plant to a new discharge structure on the banks of the Bethany Reservoir (Figure 3-32). These facilities 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.

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.

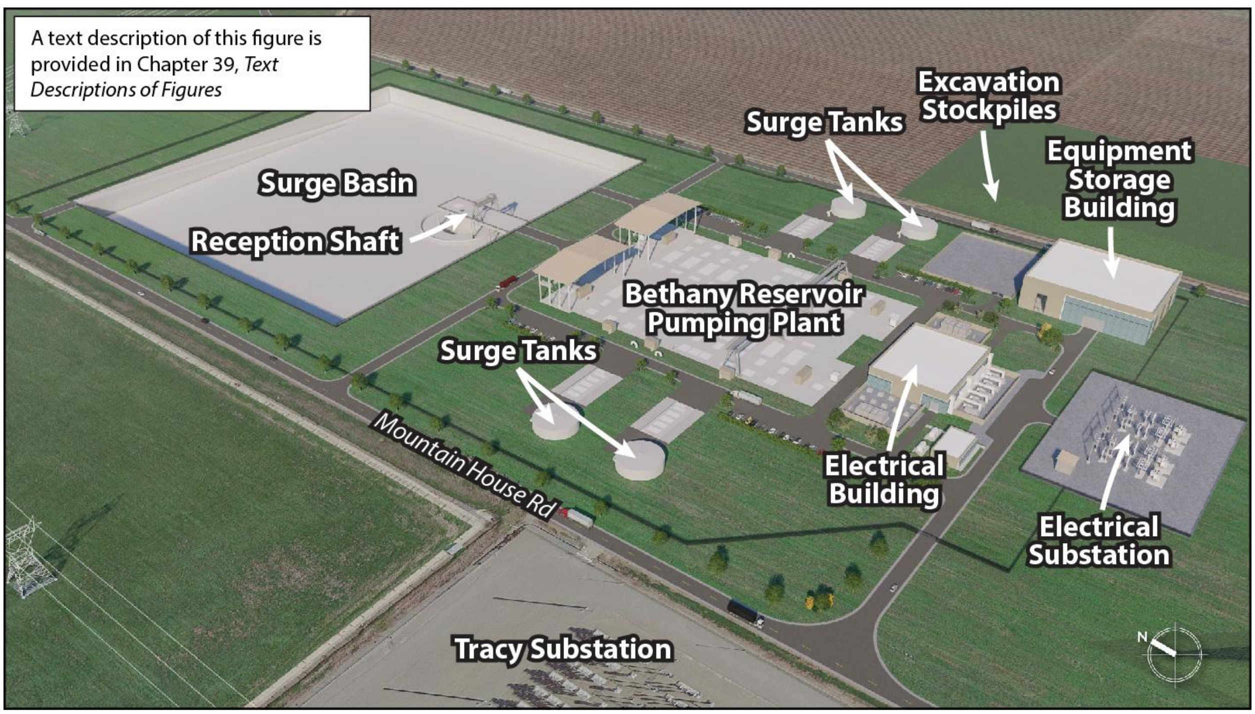


Figure 3-31. Bethany Reservoir Pumping Plant and Surge Basin

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 2.5 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.

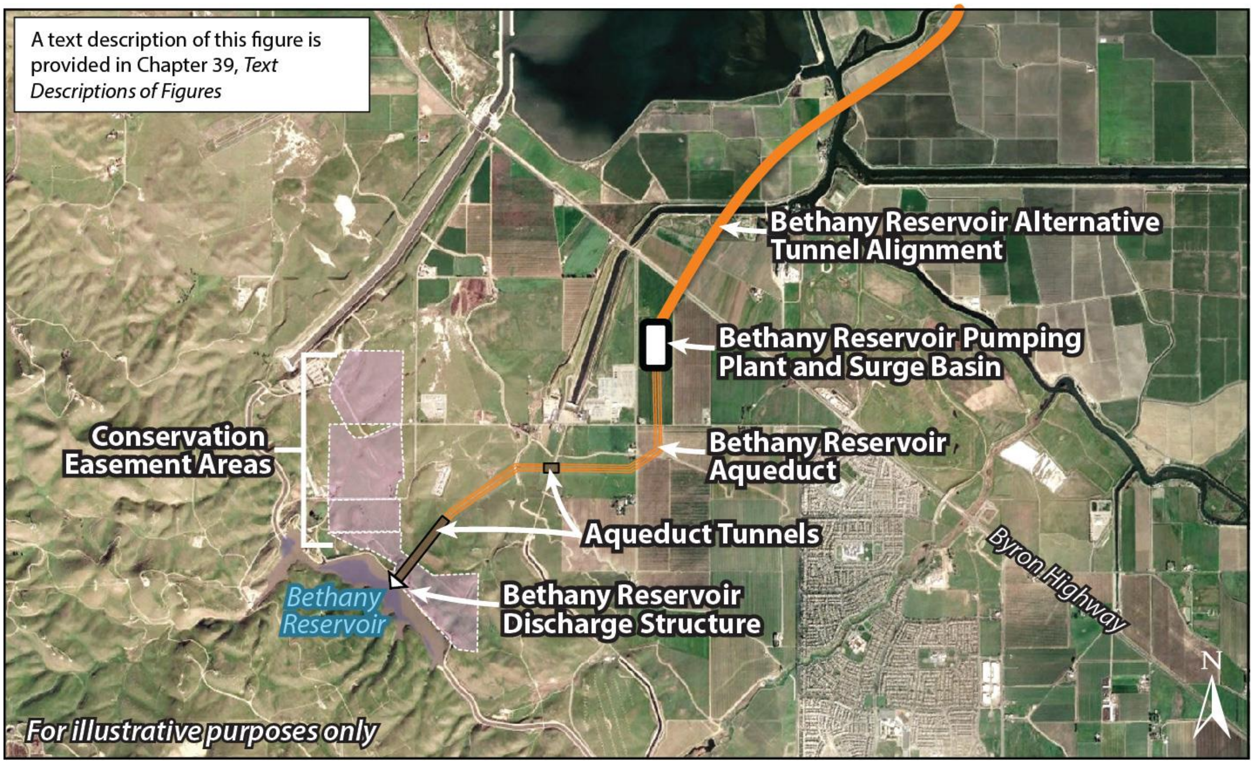


Figure 3-32. Bethany Reservoir Aqueduct Route with Tunnel Reaches

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.

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

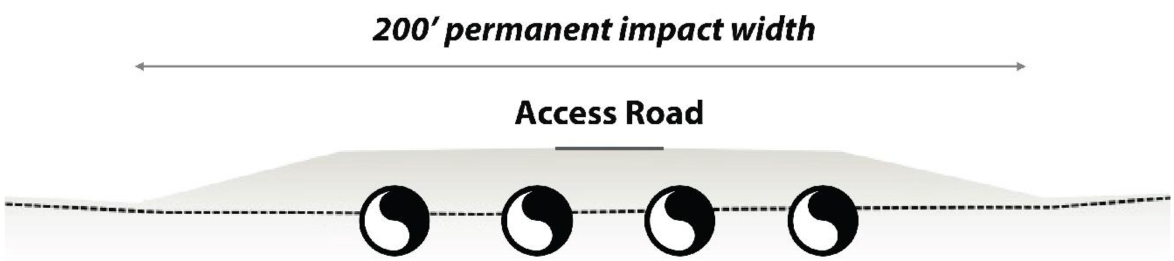


Figure 3-33. Typical Completed Section for Open Cut Reaches of Pipeline Alignment

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).

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 3,062-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 including the four 55-foot-wide shafts with required 80-foot center-to-center spacing (Figure 3-34). Each channel width would range from 55 feet at the tunnel reception shaft 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.

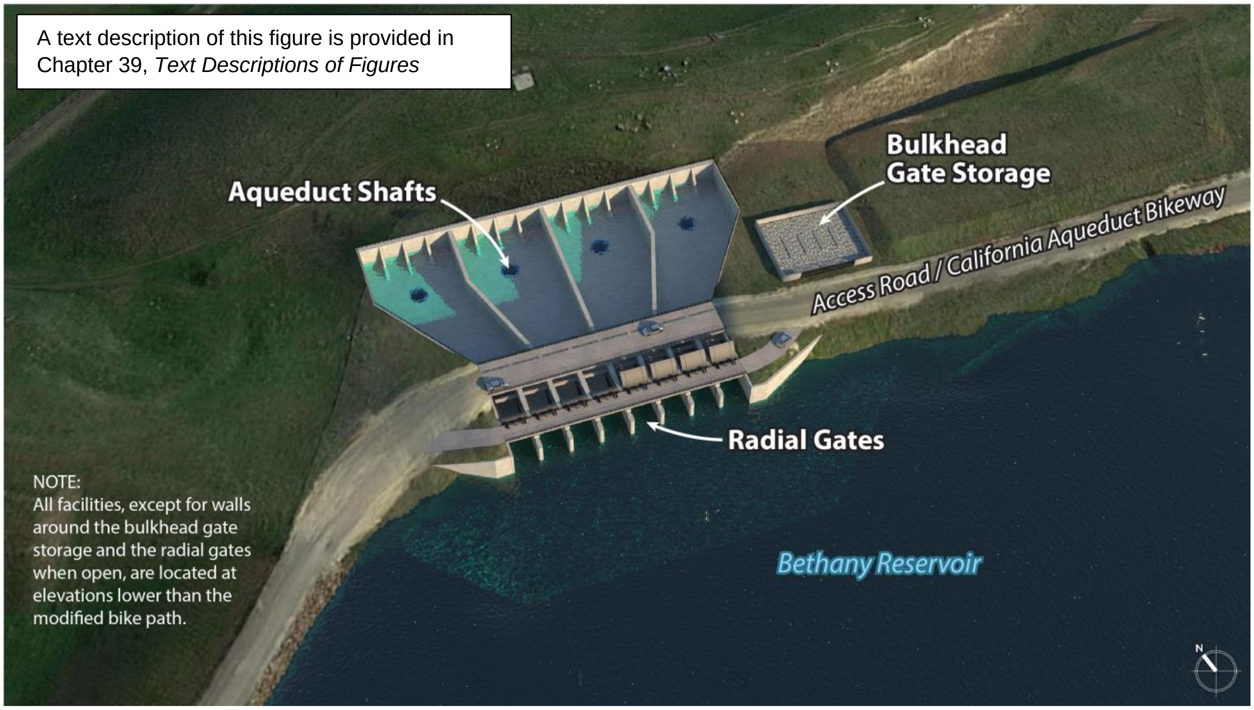


Figure 3-34. Bethany Reservoir Discharge Structure

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.

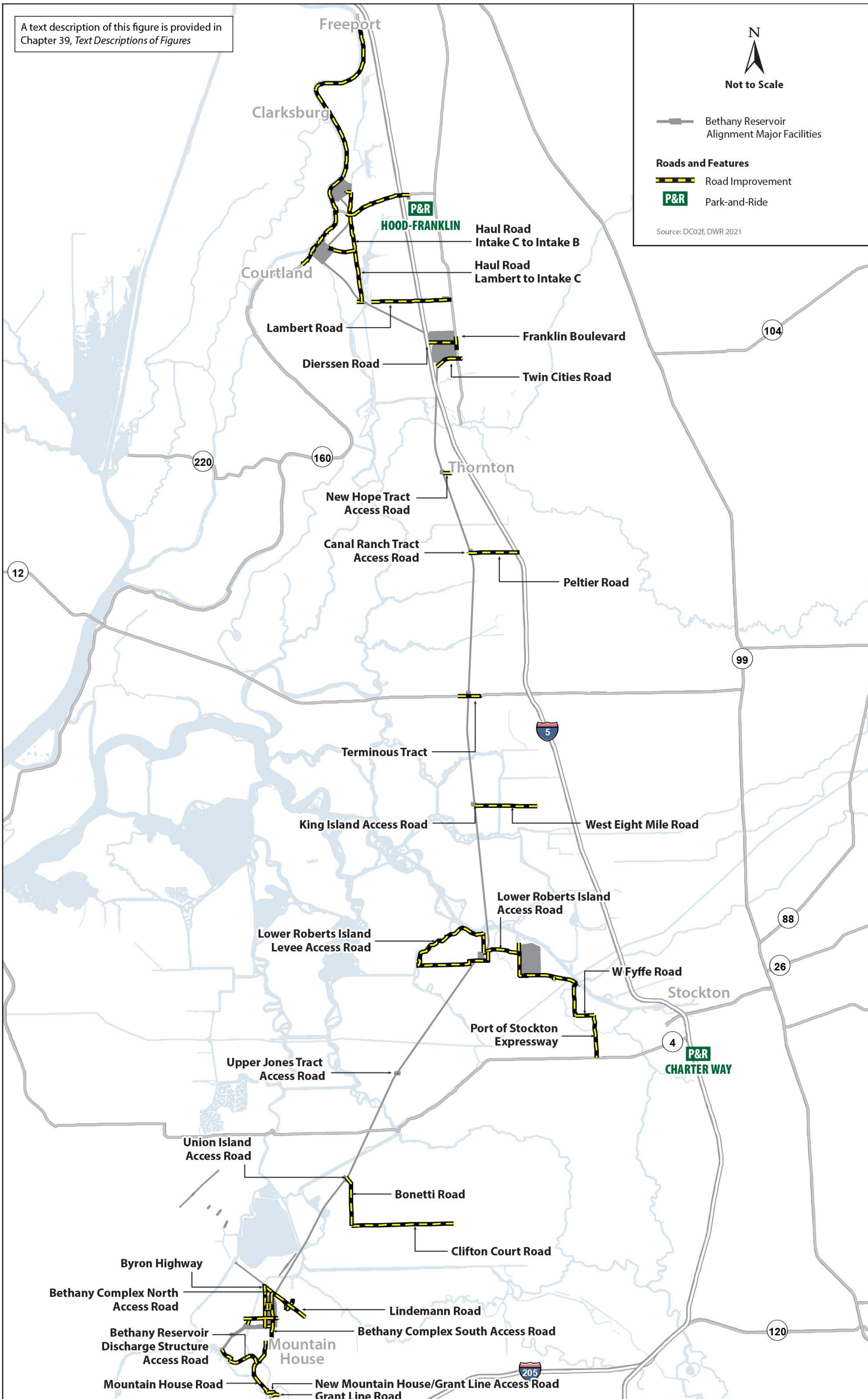


Figure 3-35. Road Modifications under the Bethany Reservoir Alignment

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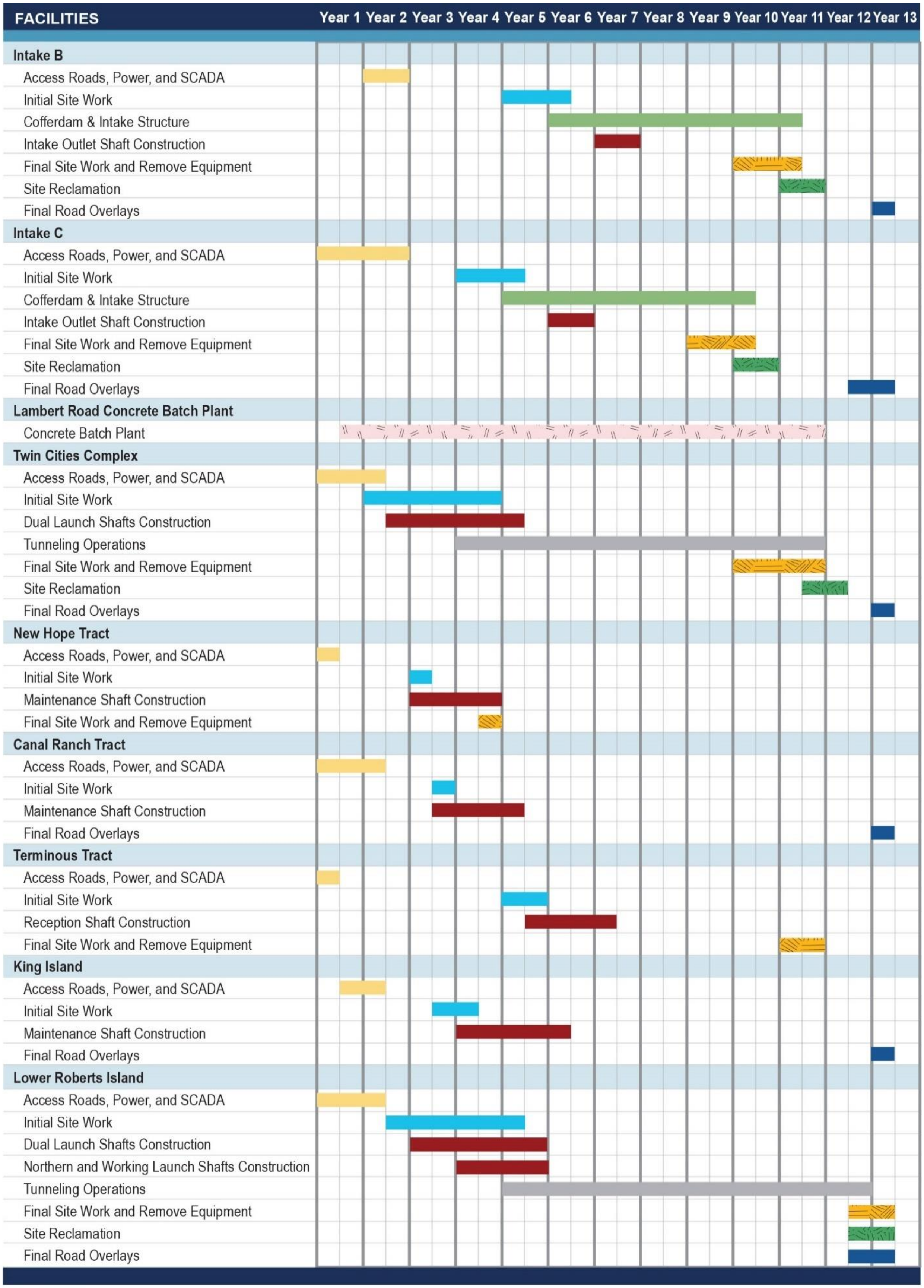
3.14.3 Maintenance

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.



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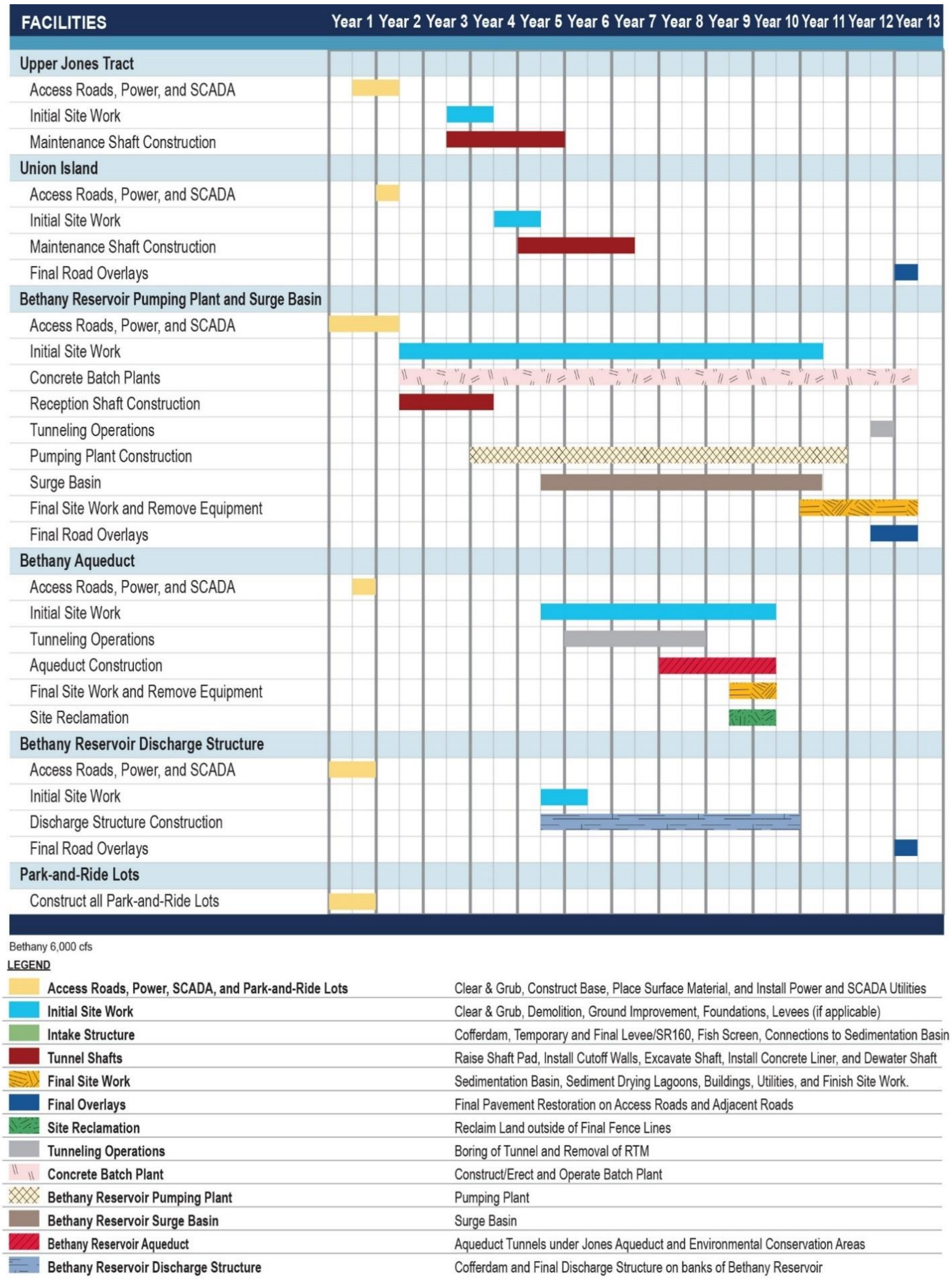

Figure 3-36. Alternative 5 Construction Schedule

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 soil materials commonly found in 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 Draft EIR. An addendum to the IS/MND (California Department of Water Resources 2020c) was approved and Notice of Determination was issued for minor project changes in February 2021. 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 and the February 2021 addendum (California Department of Water Resources 2020b, 2020c), 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 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). 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 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 CPTs would be filled with grout following completion and prior to abandonment, and all soil borings not planned for completion as a monitoring well would be completely grouted following boring. 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, 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

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, 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; 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. 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 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 to mix amendments (such as cement) into the foundation to add strength and resistance to liquefaction, including the installation of a grid of deep mechanically mixed (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 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 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 Plan) 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 perpendicular to and moving toward the screens, while sweeping velocity is the velocity of water parallel to and moving 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) and a minimum sweeping velocity of 0.4 feet per second at the proposed fish screens to help minimize near-field effects of the intake operations. 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 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.

[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.

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 pulse), (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 general strategy is expected to be employed during 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).
- 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 (up to approximately 3,000 cfs) would be needed to manage salinity in the Old River and Middle River corridor.
- 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).

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,

[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 the Department of Water Resources (Department) or the United States Bureau of Reclamation (Reclamation) for diversions of Delta water supplies at the State Water Project (SWP) Banks pumping plant and Central Valley Project (CVP) Tracy 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.

wheeling[7] for CVP or water transfers 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 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.

Therefore, even though the project may add additional export capacity, it is unlikely to increase the amount of water transfers, since the current capacity is not even fully utilized. For this reason, potential direct or indirect impacts of water transfers are not further discussed in this Draft EIR.

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.

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

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, *Proposed North Delta Diversion Bypass Flow and Pulse Protection Requirements*. 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 3-16. ○ 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 Adaptive Management and Monitoring Program 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.

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.

BiOp = Biological Opinion; cfs = cubic feet per second; E:I = export/inflow; ITP = Incidental Take Permit; 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 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 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.

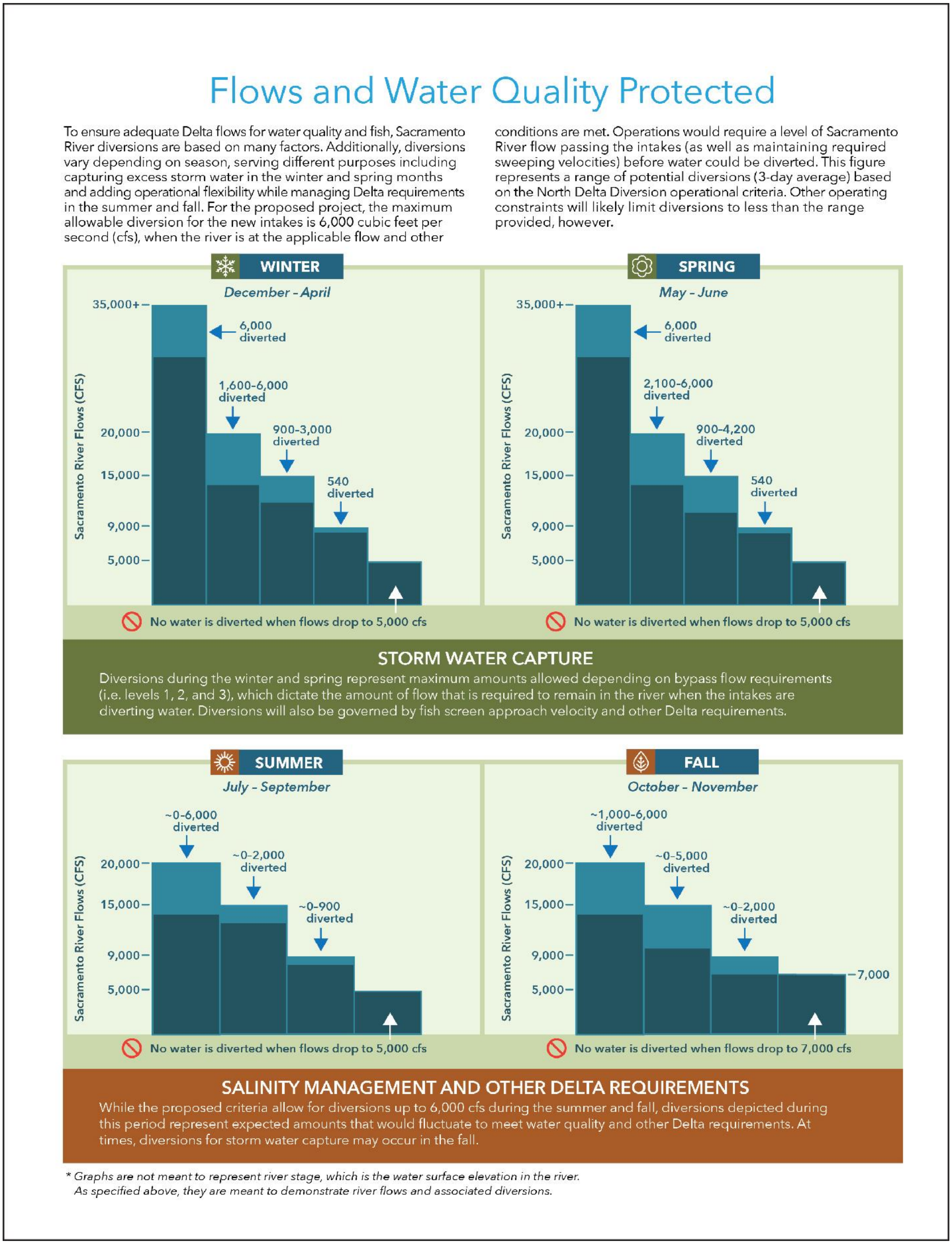

Figure 3-37. Seasonal Diversions

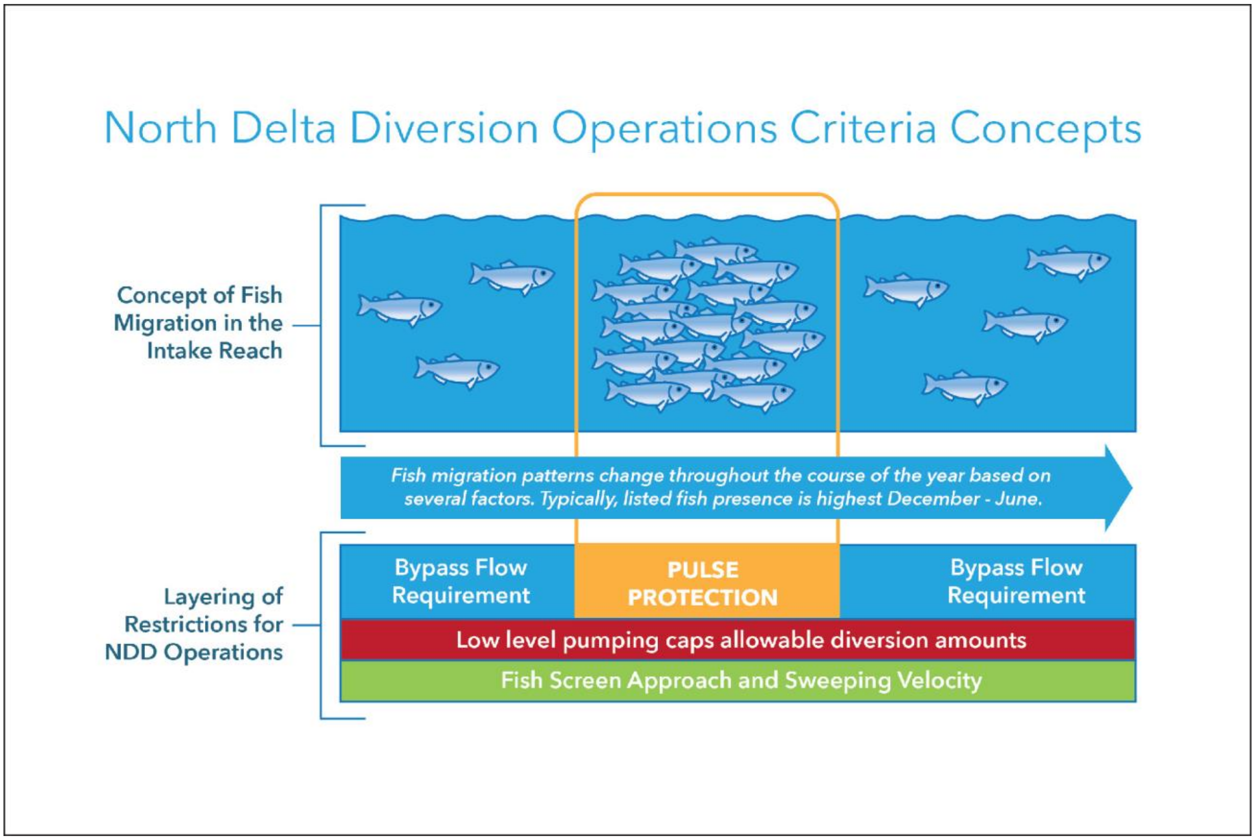

Figure 3-38. North Delta Diversion Operations Concepts

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.

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 adaptive management and monitoring plan. 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 and Compliance

- **Near Field:** Fish screen performance criteria, including facility performance in meeting approach and sweeping criteria 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. 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 upstream of each intake facility, along with the intake flows, to demonstrate sweeping velocity compliance.
    - Velocity/flow gages (i.e., Acoustic Doppler Current Profilers) upstream 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 compliance.
    - At each intake, real-time upstream flow, less the intake's real-time diversion flow, would provide a real-time flow downstream of each intake. This flow, divided by the river's cross-sectional area just downstream of each intake facility, would result in an average river velocity downstream. The average downstream river velocity can be used as a real-time surrogate to demonstrate sweeping-velocity criteria at each intake. Following planned full-facility velocity performance evaluations, the average downstream river velocity could be correlated to each intake facility's sweeping-velocity performance and adjusted as appropriate.
  - Entrainment monitoring as necessary.
  - Approach/sweeping criteria relaxation would be considered 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

[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.

(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:** 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).
  - 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 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).
  - 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 Draft EIR, such as implementation of 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 Operations Adaptive Management and Monitoring Program (OAMMP) would be used to monitor and consider the design and operation of the new north Delta intakes and determine whether they result in unanticipated effects that may warrant refinements in design, management, and/or operation.

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-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 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).[12] This position would provide a supplemental

[12] 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

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."[13]

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 [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."[14] 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

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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.

[13] Wat. Code § 11900.

[14] Wat. Code § 11910.

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.

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 this 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 Draft 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.

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Appendix C1
Environmental Commitments and Best Management Practices

The environmental commitments and best management practices in this appendix are presented as they were provided by the California Department of Water Resources (the applicant) in the Delta Conveyance Project Draft Environmental Impact Report (California Department of Water Resources 2021) and therefore is presented from the California Environmental Quality Act perspective. However, the U.S. Army Corps of Engineers relied on this information when preparing its Draft Environmental Impact Statement. All chapter references in this appendix are to those in the Draft EIR. Please refer to the Draft EIR for any information cross referenced.

3B.1 Introduction

This appendix presents more detail on aspects of the proposed Delta Conveyance Project (project) and where relevant project alternatives (environmental commitments [ECs] and best management practices [BMPs]) that either indirectly or generally address potential adverse effects of the project but are not proposed as specific mitigation for a potentially significant impact identified in one of the resource chapters. ECs are those actions that are incorporated into the engineering or design of the project alternative and are intended to avoid, reduce, or minimize general environmental impacts not specific to a particular potential significant resource impact. The avoidance and minimization features are included in the Mitigation Monitoring and Reporting Plan to enhance implementation tracking, identify responsible party, and clarify implementation timing. BMPs are standard construction practices or design elements that are incorporated into the project description to generally address the construction process environmental concerns that typically occur for most construction actions.

Project components are engineering or design features that are a part of the project description and are described in Chapter 3, *Description of the Proposed Project and Alternatives*. Project components are proposed to support implementation of the conveyance project but may indirectly address environmental effects. The project has been designed to reduce numerous impacts, as described in the Efforts to Minimize Delta Community Effects Technical Memorandum in Attachment H of *Volume 1: Delta Conveyance Final Draft Engineering Project Report—Central and Eastern Options* and in the Efforts to Minimize Delta Community Effects Supplement—Bethany Reservoir Alternative Technical Memorandum in *Volume 1: Delta Conveyance Final Draft Engineering Project Report—Bethany Reservoir Alternative* (Delta Conveyance Design and Construction Authority 2022a, 2022b).

ECs are summarized in Table 3B-1. For the purposes of this Delta Conveyance Project Draft Environmental Impact Report (Draft EIR), BMPs are considered to be part of the ECs and are identified and numbered as such in Table 3B-1. Resource-specific mitigation measures are provided in the resource chapters, Chapters 7 through 32 of this Draft EIR.

California Department of Water Resources (DWR) will incorporate the following ECs and BMPs into the engineering or design of the project to generally avoid or minimize potential adverse environmental effects.

As some of the ECs and BMPs are incorporated into engineering design in anticipation of typical conditions required for permitting and other authorizations, an environmental permitting coordinator on behalf of DWR will consult with permitting agencies and local agencies to confirm that the ECs and BMPs described in this appendix are consistent with specific requirements. Where applicable**,** DWR will follow a local agency's policies where DWR determines such policies to be appropriate and feasible**.**

Because the ECs and BMPs have been incorporated into the project description, they are not restated in the impact analysis for each resource chapter. Instead, they are incorporated by reference. A narrative discussion in the impact analysis of Chapters 7 through 32 of this Draft EIR considers the ECs and BMPs as part of the project, and the discussion presents the level of impact of the project, first without implementation of the ECs and BMPs to determine the significance of the impact and then, as the ECs and BMPs are applied, whether the impact has been reduced to a less-than-significant level and whether additional mitigation is required.

Table 3B-1. Summary of Environmental Commitments

Environmental Commitment	Chapter/Resource
EC-1: Conduct Environmental Resources Worker Awareness Training	Ch. 12, Fish and Aquatic Resources Ch. 13, Terrestrial Biological Resources
EC-2: Develop and Implement Hazardous Materials Management Plans	Ch. 9, Water Quality Ch. 12, Fish and Aquatic Resources Ch. 13 Terrestrial Biological Resources Ch. 16, Recreation Ch. 17, Socioeconomics Ch. 21, Public Services and Utilities Ch. 25, Hazards, Hazardous Materials, and Wildfire
EC-3: Develop and Implement Spill Prevention, Containment, and Countermeasure Plans	Ch. 9, Water Quality Ch. 12, Fish and Aquatic Resources Ch. 13, Terrestrial Biological Resources Ch. 16, Recreation Ch. 21, Public Services and Utilities Ch. 25, Hazards, Hazardous Materials, and Wildfire Ch. 29, Environmental Justice (Impact HAZ-2)
EC-4a: Develop and Implement Erosion and Sediment Control Plans	Ch. 9, Water Quality Ch. 10, Geology and Seismicity Ch. 11, Soils Ch. 12, Fish and Aquatic Resources Ch. 13 Terrestrial Biological Resources Ch. 16, Recreation Ch. 17, Socioeconomics Ch. 18, Aesthetics and Visual Resources Ch. 20, Transportation Ch. 21, Public Services and Utilities Ch. 26, Public Health Ch. 29, Environmental Justice

Environmental Commitment	Chapter/Resource
EC-4b: Develop and Implement Stormwater Pollution Prevention Plans	Ch. 8, Groundwater Ch. 9, Water Quality Ch. 11, Soils Ch. 12, Fish and Aquatic Resources Ch. 13, Terrestrial Biological Resources Ch. 16, Recreation Ch. 18, Aesthetics and Visual Resources Ch. 21, Public Services and Utilities Ch. 25, Hazards, Hazardous Materials, and Wildfire Ch. 26, Public Health
EC-5: Develop and Implement a Fire Prevention and Control Plan	Ch. 11, Soils Ch. 30, Climate Change
EC-6: Conduct Cultural Resources Awareness Training	Ch. 19, Cultural Resources TBD Ch. 32, Tribal Cultural Resources
EC-7: Off-Road Heavy-Duty Engines	Ch. 18, Aesthetics and Visual Resources Ch. 22, Energy Ch. 23, Air Quality and Greenhouse Gases Ch. 29, Environmental Justice (Impact AQ-1, Impact AQ-2, Impact AQ-3, Impact AQ-5, Impact AQ-6, and Impact AQ-9)
EC-8: On-Road Haul Trucks	Ch. 18, Aesthetics and Visual Resources Ch. 22, Energy Ch. 23, Air Quality and Greenhouse Gases Ch. 29, Environmental Justice (Impact AQ-1, Impact AQ-2, Impact AQ-3, Impact AQ-5, and Impact AQ-6)
EC-9: On-Site Locomotives	Ch. 18, Aesthetics and Visual Resources Ch. 22, Energy Ch. 23, Air Quality and Greenhouse Gases Ch. 29, Environmental Justice (Impact AQ-1, Impact AQ-2, Impact AQ-3, Impact AQ-5, Impact AQ-6, and Impact AQ-9)
EC-10: Marine Vessels	Ch. 18, Aesthetics and Visual Resources Ch. 22, Energy Ch. 23, Air Quality and Greenhouse Gases Ch. 29, Environmental Justice (Impact AQ-1, Impact AQ-2, Impact AQ-3, Impact AQ-5, Impact AQ-6, and Impact AQ-9)
EC-11: Fugitive Dust Control	Ch. 13 Terrestrial Biological Resources Ch. 18, Aesthetics and Visual Resources Ch. 23, Air Quality and Greenhouse Gases Ch. 29, Environmental Justice (Impact AQ-1, Impact AQ-2, Impact AQ-3, Impact AQ-5, and Impact AQ-6)
EC-12: On-Site Concrete Batching Plants	Ch. 13 Terrestrial Biological Resources Ch. 18, Aesthetics and Visual Resources Ch. 23, Air Quality and Greenhouse Gases Ch. 29, Environmental Justice (Impact AQ-1, Impact AQ-2, Impact AQ-3, Impact AQ-5, and Impact AQ-6)

Environmental Commitment	Chapter/Resource
EC-13: DWR Best Management Practices to Reduce GHG Emissions	Ch. 21, Public Services and Utilities Ch. 22, Energy Ch. 23, Air Quality and Greenhouse Gases Ch. 29, Environmental Justice (Impact AQ-1, Impact AQ-2, Impact AQ-3, Impact AQ-5, and Impact AQ-6)
EC-14: Construction Best Management Practices for Biological Resources	Ch. 9, Water Quality Ch. 12, Fish and Aquatic Resources Ch. 13, Terrestrial Biological Resources Ch. 24, Noise and Vibration
EC-15: Sediment Monitoring, Modeling, and Reintroduction Adaptive Management	Ch. 9, Water Quality Ch. 12, Fish and Aquatic Resources
EC-16: Provide Notification of Construction and Maintenance Activities in Waterways	Ch. 9, Water Quality Ch. 12, Fish and Aquatic Resources

3B.1.1 EC-1: Conduct Environmental Resources Worker Awareness Training

DWR will provide training to field management and construction personnel on the importance of protecting sensitive natural resources (e.g., special-status fish species, wildlife species, plant species, and designated critical and/or suitable habitats for these species) prior to any ground-disturbing activity. Pre-construction training will be conducted so that construction personnel are aware of their responsibilities and the importance of compliance. All trainees will be required to sign a sheet indicating their attendance and completion of environmental training. The signature pages will be provided to California Department of Fish and Wildlife (CDFW), U.S. Fish and Wildlife Service (USFWS), and National Marine Fisheries Service (NMFS), if requested.

Construction personnel will be educated on the types of sensitive resources in the project area and the measures required to avoid and minimize impacts on these resources. Materials covered in the training program will include environmental rules and regulations for the specific site requirements for limiting activities to approved work areas, timing restrictions, and avoidance of sensitive resource areas.

In general, trainings will include the following components.

1. The need and legal requirements for resource avoidance and protection.
2. Important timing windows for special-status species (i.e., timing of special-status fish migration, spawning, and rearing; wildlife mating, nesting, and fledging; amphibian breeding and dispersal, and plant flowering periods).
3. Identification of listed fish, wildlife, and plant species potentially affected at the worksite, which will depend upon the work to be performed and location of the work.
4. Relevant measures from environmental documents and regulatory permits will be implemented during construction for the protection of covered fish, wildlife, and plant species, depending upon work to be performed and location of the work (i.e., in-water, upland, wetland).

5. Brief discussions of special-status species and natural communities of concern.
6. Boundaries of the work area.
7. Exclusion and construction fencing methods.
8. Roles and responsibilities, including an explanation regarding the authority of biological monitors to stop work if needed.
9. What to do when special-status fish, wildlife, or plants are encountered (including dead, injured, stressed, or entrapped individuals) in work areas.
10. Staking methods to protect resources.
11. Avoidance and minimization commitments.
12. Emergency procedures.
13. Consequences of violations of the laws and regulations protecting resources.

A fact sheet or other supporting materials containing this information will be prepared and distributed to construction supervisors and managers, along with a list of contacts (names, numbers, and affiliations) prior to initiating construction activities. DWR will appoint a representative to be the primary point of contact for any employee or contractor who might inadvertently take[1] a special-status species, or a representative will be identified during the employee education program and the representative's name and telephone number provided to the fish and wildlife agencies.

If new construction personnel are added to the project, the contractor will require that the personnel receive the mandatory training and sign a sheet indicating their attendance and completion of the environmental training before starting work. The training sheets for new construction personnel will be provided to CDFW, USFWS, and NMFS, if requested.

3B.1.2 EC-2: Develop and Implement Hazardous Materials Management Plans

DWR will require that each project contractor responsible for construction of a project facility or project develop and implement a hazardous materials management plan (HMMP) before beginning construction. Multiple HMMPs will be prepared for the overall project construction activities, each considering site-specific conditions such as hazardous materials present on site and known historic site contamination. A database on known historic instances of contamination and results of any field inspections regarding the presence of hazardous chemicals will be maintained. The HMMPs will provide detailed information on the types of hazardous materials used or stored at all sites associated with the water conveyance facilities (e.g., intake pumping plants, maintenance facilities); phone numbers of applicable city, county, state, and federal emergency response agencies; primary, secondary, and final cleanup procedures; emergency-response procedures in case of a spill; and other applicable information. The HMMPs will include appropriate practices to reduce the likelihood of a spill of toxic chemicals and other hazardous materials during construction and facilities

[1] Under Section 9 of the Endangered Species Act, the term *take* means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct. Take includes the modification of a listed species' designated critical habitat. Under the California Endangered Species Act, *take* refers to mortality or injury of any fish, wildlife, or plant species that has been listed as endangered or threatened or designated as a candidate for listing, but not the modification of habitat for a listed species.

operation and maintenance. A specific protocol for the proper handling and disposal of hazardous materials will be established before construction activities begin, will be implemented during project construction, and will be enforced by DWR.

The HMMP will include, but not be limited to, the following measures or practices.

1. Fuel, oil, and other petroleum products will be stored only at designated sites.
2. Hazardous materials containment containers will be clearly labeled with the identity of the hazardous materials contained therein, handling and safety instructions, and emergency contact information.
3. Storage, use, or transfer of hazardous materials in or near wet or dry streams will be consistent with the Fish and Game Code (Section 5650) and/or with the permission of CDFW.
4. Material Safety Data Sheets will be made readily available to the contractor's employees and other personnel at the work site.
5. The accumulation and temporary storage of hazardous wastes will not exceed 90 days.
6. Soils contaminated by spills or cleaning wastes will be contained and removed to an approved disposal site by an appropriately-certified hazardous waste disposal contractor.
7. Hazardous waste generated at work sites, such as contaminated soil, will be segregated from other construction spoils and properly handled, hauled, and disposed of at an approved disposal facility by a licensed hazardous waste hauler in accordance with applicable law and regulations. The contractor will obtain permits required for such disposal.
8. Emergency spill containment and cleanup kits will be located at the work site. The contents of the kit will be appropriate to the type and quantities of chemical or goods stored at the work site.
9. Handling and disposal of roadway materials will follow existing standards and specifications.

3B.1.3 EC-3: Develop and Implement Spill Prevention, Containment, and Countermeasure Plans

DWR will require that each project contractor responsible for construction of a project facility or project develop and implement a spill prevention, containment, and countermeasure plan (SPCCP) for each project site (typically required to meet state and federal water quality requirements). Multiple SPCCPs will be prepared for project construction activities, each taking into account site-specific conditions. The SPCCPs will be developed in accordance with the regulatory requirements of Title 40 of the Code of Federal Regulations (CFR), Part 112, or the Spill Prevention, Control, and Countermeasure Rule under the Oil Pollution Act of 1990, which includes requirements for oil spill prevention, preparedness, and response to prevent oil discharges to navigable waters of the United States and adjoining shorelines. The rule requires the preparation, amendment and implementation of site-specific SPCCPs to prevent and respond to oil discharges that could affect navigable waters. The SPCCPs will be developed and implemented to minimize effects from spills of oil or oil-containing products[2] during project construction and operation. Each SPCC plan will address actions

[2] "Oil" includes a variety of petroleum and non-petroleum based substances including gasoline, diesel fuel, motor oil, hydraulic fluid, aviation fuel, oil-based paint, oil-based paint thinner, roofing tar, and petroleum-based solvents.

used to prevent spills in addition to specifying actions that will be taken should any spills occur, including emergency notification procedures.

The SPCCPs will include the following measures and practices.

1. Discharge prevention measures will include procedures for routine handling of products (e.g., loading, unloading, and facility transfers) (40 CFR § 112.7(a)(3)(i)).
2. Discharge or drainage controls will be implemented such as secondary containment around containers and other structures, equipment, and procedures for the control of a discharge (40 CFR § 112.7(a)(3)(ii)).
3. Countermeasures will be implemented for discharge discovery, response, and cleanup (both the facility's capability and those that might be required of a contractor) (40 CFR § 112.7(a)(3)(iii)).
4. Methods of disposal of recovered materials will comply with applicable legal requirements (40 CFR §112.7(a)(3)(iv)).
5. Personnel will be trained in emergency response and spill containment techniques, and will also be made aware of the pollution control laws, rules, and regulations applicable to their work.
6. Petroleum products will be stored in nonleaking containers at impervious storage sites from which an accidental spill cannot escape.
7. Absorbent pads, pillows, socks, booms, and other spill containment materials will be stored and maintained at the hazardous materials storage sites for use in the event of an accidental spill.
8. Contaminated absorbent pads, pillows, socks, booms, and other spill containment materials will be placed in nonleaking sealed containers until transport to an appropriate disposal facility.
9. When transferring oil or other hazardous materials from trucks to storage containers, absorbent pads, pillows, socks, booms or other spill containment material will be placed under the transfer area.
10. Refueling of construction equipment will occur only in designated areas that will be a minimum of 150 feet from surface waters and other sensitive habitats, such as wetlands.
11. Equipment used in direct contact with water will be inspected daily for oil, grease, and other petroleum products. All equipment must be cleaned of external petroleum products prior to beginning work where contact with water may occur to prevent the release of such products to surface waters.
12. Oil-absorbent booms will be used when equipment is used in or immediately adjacent to waters.
13. All reserve fuel supplies will be stored only within the confines of a designated staging area, to be located a minimum of 150 feet from surface waters and other sensitive habitats, such as wetlands.
14. Fuel transfers will take place a minimum of 150 feet from surface waters and other sensitive habitats, such as wetlands, and absorbent pads will be placed under the fuel transfer operation.
15. Staging areas will be designed to contain contaminants such as oil, grease, fuel, and other petroleum products so that should an accidental spill occur, they do not drain toward receiving waters or storm drain inlets.
16. All stationary equipment will be staged in appropriate staging areas and positioned over drip pans.

17. In the event of an accidental spill, personnel will identify and secure the source of the discharge and contain the discharge with sorbents, sandbags, or other material from spill kits and will contact appropriate regulatory authorities (e.g., National Response Center will be contacted if the spill threatens navigable waters of the United States or adjoining shorelines, as well as other appropriate response personnel).

Methods of cleanup may include the following.

18. Physical methods for the cleanup of dry chemicals include the use of brooms, shovels, sweepers, or plows.
19. Mechanical methods include, but may not be limited to, the use of vacuum cleaning systems and pumps.
20. Chemical methods include the use of appropriate chemical agents such as sorbents, gels, and foams.

3B.1.4 EC-4a: Develop and Implement Erosion and Sediment Control Plans

DWR will require all contractors prepare and implement erosion and sediment control plans[3] to control short-term and long-term erosion and sedimentation effects and to restore soils and vegetation in areas damaged by construction activities. Multiple erosion and sediment control plans will be prepared for project-related construction activities, each taking into account site-specific conditions such as proximity to surface water, erosion potential, drainage, etc. The plans will include all the necessary CGP requirements regarding erosion control and will specify BMPs for erosion and sediment control that are to be implemented during construction activities. These BMPs will be incorporated into the stormwater pollution prevention plans (SWPPPs) (see EC-4b: *Develop and Implement Stormwater Pollution Prevention Plans*).

Erosion control measures will include the following.

1. Install physical erosion control stabilization features (hydroseeding with native seed mix, mulch, silt fencing, fiber rolls, sandbags, and erosion control blankets) to capture sediment and control both wind and water erosion. Erosion control may not utilize plastic monofilament netting or similar materials.
2. Keep emergency erosion-control supplies onsite at all times during construction, and have the contractor(s) use these emergency stockpiles as needed. DWR and/or the contractors will require that supplies used from the emergency stockpiles are replaced within 48 hours. DWR will also require that materials used in construction of erosion control methods will be removed from the work site and properly disposed when no longer needed.
3. Design grading to be compatible with adjacent areas and minimize potential for disturbance of adjacent terrain and natural land features and minimize erosion in disturbed areas to the extent practicable.

[3] An erosion and sediment control plan is typically required for ground-disturbing projects as part of the National Pollutant Discharge Elimination System (NPDES)/SWPPP permitting process (U.S. Environmental Protection Agency 2007), depending on the size of the disturbed area. The Phase II EPA rules would cover project activities with 1 or more acres of ground disturbance.

4. Divert runoff away from steep, denuded slopes, or other critical areas with barriers, berms, ditches, or other facilities.
5. To the extent possible, retain native trees and vegetation to help stabilize hillsides, retain moisture, and reduce erosion.
6. Limit construction, clearing of native vegetation, and disturbance of soils to areas of proven stability.
7. To the extent possible, sequence clearing of native vegetation and disturbance of soils to minimize overall time of soil disturbance.
8. Implement construction management and scheduling measures to avoid exposure and mitigate erosion from rainfall events, runoff, or flooding at construction sites, to the extent feasible.
9. Conduct frequent site inspections (before, during, and after significant storm events) to confirm that control measures are intact and working properly and to correct problems as needed.
10. Install runoff and drainage control features (e.g., berms and swales, slope drains) as necessary to avoid and minimize erosion.
11. Install wind erosion control features (e.g., application of hydraulic mulch or bonded fiber matrix).
12. Watertight forms and other containment structures will be used to prevent spills or discharge of raw concrete, wash water, and other contaminants from entering surface waters and other sensitive habitats during overwater activities (e.g., casting of barge decks)

Sediment control measures will include:

13. Use sediment ponds, silt traps, wattles, berms, barriers, physical treatment facilities, or similar measures to slow water velocity and retain sediment transported by onsite run on or runoff.
14. Collect and direct surface run on and runoff at non-erosive velocities to onsite treatment facilities for storage and reuse as needed with controlled flows and velocities to drainage courses.
15. When ground-disturbing activities are required adjacent surface water, wetlands, or aquatic habitat, use sediment and turbidity barriers, treatment facilities, soil stabilization, and revegetation of disturbed surfaces.
16. Prevent mud from being tracked onto public roadways by installing gravel on primary construction ingress/egress points, rumble plates, and/or truck tire washing.
17. Deposit or store excavated materials away from drainage courses and apply soil stabilization materials if left in place for more than 5 days or storm events are forecast within 48 hours.

After construction is complete, site-specific restoration efforts will include grading, post construction BMPs for erosion control, and revegetation. Self-sustaining, local native plants that require little or no maintenance and do not create an extreme fire hazard will be used. All disturbed areas will be graded, recontoured to pre-project contours, as feasible, and seeded with a native seed mix. Consideration will also be given to additional replacement of or upgrades to drainage facilities to avoid and minimize erosion. Paved areas damaged by construction activities will be repaved to avoid erosion due to pavement damage. Once post construction BMPs are constructed and revegetation is appropriately established, a Notice of Termination will be filed with the State Water Board. DWR will apply for a long-term SWPPP permit with the Central Valley Water Board for operations of the intake, tunnel shaft, and Southern Complex or Bethany Complex sites that will include long-term erosion control plans.

3B.1.5 EC-4b: Develop and Implement Stormwater Pollution Prevention Plans

Project activities that disturb 1 or more acres of land have the potential to alter stormwater runoff. This includes project activities that require excavation, grading, or stockpiling material at project sites, which could result in temporary and/or permanent changes to drainage patterns, paths, and facilities that would, in turn, cause changes in drainage flow rates, directions, and velocities of runoff, or constituents of runoff. Construction sites for the intakes, tunnel shafts, concrete batch plants, Southern Complex, and Bethany Complex would include facilities to capture and divert all runoff, dewatering, and decant flows (from soil material storage areas) to on-site treatment facilities for direct on-site reuse or on-site storage. If these flows exceed the on-site reuse demand or storage capacities, the treated water would be discharged into adjacent water bodies. Construction sites for access roads and installation activities for electrical and SCADA connections would include methods described in this section to protect water quality of adjacent water bodies.[4]

DWR will require that the construction contractors implement measures, as described below, as part of the construction activities and in advance of any necessary permit(s). In accordance with this EC, DWR will require the preparation and implementation of stormwater pollution prevention plans (SWPPPs) to control short-term and long-term effects associated with construction-generated stormwater runoff. The SWPPPs will include all the necessary state requirements regarding construction-generated stormwater collection, detention, treatment, and discharge that will be in place throughout the construction period.

For the alternative selected, a series of separate but related SWPPPs will be prepared by a Qualified SWPPP Developer (QSD) and will be implemented under the supervision of a Qualified SWPPP Practitioner (for each construction site and/or each construction contract). As part of the procedure to gain coverage under the CGP, the QSD will determine the “Risk Level” (Levels 1, 2, or 3, or Types 1, 2, or 3 for linear underground/overhead projects) of the construction activities covered by a given SWPPP, which involves an evaluation of the site’s “Sediment Risk” and “Receiving Water Risk.” The risk level of the site will be determined based on the probability of a significant risk of causing or contributing to an exceedance of a water quality standard based on the construction activities to be performed, the existing water quality, soil and sediment conditions, without the implementation of additional requirements (pursuant to Order No. 2009-0009-DWQ as amended by Order Nos. 2010-0014-DWQ and 2012-2006-DWQ).

The risk is calculated separately for sediment and receiving water, with two risk categories for receiving water (low and high) and three risk categories for sediment risk (low, medium, and high). The overall project risk levels (1, 2, or 3) are then determined through a matrix, where Risk Level 1 applies to projects with low receiving water and sediment risks, Risk Level 3 for projects with high receiving water and sediment risks, and Risk Level 2 for all other combinations of sediment and receiving water risks. These project risk levels determine the level of protection (i.e., the BMPs to be

[4] These activities are regulated under the Construction General Permit for Construction and Land Disturbance Activities (Construction General Permit [CGP]) (Order 2010-0014-DWQ or any more recent version) issued from the State Water Resources Control Board (State Water Board). The CGP requires the development and implementation of a stormwater pollution prevention plan for NPDES permit coverage for stormwater discharges.

used) and monitoring that is required for the project. If the site is Risk Level 2 or 3, water sampling for pH and turbidity will be required and the SWPPP will specify sampling locations and schedule, sample collection and analysis procedures, and recordkeeping and reporting protocols. Other typical requirements for such situations are provided below under Risk Levels 2 and 3.

Table 3B-2 shows how varying sediment risk and receiving water risk combine to result in a given Risk Level for a given construction site.

Table 3B-2. Combined Risk Level Matrix

<table>
<tr><th colspan="2" rowspan="2"></th><th colspan="3">Sediment Risk</th></tr>
<tr><th>Low</th><th>Medium</th><th>High</th></tr>
<tr><td rowspan="2">Receiving Water Risk</td><td>Low</td><td>Level 1</td><td colspan="2">Level 2</td></tr>
<tr><td>High</td><td colspan="2">Level 2</td><td>Level 3</td></tr>
</table>

Changes in runoff characteristics associated with construction activities have the potential to be detrimental to special-status fish and wildlife species as well as aquatic habitat and natural communities associated with receiving waters, through changes in ambient water temperature, sediment, and pollutants resulting from stormwater runoff. The objectives of the SWPPPs will be to (1) identify pollutant sources associated with construction activities and operations that may affect the quality of stormwater and (2) identify, construct, and implement stormwater pollution prevention measures to reduce pollutants in stormwater discharges during and after construction. The SWPPP will be kept onsite during construction activity and operations and will be made available upon request.

The SWPPP will describe site topographic, soil, and hydrologic characteristics; construction activities and schedule; construction materials to be used, including sources of imported fill material, and other potential sources of pollutants at the construction site; potential non-stormwater discharges (e.g., trench dewatering); erosion and sediment control measures; "housekeeping" BMPs to be implemented; a BMP implementation schedule; a site and BMP inspection schedule; and ongoing personnel training requirements. The SWPPP will also include a hazardous materials management plan. These provisions are intended to prevent water quality degradation related to pollutant discharge to receiving waters and to prevent or constrain changes to the pH of receiving waters. Performance standards are expected to be specified in the CGP and will be met by implementing stormwater pollution prevention BMPs that are tailored to specific site conditions, including the Risk Level of individual construction sites. These measures mirror the requirements to gain and maintain coverage under the anticipated CGP. DWR will consult with the appropriate Regional Water Quality Control Board (RWQCB) or State Water Board to determine the appropriate aggregation of specific construction activities, or groups of activities, to be authorized under the CGP.

Multiple SWPPPs will be prepared for project-related construction activities, with a given SWPPP prepared to cover a particular water conveyance component (e.g., Southern Forebay), groups of components (e.g., intakes), and site-specific conditions (e.g., proximity to surface water, drainage). The risk level will be identified for each action covered by a specific SWPPP.

These SWPPPs will generally follow the U.S. Environmental Protection Agency (EPA) (2007) guidelines for such plans and would typically identify the following list of BMPs. These BMPs are requirements common to all Risk Level sites; however, some detail is provided in "Inspection and Monitoring" on various Risk Level requirements.

1. Erosion Control Measures.
    a. Implement effective wind erosion BMPs, such as watering, application of soil binders/tackifiers, and covering stockpiles.
    b. Provide effective soil cover for inactive areas and all finished slopes and utility backfill areas, such as seeding with a native seed mix, application of hydraulic mulch and bonded fiber matrices, and installation of erosion control blankets and rock slope protection.
2. Sediment Control Measures.
    a. Prevent transport of sediment at the construction site perimeter, toe of erodible slopes, soil stockpiles, and into storm drains.
    b. Capture sediment via sedimentation and stormwater detention facilities.
    c. Reduce runoff velocity on exposed slopes.
    d. Reduce off-site sediment tracking.
3. Management Measures for Construction Materials.
    a. Cover and berm inactive stockpiled construction materials.
    b. Store chemicals in watertight containers.
    c. Minimize exposure of construction materials to stormwater.
    d. Designate refueling and equipment inspection/maintenance locations.
    e. Control of drift and runoff from areas treated with herbicides, pesticides, and other chemicals that may be harmful to aquatic habitats.
4. Waste Management Measures.
    a. Prevent off-site disposal or runoff of any rinse or wash waters.
    b. Implement concrete and truck washout facilities and appropriately sized storage, treatment, and disposal practices.
    c. Require the containment of sanitation facilities (e.g., portable toilets).
    d. Clean or replace sanitation facilities (as necessary) and inspect regularly for leaks/spills.
    e. Cover waste disposal containers during rain events and at end of every day.
    f. Protect stockpiled waste material from wind and rain.
5. Construction Site Dewatering and Pipeline Testing Measures.
    a. Reclaim site dewatering discharges to the extent practicable, or use for other construction purposes (e.g., land application for dust control).
    b. Implement appropriate treatment and disposal of construction site dewatering from excavations to prevent discharges to surface waters, unless permitted by regulatory agencies to discharge to surface waters.
6. Accidental Spill Prevention and Response Measures.

a. Maintain equipment and materials necessary for cleanup of accidental spills onsite.

b. Clean up accidental spills and leaks immediately and dispose of properly.

c. Require that there are trained spill response personnel available.

7. Non-stormwater Management Measures.

a. Control all non-stormwater discharges during construction.

b. Wash vehicles in such a manner as to prevent non-stormwater discharges to surface waters.

c. Clean streets in such a manner as to prevent non-stormwater discharges from reaching surface water.

d. Discontinue the application of any erodible landscape material during rain, or within 2 days before a forecasted rain event.

8. Inspection and Monitoring Common to all Risk Levels.

a. Require that all inspection, maintenance, repair, and sampling activities at the construction site will be performed or supervised by a QSP representing the discharger.

b. Develop and implement a written site-specific Construction Site Monitoring Program (CSMP).

9. Inspection, Monitoring, and Maintenance Activities Based on the Risk Level of the Construction Site (as defined in the State Water Board CGP).

a. Risk Level 1 Sites:

1) Perform weekly inspections of BMPs, and at least once each 24-hour period during extended storm events.

2) At least 2 business days (48 hours) prior to each anticipated qualifying rain event (a rain event producing 0.5 inch or more of precipitation), visually inspect: (a) stormwater drainage areas to identify any spills, leaks, or uncontrolled pollutant sources; (b) all BMPs to identify whether they have been properly implemented in accordance with the SWPPP; and (c) stormwater storage and containment areas to detect leaks and require maintenance of adequate freeboard.

3) Visually observe stormwater discharges at all discharge locations within two business days (48 hours) after each qualifying rain event and identify additional BMPs as necessary, and revise the SWPPP accordingly.

4) Conduct minimum quarterly visual inspections of each drainage area for the presence of (or indications of prior) unauthorized and authorized non-stormwater discharges and their sources.

5) Collect one or more samples of construction site effluent during any breach, malfunction, leakage, or spill observed within the construction site during a visual inspection that could result in the discharge of pollutants to surface waters whether visually detectable or not.

b. Risk Level 2 Sites:

1) Perform all of the same visual inspection, monitoring, and maintenance measure specified for Risk Level 1 sites.

2) Perform sampling and analysis of stormwater discharges to characterize discharges associated with construction activity from the entire disturbed area at all discharge points where stormwater is discharged offsite.

3) At a minimum, collect and analyze a minimum of three samples per day for pH and turbidity during qualifying rain events. The CGP also requires the discharger to revise the SWPPP and to immediately modify existing BMPs and/or implement new BMPs such that subsequent discharges are below the relevant Numeric Action Levels (NALs) specified by the CGP. It may be a violation of the CGP if the discharger fails to take corrective action to reduce the discharge below these NALs specified by the CGP.

4) When an active treatment system is deployed on the site or a portion of the site, collect active treatment system effluent samples and measurements from the discharge pipe or another location representative of the nature of the discharge.

5) In the event that any effluent sample exceeds an applicable NAL, Risk Level 2 dischargers will submit all storm event sampling results to the State Water Board no later than 10 days after the conclusion of the storm event. The Regional Boards have the authority to require the submittal of an NAL Exceedance Report, which includes a description of the current BMPs associated with the effluent sample that exceeded the NAL and the proposed corrective actions taken.

c. Risk Level 3 Sites:

1) Perform all of the same visual inspection, monitoring, and maintenance measure specified for Risk Level 1 and Risk Level 2 sites.

2) In the event that a numeric effluent limitation (NEL) of the CGP (i.e., pH and turbidity), and has a direct discharge into receiving waters, the discharger will subsequently sample receiving waters for all parameter(s) monitored in the discharge. An exceedance of an NEL is considered a violation of the CGP, and the discharger must electronically submit all storm event sampling results to the State and Regional Water Boards via Stormwater Multiple Application and Report Tracking System (SMARTS) no later than 5 days after the conclusion of the storm event.[5]

3) If disturbing 30 acres or more of the landscape and discharging directly into receiving waters, conduct a benthic macroinvertebrate bioassessment of receiving waters prior to and after commencement of construction activities to determine if significant degradation to the receiving water's biota has occurred. However, if commencement of construction is outside of an index period (i.e., the period of time during which bioassessment samples must be collected to produce results suitable for assessing the biological integrity of streams and rivers) for the site location, the discharger will participate in the State of California's Surface Water Ambient Monitoring Program.

The SWPPP will also specify the forms and records that must be uploaded to the State Water Board online SMARTS, such as quarterly non-stormwater inspection and annual compliance reports.

[5] The State Water Board has suspended the applicability of Numeric Effluent Limitations (NELs) for pH and turbidity at Risk Level 3/LUP Type 3 construction sites. In addition, because receiving water monitoring is required only if the NELs are triggered, all receiving water monitoring requirements are also suspended. The Level 3/Type 3 NEL requirements are presented here assuming that such NELs will be reinstated when project construction commences.

If the QSP determines the site is Risk Level 2 or 3, water sampling for pH and turbidity will be required and the SWPPP will specify sampling locations and schedule, sample collection and analysis procedures, and recordkeeping and reporting protocols. In accordance with the CGP numeric action level requirements, the project contractor's QSD will revise the SWPPP and modify existing BMPs or implement new BMPs when effluent monitoring indicates that daily average runoff pH is outside the range of 6.5 to 8.5 and that the daily average turbidity is greater than 250 nephelometric turbidity units (NTUs). Such BMPs may include construction of sediment traps and sediment basins, use of Baker or other type tanks, installation of rock slope protection, covering of active stockpiles in event of rain, constructing desilting basins, and use of ATS. The ability of other areas to withstand excessive erosion and sedimentation may be increased by applying additional mulching, bonded fiber matrices, and erosion control blankets; reseeding with a native seed mix; and installation of additional fiber rolls, silt fences, and gravel bag berms. The QSD may also specify changes in the manner and frequency of BMP inspection and maintenance activities. The determination of which BMP should be applied in a given situation is very site-specific. QSDs typically refer to the California Stormwater Quality Association's *Stormwater Best Management Practice Handbook Portal: Construction* or the similar Caltrans manual for selecting BMPs for particular site conditions.

Additionally, if a given construction component is Risk Level 3, for that component DWR will report to the State Water Board when effluent monitoring indicates that daily average runoff pH is outside the range of 6.0 to 9.0 or the daily average turbidity is greater than 500 NTUs. In the event that the turbidity NEL is exceeded, DWR may also be required to sample and report to the State Water Board pH, turbidity, and suspended sediment concentration of receiving waters for the duration of construction.

The contractor will also conduct sampling of runoff effluent when a leak, spill, or other discharge of nonvisible pollutants is detected.

The CGP has specific monitoring and action level requirements for the Risk Levels, which are summarized in Table 3B-3.

Table 3B-3. SWPPP Monitoring and Action Requirements

	Risk Level/Type		
SWPPP Requirements	1	2	3
Minimum Stormwater and Non-Stormwater BMPs	✓	✓	✓
Numeric Action Levels (NAL) NAL for pH: 6.5–8.5 pH units NAL for turbidity: 250 NTU		✓	✓
Numeric Effluent Limitations (NEL) NEL for pH: 6–9 pH units NEL for turbidity: 500 NTU			✓
Visual Monitoring (weekly; before, during, after rain events; non-stormwater)	✓	✓	✓
Runoff Monitoring		✓	✓
Receiving Water Monitoring			✓

Note: The State Water Board has suspended the applicability of NELs for pH and turbidity at Risk Level 3/LUP Type 3 construction sites. In addition, because receiving water monitoring is required only if the NELs are triggered, all receiving water monitoring requirements are also suspended. The Level 3/Type 3 NEL requirements are presented here assuming that such NELs will be reinstated when project construction commences.

BMP = best management practices; pH = potential hydrogen; NTU = nephelometric turbidity unit.

The QSD preparing a SWPPP may include in the BMPs such as preservation of existing vegetation, perimeter control, seeding, mulching, fiber roll and silt fence barriers, erosion control blankets, protection of stockpiles, watering to control dust entrainment, rock slope protection, tracking control, equipment refueling and maintenance, concrete and solid waste management, and other measures to be in compliance with the pH and turbidity level requirements defined by the CGP. Partly because the potential adverse effect on receiving waters depends on location of a work area relative to a waterway, the BMPs will be site-specific. For example, BMPs applied to level island-interior sites will be different than BMPs applied to water-side levee conditions. The QSP will be responsible for day-to-day implementation of the SWPPP, including BMP inspections, maintenance, water quality sampling, and reporting to the State Water Board. If the water quality sampling results indicate an exceedance of NALs and Numeric Effluent Limitations (NELs) for pH and turbidity, as described above, the QSD will modify the type and/or location of the BMPs by amending the SWPPP in order to reduce pH, turbidity, and other contaminants to acceptable levels, consistent with CGP NALs and NELs and with the water quality objectives and beneficial uses set forth in the *Water Quality Control Plan (Basin Plan) for the Sacramento River Basin and the San Joaquin River Basin* (Central Valley Regional Water Quality Control Board 2018).

DWR will apply for a long-term SWPPP permit with the Central Valley Water Board for operations of the intake, tunnel shaft, and Southern Complex or Bethany Complex sites that will include long-term BMPs.

3B.1.6 EC-5: Develop and Implement a Fire Prevention and Control Plan

DWR will develop and implement a fire prevention and control plan in consultation with the appropriate fire suppression agencies to verify that the necessary fire prevention and response methods are included in the plan. The plan will include fire prevention and suppression measures as appropriate for different activities and will consider the policies and standards in the affected jurisdictions.

At a minimum, the following components, as applicable, will be included in the plan. If a component is not applicable to a specific activity, DWR or its contractor will explain in the plan why that component or a portion thereof is not included in the plan.

1. If a fire should start, the appropriate fire protection agencies will be contacted immediately.
2. Procedures and policies for controlling any fires that are on the work site, and other related fire prevention and control procedures developed in consultation with and fire protection agencies.
3. Procedures for regular maintenance of safeguards installed on heat-producing equipment to prevent the accidental ignition of combustible materials.
4. A list of all major potential fire hazards, proper handling and storage procedures for hazardous materials, potential ignition sources and their control, and the type of fire protection equipment necessary to control each potential major hazard.
5. Smoking will be allowed only in areas designated for smoking, and these areas will be cleared of vegetation, or in enclosed vehicles. Cigarette butts are to be disposed of in car ashtrays or other approved disposal containers and dumped daily in a proper receptacle off the work site.

6. The contractor will be responsible for maintaining appropriate fire suppression equipment at the work site including a water truck or fire truck with a water tank with a capacity of at least 3,000 gallons. Fire extinguishers, shovels, and other firefighting equipment will be available at work sites and on appropriate construction equipment. The contractor will be required to require that each construction vehicle on the work site will be equipped with a minimum 20-pound (or two 10-pound) fire extinguisher(s).
7. At the work site, a sealed fire toolbox will be located at a point accessible in the event of fire. This fire toolbox will contain: one back-pack pump-type extinguisher filled with water, two axes, two McLeod fire tools, and shovels so that employees at the work site can be equipped to fight fire.
8. Gasoline-powered construction equipment with catalytic converters will be equipped with shielding or other acceptable fire prevention features. Internal combustion engines will be equipped with spark arrestors.
9. Welding sites will include fire prevention provisions.
10. The contractor will maintain contact with local firefighting agencies throughout the fire season for updates on fire conditions, and such fire conditions will be communicated daily to the on-site employees of the contractor and subcontractors daily.

In addition to the plan, fire protection will conform to the State Fire Marshal requirements and will be in full compliance with Cal/OSHA standards for fire safety and prevention. Public road modifications will be designed per the county or state standards, which includes adequate widths for first responders. The project-only access roads would be designed with widths for large construction trucks, which would also be adequate for first responders and fire suppression equipment. Any fire hydrants will be located as deemed acceptable by the State Fire Marshal and will meet state government standards. Fire protection using water will be provided by a potable water system either from the nearest municipal clean water conveyance system or from a self-contained filtration and treatment system that takes water from an adjacent waterway or a site well or tank.

3B.1.7 EC-6: Conduct Cultural Resources Awareness Training

Prior to the start of ground disturbance, a qualified DWR archaeologist will conduct a mandatory cultural resources awareness training for all personnel involved in ground-disturbing work about cultural resources sensitivity in the project footprint and cultural resources that could be encountered during work. Cultural resources awareness training will also be conducted for all operations and maintenance staff. Participants will be required to sign a form stating that they have received and understand the training. DWR will maintain the record of training and make it available to interested parties, including but not limited to State Historic Preservation Officer, the Advisory Council on Historic Preservation, local historical societies, and other interested parties such as local preservation and community organizations with a demonstrated interest in the resource, upon request. The project foreman will require that the new personnel brought onto the project receive the mandatory training before starting work.

In general, trainings will include the following components:

1. The need and legal requirements for resource avoidance and protection.
2. Types of materials that could indicate the presence of an archaeological resource.

3. Brief discussion of the cultural context for the area.
4. Roles and responsibilities, including an explanation regarding the authority of archaeological monitors to stop work if needed.
5. What to do when archaeological resources or human remains are encountered in work areas.
6. Avoidance and minimization commitments.
7. Consequences of violations of the laws and regulations protecting resources.

3B.1.8 EC-7: Off-Road Heavy-Duty Engines

DWR will require all relevant equipment to utilize EPA certified Tier 4 Final or more advanced engines, if commercially available. A copy of each unit's certified tier specification, emissions rating and any required California Air Resources Board (CARB) or air pollution control district operating permit will be made available to DWR at the time of mobilization of each piece of equipment. Each contractor will keep a written record (supported by equipment-hour meters where available) of equipment usage during project construction and maintenance for each piece of equipment. Each contractor will provide DWR with monthly and annual reports of equipment operating hours documenting compliance. 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 and earns a track-record for reliability in real-world construction conditions and become cost effective.

All diesel equipment will be required to meet the following standards.

1. Use renewable diesel fuel meeting the most recent ASTM D975 specification for Ultra Low Sulfur Diesel and having a carbon intensity no greater than 50% of diesel with the lowest carbon intensity among petroleum fuels sold in California. This criterion may not be practicable at smaller road modification construction sites. Each contractor will provide DWR with monthly and annual reports of renewable diesel purchase records and equipment and vehicle fuel consumption. Exemptions to use traditional diesel can be made where renewable diesel is not available from suppliers within 200 miles of the project site. Contractors must identify the quantity of traditional diesel purchased and fully document the availability and price of renewable diesel to meet project demand.
2. Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes [California Code of Regulations, Title 13, sections 2449(d)(3) and 2485]. Provide clear signage that posts this requirement for workers at the entrances to the site.

3B.1.9 EC-8: On-Road Haul Trucks

DWR will require all contractors to use diesel trucks that have model year engines manufactured or retrofitted ideally within the past five years of when the vehicles are brought to the individual construction or maintenance sites, but no more than eight years from overall project groundbreaking (currently projected as 2026). Each contractor will provide DWR with monthly and annual reports documenting compliance. DWR will consider use of electric or hybrid-electric vehicles over diesel counterparts to the extent that they become commercially available and earns a track-record for reliability in real-world construction conditions and become cost effective.

3B.1.10 EC-9: On-Site Locomotives

DWR will require all locomotives operating within Twin Cities Complex, Southern Complex, and/or Lower Roberts Island to utilize EPA certified Tier 4 or more advanced engines. A copy of each unit's certified tier specification and any required California Air Resources Board (CARB) or air pollution control district operating permit will be made available to DWR at the time of mobilization of each locomotive. Each contractor will keep a written record (supported by engine-hour meters where available) of locomotive usage during project construction. Each contractor will provide DWR with monthly and annual reports of locomotive operating hours documenting compliance.

3B.1.11 EC-10: Marine Vessels

DWR will require all marine vessels to operate engines no older than model year 2010 (manufactured or retrofitted). A copy of each vessel's engine specifications will be made available to DWR at the time of mobilization of each vessel. Each contractor will keep a written record (supported by engine-hour meters where available) of engine usage during project construction. Each contractor will provide DWR with monthly and annual reports of engine operating hours documenting compliance.

3B.1.12 EC-11: Fugitive Dust Control

DWR will require all contractors employ the following measures to minimize and control fugitive dust emissions.

1. Water exposed soil during active construction with adequate frequency for continued moist soil and to prevent visible dust from leaving work areas. Frequency of watering will be increased during especially dry or windy periods or in areas with high construction activity. Active work areas include (but are not limited to), graded areas, excavation areas, and demolition sites.
2. Gravel and cover all onsite vehicle travel routes with chip-seal, or apply dust suppressants (e.g., Soil-Sement, Pennz Suppress) on all un-graveled travel routes. Onsite vehicle travel routes include (but are not limited to), staging areas, access roads, and haul areas.
3. Apply and maintain an organic biopolymer tackifier on all stockpiles during active use.
4. Cover or maintain at least 2 feet of freeboard space on haul trucks and rail cars transporting soil, sand, or other loose material on the site. Haul trucks and rail cars transporting soil, sand, or other loose material that will be traveling along freeways, major roadways, or railways will be covered.
5. If practicable, install wind breaks (e.g., plant trees, solid fencing) on the average dominant windward side(s) of construction areas. For purposes of implementation, chain-link fencing with added landscape mesh fabric adequately qualifies as solid fencing.
6. Enclose all mechanical dryers and outdoor conveyors.
7. Plant vegetative ground cover (native grass/plant seed) in disturbed areas (including stockpiles) as soon as reasonable after construction is completed. Water appropriately until vegetation is established.

8. Promptly finish and/or protect and maintain all disturbed areas in a manner to control fugitive dust. Mulch, dust palliative, soil binders, or other reasonable measures will be used in all inactive areas.
9. Establish and enforce a 15-mph speed limit for vehicles driving on unpaved portions of project construction sites.
10. Use wet power vacuum street sweepers to remove any visible trackout mud or dirt onto adjacent public roads at least once a day. Use of dry power sweeping is prohibited.
11. Install rattle plates, stabilized construction entrances/exits at construction exits, where feasible. Install tire wheel wash facilities at construction sites with entrances and exits, where feasible.
12. Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person will respond and take corrective action within 48 hours. The phone number of the air quality management district will also be visible to confirm compliance.

3B.1.13 EC-12: On-Site Concrete Batching Plants

DWR will require that the following measures be implemented to control fugitive dust emissions during concrete batching activities.

1. Apply best available control technology (BACT) (e.g., water and/or chemical suppressants) to reduce fugitive dust emissions from active storage piles and during aggregate and sand delivery, storage, and transfer.
2. Apply BACT (e.g., water sprays, enclosures, hoods, curtains, shrouds, movable and telescoping chutes, central dust collection systems) to reduce fugitive dust emissions during cement delivery and hopper and central mix loading.

Prior to beginning operations, batch plant managers must provide to DWR documentation that each batch plant meets this standard during operation.

3B.1.14 EC-13: DWR Best Management Practices to Reduce GHG Emissions

DWR will require all construction contractors to implement the following applicable greenhouse gas (GHG) BMPs, which are outlined in DWR's *Climate Action Plan Phase I: Greenhouse Gas Emissions Reduction Plan Update 2020* (California Department of Water Resources 2020).

3B.1.14.1 Preconstruction and Final Design BMPs

Pre-construction and final design BMPs are designed to ensure that individual projects are evaluated, and their unique characteristics taken into consideration when determining if specific equipment, procedures, or material requirements are feasible and efficacious for reducing GHG emissions from the project.

1. **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.

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

3. **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.

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

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

6. **BMP 6**. Limit deliveries of materials and equipment to the site to off peak traffic congestion hours.

3B.1.14.2 Construction BMPs

Construction BMPs apply to all construction and maintenance projects that DWR completes or for which DWR issues contracts. All projects are expected to implement all Construction BMPs unless a variance is granted by the Division of Engineering Chief, Division of Operation and Maintenance Chief, or Division of Flood Management Chief, as applicable, and the variance is approved by the DWR CEQA Climate Change Committee. Variances will be granted when specific project conditions or characteristics make implementation of the BMP infeasible and where omitting the BMP will not be detrimental to the project's consistency with the *Climate Action Plan Phase I: Greenhouse Gas Emissions Reduction Plan Update 2020* (California Department of Water Resources 2020).

1. **BMP 7.** Minimize idling time by requiring that equipment be shut down after five minutes when not in use (as required by the State airborne toxics control measure [13 CCR Section 2485]). Provide clear signage that posts this requirement for workers at the entrances to the site and provide a plan for the enforcement of this requirement.

2. **BMP 8.** Maintain all construction equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer's recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of all engine and emissions systems in proper operating condition. Maintenance schedules will be detailed in an Air Quality Control Plan prior to commencement of construction.

3. **BMP 9.** Implement tire inflation program on jobsite to confirm that equipment tires are correctly inflated. Check tire inflation when equipment arrives on site and every two weeks for equipment that remains on site. Check vehicles used for hauling materials off site weekly for correct tire inflation. Procedures for the tire inflation program will be documented in an Air Quality Management Plan prior to commencement of construction.

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

5. **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.

6. **BMP 12.** For deliveries to project sites where the haul distance exceeds 100 miles and a heavy-duty class 7 or class 8 semi-truck or 53-foot or longer box type trailer is used for hauling, a SmartWay[6] certified truck will be used to the maximum extent feasible.
7. **BMP 13.** Minimize the amount of cement in concrete by specifying higher levels of cementitious material alternatives, larger aggregate, longer final set times, or lower maximum strength where appropriate.
8. **BMP 14.** Develop a project specific construction debris recycling and diversion program to achieve a documented 50 percent diversion of construction waste.
9. **BMP 15.** Evaluate the feasibility of restricting all material hauling on public roadways to off-peak traffic congestion hours. During construction scheduling and execution, minimize, to the extent possible, uses of public roadways that are not designated as construction haul routes during peak commuting hours.

3B.1.15 EC-14: Construction Best Management Practices for Biological Resources

DWR will require all construction and restoration activities in and adjacent to suitable habitat for special-status species and sensitive natural communities implement BMPs and have construction monitored by qualified biologists (experience with the resources and environmental compliance training and monitoring). Depending on the resource of concern and construction timing, construction activities and areas will be monitored for compliance with water quality regulations (SWPPP monitor, see EC-4b) and with resource-specific mitigation measures developed for sensitive biological resources (biological monitoring).

Before initiating construction, DWR or its contractor, with DWR approval, will prepare a site or activity-specific environmental compliance monitoring plan to monitor, enforce, and document implementation of measures to protect special-status fish, wildlife, plant species, and their habitats, designated critical habitat, and sensitive natural communities. The plan will include the following elements.

1. Reference to or inclusion of the SWPPP prepared under the CGP, where one is needed. (See EC-4b, Develop and Implement Stormwater Pollution and Prevention Plans.)
2. Summaries or copies of planning and preconstruction surveys (if applicable) for natural communities and special-status species.
3. Description of mitigation measures to be implemented, including a description of site or activity-specific BMPs or additional measures not otherwise included in the project.
4. Descriptions of monitoring parameters (e.g., turbidity), including the specific activities to be monitored (e.g., dredging, grading activities) and monitoring frequency and duration as well as

[6] The U.S. Environmental Protection Agency (EPA) has developed the SmartWay truck and trailer certification program to set voluntary standards for trucks and trailers that exhibit the highest fuel efficiency and emissions reductions. These tractors and trailers are outfitted at point of sale or retrofitted with equipment that significantly reduces fuel use and emissions including idle reduction technologies, improved aerodynamics, automatic tire inflation systems, advanced lubricants, advanced powertrain technologies, and low rolling resistance tires. EPA Smartway (https://www.epa.gov/smartway).

parameters and reporting criteria (e.g., turbidity is not to exceed 10 NTUs above background. Exceedances will be reported and the contractor must identify and correct the cause.).

5. Description of roles and responsibilities of the monitors and protocols for notifying CDFW, NMFS, and USFWS, if needed.

6. A daily monitoring log prepared by the monitor, which documents the day's construction activities, notes any problems identified and solutions implemented to rectify those problems, and document notifications of the construction superintendent and/or the fish and wildlife agencies regarding any exceedances of specific parameters (i.e., turbidity) or observations of special-status species. The monitoring log will also document construction start/end times, weather and general site conditions, and any other relevant information.

The following measures will be implemented prior to and during construction activities and field investigations for the protection of special-status fish, wildlife and plant species and their habitats, designated critical habitats, and sensitive natural communities.

Additional measures may be developed for site-specific conditions or specific biological resources during the review and preconstruction planning of individual work areas.

7. All in-water construction activities where special-status species are known or have a potential to occur will be conducted during the allowable in-water work windows established by the USFWS, NMFS, and CDFW for the protection of special-status fish or wildlife species. With regard to impact pile driving, work windows for the north Delta intakes may be lengthened subject to NMFS, CDFW, and USFWS approval based on success of bubble curtain or other noise attenuation method (see Mitigation Measure AQUA-1a: *Develop and Implement an Underwater Sound Control and Abatement Plan* in Mitigation Measure CMP: *Compensatory Mitigation Plan*) and real-time monitoring for fish presence. In-water activities with mobilization and demobilization (e.g., initial movement of materials to construction sites) are not subject to the work windows. Any in-water work may occur within a cofferdam, or behind the sheet pile training walls, regardless of the timing of in-water work windows[7]. Any extension/reduction of in-water work windows would focus on half-month increments.

    a. Geotechnical exploration: August 1 to October 31.

    b. North Delta intakes: June 1 to October 31, except that in-water impact pile driving is unlimited during the period June 15 to September 15, and in-water impact pile driving is subject to the conditions noted above for the periods from June 1 to June 15 and September 15 to October 31.

    c. Modified bridges: June 1 to October 31, except that in-water impact pile driving is unlimited during the period June 15 to September 15.

    d. California Aqueduct (between Skinner Fish Facility and Banks Pumping Plant) and Delta-Mendota Canal (between Tracy Fish Collection Facility and Jones Pumping Plant): January 1 through December 31.

    e. Work in the Delta except for the north Delta intakes, modified bridges, and California Aqueduct and Delta-Mendota Canal: August 1 to October 31.

[7] There is no impact pile driving proposed within cofferdams or behind training walls.

8. Qualified biologists will monitor construction activities in areas identified during the planning stages and species/habitat surveys as having special-status fish, wildlife, and plant species or their habitats, designated critical habitat, and sensitive natural communities. The intent of the biological monitoring is to confirm that specific measures that have been integrated into the project design and permit requirements are being implemented correctly during construction and are working appropriately and as intended for the protection of special-status species, natural communities, and the environment in general.

9. Biological monitors will be professional biologists selected for their knowledge of the special-status species and natural communities that may be affected by construction activities. The qualifications of the biologist(s) will be presented to the fish and wildlife agencies for review and written approval, consistent with permits and authorizations. If a special-status species is observed in an active work area, the biological monitors will immediately provide the construction manager and contractor with its location and recommendations to address the species' presence and steps necessary to ensure the protection of the species consistent with permits and authorizations.

10. During construction, the non-disturbance buffers described under the special-status species' mitigation measures in Chapter 13, *Terrestrial Biological Resources*, of this Draft EIR, will be established and maintained as necessary. A qualified biologist will monitor the site consistent with the requirements described for special-status species to enforce buffers and non-disturbance of sensitive resources.

11. Active construction and staging areas will be delineated with high-visibility temporary fencing at least 4 feet in height, flagging, or other barrier to prevent encroachment of construction personnel and equipment outside the defined project footprint. The location of fencing will be included in construction plans and/or EC sheets. Such fencing will be inspected and maintained daily by the construction foreman until completion of the project. Status of the fencing will also be verified and documented by the biological monitor. The fencing or flagging will be removed from areas after all construction activities have ceased and equipment is removed. No project-related construction activities will occur outside the delineated project construction areas.

12. Project-related vehicles will observe a maximum speed limit of 15 miles per hour on unpaved non-public construction access roads and in construction sites where it is safe and feasible to do so. Paved, non-public construction access roads will observe a maximum speed limit of 30 miles per hour. Speeds limits will be posted in both directions and will be enforced. In areas adjacent to suitable habitat, signage would be provided for extra caution to be used on cool days when giant garter snake may be basking on roads and on rainy nights when California tiger salamander and California red-legged frog are most likely to be moving between breeding and upland habitats. Vehicles will observe a nighttime speed limit of 10 miles per hour in construction sites within the Southern Complex and Bethany Complex that are adjacent to suitable habitat for California red-legged frog, California tiger salamander, and San Joaquin kit fox to avoid potential vehicle strikes.

13. All ingress/egress at the project site will be restricted to those routes identified in the project plans and description. Cross-country access routes will be clearly marked in the field with appropriate flagging and signs.

14. All vehicle parking will be restricted to established areas, existing roads, or other suitable areas.

15. To avoid attracting predators, all food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in enclosed containers and trash will be removed and disposed of at an appropriate facility at least once a week from the construction or project site. All contracts with contractors will include language reminding them of the obligations to abide by all laws related to litter. These obligations will be applicable both within work areas and while traveling along public roads within the project area. Vehicles carrying trash will be required to have loads covered and secured to prevent trash and debris from falling onto roads and adjacent properties.

16. To avoid injury or death to wildlife, no firearms will be allowed on the project site except for those carried by authorized security personnel or local, state, or federal law enforcement officials.

17. To prevent harassment, injury, or mortality of sensitive wildlife by dogs or cats, no pets will be permitted in the active construction area.

18. To prevent inadvertent entrapment of special-status wildlife during construction in areas that may be occupied by wildlife at risk for entrapment, all excavated, steep-walled holes or trenches more than 6 inches deep will be covered at the close of each working day with plywood or similar material, and/or provided with one or more escape ramps constructed of earth fill or wooden planks, where feasible. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals.

19. If a special-status species is encountered during construction work, including dewatering, generally construction activities should be diverted away from the animal or, depending upon the conditions and specification in the relevant environmental documents and permits, work will cease until it moves out of the work area on its own or is relocated by a qualified biologist, following the species-specific mitigation measures appearing in the environmental documents and relevant permits. The monitor's authority to stop work will depend on the species encountered and the specific requirement of the relevant environmental documents and permits.

20. Capture and relocation of trapped or injured special-status wildlife can only be performed by personnel with appropriate USFWS and CDFW handling approvals. Any sightings and any incidental take will be reported to CDFW and USFWS via email within 1 working day of the discovery. A follow-up report will be sent to these agencies, including dates, locations, habitat description, and any corrective measures taken to protect special-status species encountered. For each special-status species encountered, the biologist will submit a completed CNDDB field survey form (or equivalent) to CDFW no more than 90 days after completing the last field visit to the project site.

21. Plastic monofilament netting or similar material will not be used for erosion control, because smaller wildlife may become entangled or trapped in it. Acceptable substitutes include coconut coir matting, burlap-wrapped straw wattles, or tackified hydroseeding compounds. This limitation will be communicated to the contractor through specifications or special provisions included in the construction bid solicitation package.

22. Wildlife, including special-status wildlife and their predators, can be attracted to den-like structures such as debris piles or pipes and may enter stored pipes and become trapped or injured. All pipes and culverts stored in the open will have their ends capped. Debris piles should be kept to a minimum and removed regularly. All construction, construction equipment,

or construction debris left overnight in areas that may be occupied by wildlife that could occupy such structures will be inspected by the biological monitor prior to being used for construction. Such inspections will occur at the beginning of each day's activities, for those materials to be used or moved that day.

23. CDFW, NMFS and/or USFWS will be notified within 1 working day of the discovery of, injury to, or mortality of a special-status species that results from project-related construction activities or is observed at the project site. Notification will include the date, time, and location of the incident or of the discovery of an individual special-status species that is dead or injured. For a special-status species that is injured or killed, general information on the type or extent of injury or likely cause of death will be included. The location of the incident will be recorded using a GPS and the coordinates will be made available upon requests by CDFW, NMFS and/or USFWS. The biologist is encouraged to include any other pertinent information in the notification. All observations of special-status species will be reported to the California Natural Diversity Database.

24. Rodenticides and herbicides will be used in accordance with the manufacturer recommended uses and applications and in such a manner as to prevent primary or secondary poisoning of special-status fish, wildlife, and plant species and depletion of prey populations upon which they depend. All uses of such compounds will observe label and other restrictions mandated by EPA, the California Department of Pesticide Regulation, and other appropriate state and federal regulations, as well as additional project-related restrictions imposed by USFWS, NMFS and/or CDFW. If rodent control must be conducted in San Joaquin kit fox habitat, zinc phosphide should be used because of its proven lower risk to kit fox. Use of pesticides may be limited in other species-specific instances as well. In addition, the method of rodent control will comply with those discussed in the 4(d) rule published in the final listing rule for California tiger salamander (69 *Federal Register* [FR] 47211–47248).

25. The most recent available standard methods for species capture and handling, as well as species specific authorizations, will be used to capture and handle special-status fish or wildlife species. A professional biologist, with appropriate USFWS and CDFW handling approvals, will be responsible for and direct any efforts to capture and handle special-status species. Any person who captures and handles special-status species will ensure their hands are free of soaps, oils, creams, lotions, insect repellents, solvents or other potentially harmful chemicals and if not single use, nitrile or other hypo-allergenic gloves (non-latex) will be used for handling special-status fish or wildlife. To avoid transferring diseases or pathogens between aquatic habitats during the course of surveys or the capture and handling of special-status fish or wildlife species, all species captured and handled will be released in a safe, aquatic environment as close to the point of capture as possible When capturing and handing special-status amphibians, the biologists will follow the Declining Amphibian Population Task Force's *Fieldwork Code of Practice* (U.S. Fish and Wildlife Service n.d.) or the most current applicable guidance. While in captivity, individual amphibians will be kept in a cool, moist, aerated environment such as a dark (e.g., green or brown) bucket containing a damp sponge. Containers used for holding or transporting these species will be sanitized and will not contain any standing water, unless transporting larvae or fish species.

26. The qualified biologist(s) will maintain monitoring records that include (1) the beginning and ending time of each day's monitoring effort; (2) a statement identifying the species encountered, including the time and location of the observation; (3) the time the specimen was identified and by whom and its condition; (4) the capture and release locations of each individual; (5)

photographs and measurements of each individual; and (6) a description of any actions taken. The biologist(s) will maintain complete records in their possession while conducting monitoring activities and will immediately provide records to USFWS, CDFW, and NMFS upon request. If requested, all monitoring records will be provided to agencies according to the reporting requirements of the relevant permits.

27. Permanent and temporary construction disturbances and other types of ongoing project-related disturbance activities in suitable habitat for special-status species will be minimized by adhering to the following activities. Project designs will limit or cluster permanent project features to the smallest area possible while still permitting achievement of project goals. To minimize temporary disturbances, all project-related vehicle traffic and material storage will be restricted to established and/or designated ingress/egress points, construction areas, and other designated staging/storage areas. These areas will also be included in preconstruction surveys and, to the extent possible, will be established in locations disturbed by previous activities to prevent further effects.

28. Geotechnical investigations taking place on land over tunnel sections where there will be no surface disturbance during construction will avoid citing test trenches, CPTs, and borings in aquatic features, to the extent possible. This measure would not apply to the West Tracy Fault studies because these investigations need to take place along the fault alignment to gather the necessary information to support future designs.

29. After construction is complete in areas temporarily impacted (i.e., those with impacts lasting less than 1 year), they will be restored within 1 year to their pre-project conditions, including grade and hydrology. Areas to be restored to grassland will be reseeded with noninvasive native mix of grasses and flowering forbs. Revegetation will take place during the appropriate time of year for the species being planted.

30. All equipment used for construction and habitat creation, enhancement, and management will be cleaned prior to entering work areas and before moving between work areas.

31. Equipment to be used in aquatic habitats will be thoroughly cleaned and inspected for aquatic invasive plant propagules and animal species before entering aquatic habitats.

3B.1.16 EC-15: Sediment Monitoring, Modeling, and Reintroduction Adaptive Management

It is estimated that any one of the project alternatives would entrain 4%–6% of the sediment load entering the Delta from the Sacramento River, which could have limited negative effects on turbidity and therefore on delta smelt habitat (see Impact AQUA-6: *Effects of Operations and Maintenance of Water Conveyance Facilities on Delta Smelt* in Chapter 12, *Fish and Aquatic Resources*). A multi-step process to assess and minimize potential negative effects will be implemented where necessary. The process will include multi-year monitoring and estimation of sediment entrainment during initial operations following north Delta diversion (NDD) construction; monitoring and modeling of potential effects relative to performance criteria based on the sediment entrainment estimates; and development and implementation of a sediment reintroduction plan should performance criteria have been exceeded. The process will be implemented by DWR and the permitting fish agencies (NMFS, USFWS, and CDFW) will have approval authority for products developed during the process (e.g., monitoring plans and annual reports).

The monitoring program will be the first step in the adaptive management process and will involve monitoring and estimating sediment entrainment during the first several years of operations following NDD construction. Monitoring duration will be subject to input from agency review and independent peer review but is anticipated to be at least 5 years to account for hydrological variability. Methods for estimating sediment entrainment will be determined during the planning phase and may include measurement of suspended sediment concentration and flow in the Sacramento River upstream and downstream of the NDD, as well as in the water diverted by each intake. Annual monitoring plans and results reporting will receive initial and periodic independent peer reviews facilitated by the Delta Science Program, and will be subject to approval by NMFS, USFWS, and CDFW.

The second step of the process will involve monitoring and modeling of potential effects relative to performance criteria. The specifics of the performance criteria will be developed with the input of the permitting fish agencies and independent peer review. The performance criteria are expected to include assessments of habitat indicators such as the percentage of time that turbidity at monitoring stations exceeds an established threshold (e.g., 12 nephelometric turbidity units; Sommer and Mejia 2013). To account for the likely variability in sediment delivery caused by operations (i.e., sediment entrainment) and other factors (e.g., contribution of sediment from other tributaries), sediment modeling (e.g., using methods from Bever et al. 2018) will be used to approximate the incremental effects of operations given the estimates of sediment entrainment made during the first step of the process. Assessments of achievement of performance criteria will receive independent scientific peer review and will be subject to approval by NMFS, USFWS, and CDFW.

If the monitoring and modeling estimates of the second step indicate exceedance of performance criteria attributable to operations, the third step of the proposed process will be initiated. This step will involve development and implementation of a sediment reintroduction plan within 5 years of the end of step two. This plan will aim to reintroduce sediment to allow performance criteria to be met. Sources of sediment to be reintroduced may include proposed facilities (e.g., the NDD sediment lagoons), existing facilities (e.g., Clifton Court Forebay), or locations unrelated to the project alternatives, and will account for factors such as sediment composition to meet performance criteria (e.g., fine particles for turbidity) and reintroduction location. Subject to approval by NMFS, USFWS, and CDFW, alternative means of achieving performance criteria may also be considered (e.g., restoration of turbid tidal habitat in the vicinity of areas that do not appear to be achieving performance standards). Modeling (e.g., using methods such as those of Bever and MacWilliams 2018, Bever et al. 2018) may be used to optimize sediment reintroduction locations relative to performance criteria to be achieved. The sediment reintroduction plan will be prepared to meet required permitting standards from the Central Valley Water Board and USACE. The sediment reintroduction approach will be consistent with objectives for turbidity in the Central Valley Water Board's Water Quality Control Plan for the Sacramento River and San Joaquin River Basins. The permitting fish agencies and independent peer review facilitated by the Delta Science Program will review and provide input on the proposed sediment reintroduction plan and annual reports of its implementation and monitoring to assess achievement of performance standards. The sediment reintroduction plan and reports of its implementation and effectiveness will be subject to approval by NMFS, USFWS, and CDFW.

3B.1.17 EC-16: Provide Notification of Construction and Maintenance Activities in Waterways

DWR will notify agencies, including the U.S. Army Corps of Engineers, the Department of Boating and Waterways, and the U.S. Coast Guard, before in-water construction or maintenance activities begin and will notify appropriate fish and wildlife agency representatives and others when these activities could affect water quality or aquatic species. The notification procedures will follow stipulations included in applicable permit documents for the construction. In general, the notification information will be provided in multiple languages and will include site location(s), schedules, and work activities (see Section C1.1.15, *EC-14: Construction Best Management Practices for Biological Resources*, for additional information regarding in-water work windows). Information on detours would include site-specific details regarding any temporary partial channel closures, including contacting other agencies and organizations, such as the U.S. Coast Guard, boating organizations, marina operators, city or county parks departments, and the California Department of Pesticide Regulation, where applicable. Before maintenance activities begin in waterways, DWR will require the posting of information regarding the maintenance of any in-water project facilities (e.g., intakes for the water conveyance facility) at nearby affected Delta marinas and public launch ramps. This information will include maintenance site location(s), maintenance schedules, speed limits, and identification of no-wake zone and/or detours, where applicable. Information on detours would include site-specific details regarding any temporary partial channel closures, including contacting the U.S. Coast Guard, boating organizations, marina operators, city or county parks departments, and California Department of Parks and Recreation, where applicable.

3B.1.18 EC-17: Pursue Solar Electric Power Options at Conveyance Facility Sites

DWR will pursue solar panel development at various locations along conveyance facility sites such as the tunnel launch shaft sites, reception and maintenance shaft sites, and on flat -roofed buildings at the Southern Complex and Bethany Complex pumping plant sites. Options will be evaluated to ensure they are logistically, economically, and environmentally feasible prior to final design and implementation. Solar power generated at these sites would be used for operating conveyance and appurtenant facilities.

3B.1.19 EC-18: Minimize Construction-Related Disturbances to Delta Community Events and Festivals

DWR will require the construction contractor coordinate with the Ombudsman to identify Delta community events and festivals that could be disturbed by construction activity (See *Sources of Contributions to the Delta Region Economy,* in Chapter 17, *Socioeconomics* and Table 16-5, Annual Community-Based Delta Recreation Events, in Chapter 16, *Recreation*). In coordination with the Ombudsman, the contractor will prepare a site or activity-specific plan to minimize and avoid construction-related disturbances, such as noise and traffic, where feasible. Specific actions could include limiting, re-routing, or avoiding truck hauling during festivals and events and developing an event specific traffic management plan to address traffic congestion. In addition, depending on the location of the event relative to the area of construction at the time, reduced construction-hours may be implemented and/or other avoidance measures (e.g., additional screening or fencing) to limit exposure of festival attendees by construction activities.

3B.2 References Cited

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Appendix C2
Mitigation Measures

This appendix documents the mitigation measures which will be implemented as part of the action alternatives. References for citations appearing in mitigation measure text can be found in Appendix A, *References*.

3.1 Aesthetics

Mitigation Measure AES-1a: Install Visual Barriers between Construction Work Areas and Sensitive Receptors

All Project Alternatives

1. To reduce the impact on sensitive receptors from the change in existing visual quality, DWR will require installation of temporary visual barriers at the construction work areas with direct line-of-sight from sensitive receptors. Barriers will be placed to obscure views of work areas where construction activity and equipment would be disruptive and lower the existing visual quality. These efforts will include the following actions and performance standards to be applied to the extent feasible and practicable.
    - Visual barriers will be installed to minimize sensitive viewers (i.e., residents and recreational areas) views of construction work areas.
    - The visual barriers will be placed to protect residents and recreational areas that are located within 0.25 mile of a project construction site and where views to the work areas represent a significant visual impact.
    - The visual barrier may include chain link fencing with privacy slats, fencing with windscreen material, silt fence, wood or concrete barrier, or other similar barrier.
    - The visual barrier will be a minimum of 6 feet high to help maintain the privacy of residents and block long-term ground-level views toward construction activities.

    While the visual barriers would introduce a visual intrusion, they would reduce the visual effects associated with visible construction activities and screening construction activities and protecting privacy is deemed desirable. The visual barriers are an effective means of reducing the visibility of active construction work areas, thereby minimizing the impact on existing localized visual quality.

Mitigation Measure AES-1b: Apply Aesthetic Design Treatments to Project Structures

All Project Alternatives

2. DWR will require aesthetic design treatments, where and to the extent feasible, to minimize the impact on existing visual quality and character in the study area associated with the introduction of water conveyance structures.

a. DWR will require evaluation of similar, local, well-designed water conveyance structures, including those with historic value and use these features as design precedent to develop designs for the intake facilities, pumping plants, control structures, fish screens, and bridges so that the resultant design will complement the natural landscape, be aesthetically pleasing, and minimize the effects of visual intrusion of the Delta Conveyance Project facilities on the landscape, to the extent feasible.

The following minimum performance standards will apply.

i. The height of new structures will be minimized as feasible. In addition, the visual intrusion of ancillary features (e.g., antennas or other equipment) will be minimized through proper siting.

ii. New structures that warrant painting will be painted with a shade that is two to three shades darker than the general surrounding area, unless aesthetic design treatments indicate another color selection with the intent to specifically improve aesthetics. Otherwise, colors shall be chosen from the Bureau of Land Management Standard Environmental Colors Chart CC-001: April 2014. Because color selection will vary by location, DWR, working with the facility designers, will employ the use of color panels evaluated from key observation points during common lighting conditions (front versus backlighting) to aid in the appropriate color selection. DWR will select colors for the coloring of the most prevalent season. Panels will be a minimum of 3 feet by 2 feet in dimension and will be evaluated from various distances, but within 1,000 feet, to ensure the best possible color selection. Refer to https://blmwyomingvisual.anl.gov/mitigation/federal/index.cfm for more information on this technique and other best management practices and techniques for visual screening.

a) All paints used for the color panels and structures will be color matched directly from the physical color chart, rather than from any digital or color-reproduced versions of the color chart.

b) Paints will be of a dull, flat, or satin finish only. Appropriate paint type will be selected for the finished structures to ensure long-term durability of the painted surfaces.

c) DWR will maintain the paint color over time.

iii. In consultation with PG&E, SMUD, and other power utility providers on the study area, DWR will require the design of the project's permanent transmission poles to incorporate the following measures to be consistent with equipment and structures used by these utilities.

a) Transmission poles will be power providers standard lattice towers and will be galvanized steel or other required treatment to make the structures visually consistent with other similar towers in the visual landscape.

b) Finishes will be selected for their ability to achieve the correct color selection, durability, and environmental safety.

iv. DWR will require aesthetic design features where they can be accommodated at concrete or shotcrete structures that are highly visible to the public. These features may include, but not be limited to, mimicking natural material (e.g., stone or rock surfacing) and integral color, in the same theme, to reduce visibility and to better blend with the landscape.

v. DWR will require evaluation of bridge crossing designs using lattice steel, consistent with other bridges in the Delta and implement where site conditions can accommodate a lattice steel structure. Such a structure would be less visually confining than concrete structures, provide better visual access to points beyond, allow light to travel through the structure, and may appear less like a visual barrier within the landscape.

vi. DWR will require that visible pipelines, guardrails, and non-safety signs will be of a material or color that helps surfaces to blend better with the surroundings. These elements will be constructed with low-sheen and nonreflective surface materials to reduce potential for glare, and the use of glossy paints or surfaces would be avoided.

This measure and the aesthetic design treatments for alternative structures would help minimize the impact on visual quality from the development of the water conveyance structures in the study area, using techniques that make the structures blend into the surrounding environment.

Mitigation Measure AES-1c: Implement Best Management Practices to Implement Project Landscaping Plan

All Project Alternatives

3. DWR will require application of additional landscape treatments and use best management practices as part of the post-project landscaping plan (as indicated by Environmental Commitment EC-4a in Appendix C1) to restore and maintain local character, improve aesthetics, and reduce the visual scale of the proposed water conveyance elements in the study area.

   a. In addition to the guidance set forth in the environmental commitments, in areas significantly affected by the project, DWR will require utilization of landscaping to minimize such impacts including, but not limited to, native vegetation and trees. In addition, native trees, shrubs, and grasslands native to the study area will be planted to preserve the visual integrity of the landscape, provide habitat conditions suitable for native vegetation and wildlife, and ensure that a maximum number and variety of well-adapted plants are maintained.

   b. The following practices will be adhered to in implementing the project landscaping plan.

      i. Design and implement low-impact development (LID) measures that disperse and reduce runoff by using such features as vegetated buffer strips between paved areas that catch and infiltrate runoff, bioswales, cisterns, and detention basins. In addition, DWR will evaluate the potential use of pervious paving to improve infiltration and to reduce the amount of surface runoff from entering waterways and the stormwater system. However, LID measures will not be used where infiltration could result in adverse environmental effects.

      ii. Vegetative accents and screening will be used to aid in a perceived reduction in the scale and mass of the built features, while accentuating the design treatments that will be applied to built features. Plant selection will be species native to the Delta and based on the plants' abilities to screen built features and provide aesthetic accents.

iii. Vegetative accents and screening will be used to aid in screening substations located next to residences. Plant selection will be species native to the Delta and based on the plants' abilities to screen features and provide aesthetic accents.

iv. Vegetative accents and screening will be used to aid in screening and shading park-and-ride lots. Plant selection will be species native to the Delta and based on the plants' abilities to screen features and provide aesthetic accents.

v. Landscape berms, combined with tree and shrub plantings, will be used to help screen built features from existing view points by allowing for additional height. The landscape berms will be constructed in a manner that has a more natural form, as opposed to one that is highly regular and levee-like. The berms will be seeded with a native meadow erosion control seed mix and be planted to comply with directions set forth below.

   a) Plantings will be native and indigenous to the area, and no invasive plant species will be used under any conditions. If indigenous plantings are not available, DWR will coordinate with the California Department of Fish and Wildlife to use a mutually acceptable plant mix palette.

   b) The species list will include trees, shrubs, and an herbaceous understory of varying heights, as well as both evergreen and deciduous types. Plant variety will increase the effectiveness of revegetated areas by providing multiple layers, seasonality, diverse habitat, and reduced susceptibility to disease.

vi. Revegetation in areas affected by bridge construction will incorporate native trees and shrubs to replace trees and shrubs that were removed due to bridge construction.

vii. The use of native grass and wildflower seed in erosion control measures will be required where such a measure would improve aesthetics.

   a) Wildflowers will provide seasonal interest to areas where trees and shrubs are removed, or grading has occurred.

   b) Species will be chosen that are native and indigenous to the study area and for their appropriateness to the surrounding habitat. For example, upland grass and wildflower species will be chosen for drier, upland areas and wetter grass species will be chosen for wetland areas.

   c) If not appropriate to the surrounding habitat, wildflowers will not be included in the seed mix.

   d) Under no circumstances will invasive plant species be used in any erosion control measures.

viii. Under no circumstances will any invasive plant species be used at any location.

ix. Vegetation will be planted within immediately following project completion.

x. Design of the landscaping plan will maximize the use of planting zones that do not need irrigation, such as seeding with a native grassland and wildflower meadow mix, which reduces or eliminates the need for a permanent irrigation system.

xi. If an irrigation system is required, an irrigation and maintenance program will be implemented during the plant establishment period and carried on, as needed, to ensure plant survival. Areas that are irrigated will use a smart watering system that evaluates the existing site conditions and plant material against weather conditions to avoid overwatering of such areas. To avoid undue water flows, the irrigation system will be managed in such a manner that any broken spray heads, pipes, or other components are fixed within 1 to 2 days, or the zone or system will be shut down until it can be repaired.

xii. All measures prescribed above to screen facilities will not degrade or eliminate scenic vistas or be designed in a manner that negatively affects views from scenic roadways.

xiii. These measures will not be implemented in habitats or locations with sensitive species. Each area where mitigation would be implemented will be surveyed prior to installation of mitigation to ensure that no sensitive habitats or sensitive species are present.

This measure will reduce the impacts on local visual quality and the overall visual quality of the study area from the presence of project water conveyance facilities by introducing a more natural visual appearance around these facilities akin to the natural surroundings in the Delta.

Mitigation Measure AES-4a: Limit Construction Outside of Daylight Hours within 0.25 Mile of Residents at the Intakes

1. Within occupational safety standards, DWR will minimize the impact of nighttime construction light and glare on residences within 0.25 mile of the intake construction sites by limiting non-tunnel-related surface construction, except for periodic continuous concrete pours at the intakes and tunnel shafts, past daylight hours (which varies according to season), minimizing the use of high-wattage lighting sources to operate in the dark, and minimizing introduction of new nighttime light and glare sources in these areas.

    a. DWR will establish a construction hotline, which will enable residents to report any construction violation including construction activities outside of daylight hours.

Implementation of this measure, while taking into account occupational safety requirements, will reduce the use of nighttime lighting and provide residences the means to report any observed deviation from the mitigation requirements.

Mitigation Measure AES-4b: Minimize Fugitive Light from Portable Sources Used for Construction

2. DWR will minimize fugitive light, or light trespass, from portable lighting sources used during construction by adhering to the following practices, at a minimum.

    a. Project-related light and glare will be minimized to the maximum extent feasible, given safety considerations.

    b. Color-corrected lights will be used.

c. Portable lights will be operated at the lowest feasible wattage and height.

d. All lights will be screened and directed down toward work activities and away from the night sky and nearby residents to the maximum extent safely possible.

e. The number of nighttime lights used will be minimized to the greatest extent feasible.

Implementation of this measure will reduce—to the extent as governed by site-specific safety and fisheries protection requirements—the overall amount of new daytime and nighttime light and glare introduced to the project vicinity during construction.

Mitigation Measure AES-4c: Install Visual Barriers along Access Routes, Where Necessary, to Prevent Light Spill from Truck Headlights toward Residences

3. DWR will evaluate construction routes and identify portions of access routes where the use of visual barriers would minimize the introduction of new light and glare from construction truck headlights and the impact on nearby residents. Access routes could include SR 160, Hood-Franklin Road, West Walnut Grove Road, Mountain House Road, South Holt Road, Byron Highway, West Bethany Road, and various levee roads.

   a. DWR will install a visual barrier along portions of access routes where screening would prevent excessive light spill toward residents from truck headlights being used during nighttime construction activities. DWR will also coordinate with local recreational interested parties to protect sensitive nighttime recreational resources, such as nighttime fishing spots, from construction truck headlight light spill. These visual barriers will meet the following performance criteria.

      i. The visual barrier will be a minimum of 5 feet high and will provide a continuous surface impenetrable by light. This height may be obtained by installing a temporary structure, such as fencing (e.g., chain link with privacy slats) or a semi-permanent structure, such as a concrete barrier (e.g., a roadway median barrier or architectural concrete wall system) retrofitted with an approved visual screen, if necessary, to meet the required height.

      ii. The visual barriers will be of a material or have a color treatment appropriate for the location and traffic safety requirements. The use of glossy materials will be avoided.

This measure will minimize the extent of construction truck headlight glare intruding into nearby residential areas.

3.2 Agricultural Resources

Mitigation Measure AG-1: Preserve Agricultural Land

1. Permanently converted Important Farmland will be mitigated at an acreage ratio of at least 1:1. This mitigation ratio will be achieved through a combination of acquisition and dedication of agricultural land, acquisition of development rights or conservation easements to permanently protect agricultural land, or payment of in-lieu fees to fully fund the acquisition and maintenance of such real property interests by a third party. To the extent feasible, any land that is acquired for the purpose of mitigation of agricultural land conversion will be of equal or better farmland quality than the land that was permanently converted. Therefore, impacts on Prime Farmland will be mitigated through protection of Prime Farmland; impacts on Farmland of Statewide Importance will be mitigated through protection of Prime Farmland or Farmland of Statewide Importance; impacts on Farmland of Local Importance will be mitigated through protection of Prime Farmland or Farmland of Statewide Importance or Farmland of Local Importance. Because Unique Farmland is land used to grow a crop considered by the State of California to be an agricultural product of economic importance, mitigation for impacts on Unique Farmland will be targeted at lands that are also mapped as Unique Farmland.
    a. Preservation of agricultural lands will be within the Delta counties (i.e., Sacramento, San Joaquin, Contra Costa, Alameda, Solano, and Yolo).
    b. Any agricultural conservation easements acquired pursuant to this mitigation strategy will be held by a qualified organization that has the legal and technical ability to hold and administer agricultural conservation easements for the purpose of conserving and maintaining lands in agricultural production.
    c. DWR will also consider an optional approach of funding farm improvements to enhance the productivity of the lower quality farmland, consistent with Agricultural Land Stewardship Strategy A2.

Mitigation Measure AG-3: Replacement or Relocation of Impacted Infrastructure Supporting Agricultural Properties

1. To the extent feasible, project designs will be modified to avoid any conflicts with irrigation or drainage infrastructure servicing farmland located outside the construction footprint for the project. DWR will consult with the neighboring landowners and agricultural operators to require that construction of the project facilities adequately avoids the impact on agricultural infrastructure servicing their properties, based on their understanding of local site conditions. If such impacts cannot be avoided through a redesign of local project design elements, DWR will implement at least one of the following options:
    - Provide new water wells until diversion connection is reestablished.
    - Relocate and/or replace wells, pipelines, power lines, drainage systems and other infrastructure that are needed to support ongoing agricultural uses.

    In the event that none of the above options is feasible, as part of a negotiated settlement process, DWR will compensate owners for production losses attributable to reductions in water supply from affected diversions, losses associated with disruption in drainage facilities, and losses associated with other infrastructure disruptions.

3.3 Air Quality

Mitigation Measure AQ-1: Offset Construction-Generated Criteria Pollutants in the Sacramento Valley Air Basin

Performance Standard

Prior to issuance of construction contracts, DWR will enter into a memorandum of understanding (MOU) with SMAQMD or develop an alternative or complementary mitigation program (as discussed below) to reduce NO_X and PM10. Emissions above the federal *de minimis* thresholds[1] will be reduced to net zero (0). Emissions not above the *de minimis* thresholds, but above SMAQMD's thresholds, will be reduced to quantities below the air district's thresholds.

Emissions generated by project construction have been quantified as part of this Draft EIS. Although this inventory could be used exclusively to inform the required mitigation commitment, the methods used to quantify emissions in this Draft EIS were conservative. They also do not account for any additional reductions that may be achieved by future state and federal regulations that reduce the emissions intensity of equipment and vehicles, nor do they account for reduction strategies that may be implemented by DWR pursuant to other mitigation measures (e.g., Mitigation Measure AQ-9). Accordingly, this Draft EIS likely overestimates actual emissions that would be generated by construction of the project. DWR may, therefore, reanalyze criteria pollutant emissions from construction of the project to update the required reduction commitment to achieve performance standard.

An updated emissions analysis conducted for the project will be performed using approved emissions models and methods available at the time of the reanalysis. The analysis must use the latest available engineering data for the project, inclusive of any required environmental commitments or emissions reduction strategies. Consistent with the methodology used in this Draft EIR, emissions factors may account for enacted regulations that will influence future year emissions intensities (e.g., fuel efficiency standards for on-road vehicles).

Mitigation Agreement with SMAQMD

1. DWR will enter into an MOU with SMAQMD to reduce NO_X and PM10 according to the performance standard described above.
    a. The mitigation offset fee amount will be determined at the time of mitigation to fund one or more emissions reduction projects within the SVAB (or in a nearby area of equal or higher nonattainment classification, as allowed under 40 CFR 93.158(2)). SMAQMD will require an additional administrative fee of no less than 5% of the total offset fee. The mitigation offset fee will be determined by DWR and SMAQMD based on the type of projects available at the time of mitigation. This fee is intended to fund emissions reduction projects to achieve reductions. Documentation of payment will be provided to DWR or its designated representative.
    b. The MOU will include details regarding the annual calculation of required offsets DWR must achieve, funds to be paid, administrative fees, and the timing of the emissions reduction projects. Reduction projects may be administrated through SMAQMD's Heavy-

[1] Federal *de minimis* thresholds are triggered if the project is subject to general conformity.

Duty Low-Emission Vehicle Incentive Programs (HDLEVIP), which include the Carl Moyer and Sacramento Emergency Clean Air Transportation (SECAT) Programs. The HDLEVIP and associated incentive programs are managed and implemented by SMAQMD on behalf of all air districts within the Sacramento Federal Nonattainment Area. Example projects funded through the Carl Moyer Program include the following.

- Independent Construction Caterpillar 633D Scraper Tier 2 Engine Repower
- Kiewit Pacific Construction Caterpillar 16G Grader Diesel Catalyst Retrofit
- Commercial Low-Emission Propane Generator
- American Engineering & Asphalt Caterpillar 825C Compactor Tier 2 Engine Repower
- B&D Geerts Construction Caterpillar 826C Compactor Tier 1 Engine Repower

The SECAT program differs from the Carl Moyer Program in that it can only fund projects for on-road vehicles. However, the SECAT program can also finance operational emissions reductions, including facility modifications and out-of-cycle replacements; the Carl Moyer Program is only available to fund the incremental capital costs of control measures.

c. Acceptance of the mitigation fee by SMAQMD will serve as an acknowledgment and commitment by SMAQMD to: (1) implement an emissions reduction project(s) within a timeframe to be determined based on the type of project(s) selected after receipt of the mitigation fee designed to achieve the emissions reduction objectives; and (2) provide documentation to DWR or its designated representative describing the project(s) funded by the mitigation fee, including the amount of emissions reduced (tons per year) from the emissions reduction project(s). To qualify under this mitigation measure, the specific emissions reduction project(s) must result in emissions reductions in the SVAB (or in a nearby area of equal or higher nonattainment classification, as allowed under 40 CFR 93.158(2)) that are real, surplus, quantifiable, enforceable, and will not otherwise be achieved through compliance with existing regulatory requirements or any other legal requirement. Funding will need to be received prior to contracting with participants and should allow enough time to receive and process applications to fund and implement off-site reduction projects prior to commencement of the project activities that are being offset. This will roughly equate to one year prior to the required mitigation; additional lead time may be necessary depending on the level of off-site emissions reductions required for a specific year.

Alternative or Complementary Mitigation Program

Should DWR be unable to enter what they regard as a satisfactory agreement with SMAQMD, or should DWR enter an agreement with SMAQMD but find themselves unable to meet the performance standards established above, DWR will develop an alternative or complementary off-site mitigation program to reduce NO_X and PM10 emissions according to the performance standard described above.

DWR will establish a program to fund emissions reduction projects through grants, emission reduction credits (ERCs), or similar mechanisms. DWR may identify emissions reduction projects through consultation with SMAQMD, other regional air districts, CARB, CEC, local governments, transit agencies, or others, as needed. Potential projects could include but are not limited to the following.

- Alternative fuel, low-emissions school buses, transit buses, and other vehicles.
- Diesel engine retrofits and repowers.
- Locomotive retrofits and repowers.
- Electric vehicle or lawn equipment rebates.
- Electric vehicle charging stations and plug-ins.
- Video-teleconferencing systems for local businesses.
- Telecommuting start-up costs for local businesses.

As part of its alternative or complementary off-site mitigation program, DWR will develop pollutant-specific formulas to monetize, calculate, and achieve emissions reductions in a cost-effective manner. Payments can be allocated to emissions reductions projects in a grant-like manner. DWR will document the fee schedule basis, such as consistency with the CARB's Carl Moyer Program cost-effectiveness limits and capital recovery factors.

DWR will conduct annual reporting to verify and document that emissions reductions projects achieve a 1:1 reduction with construction emissions to ensure claimed offsets meet the required performance standard. Each report should describe the projects that were funded over the prior year, identify emissions reduction realized by the funded projects, document compliance with mitigation requirements, and identify corrective actions (if any) needed to ensure the offsetting program achieves the performance standards for NOx and PM10. DWR will retain a third-party expert to assist with its review and approval of the annual reports. Annual reports will be finalized and posted on DWR's website by December 31 of the following year.

Mitigation Measure AQ-2: Offset Construction-Generated Criteria Pollutants in the San Joaquin Valley Air Basin

Performance Standard

Prior to issuance of construction contracts, DWR will enter into a Voluntary Emissions Reduction Agreement (VERA) with the SJVAPCD or develop an alternative or complementary mitigation program (as discussed below) to reduce NO_X and PM10. Emissions above the federal *de minimis* thresholds[2] will be reduced to net zero (0). Emissions not above the *de minimis* thresholds, but above SJVAPCD's thresholds, will be reduced to quantities below the air district's thresholds.

Emissions generated by project construction have been quantified as part of this Draft EIR. Although this inventory could be used exclusively to inform the required mitigation commitment, the methods used to quantify emissions in the Draft EIR were conservative. They also do not account for any additional reductions that may be achieved by future state and federal regulations that reduce the emissions intensity of equipment and vehicles, nor do they account for reduction strategies that may be implemented by DWR pursuant to other mitigation measures (e.g., Mitigation Measure AQ-9). Accordingly, this Draft EIR likely overestimates actual

[2] Federal *de minimis* thresholds are triggered if the project is subject to general conformity.

emissions that would be generated by construction of the project. DWR may, therefore, reanalyze criteria pollutant emissions from construction of the project to update the required reduction commitment to achieve performance standard.

An updated emissions analysis conducted for the project will be performed using approved emissions models and methods available at the time of the reanalysis. The analysis must use the latest available engineering data for the project, inclusive of any required environmental commitments or emissions reduction strategies. Consistent with the methodology used in this Draft EIR, emissions factors may account for enacted regulations that will influence future year emissions intensities (e.g., fuel efficiency standards for on-road vehicles).

Mitigation Agreement with SJVAPCD

1. DWR will enter into a VERA with the SJVAPCD to reduce NO_X and PM10 according to the performance standard described above.
   a. The mitigation offset fee amount will be determined at the time of mitigation to fund one or more emissions reduction projects within the SJVAB (or in a nearby area of equal or higher nonattainment classification, as allowed under 40 CFR 93.158(2)). SJVAPCD will require an additional administrative fee of no less than 4% of the total offset fee. The mitigation offset fee will be determined by DWR and SJVAPCD based on the type of projects available at the time of mitigation. This fee is intended to fund emissions reduction projects to achieve reductions. Documentation showing receipt of payment will be provided to DWR or its designated representative.
   b. The VERA will include details regarding the annual calculation of required offsets DWR must achieve, funds to be paid, administrative fee, and the timing of the emissions reduction projects. SJVAPCD's VERA is implemented through District Incentive Programs, which fund grants and projects to achieve emissions reductions in the SJVAB. Example programs funded through the VERA include the following.
      - On-Road Truck Voucher Program
      - Burn Clean Program
      - Heavy Duty Engine Program
      - Cordless Zero-Emission Commercial Lawn & Garden Equipment Demonstration Program
      - Statewide School Bus Retrofit Program
   c. Acceptance of the offset fee by SJVAPCD will serve as an acknowledgment and commitment by SJVAPCD to: (1) implement an emissions reduction project(s) within a timeframe to be determined based on the type of project(s) selected after receipt of the mitigation fee designed to achieve the emissions reduction objectives; and (2) provide documentation to DWR or its designated representative describing the project(s) funded by the mitigation fee, including the amount of emissions reduced (tons per year) from the emissions reduction project(s). To qualify under this mitigation measure, the specific emissions reduction project(s) must result in emissions reductions in the SJVAB (or in a nearby area of equal or higher nonattainment classification, as allowed under 40 CFR 93.158(2)) that are real, surplus, quantifiable, enforceable, and will not otherwise be achieved through compliance with existing regulatory requirements or any other legal

requirement. Funding will need to be received prior to contracting with participants and should allow enough time to receive and process applications to fund and implement off-site reduction projects prior to commencement of the project activities that are being offset. This will roughly equate to 1 year prior to the required mitigation; additional lead time may be necessary depending on the level of off-site emissions reductions required for a specific year.

Alternative or Complementary Mitigation Program

Should DWR be unable to enter what they regard as a satisfactory agreement with SJVAPCD, or should DWR enter an agreement with SJVAPCD but find themselves unable to meet the performance standards established above, DWR will develop an alternative or complementary off-site mitigation program to reduce NO_X and PM10 emissions according to the performance standard described above.

DWR will establish a program to fund emissions reduction projects through grants, ERCs, or similar mechanisms. DWR may identify emissions reduction projects through consultation with SJVAPCD, other regional air districts, CARB, CEC, local governments, transit agencies, or others, as needed. Potential projects could include but are not limited to the following.

- Alternative fuel, low-emissions school buses, transit buses, and other vehicles.
- Diesel engine retrofits and repowers.
- Locomotive retrofits and repowers.
- Electric vehicle or lawn equipment rebates.
- Electric vehicle charging stations and plug-ins.
- Video-teleconferencing systems for local businesses.
- Telecommuting start-up costs for local businesses.

As part of its alternative or complementary off-site mitigation program, DWR will develop pollutant-specific formulas to monetize, calculate, and achieve emissions reductions in a cost-effective manner. Payments can be allocated to emissions reductions projects in a grant-like manner. DWR will document the fee schedule basis, such as consistency with the CARB's Carl Moyer Program cost-effectiveness limits and capital recovery factors.

DWR will conduct annual reporting to verify and document that emissions reductions projects achieve a 1:1 reduction with construction emissions to ensure claimed offsets meet the required performance standard. Each report should describe the projects that were funded over the prior year, identify emissions reduction realized by the funded projects, document compliance with mitigation requirements, and identify corrective actions (if any) needed to ensure the offsetting program achieves the performance standards for NOx and PM10. DWR will retain a third-party expert to assist with its review and approval of the annual reports. Annual reports will be finalized and posted on DWR's website by December 31 of the following year.

Mitigation Measure AQ-3: Offset Construction-Generated Criteria Pollutants in the San Francisco Bay Area Air Basin

Performance Standard

Prior to issuance of construction contracts, DWR will enter into an MOU with the Bay Area Clean Air Foundation (Foundation), a public nonprofit and supporting organization for the BAAQMD, or develop an alternative or complementary mitigation program (as discussed below) to reduce NO_X. Emissions above the federal *de minimis* thresholds[3] will be reduced to net zero (0). Emissions not above the *de minimis* thresholds, but above BAAQMD's thresholds, will be reduced to quantities below the air district's thresholds.

Emissions generated by project construction have been quantified as part of this Draft EIR. Although this inventory could be used exclusively to inform the required mitigation commitment, the methods used to quantify emissions in the Draft EIR were conservative. They also do not account for any additional reductions that may be achieved by future state and federal regulations that reduce the emissions intensity of equipment and vehicles, nor do they account for reduction strategies that may be implemented by DWR pursuant to other mitigation measures (e.g., Mitigation Measure AQ-9). Accordingly, this Draft EIR likely overestimates actual emissions that would be generated by construction of the project. DWR may, therefore, reanalyze criteria pollutant emissions from construction of the project to update the required reduction commitment to achieve performance standard.

An updated emissions analysis conducted for the project will be performed using approved emissions models and methods available at the time of the reanalysis. The analysis must use the latest available engineering data for the project, inclusive of any required environmental commitments or emissions reduction strategies. Consistent with the methodology used in this Draft EIR, emissions factors may account for enacted regulations that will influence future year emissions intensities (e.g., fuel efficiency standards for on-road vehicles).

Mitigation Agreement with BAAQMD

1. DWR will enter into an MOU with the Foundation to reduce NO_X according to the performance standard described above.
    a. The mitigation offset fee amount will be determined at the time of mitigation to fund one or more emissions reduction projects within the SFBAAB. The Foundation will require an additional administrative fee of no less than 5% of the total offset fee. The mitigation offset fee will be determined by the Foundation based on the type of projects available at the time of mitigation. This fee is intended to fund emissions reduction projects to achieve reductions. Documentation of payment will be provided to DWR or its designated representative.
    b. The MOU will include details regarding the annual calculation of required offsets DWR must achieve, funds to be paid, administrative fee, and the timing of the emissions reduction projects. Acceptance of this fee by the Foundation will serve as an acknowledgment and commitment by the Foundation to (1) implement an emissions reduction project(s) within a timeframe to be determined based on the type of

[3] Federal *de minimis* thresholds are triggered if the project is subject to general conformity.

project(s) selected after receipt of the mitigation fee designed to achieve the emissions reduction objectives; and (2) provide documentation to DWR or its designated representative describing the project(s) funded by the mitigation fee, including the amount of emissions reduced (tons per year) from the emissions reduction project(s). To qualify under this mitigation measure, the specific emissions reduction project(s) must result in emissions reductions in the SFBAAB that are real, surplus, quantifiable, enforceable, and will not otherwise be achieved through compliance with existing regulatory requirements or any other legal requirement. Funding will need to be received prior to contracting with participants and should allow enough time to receive and process applications to fund off-site reduction projects prior to commencement of the project activities that are being offset. This will roughly equate to 1 year prior to the required mitigation; additional lead time may be necessary depending on the level of off-site emissions reductions required for a specific year.

Alternative or Complementary Mitigation Program

Should DWR be unable to enter what they regard as a satisfactory agreement with the Foundation, or should DWR enter an agreement with the Foundation but find themselves unable to meet the performance standards established above, DWR will develop an alternative or complementary off-site mitigation program to reduce NO_X emissions according to the performance standard described above.

DWR will establish a program to fund emissions reduction projects through grants, ERCs, or similar mechanisms. DWR may identify emissions reduction projects through consultation with BAAQMD, other regional air districts, CARB, CEC, local governments, transit agencies, or others, as needed. Potential projects could include but are not limited to the following.

- Alternative fuel, low-emissions school buses, transit buses, and other vehicles.
- Diesel engine retrofits and repowers.
- Locomotive retrofits and repowers.
- Electric vehicle or lawn equipment rebates.
- Electric vehicle charging stations and plug-ins.
- Video-teleconferencing systems for local businesses.
- Telecommuting start-up costs for local businesses.

As part of its alternative or complementary off-site mitigation program, DWR will develop pollutant-specific formulas to monetize, calculate, and achieve emissions reductions in a cost-effective manner. Payments can be allocated to emissions reductions projects in a grant-like manner. DWR will document the fee schedule basis, such as consistency with the CARB's Carl Moyer Program cost-effectiveness limits and capital recovery factors.

DWR will conduct annual reporting to verify and document that emissions reductions projects achieve a 1:1 reduction with construction emissions to ensure claimed offsets meet the required performance standard. Each report should describe the projects that were funded over the prior year, identify emissions reduction realized by the funded projects, document compliance with mitigation requirements, and identify corrective actions (if any) needed to ensure the offsetting program achieves the performance standards for NOx. DWR will retain a third-party expert to assist with its review and approval of the annual reports. Annual reports will be finalized and posted on DWR's website by December 31 of the following year.

Mitigation Measure AQ-5: Avoid Public Exposure to Localized Particulate Matter and Nitrogen Dioxide Concentrations

1. DWR will employ a tiered approach to reduce ambient exposure to localized PM and NO_2 concentrations. The approach will be taken in the following way.
   a. Conduct refined PM and NO_2 concentration modeling at locations identified in the air quality analysis as exceeding the SIL or ambient air quality standards (as appliable, depending on background concentrations). NO_2 modeling will be refined by using seasonal and diurnal hourly background NO_2 concentration data for the local air quality study area. In addition, ozone data from the same hourly meteorological period will be used to perform a Tier 3 analysis of 1-hour NO_2 using the EPA's ozone limiting method. The refined PM modeling (both PM2.5 and PM10) will be performed using local site-specific representative data collected for silt loading and soil moisture content. The measurement will be completed using specific test methods as described in EPA AP-42 Appendix C.1. *Procedures for Sampling Surface/Bulk Dust Loading* and EPA AP-42 Appendix C.2. *Procedures for Laboratory Analysis of Surface/Bulk Dust Loading Samples*. These site-specific silt loading and soil moisture measurements will be used to determine emissions estimates for use in the refined PM concentration modeling.
   b. If the refined modeling shows an exceedance of the SIL or ambient air quality standards (as appliable), DWR will conduct real-time air quality monitoring for PM and/or NO_2 during construction at locations identified in the refined modeling as potentially exceeding the SIL or ambient air quality standards (as appliable, depending on background concentrations). The monitoring will be conducted according to the following requirements.
      i. **Background Monitoring During Construction**: DWR will identify representative background PM and/or NO_2 air quality monitors in coordination with the local air district. CARB and air districts maintain a network of air quality monitoring sites designed to monitor background concentrations within the air district. Project construction features must be within the spatial scale[4] of representativeness for the selected monitors. DWR will identify background monitoring stations based on their proximity to project construction features and registered spatial scale. DWR will confirm with the local air district that the selected stations are representative of ambient air quality for the study area(s). DWR will also confirm with the station administrator (CARB or local air district) that the selected monitoring stations will operate during construction of those features for which the background concentrations will be applied and real-time monitoring results will be accessible to DWR.

[4] 40 CFR Part 58, Appendix D defines spatial scale as the "physical dimensions of the air parcel nearest to a monitoring site throughout which actual pollutant concentrations are reasonably similar." The six scales are microscale (several meters to 100 meters), middle scale (100 meters to 0.5 kilometer), neighborhood scale (0.5 kilometer to 4.0 kilometers), urban scale (4.0 kilometers to 50 kilometers), regional scale (tens to hundreds of kilometers), and national and global scales.

In the event that there are no CARB or air district monitoring stations within an appropriate distance of project construction features (as determined through consultation with the local air district), or those stations will not operate during project construction and/or real-time data would not be available to DWR, DWR will consult with the local air district to identify alternative monitoring stations, which may include establishment of a DWR operated background station. Any alternative monitoring station used to collect background monitoring data must meet the network design criteria for ambient air quality monitoring defined in 40 CFR Part 58, Appendix D. DWR must obtain confirmation from the local air district that the alternative monitoring station(s) meet these design standards.

ii. **On-Site Construction Monitoring:** Downwind monitoring during construction will be conducted by DWR in the prevailing downwind direction from the construction activity at the fence line location. The location of the monitor may be moved from time to time to follow changes in active construction. DWR will use a monitoring method that is equivalent to the method used at the background station (e.g., Federal Reference Method). This will allow real-time differences in PM concentrations to be determined through a comparison of the construction monitoring data collected by DWR to the background monitoring maintained by the air district. The difference in concentrations between the monitoring results represents the incremental project contribution for comparison to the SILs.

iii. **Increment:** If the real-time construction monitoring concentration is found to be within 80% of the 24-hour PM10 CAAQS (50 $\mu g/m^3$) or 24-hour PM2.5 NAAQS (35 $\mu g/m^3$), and the real-time hourly increment (construction minus background) concentrations are found to be within 80% of the 24-hour PM10 SIL (5 $\mu g/m^3$) or 24-hour PM2.5 SIL (1.2 $\mu g/m^3$), then DWR will take corrective action to reduce incremental concentrations to acceptable levels. Likewise, if the real-time construction monitoring concentration is found to be within 80% of the 1-hour NO_2 CAAQS (188 $\mu g/m^3$), then DWR will take corrective action to reduce total concentrations to acceptable levels. Actions may include potentially limiting construction activity during adverse meteorological conditions (e.g., during high wind events), relocating construction activity during the adverse period, or taking additional corrective activities to limit emissions (e.g., temporary covering of portions of the storage piles, reducing equipment operation).

iv. **Timing:** DWR will select the background monitoring station(s) prior to obtaining the authority to construct permit for the construction activities. Background monitoring (i) and on-site construction monitoring (ii) will occur daily over the entire duration of construction activities.

v. **Reporting:** DWR will conduct monthly reviews of the concentration data and maintain a record of data throughout construction. If the measured increment concentrations attributable to on-site construction activities exceed the performance standard (SIL or ambient air quality standard), DWR will report this information to the local air district and describe the action(s) taken to reduce the increment concentrations (as described under [iii]).

Mitigation Measure AQ-6: Avoid Residential Exposure to Localized Diesel Particulate Matter

1. DWR will coordinate with the occupants of the three homes north of Intake A where projected cancer risk exceeds 10 per million. DWR will offer residential occupants the following options to reduce exposure to project-generated DPM.

    a. Minimum Efficiency Reporting Value (MERV) 15 air filters: DWR will provide financial assistance for the purchase of up to two filters per year, or at a frequency per manufacturer recommendations, during construction of Intake A. If a resident's home is not equipped with a heating, ventilation, and air conditioning (HVAC) system that can accept a MERV 15 air filter, DWR will purchase an EnergyStar certified portable home air cleaning device (or up to the number of devices needed to clear multi-room homes, consistent with manufacturer's recommendations). DWR will establish an online procurement system (or similar) to facilitate the purchase and distribution of the filters to residents electing to participate in the program.

    b. Relocation assistance: DWR will provide full compensation for expenses related to the procurement of either: (i) temporary housing during construction of Intake A; or (ii) permanent replacement housing of the same market value as the housing being vacated by the residents or greater. Under either scenario, DWR will provide, in compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act and the California Relocation Assistance Act, relocation and replacement expenses, including relocation advisory services, moving cost reimbursement, and reimbursement for related expenses.

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

Prior to issuance of the first construction or grading permit for the project, DWR will retain a qualified consultant to develop a GHG Reduction Plan (Plan) to mitigate GHG emissions resulting from construction and displaced purchases of CVP electricity to net zero. Net additional GHG emissions from construction and displaced purchases of CVP electricity have been quantified as part of this Draft EIR and total between 453,412 and 794,180 metric tons CO_2e, depending on the alternative. Construction of the compensatory mitigation restoration sites is predicted to generate an additional 3,570 metric tons CO_2e. This yields a reduction commitment of up to 797,750 metric tons CO_2e needed to meet the net zero performance standard. The net zero performance standard may be achieved based on actual emissions calculations, as described below. The reduction commitment may therefore change based on project activities and adoption of new state regulations. Notably, if CARB's amendments to the Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear (SF_6 Switchgear Regulation) are not adopted, DWR must reduce annual ongoing SF_6 from electrical transmission beyond 2045. This is further discussed below.

Required content for the Plan is identified in Section A below, including potential GHG reduction strategies to achieve the net zero performance standard. Monitoring, reporting, and enforcement requirements for future implementation of the Plan are outlined in Section B.

A. Required Plan Contents

1) *Emissions Quantities and Reduction Commitments:* GHG emissions from construction and displaced purchases of CVP electricity must be mitigated to net zero on a continual basis throughout construction and operations. This will require DWR to constantly "stay ahead" of the estimated emissions through early investment in GHG reduction efforts prior to construction (to ensure mitigation of unavoidable initial construction GHG emissions) and advanced planning for GHG reductions so that throughout the construction and operational period, the net effect of project emissions and this mitigation is that the project will not result in any increase in GHG emissions over baseline conditions. Since some of the planning will rely on the estimated GHG reduction value of future actions during construction and operation, there may be some need for "catch up" GHG reductions if emissions are higher than expected or reduction results are lower than expected. Conversely, if emissions are lower than expected or reduction results are higher than expected, there may be some building up of "forward credits" for the next phase of construction and/or operations.

2) *Plan Development:* Developing a fixed and rigid implementation strategy up-front to cover 12 to 14 years of construction, depending on the alternative, followed by project operation will be restrictive and will potentially preclude DWR from pursing future reduction technologies that could be economically or environmentally superior to options that are currently available.

   Given the constraints associated with developing a fixed and rigid reduction plan to cover all project emissions, the Plan may be developed and implemented over multiple phases. A phased approach provides increased implementation and management flexibility. It also enhances Plan quality as lessons learned during initial phases are applied to future reduction efforts. The first phase of the Plan must address no fewer than the first 5 years of construction. The Plan will be amended to provide implementation details for subsequent phases according to the requirements in Section B below.

   The Plan will identify the amount of GHG emissions anticipated in the covered phase, as well as emissions from prior phases (if applicable) and the projected total net emissions of the project. This Draft EIR presents an estimate of annual GHG emissions generated by project construction and displaced purchases of CVP electricity. Although this inventory could be used exclusively to inform the required mitigation commitment, the methods used to quantify emissions in the Draft EIR were conservative. They also do not account for any GHG reduction strategies that may be implemented by DWR pursuant to this measure. Accordingly, this Draft EIR likely overestimates actual GHG emissions that would be generated by the project. DWR may therefore reanalyze GHG emissions for any phase of the project to update the required reduction commitment to achieve net zero.

   An updated emissions analysis conducted for the Plan will be performed using approved emissions models and methods available at the time of the reanalysis. The analysis must use the latest available engineering data for the project, inclusive of any required environmental commitments or GHG emissions reduction strategies. Consistent with the methodology used in this Draft EIR, emissions factors may account for enacted regulations that will influence future year emissions intensities (e.g., fuel efficiency standards for on-road vehicles). Emissions from displaced purchases of CVP electricity will be derived by subtracting the project total energy consumption from what would have been generated by the system without implementation of the project, and then multiplying the net change in energy consumption by the statewide grid average emissions intensity.

3) *GHG Reduction Strategies*: Each phase of the Plan will identify the GHG reduction strategies that will be implemented during that phase to achieve the net zero performance standard. Strategies that could be used in formulating the Plan are summarized below. GHG reduction strategies must be verifiable and feasible to implement. The Plan will identify the entity responsible for implementing each strategy (if not DWR) and the estimated GHG reduction that will be achieved by implementation of the strategy. If the selected strategies are shown to exceed total net emissions of that phase, the estimated surplus can be applied as a credit in future phase(s), as explained in Section B.1.

Environmental commitments (Section A.3a) are required project design features that must be incorporated into the Plan. Following environmental commitments, DWR will prioritize selected strategies as: (1) on-site construction strategies (Section A.3b); (2) off-site strategies (Section A.3c); and (3) GHG credits (Section A.3d). The order of priority for the location of selected strategies will be: (1) within the project right-of-way; (2) within communities surrounding the water conveyance alignment (e.g., Hood); (3) throughout California's Central Valley and Northern California; (4) in the State of California; (5) in the United States; and (6) outside of the United States. If the Plan proposes GHG reduction strategies that do not conform to the priorities outlined above, it must present substantial evidence to justify the deviation or explain why higher priority strategies were deemed infeasible as defined under CEQA.

It is possible that some of the strategies could independently achieve the net zero performance standard for the project. Various combinations of strategies could also be pursued to optimize total costs or community co-benefits. DWR will be responsible for determining the overall mix of strategies necessary to ensure the performance standard to mitigate the significant GHG impact is met.

The list of strategies presented in this section is not exclusive. DWR may include additional or new strategies to reduce GHG emissions to the extent that they become commercially available and cost effective and earn a track-record for reliability in real-world conditions. This may include new equipment and vehicle systems (e.g., autonomous construction equipment, fuel-cells), new energy systems (e.g., battery storage), or other technologies (e.g., carbon capture and storage).

a. <u>Environmental Commitments</u>: All phases of the Plan must incorporate the following environmental commitments. Refer to Appendix 3B, *Environmental Commitments and Best Management Practice*, for measure descriptions.

   i. EC-7: *Off-Road Heavy-Duty Engines*

   ii. EC-8: *On-Road Haul Trucks*

   iii. EC-9: *On-Site Locomotives*

   iv. EC-10: *Marine Vessels*

v. EC-13: *DWR Best Management Practices to Reduce GHG Emissions*

b. On-Site Construction Strategies: Strategies to reduce on-site construction emissions may include but are not limited to the following.

i. *Purchase Zero-Carbon Electricity:* Enter into a power purchase agreement, where feasible, with utilities that provide electricity service to the study area to purchase construction electricity from renewable sources. Renewable sources must be zero-carbon energy sources (e.g., wind, solar, hydro) and may not be accounted to utility RPS goals.

ii. *Install Electric Vehicle (EV) Charging Stations at Park-and-Ride Lots:* Install EV charging stations at employee park-and-ride lots.

iii. *Use Electric Shuttles and Buses:* Require electric shuttles and buses to transport employees from the park-and-ride lots to construction sites.

iv. *Optimize Delivery Logistics:* Utilize freight instead of on-road haul trucks to deliver construction materials and equipment, if feasible.

c. Off-Site Strategies: Off-site strategies to reduce emissions may include but are not limited to the following.

i. *Support Community Building Energy Efficiency Improvements:* In coordination with local utilities, fund or contribute to an energy efficiency improvement program to achieve reductions in residential and commercial natural gas and electricity usage. Potential building improvements may include energy efficient appliances, energy efficient boilers, installation of alternative water heaters in place of natural gas storage tank heaters, installation of induction cooktops in place of gas ranges, or installation of cool roofs or green roofs.

ii. *Support Community Renewable Energy Projects:* In coordination with local utilities, fund or contribute to community solar, wind, or other renewable energy projects or programs. This could include providing funding to support utility programs that will allow homeowners to install solar photovoltaic systems at zero or minimal up-front cost. All projects installed under this measure must be designed for high performance (e.g., optimal full-sun location, solar orientation) and additive to utility RPS goals.

iii. *Support Energy Decarbonization Projects:* In coordination with local utilities, fund or contribute to community infrastructure projects (e.g., retirement of natural gas facilities) to support decarbonization of the electric power sector.

iv. *Support Community Transit Programs:* In coordination with local transit providers, fund or contribute to programs to increase the use of public transit (e.g., increased transit frequency, reduced transit fares).

v. *Support Community Pedestrian Network Improvements:* In coordination with local authorities, fund or contribute to programs to increase sidewalk coverage to improve pedestrian access and interconnectivity of the pedestrian network.

vi. *Support Community Bicycle Network Improvements:* In coordination with local authorities, fund or contribute to programs to construct or improve bicycle lane facilities (Class I, II, or IV) or bicycle boulevards.

vii. *Support Community Carshare or Bikeshare Programs:* In coordination with local authorities, fund or contribute to the deployment of neighborhood/city conventional or electric carshare or bikeshare programs.

viii. *Support Transportation Decarbonization Projects:* In coordination with local authorities, utilities, or transit providers, fund or contribute to community infrastructure projects (e.g., electric-transit buses, EV infrastructure) to support decarbonization of the transportation sector.

ix. *Support Biomass Waste Digestion and Conversion Facilities:* Fund or contribute financing to facility development either through long-term power purchase agreements or up-front project financing. Projects should be awarded through a competitive bidding process and chosen for GHG reduction and other environmental benefits to the project area. Projects could provide a range of final products: electricity generation, compressed natural gas for transportation fuels, and pipeline quality biomethane.

x. *Support Agriculture Waste Conversion Development:* Fund or contribute financing to the re-commissioning of thermal chemical conversion facilities to process collected agricultural biomass residues**.** Project funding should provide incentives to farmers in the project area to deliver agricultural wastes to existing facilities.

xi. *Increase Renewable Energy Purchases for Operations:* Increase renewable energy purchases under DWR's REPP) to reduce project emissions. The REPP identifies the quantity of renewable electricity resources that DWR will purchase each year to achieve the GHG emissions reduction goals laid out in its Update 2020.

xii. *Support Tidal Wetland Inundation Projects:* Expand the number of subsidence reversal and/or carbon sequestration projects currently being undertaken by DWR on Sherman and Twitchell Islands. Existing research at the Twitchell Wetlands Research Facility demonstrates that wetland restoration can sequester 25 tons of carbon per acre per year. Measure funding could be used to finance permanent wetlands for waterfowl or rice cultivation, creating co-benefits for wildlife and local farmers.

xiii. *Support Urban Tree Planting:* In coordination with local authorities, fund, contribute to, or implement a program to expand urban tree planting. The program should prioritize native tree species that require minimal water and maintenance, low-biogenic VOC emitting tree species, and low-allergen tree species. All trees should be appropriately distanced from buildings, especially in high fire areas.

xiv. *Conserve Agricultural Lands:* In coordination with local authorities, fund a program to protect agricultural lands from conversion to urban or rural residential development.

d. GHG Credits: A GHG credit enables development projects to compensate for their GHG emissions and associated environmental impacts by financing reductions in GHG emissions elsewhere. GHG credits derived from completed prior actions are referred to as "GHG offsets" or "carbon offsets." GHG credits derived from future contracted actions are referred to as "GHG future credits" or "GHG future mitigation units" (FMUs). GHG credits (including offsets) are classified as either compliance credits or voluntary credits. Compliance offsets can be purchased by covered entities subject to the cap-and-trade regulation to meet predetermined regulatory targets (to date, the cap-and-trade regulation only allows the use of GHG offsets, not GHG future credits). Voluntary offsets or voluntary GHG future credits are not associated with the cap-and-trade regulation and are purchased with the intent to voluntarily meet carbon neutral or other environmental obligations.

As of June 2021, DWR has 59,552 credits registered with the American Carbon Registry (ACR). One credit is equal to a GHG reduction or GHG removal enhancement of 1 metric ton of CO_2e. All GHG credits must be created through a CARB-approved registry. These registries are currently the ACR, Climate Action Reserve, and Verra, although additional registries may be accredited by CARB in the future. These registries use robust accounting protocols for all GHG credits created for their exchange, including the six currently approved CARB protocols. This mitigation measure specifically requires GHG credits created for the project to originate from a CARB-approved protocol or a protocol that is equal to or more rigorous than CARB requirements under 17 Cal. Code Regs. Section 95972. The selected protocol must demonstrate that the reduction of GHG emissions are real, permanent, quantifiable, verifiable, enforceable, and additional. Definitions of these terms from 17 Cal. Code Regs. Section 95802(a) are provided below (the original text used the term *offset*, which has been replaced in the text below with the generic term *GHG credit,* as this measure allows for use of both offsets and FMUs).

- **Real:** GHG reductions or GHG enhancements result from a demonstrable action or set of actions, and are quantified using appropriate, accurate, and conservative methodologies that account for all GHG emissions sources, GHG sinks, and GHG reservoirs within the [GHG credit] project boundary and account for uncertainty and the potential for activity-shifting leakage and market-shifting leakage.
- **Additional:** GHG reductions or removals that exceed any GHG reduction or removals otherwise required by law, regulation, or legally binding mandate, and that exceed any GHG reductions or removals that would otherwise occur in a conservative business-as-usual scenario.
- **Permanent:** GHG reductions and GHG removal enhancements are not reversible, or when GHG reductions and GHG removal enhancements may be reversible, mechanisms are in place to replace any reversed GHG emissions reductions and GHG removal enhancements to ensure that all credited reductions endure for at least 100 years.
- **Quantifiable:** The ability to accurately measure and calculate GHG reductions or GHG removal enhancements relative to a project baseline in a reliable and replicable manner for all GHG emissions sources, GHG sinks, or GHG reservoirs

included within the [GHG credit] project boundary, while accounting for uncertainty and activity-shifting leakage and market-shifting leakage.

- **Verified:** A [GHG credit] project report assertion is well documented and transparent such that it lends itself to an objective review by an accredited verification body.
- **Enforceable:** The authority for CARB to hold a particular party liable and to take appropriate action if any of the provisions of this article are violated.

  Note that this definition of enforceability is specific to the cap-and-trade regulation, where CARB holds enforcement authority, but this measure will employ GHG credits from the voluntary market, where CARB has no enforcement authority. Applying the definition to this mitigation measure means that GHG reductions must be owned by a single entity and be backed by a legal instrument or contract that defines exclusive ownership.

GHG credits may be in the form of GHG offsets for prior reductions of GHG emissions verified through protocols or FMUs for future committed GHG emissions meeting protocols. Because emissions reductions from GHG offsets have already occurred, their benefits are immediate and can be used to compensate for an equivalent quantity of project-generated emissions at any time. GHG credits from FMUs must be funded and implemented within 5 years of project GHG emissions to qualify as a GHG credit under this measure (i.e., there can only be a maximum of 5 years lag between project emissions and their real-world reductions through funding an FMU in advance and implementing the FMU on the ground). Any use of FMUs that result in a time lag between project emissions and their reduction by GHG credits from FMUs must be compensated through a pro-rated surcharge of additional FMUs proportional to the effect of the delay. Since emissions of CO_2 in the atmosphere reach their peak radiative forcing within 10 years, a surcharge of 10% for every year of lag between project emissions and their reduction through an FMU will be added to the GHG credit requirement (i.e., 1.10 FMUs will be required to mitigate 1 metric ton of project GHG emissions generated in the year prior to funding and implementation of the FMU).

Consistent with the priorities outlined above in Section A.2, GHG credits from reduction projects in geographies closest to the water conveyance alignment (i.e., Sacramento and Central Valley) will be prioritized before projects in larger geographies (i.e., Southern California, California, United States, internationally). DWR will inform brokers of the required geographic prioritization for the procurement of GHG credits. GHG credits from reduction projects identified in the Sacramento and Central Valley that are of equal or lesser cost compared to the settlement price of the latest cap-and-trade auction must be included in the transaction. GHG credits from reduction projects in larger geographies may be purchased if adequate credits cannot be found in the Sacramento and Central Valley or they exceed the price maximum identified above. The economic and geographic analysis undertaken to inform the selection of GHG credits must be provided as part of the required documentation discussed below in Section B.3.

All GHG credits will be verified by an independent verifier accredited by the ANSI National Accreditation Board (ANAB) or CARB, or an expert with equivalent qualifications to the extent necessary to assist with the verification. Following the standards and requirements established by the accreditation board (ANAB or CARB), the verifier will certify the following.

- GHG credits conform to a CARB-approved protocol or a protocol that is equal to or more rigorous than CARB requirements under 17 Cal. Code Regs. Section 95972. Verification of the latter requires certification that the credits meet or exceed the standards in 17 Cal. Code Regs. Section 95972.
- GHG credits are real, permanent, quantifiable, verifiable, enforceable, and additional, as defined in this measure.
- GHG credits were purchased according to the geographic prioritization standard defined in this measure.

Verification of GHG offsets must occur as part of the certification process for compliance with the accounting protocol. Because FMUs are GHG credits that will result from future projects, additional verification must occur beyond initial certification. Verification for FMUs must include initial certification and independent verification every 5 years over the duration of the FMU generating the GHG credits. The verification will examine both the GHG credit realization on the ground and its progress toward delivering future GHG credits. DWR will retain an independent verifier meeting the qualifications described above to certify reductions achieved by FMUs are achieved following completion of the future reduction project.

B. Implementation and Enforcement

1) *Phased Analysis and Plan Amendments:* As described above in Section A.1, the Plan may be developed and implemented over multiple phases. Prior to the start of each phase, DWR will update the Plan to calculate the amount of GHG emissions anticipated in the covered phase, as well as emissions from prior phases (if applicable) and the projected total net emissions of the project. The Plan will identify the specific GHG reduction strategies that will be implemented to meet the net zero performance standard for the covered phase and quantify the expected reductions that will be achieved by each strategy. All emissions and reductions will be quantified in accordance with the requirements outlined in Section A.1.

   DWR will retain a qualified professional firm where the supervising staff has at least 10 years of experience performing air quality and GHG analysis to assist with its review and approval of the Plan. Subsequent amendments to the Plan will identify reductions that have been achieved during prior phases and determine if those reductions exceed emissions generated by the project. If the GHG reduction strategies implemented by DWR result in a surplus of reductions above the net zero performance standard, the balance of those reductions may be credited to subsequent phases.

   The final phase of the Plan must address operational emissions following construction, accounting for regulations adopted at that time that will reduce project emissions. Specifically, DWR will confirm statewide emissions from electricity transmission will achieve carbon neutrality no later than December 31, 2045, pursuant to SB 100 and the SF_6 Switchgear Regulation (or subsequent regulations). If GHG emissions from displaced purchases of CVP electricity are expected to persist beyond 2045, DWR will calculate the amount of GHG emissions anticipated until the industry achieves carbon neutrality. The final Plan will identify GHG reduction strategies that will be implemented by DWR to meet the net zero performance standard for these emissions.

2) *Timing and Execution:* DWR will prepare the Plan (or first phase of the Plan) prior to issuance of the first construction or grading permit for the project. If DWR elects to use a phased approach, the first phase of the Plan must identify the expected future phases and schedule for amending the Plan to cover future phases.

Environmental Commitments and selected on-site construction strategies will be included in construction permits (as appliable) and contractor bid packages/agreements. Selected off-site strategies will be completed or operational before completion of the applicable phase. If GHG credits are pursued, DWR will enter the necessary contract(s) to purchase credits prior to the start of each phase. All credits must be retired before completion of the applicable phase.

3) *Reporting:* DWR will conduct annual reporting to verify and document that selected strategies achieve sufficient emissions reductions to mitigate project emissions to net zero. Each report should describe the GHG reduction strategies that were implemented over the prior year, summarize past, current, and anticipated project phasing, document compliance with Plan requirements, and identify corrective actions (if any) needed to ensure the Plan achieves the net zero performance standard. If GHG credits have been purchased to reduce emissions for the reporting year, the annual report must include copies of the offset retirement verification.

DWR will retain a qualified professional firm where the supervising staff has at least 10 years of experience performing air quality and GHG analysis to assist with its review and approval of the annual reports. Annual reports will be finalized and posted on DWR's website by December 31 of the following year.

Mitigation Measure CMP: Compensatory Mitigation Plan

Under the CMP that DWR will implement, mitigation sites on Bouldin Island would be designed to provide compensatory mitigation for aquatic resources impacts and the I-5 ponds would provide compensatory mitigation for special-status species habitat. The net gain in habitat, once changes from existing land cover are accounted for, is summarized for wetlands and other waters in Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources,* Table 3F-3. DWR commits to providing the funding for the initial establishment and long-term management of the mitigation sites to ensure that it continues to meet the established goals of the CMP and any subsequent management plans. This includes the initial 5-year establishment period for the mitigation sites, all activities associated with ongoing maintenance, as well as future actions associated with an adaptive management strategy. Refer to Appendix 3F, Section SF.5, *Assurances*, for additional information.

3.4 Aquatic Environment

Mitigation Measure AQUA-1a: Develop and Implement an Underwater Sound Control and Abatement Plan

All Project Alternatives

DWR will implement an underwater sound control and abatement plan outlining specific measures such as changing the time of activities, best practices, and equipment that will be used to avoid and minimize the effects of underwater construction noise on fish, particularly the underwater noise effects associated with impact pile driving activities.

The underwater sound control and abatement plan will be provided to the appropriate fish and wildlife agencies for their review and approval prior to implementation of any in-water impact pile driving activities. The plan will evaluate the potential effects of underwater noise on fish using applicable and interim underwater noise thresholds established for disturbance and injury of fish (California Department of Transportation 2015:4-21–4-23). The thresholds include the following.

1. Injury threshold for fish of all sizes includes a peak sound pressure level (SPL) of 206 decibels (dB) relative to 1 micropascal.
2. Injury threshold for fish less than 2 grams is 183 dB relative to 1 micropascal cumulative sound exposure level ($SEL_{cumulative}$), and 187 dB relative to 1 micropascal $SEL_{cumulative}$ for fish greater than or equal to 2 grams.
3. Disturbance threshold for fish of all sizes is 150 dB root mean square relative to 1 micropascal.

The specific number of pilings that will be driven per day with an impact pile driver, and thus the number of pile strikes per day, will be defined as part of the design of project elements that require pilings; initial assumptions are presented in Table pile1.

The sound control and abatement plan will restrict in-water work to the in-water work windows specified in Environmental Commitment EC-14 (Appendix C1, *Environmental Commitments and Best Management Practices*) and approved by NMFS/USFWS/CDFW. There would be rest periods without pile driving at night.

The underwater noise generated by impact pile driving will be abated using the best available and practicable methods. Examples of such methods include the use of vibratory rather than impact pile driving equipment; use of an impact pile driver to proof piles initially placed with a vibratory pile driver; noise attenuation with pile caps (e.g., wood or micarta), bubble curtains, air-filled fabric barriers, or isolation piles; or installation of piling-specific cofferdams. Specific techniques to be used will be selected based on site-specific conditions.

In addition to primarily using vibratory pile driving methods and establishing protocols for attenuating underwater noise levels produced during in-water construction activities, DWR will develop and implement operational protocols for when impact pile driving is necessary. These operational protocols will be used to minimize the effects of impact pile driving on fish and may include the following.

4. Monitoring[5] the in-water work area for fish that may be showing signs of distress or injury as a result of pile driving activities and stopping work when distressed or injured fish are observed, e.g., if injured fish are seen floating near the surface.
5. Initiating impact pile driving with a "soft-start," such that pile strikes are initiated at reduced impact and increase to full impact over several strikes to provide fish an opportunity to move out of the area.
6. Restricting impact pile driving activities to specific times of the day and for a specific duration to be determined through coordination with the fish and wildlife agencies.
7. If more than one pile driving rig is employed, ensuring pile driving activities are initiated in a way that provides an escape route and avoid "trapping" fish between pile drivers in waters exposed to underwater noise levels that could potentially cause injury.

Where impact pile driving is required, DWR will monitor underwater sound levels to ensure compliance with underwater noise thresholds at a distance appropriate for protection of the species (e.g., 183 dB $SEL_{cumulative}$ for fish less than 2 grams, 187 dB $SEL_{cumulative}$ for fish greater than 2 grams), based on the results from calculations to be provided in the underwater sound control and abatement plan. If such monitoring shows that noise could exceed applicable thresholds, physical or operational attenuation methods will be implemented to ensure compliance with these thresholds.

Mitigation Measure AQUA-1b: Develop and Implement a Barge Operations Plan

All Project Alternatives

DWR will require that any construction contractor proposing to use barges (to perform construction or to transport materials or equipment) develop a barge operations plan, to be approved by NMFS, USFWS, and CDFW. Each plan will be developed and submitted by the construction contractors per standard DWR contract specifications. Each barge operations plan will be part of a comprehensive traffic control plan coordinated with the U.S. Coast Guard for large channels. The barge operations plan will address the following topics.

1. Bottom scour from propeller wash.
2. Bank erosion or loss of submerged or emergent vegetation from propeller wash and/or excessive wake.
3. Accidental material spillage.
4. Sediment and benthic community disturbance from accidental or intentional barge grounding or deployment of barge spuds (extendable shafts for temporarily maintaining barge position) or anchors, including a timeline for addressing grounding to minimize risk from potential channel blockage.
5. Hazardous materials spills (e.g., fuel, oil, hydraulic fluids).

The barge operations plan will serve as a guide to barge operations and to a biological monitor who will evaluate barge operations daily during construction with respect to the stated

[5] Monitoring will be conducted by a NMFS-/USFWS-/CDFW-approved fisheries monitor that is trained in Delta fish behavior/biology/presence and timing concerns. If distress or injury are observed, the incident will be reported to NMFS/USFWS/CDFW.

performance measures outlined in this mitigation measure (see *Performance Measures* below). This plan, when approved by the DWR and other resource agencies, will be read by barge operators and kept aboard all vessels operating at the construction sites.

Sensitive Resources

The barge operations plan is intended to protect fish and aquatic resources in the vicinity of barge operations. The plan will be developed to avoid barge-related effects on listed species of fish; if avoidance is not possible, the plan will include provisions to minimize effects on fish and aquatic resources as described under the *Avoidance Measures*, *Environmental Training*, and *Approach and Departure Protocol* sections below. The sensitive resources potentially affected by barge maneuvering and anchoring in affected areas are listed below.

6. Sediments that could cause turbidity or changes in bathymetry if disturbed.
7. Bottom-dwelling (benthic) invertebrates that provide a prey base for fish.
8. Riparian vegetation that provides shade, cover, habitat structure, and organic nutrients to the aquatic environment.
9. Submerged aquatic vegetation that provides habitat structure and primary (plant) production.

Responsibilities

Construction contractors operating barges in the process of constructing the water conveyance facilities will be responsible for the following.

10. Operate vessels safely to prevent significant impacts on aquatic resources of the Delta.
11. Read, understand, and follow the barge operations plan.
12. Report to the project biological monitor any vessel grounding or other deviations from the barge operations plan that could have resulted in the disturbance of bottom sediments, damage to riverbanks, or loss of submerged, emergent, or riparian vegetation.
13. Immediately report material fuel or oil spills to the CDFW Office of Spill Prevention and Response, the project biological monitor, and DWR.
14. Follow all other relevant plans, including the hazardous materials management plan, stormwater pollution prevention plan (SWPPP), and spill prevention, containment, and countermeasure plan (SPCCP).
15. Observe state laws regarding monitoring and control of invasive species when introducing new watercraft to the Delta

The biological monitor will be responsible for the following.

16. Observe barge operation activities including loading and unloading.
17. Provide same-day reports to DWR on any observed problems with barge operations.
18. Provide annual reports to DWR, summarizing monitoring observations during each construction year, including an evaluation of the plan performance measures. The annual report will also include descriptions and representative photographs and/or videos of conditions of riverbanks and vegetation.

19. Visit each site requiring barges to determine the extent of emergent and riparian vegetation, bank conditions, and general site conditions during the growing season prior to initiation of construction, during construction, and then annually for up to 5 years after construction.
20. Monitor construction including observation of barge arrival, loading, and unloading; departure of barges at each active site and the condition of both riverbanks at each site; pile driving; and other in-water construction activity as directed by DWR.

Avoidance Measures

The following avoidance measures will be implemented to ensure that the goal of avoiding impacts on aquatic resources from tugboat and barge operations will be achieved: training of tug boat operators; limiting vessel speed to minimize the effects of wake impinging on unarmored or vegetated banks and the potential for vessel wake to strand small fish; limiting the direction and/or velocity of propeller wash to prevent bottom scour and loss of aquatic vegetation; and prevention of spillage of materials and fluids from vessels.

If deviations from these procedures are required to maintain the safety of vessels and crew, the biological monitor will be informed of the circumstances and any apparent impacts on water quality, habitats, fish, or wildlife. Any such impacts will be brought to the attention of the applicable fish and wildlife agency to ascertain and implement appropriate remedial measures.

Environmental Training

All pilots operating at intake construction and geotechnical exploration sites will be required to read and follow the barge operations plan and to keep a physical copy of the plan aboard and accessible. All pilots responsible for operating a vessel at the intake sites will read the barge operations plan and sign an affidavit as provided in the plan.

Approach and Departure Protocol

DWR will require that construction contractors develop and implement a protocol for site approach and departure to ensure the following.

21. Vessel operators will obey all federal and state navigation regulations that apply to the Delta.
22. All vessels will approach and depart from sites at dead slow in order to reduce vessel wake and propeller wash.
23. To minimize bottom disturbance, anchors and barge spuds will be used to secure vessels only when it is not possible to tie up.
24. Barge anchoring will be preplanned. Anchors will be lowered into place and not be allowed to drag across the channel bed.
25. Vessel operators will limit vessel speed as necessary to maintain wake heights of less than 2 feet at shore.
26. Vessel operators will avoid pushing stationary vessels up against fixed structures for extended periods, because this could result in excessive directed propeller wash impinging on a single location. Barges will be tied up whenever possible to avoid the necessity of maintaining stationary position by tugboat or by the use of barge spuds.

27. Barges will not be anchored where they will ground during low tides.
28. All vessels will obey U.S. Coast Guard regulations related to the prevention, notification, and cleanup of hazardous materials spills.
29. All vessels will keep an oil spill containment kit and spill prevention and response plan onboard.
30. In the event of a fuel spill, CDFW Office of Spills Prevention and Response will be contacted immediately at 800-852-7550 or 800-OILS-911 (800-645-7911) to report the spill.
31. When transporting loose materials (e.g., sand, aggregate), barges will use deck walls or other features to prevent loose materials from blowing or washing off the deck.

Performance Measures

Performance will be assessed based on the results of the biological monitoring reports. The assessment will evaluate observations for the following indicators of impacts.

- **Emergent vegetation loss.** The extent and dominant species of emergent vegetation will be determined and mapped by a global positioning system (GPS) unit at and cross-channel from each of the intake sites during the growing seasons prior to, during, and after construction. Extent will be mapped as linear coverage along the site and opposite banks. In the event that the linear extent of emergent vegetation is found to have decreased by 20% or more following construction (or as otherwise conditioned by applicable CDFW streambed alteration agreements), the position and nature of the change will be evaluated for the probability that the loss was due to barge grounding, propeller wash, or other effects related to barge operations. Adequate performance will be achieved if the linear extent of riparian and emergent vegetation following construction is at least 80% of the preconstruction extent (or as otherwise conditioned by applicable CDFW streambed alteration agreements), not including areas that will be lost to construction activities (e.g., footprint impacts) and that will be mitigated with previously described measures (Mitigation Measure CMP: *Compensatory Mitigation Plan*, specifically CMP-23: *Tidal Perennial Habitat Restoration for Construction Impacts on Habitat for Fish and Aquatic Resources* and CMP-24: *Channel Margin Habitat Restoration for Construction Impacts on Habitat for Fish and Aquatic Resources* [Attachment 3F.1, Table 3F.1-3]). Compensatory mitigation to replace lost emergent vegetation will be undertaken should the performance standards be exceeded.
- **Bank erosion and riparian vegetation loss.** The linear extent of bank erosion will be mapped by GPS at each of the intake sites prior to, during, and after construction. Photos and written descriptions will be recorded for each area of eroded bank to describe the extent of the erosion. In the event that the linear extent of eroded bank is found to have increased by 20% or more following construction as a result of barge operations (and not other construction impacts; see above in *Emergent Vegetation Loss*), the position and nature of the change will be evaluated for the probability (low, moderate, or high) that the erosion was due to barge grounding, propeller wash, or other effects related to barge operations, and preconstruction and postconstruction photographs will be compared to determine if riparian vegetation was also lost as a result of the erosion.
- **Cargo containment.** The biological monitor will note the use of deck walls or other appropriate containment during loading and unloading of materials from a barge at each site. Adequate performance will be achieved if appropriate measures are in use during each

observed loading and unloading. In the unlikely event that an accidental spill occurs despite appropriate containment measures, the barge crew will describe the type, amount, and location of the spill to the biological monitor. The biological monitor will make observations at the site of the material spill and evaluate the potential impacts of the spill on biological resources. This will help the biological monitor evaluate whether mitigation is required and will be included in the annual monitoring report. Any such impacts will be brought to the attention of the applicable fish and wildlife agency to ascertain and implement appropriate remedial measures.

- **Fuels spill prevention.** Vessels operating in accordance with the SPCCP and all applicable federal, state, and local safety and environmental laws and policies governing commercial vessel and barge operations will be considered to be performing adequately with regard to fuel spill prevention.
- **Barge grounding.** Barges are not to be grounded or anchored where falling tides are reasonably expected to cause grounding during a low tide. Barge grounding has the potential to disturb bottom sediments and benthic organisms, as well as creating a temporary obstacle to fish passage. Performance will be considered adequate if no cases of vessel grounding occur.

Contingency Measures

In the event that the performance measures are not met, DWR will coordinate with NMFS, USFWS, CDFW, and Central Valley Regional Water Quality Control Board to determine appropriate rectification or compensation for impacts on aquatic resources.

Mitigation Measure AQUA-1c: Develop and Implement a Fish Rescue and Salvage Plan

All Alternatives

Fish rescue operations will occur at any in-water construction site where isolation of fish may occur. Fish rescue and salvage plans will be developed by DWR or its contractors and will include detailed procedures for fish rescue and salvage to minimize the number of fish subject to stranding during placement and removal of cofferdams. The plans will be approved by NMFS, USFWS, and CDFW. The plans will identify the appropriate procedures for removing fish from construction zones and preventing fish from reentering construction zones prior to dewatering and other construction activities. A draft plan will be submitted to the fish and wildlife agencies for review and approval. An authorization letter from NMFS, USFWS, and CDFW will be required before in-water construction activities with the potential for stranding fish can proceed.

Construction activities include placement of cofferdams and training walls that isolate construction areas and minimize significant impacts on aquatic species and habitat during construction activities. However, aquatic species can become trapped within the cofferdam or behind the training walls and will need to be rescued or salvaged prior to dewatering.

All fish rescue and salvage operations will be conducted under the guidance of a qualified fish biologist[6] and in accordance with required permits. Each fish rescue plan will identify the

[6] The qualified fish biologist will have necessary fish collection permits; will be approved by NMFS, USFWS, and CDFW; and will have experience in identifying and handling Delta fish species. The fish rescue and salvage crew overseen by the qualified fish biologist will also have experience in handling Delta fish species.

appropriate procedures for excluding fish from the construction zones, and procedures for removing fish, should they become trapped. The primary procedure will be to herd fish out of the partially enclosed work area with seines (nets) and/or dip nets, followed by collection and removal of any remaining fish once the work area is fully enclosed; electrofishing techniques may also be authorized under certain conditions. It is critical that fish rescue and salvage operations begin as soon as possible and be completed within 48 hours after isolation of a construction area to minimize potential predation and adverse water quality impacts (high water temperature, low dissolved oxygen) associated with confinement. The cofferdam will be installed to block off the construction area before fish removal activities occur, except for a small area left open to allow fish to be herded out of the area to be enclosed. Capture, release, and relocation measures will be consistent with the general guidelines and procedures set forth in Part IX of the most recent edition of the *California Salmonid Stream Habitat Restoration Manual* (California Department of Fish and Game 2010) to minimize impacts on listed species of fish and their habitat.

All fish rescue and salvage operations will be conducted under the guidance of a fish biologist meeting the qualification requirements described under *Qualifications of Fish Rescue Personnel*. The following description includes detailed fish collection, holding, handling, and release procedures of the plan. Unless otherwise required by project permits, the construction contractor will provide the following.

1. A minimum 7-day notice to the appropriate fish and wildlife agencies, prior to an anticipated activity that could result in isolating fish, such as installation of a cofferdam.
2. Unrestricted access for the appropriate fish and wildlife agency personnel to the construction site for the duration of implementation of the fish rescue plan.
3. A work site that is accessible and safe for fish rescue workers.
4. Safety training for fish rescue workers before accessing the work site.
5. Cessation of construction activities in the vicinity of the fish rescue from the time the fish rescue begins until completion.

Qualifications of Fish Rescue Personnel

Personnel active in fish rescue efforts will include at least one person with a 4-year college degree in fisheries or biology, or a related degree. This person also must have at least 2 years of professional experience in fisheries field surveys and fish capture and handling procedures. The person will have completed an electrofishing training course such as Principles and Techniques of Electrofishing (USFWS, National Conservation Training Center), or similar course, if electrofishing is used. To avoid and minimize the risk of injury to fish, attempts to seine and/or net fish will precede the use of electrofishing equipment to the extent possible.

Seining and Dipnetting

Fish rescue and salvage operations will begin prior to or immediately after completing the cofferdam. As discussed above, fish will be herded from the construction area before installing the last sections of the cofferdam. Fish exclusion and/or rescue activities may need to be conducted incrementally in coordination with cofferdam placement to minimize the number of fish subjected to prolonged confinement and stressful conditions associated with crowding, capture, and handling. If the enclosed area is wadable (less than ~3 feet deep), fish can be herded out of the cofferdam enclosure by dragging a seine (net) through the enclosure, starting from the enclosed end and continuing to the cofferdam opening. It may also be possible to herd fish in deeper water with nets using divers or rafts as necessary. Depending on conditions, this process may need to be conducted several times. After completing this fish herding process, the net or an exclusion screen will be positioned at the cofferdam opening to prevent fish from reentering the enclosure while the final section of the cofferdam is installed. The net or screen mesh will be no greater than 0.125 inch, with the bottom edge of the net (lead line) securely weighted down to prevent fish from entering the area by moving under the net. Screens will be checked periodically and cleaned of debris to permit free flow of water.

After installing the last sections of the cofferdam or training wall, remaining fish in the enclosed area will be removed using seines, dip nets, electrofishing techniques, or a combination of these depending on site conditions.

Following each sweep of a seine through the enclosure, the fish rescue team will do the following.

6. Carefully bring the ends of the net together and pull in the wings, ensuring the lead line is kept as close to the substrate as possible.
7. Slowly turn the seine bag inside out to reveal captured fish, ensuring fish remain in the water as long as possible before transfer to an aerated container.
8. Follow the procedures outlined below in *Electrofishing*, and relocate fish to a predetermined release site.

Dipnetting is best suited for very small, shallow pools in which fish are concentrated and easily collected. Dip nets will be made of soft (nonabrasive) nylon material and small mesh size (0.125 inch) to collect small fish.

Electrofishing

After conducting the herding and netting operations described above, electrofishing may be necessary to remove as many fish as possible from the enclosure. Electrofishing will be conducted in accordance with NMFS electrofishing guidelines (National Marine Fisheries Service 2000) and other appropriate fish and wildlife agency guidelines. Electrofishing will be conducted by one or two 3- to 4-person teams, with each team having an electrofishing unit operator and two or three netters. At least three passes will be made through the enclosed areas to remove as many fish as possible. Fish initially will be placed in 5-gallon buckets filled with river water. Following completion of each pass, the electrofishing team will do the following.

9. Transfer fish into 5-gallon buckets filled with clean river water at ambient temperature.
10. Hold fish in 5-gallon buckets equipped with a lid and an aerator, and add fresh river water or small amounts of ice to the fish buckets if the water temperature in the buckets becomes more than 2°F warmer than ambient river waters.
11. Maintain a healthy environment for captured fish, including low densities in holding containers to avoid effects of overcrowding.
12. Use water-to-water transfers whenever possible.
13. Release fish at predetermined locations as specified in the fish rescue and salvage plans approved by NMFS, USFWS, and CDFW.

14. Segregate larger fish from smaller fish to minimize the risk of predation and physical damage to smaller fish from larger fish.
15. Limit holding time to about 10 minutes, if possible.
16. Avoid handling fish during processing unless absolutely necessary; use wet hands or dip nets if handling is needed.
17. Handle fish with hands that are free of potentially harmful products, including but not limited to sunscreen, lotion, and insect repellent.
18. Avoid anesthetizing or measuring fish.
19. Note the date, time, and location of collection; species; number of fish; approximate age (e.g., young-of-the-year, yearling, adult); fish condition (dead, visibly injured, healthy); and water temperature.
20. If positive identification of fish cannot be made without handling the fish, note this and release fish without handling.
21. In notes, indicate the level of accuracy of visual estimates to allow appropriate reporting to the appropriate fish and wildlife agencies (e.g., "Approx. 10–20 young-of-the-year steelhead").
22. Release fish in appropriate habitat either upstream or downstream of the enclosure, noting release date, time, and location.
23. Stop efforts and immediately contact the appropriate fish and wildlife agencies if mortality or injury occurs during relocation of listed species.
24. Place dead fish of listed species in sealed plastic bags with labels indicating species, location, date, and time of collection, and store them on ice.
25. Freeze collected dead fish of listed species as soon as possible and provide the frozen specimens to the appropriate fish and wildlife agencies, as specified in the permits.
26. Release rescued fish at sites either upstream or downstream of the construction area that are similar in temperature to the area from which fish were rescued, contain ample habitat, and have a low likelihood of fish reentering the construction area or being impinged on exclusion nets/screens.

Final Inspections and Reporting

The fish rescue team will notify the contractor when the fish rescue has been completed and construction can recommence. The results of the fish rescue and salvage operations (including date, time, location, comments, method of capture, fish species, number of fish, approximate age, condition, release location, and release time) will be reported to the appropriate fish and wildlife agencies, as specified in the pertinent permits.

3.5 Biological Resources

Mitigation Measure BIO-2a: Avoid or Minimize Impacts on Special-Status Natural Communities and Special-Status Plants

DWR will evaluate all project activities for their impacts on special-status natural communities and special-status plants and avoid or minimize impacts on special-status natural communities and special-status plants that occur on project sites. Diamond-petaled California poppy and caper-fruited tropidocarpum, which are quite rare and on the verge of extinction, will be avoided. Impacts on other special-status plant species will be avoided to the extent feasible.

DWR will conduct preconstruction surveys for special-status natural communities and special-status plants within and adjacent to all project sites in areas of potential suitable habitat, as identified in the habitat models. The purposes of these surveys will be to (1) identify and map any special-status natural communities present, (2) determine whether the locations of special-status plants identified in previous record searches or surveys are extant, (3) identify any new special-status plant occurrences, (4) cover any portions of the study area not previously surveyed, and (5) identify where mitigation measures would be implemented to avoid or offset impacts. The extent of mitigation for direct loss of or indirect effects on special-status plants will be based on these survey results.

All surveys for special-status natural communities and special-status plants will be conducted by qualified biologists following *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (U.S. Fish and Wildlife Service 1996) and *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities* (California Department of Fish and Wildlife 2018b:1–12), or the most current versions of these protocols. The surveys will be floristic in nature and conducted in a manner that maximizes the likelihood of locating special-status plant species or special-status natural communities that may be present (i.e., during the appropriate season and at an appropriate level of ground coverage). Locations of special-status plants in construction areas will be recorded using a GPS unit and flagged.

Mitigation Measure BIO-2b: Avoid and Minimize Impacts on Terrestrial Biological Resources from Maintenance Activities

DWR will implement the following process and measures to avoid and minimize potential impacts on terrestrial biological resources when maintenance activities occur at DWR project facilities. Consistent with current DWR environmental clearance review procedures, DWR will implement the following measures to avoid and minimize impacts on sensitive species, sensitive natural communities, and sensitive vegetation alliances during project maintenance activities, to the greatest extent practicable. Additional measures may be developed for site-specific conditions or specific biological resources and implemented, as necessary. If additional permits and approvals are determined to be necessary through the environmental clearance review, then the conditions of those permits and approvals will supersede the measures listed below.

1. Prior to the start of maintenance activities, DWR environmental staff will conduct an environmental review of the potential for maintenance to impact sensitive resources. Using occurrence databases, aerial imagery, and prior knowledge of maintenance areas, DWR environmental staff will evaluate the potential for suitable habitat for special-status species,

sensitive natural communities, and/or cultural resources to occur in the vicinity of the maintenance footprint. A site visit may be conducted to verify whether sensitive resources have the potential to be present within the maintenance area. Based on the results of the desktop review and/or site visit, the following avoidance measures may be required, as appropriate for the timing, location, and nature of the maintenance activity.

2. Depending on site-specific conditions and timing, a preconstruction survey may be required to determine potential presence of suitable habitat for sensitive species prior to the start of maintenance activities. Surveys will be conducted by a qualified biologist with experience identifying the resources in question using standard survey protocols and during appropriate timeframes specific to each sensitive resource.

3. Appropriate non-disturbance buffers may be applied around sensitive biological resources and habitat identified during the environmental clearance review or preconstruction surveys. Non-disturbance buffers will be established by a qualified biologist and will take into consideration the nature of the maintenance activity, the sensitivity of the species, site-specific conditions, and applicable state and federal recommendations. Non-disturbance buffers may be removed after a qualified biologist determines the sensitive resource is no longer present or at risk of impacts due to maintenance activities.

4. When feasible, maintenance activities will avoid impacts on rodent burrows, wetlands, or other areas that may provide potential habitat to avoid impacts on sensitive biological resources. Areas to be avoided will be flagged. Debris or cut vegetation may not be left where it may enter aquatic habitat.

5. Appropriate work windows and weather restrictions may be applied to avoid impacts on sensitive biological resources identified during the environmental clearance review or preconstruction survey.

6. A Worker Awareness Training may be required if sensitive natural resources are present. DWR will provide training to maintenance personnel on the importance of protecting sensitive natural resources (e.g., special-status fish species, wildlife species, plant species, and designated critical and/or suitable habitats for these species). Preconstruction training will be conducted so that maintenance personnel are aware of their responsibilities and the importance of compliance. Construction personnel will be educated on the types of sensitive resources in the project area and the measures required to avoid and minimize impacts on these resources. Materials covered in the training program will include environmental rules and regulations for the specific site requirements for limiting activities to approved work areas, timing restrictions, and avoidance of sensitive resource areas. A record of personnel that completed the environmental training will be kept. Operations and maintenance personnel working in and adjacent to special-status species habitat and natural communities may also be required to complete the existing DWR environmental trainings at regular intervals such as the Employee Environmental Responsibility training.

7. Qualified biologists may be required to monitor maintenance activities in areas identified during the environmental clearance review and preconstruction surveys as having special-status fish, wildlife, and plant species and their habitats, designated critical habitat, and sensitive natural communities.

8. Any wildlife that is encountered within the maintenance area will be avoided and allowed to move out of harm's way of its own accord.

9. Vegetation removal will be kept to the minimum necessary to accomplish maintenance need.

10. Spill prevention measures will be implemented to prevent and respond to petroleum product discharges into wetlands or waters of the United States and State.

11. Maintenance vehicles will observe a maximum speed limit of 15 miles per hour on un-paved non-public access roads where it is safe and feasible to do so, and 30 miles per hour on paved non-public access roads.

12. All ingress/egress at the project site will be restricted to those routes identified in the project plans and description. Cross-country access routes will be clearly marked in the field with appropriate flagging and signs.

13. All vehicle parking will be restricted to established areas, existing roads, or other suitable areas.

14. To prevent harassment, injury, or mortality of sensitive wildlife, no pets will be permitted in the maintenance area.

15. Plastic monofilament netting or similar material will not be used for erosion control, because smaller wildlife may become entangled or trapped in it. Acceptable substitutes include burlap-wrapped straw wattles, coconut coir matting or tackified hydroseeding compounds.

16. Rodenticides and herbicides will be used in accordance with the manufacturer recommended uses and applications and in such a manner as to prevent primary or secondary poisoning of special-status fish, wildlife, and plant species and depletion of prey populations upon which they depend. All uses of such compounds will observe label and other restrictions mandated by EPA, the California Department of Pesticide Regulation, and other appropriate state and federal regulations, as well as additional project-related restrictions imposed by USFWS, NMFS, and/or CDFW. If rodent control must be conducted in San Joaquin kit fox habitat, zinc phosphide should be used because of its proven lower risk to kit fox. Use of pesticides may be limited in other resource-specific instances as well. In addition, the method of rodent control will comply with those discussed in the 4(d) rule published in the final listing rule for California tiger salamander (69 *Federal Register* [FR] 47211–47248).

Mitigation Measure BIO-2c: Electrical Power Line Support Placement

1. DWR will contract with electric utilities to provide primary power to designated locations for project construction and operation. DWR will coordinate with electric utilities to design and construct power transmission and distribution lines and the locations of necessary appurtenances such as supports and substations to avoid sensitive terrestrial and aquatic habitats to the maximum extent feasible and to minimize take and encumbrance of agricultural lands. In cases where sensitive habitat cannot be feasibly avoided, disturbance will be minimized to the greatest degree feasible, and disturbed areas will be returned as near as reasonably and practically feasible to preconstruction conditions by reestablishing surface conditions through carefully grading, reconstructing features such as irrigation and drainage facilities, and replanting vegetation and crops and/or compensating farmers for crops losses. This will be accomplished through an agreement with the utility providers. Implementation of this measure relies, in part, on coordination and cooperation with all

appropriate utility providers and local agencies to integrate with other construction projects and minimize disturbances.

2. DWR will coordinate with electric utilities to design tower and pole placement and location of substations to avoid existing structures (e.g., agricultural irrigation infrastructure) to the extent feasible. In cases where existing structures and improvements cannot be feasibly avoided, DWR will relocate structures and improvements or compensate the owner for the loss, and will return temporarily disturbed areas to preconstruction conditions. Where poles or towers are to be constructed in agricultural areas, DWR will require incorporation of the following BMPs where feasible.

    a. Select means and methods of construction to minimize crop damage.

    b. Use single-pole structures instead of H-frame or other multiple-pole structures to reduce the potential for interference with farm machinery, reduce land impacts, and minimize weed encroachment issues.

    c. Locate lines adjacent to roads and existing property lines to reduce property take and encumbrance.

    d. Use transmission structures with longer spans to clear longer sections of fields or sensitive areas where feasible. Longer spans may not be feasible in areas where aerial spraying and seeding is common. In areas where aerial spraying and seeding are common, install markers on the shield wires above the conductors.

    e. Minimize the use of guy wires, and keep guy wires out of crop and hay lands. Place highly visible shield guards on guy wires in farm vehicle and equipment traffic areas.

    f. Locate new transmission lines along existing transmission line corridors.

    g. Locate new powerlines on existing poles on same vertical plane as the existing wires.

3. As part of and prior to approval of construction, DWR will work with electric utilities to ensure incorporation of bird and raptor-safe design in accordance with the applicable recommendations presented by the Avian Power Line Interaction Committee (APLIC) in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee 2006) and *Reducing Avian Collisions with Power Lines: State of the Art in 2012* (Avian Power Line Interaction Committee 2012), or with more current guidance if it becomes available. Applicable APLIC recommendations include, but are not limited to:

    a. Ensuring sufficient spacing of phase conductors to prevent bird electrocution.

    b. Minimizing the use of guywires. Where the use of guywires is unavoidable, demarcating guywires using the best available methods to minimize avian collisions (e.g., line markers).

    c. Reusing or co-locating new transmission facilities and other ancillary facilities with existing facilities and disturbed areas to minimize habitat impacts and avoid potential collisions.

    d. Configuring lines to reduce vertical spread of lines and/or decreasing the span length if such options are feasible.

    e. Marking lines to increase the visibility of lines and reduce the potential for collision.

4. DWR will work with electric utilities to mark all aboveground project lines and towers within 3 miles of known greater sandhill crane roost sites with bird flight diverters that are visible under all conditions (e.g., glow-in-the-dark markers, near-UV line markers). Bird flight diverters will be installed with the following conditions:

    a. If a new project line will be placed on poles or towers with existing lines that have bird diverters installed, bird diverters will not be required on the new project lines if the new project lines can be placed within the same vertical prism as the existing lines.

    b. If a new project line will be placed on poles or towers with existing lines but cannot be placed within the same vertical prism as the existing lines (e.g., a new project SCADA line that will be placed on a transmission tower with existing transmission lines), bird diverters will be required on both the new and existing lines.

    DWR will work with electric utilities to:

    c. Select the most effective and appropriate bird flight diverter for minimizing collisions based on APLIC recommendations (Avian Power Line Interaction Committee 2006, 2012), or more current guidance if available.

    d. Install bird flight diverters in a configuration, frequency, and spacing consistent with APLIC recommendations (Avian Power Line Interaction Committee 2006, 2012), or more current guidance if available.

    e. Periodically inspect and replace bird flight diverters as needed until or unless the project or existing line is removed.

Mitigation Measure BIO-14: Avoid and Minimize Impacts from Construction on Vernal Pool Aquatic Invertebrates and Critical Habitat for Vernal Pool Fairy Shrimp

All Project Alternatives

As properties become accessible for initiating project activities, planning level surveys will be conducted to assess the suitability of modeled habitat and, where suitable, conduct protocol-level surveys for vernal pool fairy shrimp and vernal pool tadpole shrimp. To the extent practicable, work areas will be designed to avoid habitat for vernal pool aquatic invertebrates and critical habitat for vernal pool fairy shrimp. Where practicable, the project will be planned and designed to avoid ground-disturbing activities or alterations to hydrology within 250 feet of vernal pool aquatic invertebrate habitat. Where activities need to occur within 250 feet of habitat, those work areas will be assessed for their potential to alter the hydrology of the pool habitat such that the hydroperiod of the pool will no longer support the species. Where the USFWS agrees that any changes to the hydroperiod will not permanently affect habitat functionality, compensatory mitigation would not be required.

To the extent practicable, DWR will minimize impacts on critical habitat for vernal pool fairy shrimp. To achieve this, project construction will occur at least 250 feet from vernal pool fairy shrimp critical habitat containing the primary constituent elements defined below unless it is determined through USFWS review that the activities within the buffer will not substantially modify the primary constituent elements of vernal pool fairy shrimp critical habitat.

Primary constituent elements for vernal pool fairy shrimp are defined as follows (70 FR 46924–46998).

1. Topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools described below, providing for dispersal and promoting hydroperiods of adequate length in the pools.
2. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 18 days, in all but the driest years, thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.
3. Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding.
4. Structure within the pools described above, consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter.

For suitable aquatic habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp that will be affected by the project, protocol-level surveys for these species will be conducted to determine whether they are present or where time does not allow for surveys to be completed (e.g., dry years, timely access), the suitable habitat will be assumed to be occupied. Surveys will be conducted according to the most recent USFWS guidelines by USFWS-approved biologists with the appropriate recovery permit under Section 10(a)(1)(A) of the ESA.

Project elements will be designed to avoid direct and indirect effects on vernal pool aquatic invertebrate habitat to the extent practicable. Where construction occurs within 250 feet of vernal pool crustacean habitat, construction BMPs will be implemented to ensure that construction activities minimize effects on the habitat. Protective fencing will be installed around vernal pool aquatic invertebrate habitat with signage identifying these areas as containing sensitive biological resources. A biological monitor will ensure that fencing and BMPs are maintained for the duration of construction and that construction personnel are provided the necessary worker awareness training.

Mitigation Measure BIO-18: Avoid and Minimize Impacts on Valley Elderberry Longhorn Beetle

All Project Alternatives

As properties become accessible for initiating project activities, DWR will require surveys for elderberry shrubs to be conducted in construction areas by a USFWS-approved biologist. Elderberry shrubs will be avoided to the maximum extent practicable. Complete avoidance (i.e., no adverse effects) will be assumed when a buffer of at least 165 feet is established and maintained around elderberry shrubs containing stems measuring 1 inch or greater in diameter at ground level (U.S. Fish and Wildlife Service 2017a:10, 11).

Elderberry shrubs that have stems measuring 1 inch or greater in diameter at ground level determined or assumed to be occupied, according to the criteria in the 2017 Framework or the most recent available guidance at that time, that are identified within project footprints that cannot be avoided (i.e., those in the project footprint) will be transplanted to conservation areas identified in the CMP. Transplanting will follow the guidance outlined in USFWS's 2017 *Framework for Assessing Impacts on Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)* (2017 Framework) or the most recent available guidance at that time.

For shrubs not directly affected by construction but that occur within 165 feet of ground-disturbing activities, the following measures will be implemented, which come from the USFWS 2017 Framework.

1. Fencing. All areas to be avoided during construction activities will be fenced and flagged as close to construction limits as feasible.
2. Avoidance area. Activities that may damage or kill an elderberry shrub (e.g., trenching, paving, etc.) may need an avoidance area of at least 20 feet from the drip-line, depending on the type of activity.
3. Timing. As much as feasible, all activities that occur within 165 feet of an elderberry shrub, will be conducted outside of the flight season of the species (March to July).
4. Trimming. Trimming may remove or destroy valley elderberry longhorn beetle eggs and/or larvae and may reduce the health and vigor of the elderberry shrub. In order to avoid and minimize adverse effects on valley elderberry longhorn beetle, trimming will occur between November 1 and February 1 and will avoid the removal of any branches or stems that are ≥ 1 inch in diameter. Measures to address regular or largescale maintenance (trimming) should be established in consultation with USFWS.
5. Chemical usage. Herbicides will not be used within the drip-line of an elderberry shrub. Insecticides will not be used within 100 feet of an elderberry shrub. All chemicals will be applied using a backpack sprayer or similar direct-application method.

Mitigation Measure BIO-21: Avoid and Minimize Impacts on Bumble Bees

All Project Alternatives

As properties become accessible for initiating project and restoration activities, DWR will require site-level surveys to be conducted to verify the suitability of modeled habitat. Botanical surveys will be conducted by experienced botanists in spring/early summer to identify and map general concentrations of flowering plants that provide food resources (foraging habitat) for Crotch and western bumble bees. The foraging habitat evaluation surveys will be based on recommendations in the *Rusty Patched Bumble Bee Habitat Assessment Form and Guide* (The Xerces Society for Invertebrate Conservation 2017:3–12) or will follow specific guidance for Crotch and western bumble bees available at that time.

If moderate to high quality foraging habitat for Crotch and western bumble bee is identified in construction areas based on the habitat evaluation surveys and these areas will have initial ground disturbance occurring during the nesting season, these areas will be surveyed by qualified invertebrate biologist(s) (familiar with the behavior and life histories of Crotch and western bumble bee) within 1 year prior to the start of construction in a given area. Surveys will be conducted according to the methods in Thorp et al. (1983) or according to any future survey methodologies specifically for Crotch and western bumble bees. Surveys would be conducted during four evenly spaced sampling periods during the flight season for both Crotch and western bumble bees, which is generally between early February and late November (Thorp et al. 1983:18, California Department of Fish and Wildlife 2019b:30). For each sampling event, the biologist(s) will survey suitable habitat using nonlethal netting methods for 1 person-hour per 3 acres of the highest quality habitat or until Crotch or western bumble bees are sighted, whichever comes first. If initial sampling does not find Crotch or western bumble bees and if based on the opinion of a qualified biologist that the habitat is of low quality, no further sampling of that area will be required.

If Crotch and western bumble bees are determined to be absent from a given work area based on negative survey results, or a qualified invertebrate biologist (experienced with bumble bees) concludes that there is a very low likelihood that these species are present, then no additional mitigation is required.

If Crotch or western bumble bees are determined to be present in project work areas, then DWR will implement the following measures.

1. If bumble bee surveys identify occupied Crotch and/or western bumble bee habitat within construction areas, the qualified biologist will then conduct additional preconstruction surveys within the project disturbance footprint for active Crotch and western bumble bee nest colonies and associated floral resources (i.e., flowering vegetation on which bees from the colony are observed foraging) no more than 30 days prior to any ground disturbance between March and September. The purpose of this preconstruction survey is to identify active nest colonies and associated floral resources outside of permanent impact areas (e.g., in staging or other temporary disturbance areas), that could be completely or temporarily avoided by construction personnel. A qualified biologist will establish, monitor, and maintain no-work buffers around Crotch and western bumble bee nest colonies and floral resources identified during surveys. The size and configuration of the no-work buffer will be based on best professional judgment of the biologist. At a minimum, the buffer will provide at least 20 feet of clearance around nest entrances. Construction activities will not occur within the no-work buffers until the colony is no longer active (i.e., no Crotch or western bumble bees are seen flying in or out of the nest for 3 consecutive days, indicating the colony has completed its nesting season and the next season's queens have dispersed from the colony). Monitoring of an active nest could be conducted using a motion-detecting wildlife trail camera or daily by a qualified biologist for a duration suitable for detecting nesting activity based on site-specific conditions, weather, and species behaviors.

2. To minimize temporary disturbance of suitable foraging and nesting habitat for Crotch and western bumble bees, ground disturbance within suitable habitat will be restricted to the minimum area necessary to perform construction activities.

3. Temporarily disturbed grasslands that are revegetated will use a seed mix combination that includes nectar- and pollen-producing plants commonly used as a food source by Crotch and western bumble bees. These plants will be incorporated into the seed mix, as applicable for the existing habitat conditions.

Mitigation Measure BIO-22a: Avoid and Minimize Impacts on California Tiger Salamander

All Project Alternatives

The following measures for California tiger salamander will only be required for construction activities occurring within suitable habitat as identified from the habitat modeling and by additional assessments conducted during the planning for work in a given area.

During project implementation and prior to project construction, DWR will implement the following measures.

1. When each site is available for surveys a USFWS- and CDFW- approved biologist will then delineate California tiger salamander habitat at each project site, based on the definition of suitable habitat, including both aquatic and upland habitat. The criteria used for assessing suitable habitat have been adopted from the primary constituent elements identified in the 2005 critical habitat designation for the Central Valley distinct population segment of California tiger salamander (70 FR 49390). Habitat deemed suitable will include at least one of the following:
    a. Aquatic—Standing bodies of fresh water (including natural and human-made [e.g., stock]) ponds, vernal pools, and other ephemeral or permanent waterbodies that typically support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall.
    b. Upland—Upland habitats within 1.3 miles of suitable aquatic habitat that contain small mammal burrows or other underground habitat that California tiger salamander depend upon for food, shelter, and protection from the elements and predation. Accessible upland dispersal habitat between occupied locations that allow for movement between such sites.
2. Once habitat has been delineated, the USFWS- and CDFW-approved biologist may use surveys performed using a method approved by USFWS and CDFW to determine presence of the species on the project site to enable further determination of compensatory mitigation requirements. In the event of a dry year, the aquatic habitat will be evaluated based on general suitability (e.g., evidence of suitable ponding depths, proximity to occurrences) and the habitat will be assumed to represent occupied habitat.
3. To the greatest extent possible, identified and delineated habitat will be completely avoided.

For areas verified as being suitable for California tiger salamander and that can't be avoided, the following measures will be implemented.

4. To the extent practicable, initial ground-disturbing activities will not be conducted between November 1 and March 31, or extended to April 30 during wet years, in areas identified during the planning stages as providing suitable California tiger salamander habitat, to avoid the period when they are most likely to be moving through upland areas. Once the area has been surveyed, initial ground disturbance has occurred, and exclusionary fencing is in place, work within the disturbed area can occur outside the construction window.
5. Where construction takes place in aquatic habitat, activities will not be initiated until after the habitat is no longer ponding water or until a USFWS- and CDFW-approved biologist has surveyed the aquatic habitat for presence of California tiger salamander and results have been submitted to the agencies. No work or dewatering will be allowed in occupied habitat.

If a work site is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than 5 millimeters to prevent larger aquatic species from entering the pump system.

6. Ground-disturbing activities will be designed to minimize or eliminate effects on rodent burrows that may provide suitable cover habitat for California tiger salamander. Surface-disturbing activities will avoid areas with a high concentration of burrows to the greatest extent practicable. In addition, when a concentration of burrows is present in a work site, the area plus a 50-foot buffer will be staked or flagged to ensure that work crews are aware of their location and to facilitate avoidance of the area.

7. All initial ground disturbance or vegetation removal (clearing) will be limited to periods of no or low rainfall (less than 0.08 inch per 24-hour period and less than 40% chance of rain). To the extent practicable, clearing activities within California tiger salamander habitat will cease 24 hours prior to a 40% or greater forecast of rain from the closest National Weather Service (NWS) weather station. Clearing may continue 24 hours after the rain ceases, if no more than 0.5 inch of precipitation is in the 72-hour forecast. If clearing must continue when rain is forecast (greater than 40% chance of rain), a USFWS- and CDFW-approved biologist will survey the work site before clearing begins each day rain is forecast. If rain exceeds 0.5 inch during a 24-hour period, clearing will cease until the NWS forecasts no further rain. Modifications to this timing may be pursued in coordination with the agencies based on site conditions and expected risks to California tiger salamander. For a given site that has exclusion fencing in place and all surface soil disturbance completed (i.e., no burrows present), these restrictions would no longer apply.

8. To the extent practicable, earthmoving and construction activities will cease no less than 30 minutes before sunset and will not begin again until no less than 30 minutes after sunrise within 300 feet of California tiger salamander habitat. Except when necessary for driver or pedestrian safety, to the greatest extent practicable, artificial lighting at a work site will be prohibited during the hours of darkness.

9. At least 15 days prior to any ground-disturbing activities, DWR will prepare and submit a relocation plan for USFWS's and CDFW's written approval. The relocation plan will contain the name(s) of the USFWS- and CDFW-approved biologist(s) to relocate California tiger salamanders, the method of relocation (if different than described), a map, and a description of the proposed release site(s) within 300 feet of the work area or at a distance otherwise agreed to by USFWS and CDFW, and written permission from the landowner to use their land as a relocation site. The relocation plan will also include methods for searching for California tiger salamander in the work areas to avoid and minimize the potential for injury and mortality. Generally, work areas will be attempted to be cleared of California tiger salamanders by placing pit fall traps along the inside of the exclusion fence (i.e., within work areas) or by hand-excavating mammal burrows. Methods will be selected based on site specific conditions in a given work area and will be approved by USFWS and CDFW. Any California tiger salamanders found will be relocated according to the agency-approved relocation plan and will following the handling protocols outlined below.

10. The perimeter of construction sites within or adjacent to California tiger salamander habitat will be fenced with fencing material suitable for excluding amphibians by no more than 14 days prior to the start of construction activities (e.g., staging, vegetation removal, grading) in a given area. The construction manager and the USFWS- and CDFW-approved biologist will

determine where exclusion fencing will be installed to protect California tiger salamander habitat adjacent to the defined site footprint and to minimize the potential for California tiger salamanders to enter the construction work area. The placement of exclusion fencing will be determined, in part, by the locations of suitable habitat for the species (defined above). A conceptual fencing plan will be submitted to USFWS and CDFW prior to the start of construction and the exclusion fencing will be shown on the final construction plans. DWR will include the amphibian exclusion fence specifications including installation and maintenance criteria in the bid solicitation package special provisions. The amphibian exclusion fencing will remain in place for the duration of construction and will be regularly inspected and fully maintained. The biological monitor and construction manager will be responsible for checking the exclusion fencing around the work areas each day of construction for wildlife trapped inside and to ensure that they are intact and upright. This will be especially critical during times of inclement weather that could damage the fencing. Repairs to the amphibian exclusion fence will be made within 24 hours of discovery of a breach. Where construction access is necessary, gates will be installed in the exclusion fence and fencing will be installed to direct animals away from the work area to the extent practicable (e.g., fencing will flare out and turn back toward suitable habitat).

11. Preconstruction surveys will be conducted by a USFWS- and CDFW-approved biologist immediately prior to the initiation of any ground-disturbing activities or vegetation clearing, including immediately prior to exclusion fence installation, in areas identified as having suitable California tiger salamander habitat. These surveys will consist of walking surveys within the work sites and investigating suitable aquatic and upland habitat including potential refugia habitat such as small woody debris, refuse, burrow entrances, etc., that are not directly disturbed by project activities. If there is a lapse in construction in a work area for 7 days or more, these surveys will be repeated before activities resume.

12. The USFWS- and CDFW-approved biologist will conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of California tiger salamander. Surveys will be conducted in the same manner as the preconstruction surveys.

13. If a California tiger salamander is observed at any point within a work area, the USFWS- and CDFW-approved biologist will implement the following species observation and handling protocol. Only USFWS- and CDFW-approved biologists will participate in activities associated with the capture, handling, and monitoring of California tiger salamanders. If a California tiger salamander is encountered in a construction area, activities within the vicinity of the individual will cease immediately and the construction manager and USFWS- and CDFW- approved biologist will be notified. The California tiger salamander will be allowed to leave the area of its own volition, and work may resume when it is no longer in harm's way. All personnel on-site will be notified of the finding and at no time will work occur in the vicinity of the California tiger salamander without a USFWS- and CDFW-approved biologist present. If the salamander does not move out of the area on its own, and it is determined by the approved biologist that relocating the California tiger salamander is necessary, these steps will be followed:

    a. Prior to handling and relocation, the USFWS- and CDFW-approved biologist will take precautions to prevent introduction of amphibian diseases in accordance with the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (U.S. Fish and Wildlife Service 2003), or the most up-to-date guidance available at the time. Disinfecting equipment and clothing is especially important when biologists are coming to the action area to handle amphibians after working in other aquatic habitats. California tiger salamanders will also be handled and assessed according to the *Restraint and Handling of Live Amphibians* (U.S. Geological Survey National Wildlife Health Center 2001), or the most up-to-date guidance available at the time.

b. California tiger salamanders will be captured by hand, dipnet, or other USFWS- and CDFW-approved methodology, transported, and relocated to nearby suitable habitat outside of the work area and released as soon as practicable the same day of capture. Individuals will be relocated no greater than 300 feet outside of the work area to areas with an active rodent burrow or burrow system (unless otherwise approved by USFWS). Holding/transporting containers and dipnets will be thoroughly cleaned, disinfected, and rinsed with fresh water prior to use within the action area. USFWS and CDFW will be notified within 24 hours of all capture, handling, and relocation efforts. USFWS- and CDFW-approved biologists will wear clean, new disposable surgical style (nitrile, etc.) gloves and/or ensure that their hands are free of soaps, oils, creams, lotions, repellents, or solvents of any sort while capturing and relocating individuals. To avoid transferring disease or pathogens in handling of the amphibians, USFWS- and CDFW-approved biologists will follow the Declining Amphibian Populations Task Force's "Code of Practice" or the most recent guidance.

c. If an injured California tiger salamander is encountered and the USFWS- and CDFW-approved biologist determines the injury is minor or healing and the salamander is likely to survive, the salamander will be released immediately, consistent with the preapproved relocation plan as described above. The California tiger salamander will be monitored until it is determined that it is not imperiled by predators or other dangers.

d. If the USFWS- and CDFW-approved biologist determines that the California tiger salamander has major or serious injuries because of activities at the work site, the USFWS- and CDFW-approved biologist, or designee, will immediately take it to a USFWS- and CDFW-approved facility. If taken into captivity, the individual will not be released into the wild unless it has been kept in quarantine and the release is authorized by USFWS. DWR will bear any costs associated with the care or treatment of such injured California tiger salamanders. The circumstances of the injury, the procedure followed, and the final disposition of the injured animal will be documented in a written incident report. Notification to USFWS and CDFW of an injured or dead California tiger salamander in the project area will be reported within 24 hours and will include details such as whether or not its condition resulted from activities related to the proposed project. In addition, the USFWS- and CDFW-approved biologist will follow up with USFWS and CDFW in writing within 2 calendar days of the finding. Written notification to USFWS and CDFW will include the following information: the species, number of animals taken or injured, sex (if known), date, time, location of the incident or of the finding of a dead or injured animal, how the individual was taken, photographs of the specific animal, the names of the persons who observed the take or found the animal, and any other pertinent information. Dead specimens will be preserved, as appropriate, and held in a secure location until instructions are received from USFWS regarding the disposition of the specimen.

14. The USFWS- and CDFW-approved biologist will have the authority to stop activities at the work site if they determine that any of avoidance and minimization measures are not being fulfilled.

15. If the exclusion fence is compromised during the rainy season, when California tiger salamanders are likely to be active, the fence will be repaired and a survey will be conducted immediately preceding construction activity that occurs in modeled or suitable California tiger salamander habitat, as determined by a USFWS- and CDFW-approved biologist, or in advance of any activity that may result in take of the species. The biologist will search along exclusion fences, and beneath vehicles each morning before they are moved. The survey will include a careful inspection of all potential hiding spots, such as along exclusion fencing; large, downed woody debris; and the perimeter of ponds, wetlands, and riparian areas. Any California tiger salamanders found will be captured and relocated according to the USFWS/CDFW-approved relocation plan.

16. If work must be conducted at night within 300 feet of California tiger salamander habitat, all lighting will be directed away and shielded from California tiger salamander habitat outside the construction area to minimize light spillover to the greatest extent possible. If light spillover into adjacent California tiger salamander habitat occurs, a USFWS- and CDFW-approved biologist will be present during night work to survey for burrows and emerging California tiger salamanders in areas illuminated by construction lighting. If California tiger salamander is found aboveground the USFWS- and CDFW-approved biologist has the authority to terminate the project activities until the light is directed away from the burrows, the California tiger salamander moves out of the illuminated area, or the California tiger salamander is relocated out of the illuminated area by the USFWS- and CDFW-approved biologist.

17. If requested before, during, or upon completion of ground disturbance and construction activities where suitable California tiger salamander habitat is present, DWR will require that USFWS and CDFW can access and inspect the work site for compliance with the description of the project and avoidance and minimization measures, and to evaluate effects on the California tiger salamander and its habitat. A USFWS- and CDFW-approved biologist will be on-site during all activities that may result in take of California tiger salamander.

Mitigation Measure BIO-22b: Avoid and Minimize Operational Traffic Impacts on Wildlife

DWR will implement the following measures to avoid and minimize wildlife-vehicle collisions on DWR facility access roads.

1. Vehicles will observe a maximum speed limit of 15 miles per hour on unpaved non-public DWR access roads where it is safe and feasible to do so. Vehicles will observe a maximum speed limit of 30 miles per hour on paved, non-public DWR access roads. Speed limits will be posted in both directions.

2. To extent practicable, traffic control structures, such as speed bumps, will be utilized to reduce speeds.

3. Wildlife crossing signs will be posted in both directions on new or widened access roads that overlap with habitat for special-status wildlife, to the extent practicable.

Mitigation Measure BIO-23: Avoid and Minimize Impacts on Western Spadefoot Toad

All Project Alternatives

As properties become accessible for initiating project activities within areas of modeled western spadefoot toad habitat, the suitability of the modeled habitat will be assessed on the ground by a biologist qualified to identify aquatic and upland habitat for the species.

For areas verified as being suitable for western spadefoot toad, the following measures will be implemented.

1. Except for limited vegetation clearing necessary to minimize effects on nesting birds, initial suitable upland habitat clearance and disturbance will not be conducted between November 1 and March 31, with the period extending to April 30 during wet years. Once the initial ground disturbance has occurred, the area has been surveyed, and exclusionary fencing is in place, work in the disturbed area can occur outside the construction window.
2. Where construction or restoration activities take place in aquatic habitat, activities will not be initiated until after the habitat is no longer ponding water or until a biologist has surveyed the aquatic habitat for presence of western spadefoot toad larvae. No work or dewatering will be allowed in occupied habitat. If a work site is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than 5 millimeters to prevent larger aquatic species from entering the pump system.
3. Ground-disturbing activities will be designed to minimize or eliminate effects on rodent burrows that may provide suitable upland habitat for western spadefoot toad. Surface-disturbing activities will avoid areas with a high concentration of burrows to the greatest extent practicable. In addition, when a concentration of burrows is present in a work site, the area plus a 50-foot buffer will be staked or flagged to ensure that work crews are aware of their location and to facilitate avoidance of the area.
4. All initial ground disturbance or vegetation removal (clearing) will be limited to periods of no or low rainfall (less than 0.08 inch per 24-hour period and less than 40% chance of rain). To the extent practicable, clearing activities within western spadefoot toad habitat will cease 24 hours prior to a 40% or greater forecast of rain from the closest NWS weather station. Clearing may continue 24 hours after the rain ceases, if no more than 0.5 inch of precipitation is in the 72-hour forecast. If clearing must continue when rain is forecast (greater than 40% chance of rain), a qualified biologist will survey the work site before clearing begins each day rain is forecast. If rain exceeds 0.5 inch during a 24-hour period, clearing will cease until the NWS forecasts no further rain. For a given site that has exclusion fencing in place and all surface soil disturbance completed (i.e., no burrows present), these restrictions would no longer apply.
5. To the extent possible, earthmoving and construction activities will cease no less than 30 minutes before sunset and will not begin again until no less than 30 minutes after sunrise within 300 feet of western spadefoot toad habitat. Except when necessary for driver or pedestrian safety, to the greatest extent practicable, artificial lighting at a work site will be prohibited during the hours of darkness.
6. The perimeter of construction and restoration sites within western spadefoot toad habitat will be fenced with fencing material suitable for excluding amphibians by no more than 14 days prior to the start of construction activities (e.g., staging, vegetation removal, grading) in

a given area. The construction manager and qualified biologist will determine where exclusion fencing will be installed to protect western spadefoot toad habitat adjacent to the defined site footprint and to minimize the potential for toads to enter the construction work area. DWR will include the amphibian exclusion fence specifications including installation and maintenance criteria in the bid solicitation package special provisions. The amphibian exclusion fencing will remain in place for the duration of construction and will be regularly inspected and fully maintained. A biological monitor and construction manager will be responsible for checking the exclusion fencing around the work areas each day of construction for wildlife trapped inside and to ensure that they are intact and upright. This will be especially critical during times of inclement weather that can damage the fencing. Repairs to the amphibian exclusion fence will be made within 24 hours of discovery of a breach. Where construction access is necessary, gates will be installed in the exclusion fence and fencing will direct animals away from the work area to the extent practicable (e.g., fencing will flare out and turn back toward suitable habitat).

7. Preconstruction surveys will be conducted by a qualified biologist immediately prior to the initiation of any ground-disturbing activities or vegetation clearing, including immediately prior to exclusion fence installation, in areas identified as having suitable western spadefoot toad habitat. These surveys will consist of walking surveys within the work sites and investigating suitable aquatic and upland habitat including potential refugia habitat such as small woody debris, refuse, burrow entrances, etc., that are not directly disturbed by project activities. If there is a lapse in construction in a work area for 7 days or more, these surveys will be repeated before activities resume.

8. If the exclusion fence is compromised during the rainy season, a survey will be conducted immediately preceding construction activity that occurs in suitable western spadefoot toad habitat, or in advance of any activity that may result in take of the species. The biologist will search along exclusion fences, and beneath vehicles each morning before they are moved. Surveys will be conducted in the same manner as the preconstruction surveys.

9. If a western spadefoot toad is encountered in a construction or restoration area, activities within the vicinity of the animal will cease immediately and the construction manager and biological monitor will be notified. The toad will be allowed to leave the area of its own volition, and work may resume when it is no longer in harm's way. If the toad does not move out of the area on its own, and it is determined by the biologist that relocating is necessary, these steps will be followed:

    a. Prior to handling and relocation, the biologist will take precautions to prevent introduction of amphibian diseases by following guidance in *The Declining Amphibian Task Force Fieldwork Code of Practice* (U.S. Fish and Wildlife Service 2019:1) or the most up-to-date guidance available at the time. Western spadefoot toads will also be handled and assessed according to the *Restraint and Handling of Live Amphibians* (U.S. Geological Survey National Wildlife Health Center 2001) or the most up-to-date guidance available at the time.

    b. Western spadefoot toads will be captured by hand, dipnet, or other CDFW-approved methodology, transported, and relocated to nearby suitable habitat outside of the work area and released as soon as practicable the same day of capture.

Mitigation Measure BIO-24a: Avoid and Minimize Impacts on California Red-Legged Frog

All Project Alternatives

The following measures for California red-legged frog will only be required for construction activities occurring within suitable habitat as identified from the habitat modeling and by additional assessments conducted during the planning for work in a given area.

To the extent practicable, DWR will minimize impacts on critical habitat for California red-legged frog containing the primary constituent elements listed below.

1. Aquatic Breeding Habitat. Standing bodies of fresh water (with salinities less than 4.5 parts per thousand [ppt]), including: natural and human-made (e.g., stock) ponds, slow-moving streams or pools within streams, and other ephemeral or permanent waterbodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years.

2. Non-Breeding Aquatic Habitat. Freshwater pond and stream habitats, as described above, that may or may not hold water long enough for the species to complete its aquatic life cycle but that do provide for shelter, foraging, predator avoidance, and aquatic dispersal for juvenile and adult California red-legged frogs. Other wetland habitats that would be considered to meet these criteria include, but are not limited to: plunge pools within intermittent creeks, seeps, quiet water refugia during high water flows, and springs of sufficient flow to withstand short-term dry periods.

3. Upland Habitat. Upland areas adjacent to or surrounding breeding and non-breeding aquatic and riparian up to a distance of 1 mile in most cases (i.e., depending on surrounding landscape and dispersal barriers) including various vegetational series such as grassland, woodland, forest, wetland, or riparian areas that provide shelter, forage, and predator avoidance. Upland features are also essential in that they are needed to maintain the hydrologic, geographic, topographic, ecological, and edaphic features that support and surround the aquatic, wetland, or riparian habitat. These upland features contribute to the filling and drying of the wetland or riparian habitat and are responsible for maintaining suitable periods of pool inundation for larval frogs and their food sources, and provide breeding, non-breeding, feeding, and sheltering habitat for juvenile and adult frogs (e.g., shelter, shade, moisture, cooler temperatures, a prey base, foraging opportunities, and areas for predator avoidance). Upland habitat can include structural features such as boulders, rocks and organic debris (e.g., downed trees, logs), as well as small mammal burrows and moist leaf litter.

4. Dispersal Habitat. Accessible upland or riparian habitat within and between occupied or previously occupied sites that are located within 1 mile of each other, and that support movement between such sites. Dispersal habitat includes various natural habitats and altered habitats such as agricultural fields, which do not contain barriers to dispersal. Dispersal habitat does not include moderate- to high-density urban or industrial developments with large expanses of asphalt or concrete, nor does it include large lakes or reservoirs over 50 acres in size, or other areas that do not contain those features identified in primary constituent elements 1, 2, or 3 as essential to the conservation of the species.

During project implementation and prior to project construction, DWR will implement the following measures.

5. When each site is available for surveys, biologist approved by USFWS, will then delineate California red-legged frog habitat at each project site, based on an agreed-upon definition of suitable habitat, including both aquatic and upland habitat.

6. Once habitat has been delineated, the qualified biologist may conduct surveys performed using a method approved by USFWS to determine presence of the species on the project site to enable further determination of compensatory mitigation requirements. In the event of a dry year, the aquatic habitat will be evaluated based on general suitability (e.g., evidence of suitable ponding depths, proximity to occurrences) and the habitat will be assumed to represent occupied habitat.

7. To the greatest extent possible, identified and delineated habitat will be completely avoided.

For areas verified as being suitable for California red-legged frog and that can't be avoided, the following measures will be implemented.

8. To the extent practicable, initial ground-disturbing activities will not be conducted between September 1 and April 30, to avoid the wet season which encompasses breeding as well as potential upland migration before and after. Once the area has been surveyed, initial ground disturbance has occurred, and exclusionary fencing is in place, the seasonal restriction would not apply.

9. Ground-disturbing activities will be designed to minimize or eliminate effects on rodent burrows that may provide suitable cover habitat for California red-legged frog. Surface-disturbing activities will avoid areas with a high concentration of burrows to the greatest extent practicable. In addition, when a concentration of burrows is present in a work site, the area will be staked or flagged to ensure that work crews are aware of their location and to facilitate avoidance of the area.

10. All initial ground disturbance or vegetation removal (clearing) will be limited to periods of no or low rainfall (less than 0.08 inch per 24-hour period and less than 40% chance of rain). To the extent practicable, clearing activities within California red-legged frog habitat will cease 24 hours prior to a 40% or greater forecast of rain from the closest NWS weather station. Clearing may continue 24 hours after the rain ceases, if no more than 0.5 inch of precipitation is in the 72-hour forecast. If clearing must continue when rain is forecast (i.e., greater than 40% chance of rain), a USFWS-approved biologist will survey the work site before clearing begins each day rain is forecast. If rain exceeds 0.5 inch during a 24-hour period, clearing will cease until the NWS forecasts no further rain. Modifications to this timing may be approved by USFWS based on site conditions and expected risks to California red-legged frog. For a given site that has exclusion fencing in place and all surface soil disturbance completed (i.e., no burrows present), these restrictions would no longer apply.

11. To the maximum extent practicable, nighttime construction will be minimized or avoided when working in suitable California red-legged frog habitat. To the greatest extent practicable, earthmoving and construction activities will cease no less than 30 minutes before sunset and will not begin again prior to no less than 30 minutes after sunrise. Except when necessary for driver or pedestrian safety, artificial lighting at a work site will be prohibited during the hours of darkness when working in suitable California red-legged frog habitat.

12. If work must be conducted at night within 300 feet of California red-legged frog habitat, all lighting will be directed away and shielded from California red-legged frog habitat outside

the construction area to minimize light spillover to the greatest extent possible. If light spillover into adjacent California red-legged frog habitat occurs, a USFWS-approved biologist will be present during night work to survey for California red-legged frogs in areas illuminated by construction lighting. If California red-legged frog is found to be illuminated, the USFWS-approved biologist has the authority to terminate the project activities until the light is directed away from the frog's location, or the California red-legged frog moves out of the illuminated area.

13. At least 15 days prior to any ground disturbance activities, DWR will prepare and submit a relocation plan for USFWS's written approval. The relocation plan will contain the name(s) of the USFWS-approved biologist(s) to relocate California red-legged frogs, the method of relocation (if different than described), a map, and a description of the proposed release site(s) within 300 feet of the work area or at a distance otherwise agreed to by USFWS, and written permission from the landowner to use their land as a relocation site

14. The perimeter of construction sites will be fenced with fencing material suitable for excluding amphibians by no more than 14 days prior to the start of construction. The construction manager and the USFWS-approved biologist will determine where exclusion fencing will be installed to protect California red-legged frog habitat adjacent to the defined site footprint and to minimize the potential for California red-legged frog to enter the construction work area. The placement of exclusion fencing will be determined, in part, by the locations of suitable habitat for the species. A conceptual fencing plan will be submitted to USFWS prior to the start of construction and the California red-legged frog exclusion fencing will be shown on the final construction plans. DWR will include the amphibian exclusion fence specifications including installation and maintenance criteria in the bid solicitation package special provisions. The amphibian exclusion fencing will remain in place for the duration of construction and will be regularly inspected and fully maintained. The biological monitor and construction manager will be responsible for checking the exclusion fencing around the work areas each day of construction for wildlife trapped inside and to ensure that they are intact and upright. This will be especially critical during times of inclement weather that can damage the fencing. Repairs to the amphibian exclusion fence will be made within 24 hours of discovery of a breach. Where construction access is necessary, gates will be installed in the exclusion fence and fencing will direct animals away from the work area to the extent practicable (e.g., fencing will flare out and turn back toward suitable habitat).

15. Preconstruction surveys will be conducted by a USFWS-approved biologist immediately prior to the initiation of any ground-disturbing activities or vegetation clearing, including immediately prior to exclusion fence installation, in areas identified as having suitable California red-legged frog habitat. These surveys will consist of walking the work site limits. The USFWS-approved biologist will investigate all potential areas that could be used by the California red-legged frog for feeding, breeding, sheltering, movement, or other essential behaviors. If there is a lapse in construction in a work area for 7 days or more, these surveys will be repeated before activities resume.

16. The USFWS-approved biologist will conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of California red-legged frog. These surveys will consist of walking surveys within the work sites and investigating suitable aquatic and upland habitat including

potential refugia habitat such as small woody debris, refuse, and burrow entrances, that are not directly disturbed by project activities.

17. If a California red-legged frog is encountered at any point within a work area, activities in the vicinity of the animal will cease immediately and the construction manager and biological monitor will be notified. The frog will be allowed to leave the area of its own volition, and work may resume when it is no longer in harm's way. All personnel on-site will be notified of the finding and at no time will work occur in the vicinity of the frog without a USFWS-approved biologist present. If the frog does not move out of the area on its own, and it is determined by the USFWS-approved biologist that relocating the frog is necessary, these steps will be followed:

    a. Prior to handling and relocation, the biologist will take precautions to prevent introduction of amphibian diseases by following guidance in *The Declining Amphibian Task Force Fieldwork Code of Practice* (U.S. Fish and Wildlife Service 2019:1), or the most up-to-date guidance available at that time. California red-legged frogs will also be handled and assessed according to the *Restraint and Handling of Live Amphibians* (U.S. Geological Survey National Wildlife Health Center 2001), or the most up-to-date guidance available at that time.

    b. California red-legged frogs will be captured by hand, dipnet, or other USFWS-approved methodology, transported, and relocated to nearby suitable habitat outside of the work area and released as soon as practicable the same day of capture per the relocation plan. Holding/transporting containers and dipnets will be thoroughly cleaned, disinfected, and rinsed with fresh water prior to use within construction areas. USFWS will be notified within 24 hours of all capture, handling, and relocation efforts. USFWS-approved biologists will wear clean, new disposable surgical style (latex, nitrile, etc.) gloves and/or ensure that their hands are free of soaps, oils, creams, lotions, repellents, or solvents of any sort while capturing and relocating individuals. To avoid transferring disease or pathogens in handling of the amphibians, USFWS-approved biologists will follow the Declining Amphibian Populations Task Force's "Code of Practice" or the most up to date, agency-accepted guidance.

    c. If an injured California red-legged frog is encountered and the USFWS-approved biologist determines the injury is minor or healing and the frog is likely to survive, the frog will be released immediately, consistent with the preapproved relocation plan as described above. The frog will be monitored until it is determined that it is not imperiled by predators or other dangers.

    d. If the USFWS-approved biologist determines that the frog has major or serious injuries because of activities at the work site, the USFWS-approved biologist, or designee, will immediately take it to a USFWS-approved facility. If taken into captivity, the individual will not be released into the wild unless it has been kept in quarantine and the release is authorized by USFWS. DWR will bear any costs associated with the care or treatment of such injured frogs. The circumstances of the injury, the procedure followed, and the final disposition of the injured animal will be documented in a written incident report. Notification to USFWS of an injured or dead California red-legged frog in the project area will be reported within 24 hours and will include details such as whether or not its condition resulted from activities related to the proposed project. In addition, the USFWS-approved biologist will follow up with USFWS in writing within 2 calendar days of the finding. Written notification to USFWS will include the following information: the species, number of animals taken or injured, sex (if known), date, time, location of the incident or of the finding of a dead or injured animal, how the individual was taken, photographs of the specific animal, the names of the persons who observed the take or found the animal, and any other pertinent information. Dead specimens will be preserved, as appropriate, and held in a secure location until instructions are received from USFWS regarding the disposition of the specimen.

18. Work within suitable aquatic habitats will not begin until the habitat is dry or has been adequately surveyed and dewatered. Aquatic habitats that must be dewatered will be surveyed for California red-legged frogs prior to dewatering. Dewatering pumps will be screened with wire mesh not larger than 5 millimeters to prevent larvae from entering the pump. The biological monitor will be present during dewatering. Any California red-legged frogs found will be relocated per the relocation plan.

Mitigation Measure BIO-24b: Compensate for Impacts on California Red-Legged Frog Habitat Connectivity

All Project Alternatives

To mitigate for impacts on California red-legged frog habitat connectivity resulting from the construction of the access roads and rail spur leading to the Southern Forebay (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) and the construction of a new crossing on Mountain House Creek, a widened section of Byron Highway crossing over an unnamed channel near the new Lindemann Road interchange (Alternative 5), and a widened section of Mountain House Road over two unnamed creeks, DWR will design and construct crossings (i.e., culverts or bridges) on Brushy Creek, Italian Slough, Mountain House Creek, and the unnamed channels crossing Byron Highway and Mountain House Road that meet the following performance standards.

1. Completely span suitable California red-legged frog aquatic habitat.
2. Maintain natural channel substrates, or similar materials, at road and rail spur crossings over California red-legged frog habitat.
3. Size the constructed crossings to include upland habitat on at least one side of each channel that is above the bank full width to allow for terrestrial movement and refugia from bank full flows.

New and widened road segments will be designed and constructed on the new access road to Bethany Reservoir, Byron Highway, Mountain House Road, Grant Line Road, and Lindemann Road with the following features:

4. New and widened access road segments will avoid installing curbs, to the extent practicable. If curbs must be installed, curbs will be designed with sloping sides less than 30 degrees (Clevenger and Huijser 2011:156) to allow amphibian movement across the road.
5. New and widened access road segments will avoid installing median barriers (i.e., k-rails), to the extent practicable. If median barriers cannot be avoided due to public safety concerns, barriers will be outfitted with small openings at ground level to allow amphibian passage.

Mitigation Measure BIO-25: Avoid and Minimize Impacts on Western Pond Turtle

All Project Alternatives

The following measures for western pond turtle will only be required for project construction occurring within or adjacent to suitable habitat as identified from the habitat modeling and by planning level assessments conducted once access to the project footprint is available. A qualified biologist will conduct a field evaluation of suitable upland or aquatic habitat for western pond turtles for all project activities that occur within modeled habitat.

If the project does not fully avoid effects on suitable habitat, the following measures will be required.

1. No more than 14 days prior to the start of construction activities in a given area, exclusion fencing will be installed between the work area and adjacent suitable aquatic habitat. Where openings need to be maintained, such as on the levee road, fencing will be installed to direct turtles away from the work area to the extent practicable (e.g., fencing will flare out and turn back toward the river and adjacent riparian). Fencing will be installed prior to the start of the nesting season (March) and remain in place for the duration of construction. Fencing may be moved or reconfigured to facilitate construction. The biological monitor and construction manager will be responsible for checking the exclusion fencing around the work areas each day of construction to ensure that they are intact and upright. Repairs to the exclusion fence will be made within 24 hours of discovery of damage. Where construction access is necessary, gates will be installed in the exclusion fence and fencing will direct animals away from the work area to the extent practicable (e.g., fencing will flare out and turn back toward suitable habitat).

2. Preconstruction surveys will be conducted by a qualified biologist immediately prior to the initiation of any ground-disturbing activities or vegetation clearing, including exclusion fence installation, in areas identified as having suitable western pond turtle habitat. If there is a lapse in construction in a work area for 7 days or more, these surveys will be repeated before activities resume.

3. The qualified biologist will conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of western pond turtle. If a turtle is observed, the qualified biologist will implement the following species observation and handling protocol. Only qualified biologists will participate in activities associated with the capture, handling, and monitoring of western pond turtles. If a turtle is encountered in a construction area, activities within the vicinity of the individual will cease immediately, and the construction manager and qualified biologist will be notified. The turtle will be allowed to leave the area of its own volition, and work may resume when it is no longer in harm's way. All personnel on-site will be notified of the finding and at no time will work occur in the vicinity of the turtle without a qualified biologist present. If the turtle does not move out of the area on its own, and it is determined by the qualified biologist that relocating the turtle is necessary, relocation will be done in coordination with CDFW. Any handling of turtles will be done by a biologist with a valid memorandum of understanding from CDFW authorizing the capture and relocation of turtles and as determined during coordination with CDFW. Biologists will wear clean, new disposable surgical style (nitrile, etc.) gloves while handling and relocating individuals.

4. If a work site is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than 5 millimeters to prevent juvenile pond turtle and other aquatic species from entering the pump system. Any turtles found in the dewatered area will be relocated in coordination with CDFW to the nearest aquatic habitat by a biologist authorized to relocate turtles.

Mitigation Measure BIO-26: Avoid and Minimize Impacts on Special-Status Reptiles

All Project Alternatives

The following measures will be required to avoid and minimize impacts on special-status reptiles.

1. During project implementation and prior to project construction, DWR will direct a qualified biologist to conduct a habitat assessment in modeled habitat for coast horned lizard, Northern California legless lizard, California glossy snake, and San Joaquin coachwhip to confirm these areas contain suitable habitat for the species as defined in the species accounts in Appendix 13B.
2. Where suitable habitat exists, the qualified biologist will conduct a preconstruction survey for special-status reptiles immediately prior to the start of vegetation clearing or ground-disturbing activities. If there is a lapse in construction in a work area for 7 days or more, these surveys will be repeated before activities resume.
3. If special-status reptiles are found in work areas, the biologist will first attempt to allow these species to move out of harm's way on their own, but if conditions do not allow this, individuals will be captured by the biologist and relocated to the nearest suitable habitat outside of the work area, as determined in consultation with CDFW.
4. Vehicles that are parked near suitable habitat for these species overnight or for more than 1 hour during the day, shall be inspected to ensure no reptiles have taken refuge beneath the tires prior to moving the vehicles.
5. To the extent practicable, work in areas with suitable habitat should not be conducted during periods of cold and hot temperatures (below 67 degrees Fahrenheit [°F] and above 100°F), because these species would generally be relatively inactive during these periods and could be taking cover in loose soil, in burrows or crevices, or under structures such as rocks or logs. This will reduce the likelihood of special-status reptiles being injured or killed by ground-disturbing activities.

Mitigation Measure BIO-30: Avoid and Minimize Impacts on Giant Garter Snake

All Project Alternatives

The following measures for giant garter snake will only be required for construction and restoration activities occurring within suitable habitat as identified from the habitat modeling and by additional assessments conducted during the planning for work in a given area.

During project implementation and prior to project construction, DWR, in agreement with CDFW and USFWS, will perform the following measures.

1. When each site is available for surveys, a USFWS- and CDFW-approved biologist, will then delineate giant garter snake habitat at each project site, based on an agreed upon definition of suitable habitat, including both aquatic and upland habitat.
2. Once habitat has been delineated, the biologist may use giant garter snake surveys performed using a method approved by USFWS to determine presence of the species on the project site to enable further determination of compensatory mitigation requirements.
3. For sites where such surveys are performed, the surveys will conform to established protocols for giant garter snake surveys and all occurrence data gathered will be reported to the CNDDB and USFWS to add to the understanding of populations and occurrences for the species in the Delta.
4. To the greatest extent possible, identified and delineated habitat will be completely avoided.

If the construction or restoration activity does not fully avoid effects on suitable habitat, the following measures will be implemented.

5. Initiate construction and clear suitable habitat in the summer months, between May 1 and October 1, and avoid giant garter snake habitat during periods of brumation (between October 1 and May 1). Suitability of aquatic and upland habitat characteristics will be determined by the biologist consistent with the description of suitable habitat defined in Appendix 13B, Section 13B.55. Once a construction site has been cleared and exclusionary fencing is in place, work within the cleared area can occur between October 1 and May 1.
6. To the extent practicable, conduct all activities within paved roads, farm roads, road shoulders, and similarly disturbed and compacted areas; confine ground disturbance and habitat removal to the minimal area necessary to facilitate construction activities.
7. At least 15 days prior to any ground-disturbing activities, DWR will prepare and submit a relocation plan for USFWS's and CDFW's written approval. The relocation plan will contain the name(s) of the biologist(s) to relocate giant garter snakes, the method of relocation (if different than described), a map, and a description of the proposed release site(s) within 300 feet of the work area or at a distance otherwise agreed to by USFWS and CDFW, and written permission from the landowner to use their land as a relocation site.
8. The perimeter of construction sites (except for work sites within areas of open water, like the Sacramento River) within or adjacent to giant garter snake habitat will be fenced with exclusion fencing by no more than 14 days prior to the start of construction activities (e.g., staging, vegetation removal, grading) in a given area. The construction manager and the biologist will determine where exclusion fencing will be installed to minimize the potential for giant garter snake to enter the construction work area, including consideration of nearby vegetation that could facilitate giant garter snake entering the exclusion area. The placement of exclusion fencing will be determined, in part, by the locations of suitable habitat for the species. A conceptual fencing plan will be submitted to USFWS and CDFW prior to the start of construction and the exclusion fencing will be shown on the final construction plans. DWR will include the exclusion fence specifications including installation and maintenance criteria in the bid solicitation package special provisions. The exclusion fencing will remain in place for the duration of construction and will be regularly inspected and fully maintained. The biological monitor and construction manager will be responsible for checking the exclusion fencing around the work areas each day of construction to ensure that they are intact and upright. This will be especially critical during times of inclement

weather that can damage the fencing. Repairs to the exclusion fence will be made within 24 hours of discovery of a breach. Where construction access is necessary, gates will be installed in the exclusion fence and fencing will direct animals away from the work area to the extent practicable (e.g., fencing will flare out and turn back toward suitable habitat).

9. Immediately prior to the initiation of any vegetation clearing, ground-disturbing activities, and exclusion fence installation, the USFWS- and CDFW-approved biologist will survey suitable aquatic and upland habitat in the entire work site for the presence of giant garter snakes. If there is a lapse in construction in a work area for 7 days or more, these surveys will be repeated before activities resume.

10. If exclusionary fencing is found to be compromised, a survey of the exclusion fencing and the area inside the fencing will be conducted immediately preceding construction activity that occurs in delineated giant garter snake habitat or in advance of any activity that may result in take of the species. The biologist will search along exclusionary fences, in pipes, and beneath vehicles before they are moved.

11. If a giant garter snake is found in the work area, all work will cease in the vicinity of the snake, and the snake will be allowed to move of its own volition out of harm's way. If the snake does not move and it is deemed necessary to relocate the animal to prevent harm, the snake may be captured and relocated to suitable habitat a minimum of 200 feet outside of the work area in accordance with the relocation plan, prior to resumption of construction activity.

12. Within 24 hours prior to construction activities, and dredging, requiring heavy equipment, a USFWS- and CDFW-approved biologist will survey all the activity area not protected by exclusionary fencing where giant garter snake could be present. This survey of the work area will be repeated if a lapse in construction or dredging activity of 2 weeks or greater occurs during the aestivation period (October 1 to May 1) or if the lapse in construction activity is more than 12 hours during active season (May 1 to October 1). If a giant garter snake is encountered during surveys or construction, cease activities until appropriate corrective measures have been completed, it has been determined that the giant garter snake will not be harmed, or the giant garter snake has left the work area.

13. The USFWS- and CDFW-approved biological monitor will help guide access and construction work around wetlands, active rice fields, and other sensitive habitats capable of supporting giant garter snake to minimize habitat disturbance and risk of injuring or killing giant garter snakes.

14. Store equipment in designated staging area areas at least 200 feet away from giant garter snake aquatic habitat to the extent practicable.

15. Visually check for giant garter snake under any vehicles or equipment that have been idle for more than 1 hour, or parked overnight, prior to moving the vehicles. Check any crevices or cavities in the work area where individuals may be present, including stockpiles that have been left for more than 24 hours where cracks/crevices may have formed.

For activities that will occur during the giant garter snake inactive season (October 2 to April 30) and will last more than 2 weeks, DWR will implement the following additional avoidance and minimization measures.

16. For proposed activities that will occur within suitable aquatic giant garter snake habitat, during the inactive giant garter snake season (October 2–April 30), all aquatic giant garter snake habitat will be dewatered for at least 15 consecutive days prior to excavating or filling the dewatered habitat. Dewatering is necessary because aquatic habitat provides prey and cover for giant garter snake; dewatering serves to remove the attractant and increase the likelihood that giant garter snake will move to other available habitat. Any deviation from this measure will be done in coordination with and with approval of USFWS and CDFW.
17. Following dewatering of aquatic habitat, all potential impact areas that provide suitable aquatic or upland giant garter snake habitat will be surveyed for giant garter snake by the biologist. If giant garter snakes are observed, they will be passively allowed to leave the potential impact area. If the snake does not move of its own accord and it is determined necessary, the snake will be relocated in accordance with the approved relocation plan.
18. Once habitat is deemed free of giant garter snakes, exclusion fencing will be installed around the construction site so no snakes may reenter prior to or during construction.

Mitigation Measure BIO-31: Avoid and Minimize Impacts on Western Yellow-Billed Cuckoo

All Project Alternatives

The following measures will be required for all construction activities occurring between May 15 through September 1 to avoid and minimize impacts on western yellow-billed cuckoo.

1. Prior to the construction, a noise expert will create a sound level contour map showing the 60 dBA sound level contour specific to the type and location of construction to occur in the area.
2. Two weeks prior to construction, a USFWS- and CDFW-approved biologist will conduct daily surveys, consistent with a USFWS- or CDFW-approved survey protocol (e.g., Halterman et al. 2015:9-42, or more current guidance), in suitable habitat where construction-related noise levels could exceed 60 dBA equivalent sound level (L_{eq}) (1 hour).
3. If a yellow-billed cuckoo is found, construction activities will be limited such that sound will not exceed 60 dBA within 500 feet of the habitat being used until the USFWS- and CDFW-approved biologist has confirmed that the bird has left the area.
4. If surveys find cuckoos in an area where vegetation will be removed, vegetation removal will be conducted when the USFWS- and CDFW-approved biologist has confirmed that cuckoos are not present within 500 feet of vegetation removal activities.
5. Portable and stationary equipment will be located, stored, and maintained as far as possible, with a minimum distance of 500 feet, from suitable western yellow-billed cuckoo habitat.
6. All lights will be screened and directed down toward work activities and away from migratory habitat. A biological monitor will ensure that lights are properly directed at all times during construction.

Mitigation Measure BIO-32: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of California Black Rail

All Project Alternatives

Preconstruction surveys for California black rail will be required by DWR to be conducted 1 year prior to construction and the year of construction where potentially suitable habitat for this species occurs within 500 feet of work areas and where access is available. Potentially suitable habitat includes tidal and nontidal seasonal or perennial wetlands at least 2 acres in size with any kind of vegetation types consistent with California black rail use in the Delta (as determined by field evaluations conducted by a CDFW-approved biologist with experience surveying for black rail) over 10 inches high, whether or not the patch in question was mapped as modeled habitat. A minimum of four surveys will be conducted between February 1 and April 15, with at least 10 days between surveys. Because California black rail are most active between 2 hours before and 3 hours after sunrise, surveys will start at sunrise and continue no later than 9:30 a.m. These surveys will involve the following protocols (based on Evens et al. 1991), or other CDFW-approved survey methodologies that may be developed using new information and best-available science and will be conducted by biologists with the qualifications stipulated in the CDFW-approved methodologies.

1. Listening stations will be established at 300-foot intervals throughout potential California black rail habitat that will be affected by construction or CMP restoration activities. Listening stations will be placed along roads, trails, and levees to avoid trampling wetland vegetation. Listening stations will be located a maximum of 10 meters from suitable habitat where access is available.
2. Surveys at each station will consist of a biologist listening passively for 1 minute, then broadcasting prerecorded black rail vocalizations: 1 minute of "grr" calls followed by 0.5 minute of "ki-ki-doo" calls. The CDFW-approved biologist will then listen for another 3.5 minutes for a total of 6 minutes per station. Once a California black rail response is detected, the biologist will cease broadcasting immediately.
3. A global positioning system (GPS) receiver and compass will be used to identify survey stations, angles to call locations, and call locations and distances from listening stations. The California black rail call type, location, distance from listening station, and time will be recorded.

The project will be implemented in a manner that will not result in take of California black rail as defined by Section 86 of the California Fish and Game Code. If California black rail is present in the immediate construction area, the following measures will be required.

4. To avoid the loss of individual California black rails, activities within 500 feet of potential habitat will not occur within 2 hours before or after extreme high tides (6.5 feet or above, as measured at the Golden Gate Bridge), to the extent feasible. During high tide, protective cover for California black rail is sometimes limited, and disturbance from project activities could prevent individual rails from reaching available cover.
5. To avoid the loss of individual California black rails, activities within 500 feet of tidal marsh areas and managed wetlands will be avoided during the rail breeding season (February 1 through August 31), unless surveys are conducted to determine that no rails are present within the 500-foot buffer.

6. If breeding California black rail is determined to be present, activities will not occur within 500 feet of an identified calling center (or a smaller distance if approved by CDFW). If the intervening distance between the rail calling center and any activity area is greater than 200 feet and across a major slough channel or substantial barrier (e.g., constructed noise barrier) it may proceed at that location within the breeding season.

7. If construction activities require removal of potential California black rail habitat, whether or not rails have been detected there, vegetation will be removed during the nonbreeding season (September 1 through January 31). Vegetation removal will be completed carefully using hand tools or vegetation removal equipment that is approved by a CDFW-approved biologist. The CDFW-approved biologist will search vegetation immediately in front of the removal tools or equipment and will stop removal if rails are detected. Vegetation removal will resume when the California black rail leaves the area.

8. If the construction footprint is within 500 feet of a known calling center, noise reduction structures such as temporary noise-reducing walls, will be installed at the edge of construction footprint, as determined by an on-site CDFW-approved biologist. Noise-causing construction will be initiated during the nonbreeding season (September 1 through January 31), where feasible, so that California black rails can acclimate to noise and activity prior to nesting.

Mitigation Measure BIO-33: Avoid and Minimize Disturbance of Sandhill Cranes

All Project Alternatives

Construction will be avoided during the sandhill crane wintering season (September 15 through March 15) to the extent feasible. In addition, the following measures will be implemented to avoid and minimize impacts on greater and lesser sandhill crane and to avoid take of greater sandhill crane as defined by Section 86 of the California Fish and Game Code.

1. <u>Preconstruction Surveys</u>

    a. Preconstruction surveys will be conducted to evaluate the use of sandhill crane modeled habitat by a qualified biologist familiar with sandhill crane biology and experienced with sandhill crane survey techniques. Preconstruction surveys will be conducted for sandhill crane temporary (cultivated lands) and permanent (managed wetlands) roost sites (Ivey et al. 2014a:6) within 0.75 mile of the construction area boundary where access is available. Surveys will be conducted during the winter prior to project implementation, over multiple days within the survey area by a qualified biologist with experience observing the species. DWR will coordinate with CDFW and Refuge biologists prior to conducting sandhill crane preconstruction surveys.

    b. Prior to construction, a noise expert will create a sound level contour map showing the 50 dBA sound level contour specific to the type and location of construction to occur in the area and existing noise barriers such as levees or embankments. The sandhill crane survey data will be used with GIS-based methods to evaluate habitat loss, the acres of habitat affected by the 50 dB sound level contour, to identify lands in fulfillment of minimization requirements, and to determine the total affected and compensatory habitat required, at the time of project footprint finalization. The sandhill crane foraging habitat model may be updated using agricultural land-use data or a combination of land-use and survey data to allow for avoidance and minimization requirements to be quantified using up-to-date information.

2. Timing

   a. Construction of some project facilities such as access roads and underground transmission lines may be scheduled so that they occur outside of the crane wintering season (September 15 through March 15). The construction activities with a high potential to disturb cranes, such as pile driving, that need to occur for only limited time periods will be scheduled for periods outside the sandhill crane wintering season (September 15 through March 15) to the extent feasible.

   b. Helicopter surveys to identify buried groundwater and natural gas wells throughout the project area and pile installation test methods at the north Delta intakes will be conducted outside of the sandhill crane wintering season (September 15 through March 15). Pile installation test methods will include noise monitoring to test the site-specific effectiveness of noise minimization measures (e.g., shrouds around the hammer as described below), to determine which measures will be feasible and effective to implement during pile installation.

   c. Other field investigations including test trenches, CPTs, soil borings, ERT, groundwater testing, monument installation, pilot studies for settlement, agronomic testing, and utility potholing will not be conducted within known permanent and temporary roost sites during the sandhill crane wintering season (September 15 through March 15).

   d. To the extent feasible, construction within habitat that is known to be occupied based on preconstruction surveys and cannot be completed prior to commencement of the wintering season, will be started at a minimum, 14 days before September 15 or 14 days after March 15, such that no new sources of noise or other major disturbance that could affect sandhill cranes will be introduced after the sandhill cranes arrive at their wintering grounds.

3. Minimize Effects on Sandhill Crane Foraging and Roosting Habitat Resulting from Water Conveyance Facilities Construction

   DWR will implement the following measures to minimize effects on sandhill crane resulting from implementation of the final design of the water conveyance facilities.

   a. Foraging Habitat

      i. The final design of the conveyance facilities will avoid construction-related loss of sandhill crane foraging habitat to the extent feasible.

      ii. Avoid pile driving and general construction-related combined noise effects on foraging habitat to the extent feasible. DWR will avoid the area of crane foraging habitat to be affected during the day (from 1 hour after sunrise to 1 hour before sunset) by construction noise exceeding 50 dBA L_{eq} (1 hour), where feasible.[7] Prior to construction, a noise expert will create a sound level contour map showing the 50 dBA sound level contour specific to the type and location of construction to occur in the area and existing noise barriers such as levees or embankments. DWR will use shrouds or noise blankets to reduce noise from

[7] 50 decibels averaged over a 1-hour period.

impact hammers or vibratory pile drivers at the intake work sites, which have been shown to reduce pile hammer noise by 8 to 23 dBA (Teachout and Cushman 2005:8; Washington State Department of Transportation 2018:7.15). Artificial noise barriers may be installed to decrease noise levels at foraging habitat below 50 dBA L_{eq} (1 hour). However, the visual effects of noise barriers on sandhill cranes are unknown; therefore, all other options to reduce noise (e.g., installation of shrouds at pile driving locations at the intakes and other construction sites) will be implemented before installing noise barriers in close proximity to crane habitat. As described above, test piles constructed under field investigations and sound level surveys will determine site-specific considerations and feasibility for implementation of these measures.

iii. Enhance foraging habitat to avoid loss of foraging values that could otherwise result from unavoidable noise-related effects. DWR will enhance 0.1 acre of foraging habitat for each acre of foraging habitat to be indirectly affected within the 50 dBA L_{eq} (1 hour) construction sound level contour during the wintering season (September 1 through March 15). The enhanced foraging habitat will be established one crane wintering season (September 1 through March 15) prior to construction and will be maintained until the activities causing the indirect noise effect is completed. The enhanced habitat will consist of corn fields that will not be harvested and will be managed to maximize food availability to sandhill cranes (e.g., corn stalks will be knocked down or mulched to make grain available to foraging cranes). A management plan for the enhanced habitat will be completed prior to establishing the habitat, in coordination with a qualified biologist with experience managing sandhill crane habitat on cultivated lands, or experience directing such management. The enhanced habitat will be located outside the construction-related 50 dBA L_{eq} (1 hour) sound level contour and within 1 mile of the affected habitat.

b. Roosting Habitat

i. If a sandhill crane roost site is located within 0.75 mile of the construction area boundary, then to the extent feasible, nighttime (1 hour before sunset to 1 hour after sunrise) project activities will be relocated to maintain a 0.75-mile non-disturbance buffer. If this is not practicable, the following measures will be implemented to avoid and minimize effects on roosting sandhill cranes.

ii. DWR will avoid permanent impacts resulting in direct loss of roost sites. This can be accomplished by siting activities outside identified crane roost sites or by relocating the roost site if it consists of cultivated lands (roost sites that consist of wetlands rather than cultivated lands will not be subject to relocation). A cultivated land roost site can be relocated by not flooding the site where the impact will occur during years when construction will occur and by establishing a new roost site equal or greater in size at a new location away from the disturbance (outside the 50 dBA L_{eq} [1 hour] pile driving and general construction sound level contour) but within 1 mile of the affected roost site. The relocated roost site will be established 1 year prior to construction activities affecting the original roost site. A qualified biologist familiar with crane biology will design the new roost site and direct implementation of the roost site establishment. Potential sites will be identified and surveyed prior to establishment. Relocated roost sites will be maintained until construction is complete in the affected region. Prior to construction, a noise expert will create a sound level contour map showing the 50 dBA sound level contour specific to the type and location of construction to occur in the area and existing noise barriers such as levees or embankments.

iii. Avoid pile driving and general construction-related noise effects on known permanent and temporary roost sites as described below. Activities within 0.75 mile of known roost sites will reduce pile driving and general construction noise during nighttime hours (from 1 hour before sunset to 1 hour after sunrise) such that pile-driving and general construction noise levels do not exceed a combined 50 dBA L_{eq} (1 hour) at the nearest temporary or permanent roost sites during periods when the roost sites are available (flooded). This can be accomplished by limiting construction activities that could result in pile-driving and general construction noise levels above 50 dBA L_{eq} (1 hour) at the roost site to day time only (from 1 hour after sunrise to 1 hour before sunset); siting nighttime project activities to ensure that pile-driving and general construction noise levels do not exceed a combined 50 dBA L_{eq} (1 hour) at the roost site; relocating cultivated land or wetland roost sites as described above; and/or installing noise barriers between roost sites within the 50 dBA L_{eq} (1 hour) contour and the pile-driving and general construction noise source areas, such that construction noise levels at the roost site do not exceed 50 dBA L_{eq} (1 hour). The installation of noise barriers will be used only if the first three options cannot be implemented to the extent that noise levels do not exceed 50 dBA L_{eq} (1 hour) at the roost site. As described above, DWR will use shrouds or noise blankets to reduce noise from impact hammers or vibratory pile drivers at the intake work sites, which have been shown to reduce pile hammer noise by 8 to 23 dBA (Teachout and Cushman 2005; Washington State Department of Transportation 2018:7.15). All other options to reduce noise (e.g., installation of shrouds at pile driving locations at the intakes and other construction sites) will be implemented before installing noise barriers in close proximity to crane habitat. As described above, test piles constructed under field investigations and sound level surveys will determine site-specific considerations and feasibility for implementation of these measures.

iv. If the roost site to be indirectly affected within the 50 dBA L_{eq} (1 hour) pile-driving and general construction combined sound level contour is a wetland roost site (natural wetlands) rather than flooded cultivated lands, then the existing wetland roost site will not be removed. A new, cultivated land roost site will be temporarily established at a new location away from the disturbance (outside the 50 dBA L_{eq} (1 hour) sound level contour) but within 1 mile of the affected site, at a ratio of 1 acre created for each acre of temporary or permanent roost site within the pile-driving and general construction 50 dBA L_{eq} (1 hour) sound level contour. The new roost site will be established prior to commencement of the wintering season that occurs prior to construction activities potentially affecting the original roost site and will be maintained until the activities creating the indirect disturbance are completed. A qualified biologist familiar with crane biology will design the new roost site and direct implementation of the roost site establishment.

4. Measures to Avoid and Minimize Potential Effects from Lighting and Visual Disturbance

DWR has designed the project to minimize lighting and visual effects from traffic to reduce disturbance to sandhill cranes in the vicinity of Stone Lakes NWR. Project-related traffic on Hood-Franklin Road would be limited to shuttles bringing construction employees to and from the intake construction areas and the park and ride lot. In areas within 0.75 miles of known sandhill crane roost sites, DWR will implement the following measures to avoid and minimize potential lighting and visual effects that could result from construction or operation and maintenance.

a. Route nighttime truck traffic to reduce headlight impacts in roosting habitat where feasible.

b. Require trucks traveling along the intake haul road to move continuously and not idle or stop along the haul road adjacent to Stone Lakes NWR.

c. Install light barriers, where there are no existing barriers, to block the line of sight between the nearest roosting areas and the primary nighttime construction light source areas.

d. Screen all construction-related lights and direct them down toward work activities and away from the night sky and nearby roost sites. A biological monitor will ensure that lights are properly directed at all times during construction.

e. Minimize the use of construction equipment greater than 50 feet in height to the extent feasible in light of project schedule and cost and logistical considerations.

5. Measures to Minimize Effects to Sandhill Cranes on Staten Island

Because of the density of greater sandhill cranes wintering on Staten Island and the importance of Staten Island to the existing population of the greater sandhill crane in the study area facilities will be placed to minimize disturbance to sandhill cranes at this site. Interested parties provided information used to identify the placement of the tunnel shaft on Staten Island (under Alternatives 1, 2a, 2b, and 2c) at a location at the northern portion of Staten Island in a previously disturbed area adjacent to a road and powerline (Delta Conveyance Design and Construction Authority 2022d:4). DWR will ensure that project-related construction will not result in a net decrease in crane use on Staten Island as determined by deriving greater sandhill crane use days for the entire winter period.[8] This standard will be achieved through some combination of the following (and including the above required avoidance and minimization measures).

c. Minimize noise, lighting, and visual disturbances during construction (see measures described above).

d. Minimize construction activity during the crane wintering season (September 15 through March 15) to the extent feasible.

[8] Expected loss of crane use will be estimated by using data on crane use days/acre by habitat type on Staten Island from past studies and future monitoring before construction begins (using averages among available years). These will be used to predict the number of lost crane use days within the footprint of the habitat loss and within the 50 dBA L_{eq} (1 hour) pile-driving and general construction sound level contour. Preproject crane surveys will provide additional data on crane use day densities per habitat type to improve the prediction. Use day densities will be used to guide decisions regarding crop habitat needed to be maintained on Staten Island to maintain this performance standard during construction.

e. Provide supplemental feeding/foraging habitat enhancement as described above under *Minimize Effects on Sandhill Crane Foraging and Roosting Habitat Resulting from Water Conveyance Facilities Construction*.

f. Maintain flooding and irrigation capacity. DWR will work with land managers to stage construction activities on Staten Island such that they do not disrupt flooding and irrigation to the extent that greater sandhill crane habitat will be reduced during the crane wintering season.

Prior to construction on Staten Island, the qualified biologist will coordinate with DWR to develop a strategy for achieving no net decrease in crane use on Staten Island using a combination of the measures described above, and prepare a plan based on the final construction design on Staten Island that includes all avoidance and minimization measures necessary for achieving no net decrease in crane use on Staten Island. This plan will be subject to review and approval by the wildlife agencies prior to its implementation. All avoidance and minimization measures will be in place, consistent with the plan, prior to project construction on Staten Island.

6. <u>Bouldin Island Minimization Measures</u>

Because of the regular use of temporary roost sites (cultivated lands) on Bouldin Island by sandhill cranes, DWR will place conveyance facilities and RTM to minimize disturbance to sandhill cranes at this site to the extent feasible. Interested parties provided information used to minimize impacts on habitat for special-status species on Bouldin Island and to prioritize placement of facilities and RTM along the southern, western, and northeastern portions of the island based on physical conditions and biological resources. DWR will implement some combination of the following (and including the above required avoidance and minimization measures).

g. Provide supplemental feeding/foraging habitat enhancement as described above under *Minimize Effects on Sandhill Crane Foraging and Roosting Habitat Resulting from Water Conveyance Facilities Construction*.

h. Maintain flooding and irrigation capacity. DWR will work with land managers to stage construction activities on Bouldin Island such that they do not disrupt flooding and irrigation to the extent that sandhill crane habitat will be reduced during the crane wintering season.

Mitigation Measure BIO-34: Avoid California Least Tern Nesting Colonies and Minimize Indirect Effects on Colonies

All Project Alternatives

The following measures will be implemented to avoid and minimize impacts on California least tern nesting colonies and to avoid take of California least tern, as defined by Section 86 of the California Fish and Game Code.

1. If suitable nesting habitat for California least tern (flat, unvegetated areas near aquatic foraging habitat) is identified during planning-level surveys the year prior to construction, DWR will require that at least three preconstruction surveys for this species will be conducted in all suitable habitat within 500 feet of the construction footprint during the California least tern nesting season (April 15 to August 15). Surveys will be conducted by a

USFWS- and CDFW-approved biologist with experience observing the species and its nests. Construction projects will be designed to avoid loss of California least tern nesting colonies if construction will take place within 500 feet of a California least tern nest during the nesting season (April 15 to August 15 or extended as determined through surveys).

2. A USFWS- and CDFW-approved wildlife biologist will monitor construction activities in the vicinity of the nests to ensure that construction activities do not affect nest success. Reduced buffers may be allowed, through coordination with USFWS and CDFW, if a full-time USFWS- and CDFW-approved biologist is present to monitor the nest and has authority to halt construction if bird behavior indicates continued activities could lead to nest failure. Active nests will be monitored to track progress of nesting activities until the biologist determines that the young have fledged and are capable of independent survival or the nest site is no longer active.
3. Only inspection, research, or monitoring activities may be performed during the least tern breeding season, in occupied least tern nesting habitat, with USFWS and CDFW approval and under the supervision of a USFWS- and CDFW-approved biologist.

Mitigation Measure BIO-35: Avoid and Minimize Impacts on Cormorant, Heron, and Egret Rookeries

All Project Alternatives

Cormorants, herons, and egrets are highly traditional in their use of nest sites (rookeries), in that they use the same sites year after year. To reduce impacts on rookeries, DWR will implement the following measures prior to construction activities.

1. To the maximum extent feasible, vegetation removal and trimming will be scheduled during the nonbreeding season of birds (September 1 through January 31). Vegetation trimming will not remove known nests. If a rookery needs to be removed, DWR will contact CDFW prior to removal and removal will occur during the nonbreeding season (September 1 through January 31). Preconstruction surveys of previously occupied colonies and all suitable habitat within 500 feet of the project footprint and compensatory mitigation sites will be conducted during the breeding (February 1 through August 31) season by a qualified biologist with experience observing cormorants, herons, and egrets and their nests. If there is a break in construction of 3 calendar days or more, surveys will be conducted prior to restarting construction in the area.
2. To the maximum extent feasible, major construction activities that will occur within 500 feet of an active cormorant, heron, or egret rookery (including ground-nesting cormorants) will be avoided during the breeding season. If feasible, construction activities that will result in the greatest disturbance to an active cormorant, heron, or egret rookery will be deferred until after or as late in the breeding season as feasible. If construction must take place within 500 feet of an active cormorant, heron, or egret rookery during the breeding season, a qualified biologist will monitor construction activities in the vicinity of the nests to ensure that construction activities do not affect nest success. The extent of the buffer will be determined by the qualified wildlife biologist(s) and will be established by taking into consideration the type and extent of the proposed activity occurring near the nest, the duration and timing of the activity, the line of sight between the nest and the disturbance, the sensitivity and the habituation of the birds and raptors to existing conditions, and the

dissimilarity of the proposed activity to ambient levels of noise and other disturbances. Reduced buffers may be allowed if a full-time qualified biologist is present to monitor the nest and has authority to expand the buffer or halt construction if bird behavior indicates continued activities could lead to nest failure or if a bird is in the footprint during project activities.

3. Active nests will be monitored to track progress of nesting activities until the biologist determines that the young have fledged and are capable of independent survival or the nest site is no longer active.

Mitigation Measure 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

All Project Alternatives

To reduce impacts on nesting birds, DWR will implement the measures listed below prior to construction activities.

1. Timing Restrictions. To the maximum extent feasible, construction activities, vegetation removal, and trimming will be scheduled during the nonbreeding season of birds (September 1 through January 31) to avoid impacts on nesting birds if nesting birds are present. If construction activities, vegetation removal, and trimming cannot be conducted in accordance with this timeframe, surveys for nesting birds and additional protective measures will be implemented as described below.

2. Preconstruction Surveys. A qualified wildlife biologist with knowledge of the relevant species will conduct nesting surveys before the start of construction. A minimum of three separate surveys will be conducted within 30 days prior to construction, with the last survey within 3 days prior to construction. Surveys will be conducted within the project construction and staging areas and all suitable nesting habitat (e.g., trees, shrubs, emergent wetland, grasslands ruderal areas, cultivated lands, human-made structures) within 500 feet of the project construction and staging areas (or an alternative survey distance if described within species-specific USFWS or CDFW protocols or species-specific mitigation measures within this document) to locate any active nest protected by the Migratory Bird Treaty Act. If no active nests are detected during these surveys, no additional measures are required if construction begins within 3 calendar days. An additional survey will be conducted after any construction breaks of 3 calendar days or more. Surveys for nesting bank swallows will be conducted in RTM areas that have been present for at least 1 year, allowing the substrate to stabilize. Surveys of RTM will be conducted prior to RTM removal, during the bank swallow nesting season (April 1 through August 31).

3. No-Disturbance Buffer. If active nests are found in the survey area, no-disturbance buffers will be established around the nest sites to avoid disturbance or destruction of the nest site until the end of the breeding season (approximately September 1) or until a qualified wildlife biologist determines that the young have fledged and moved out of the work area (this date varies by species). Buffer distances vary by species and conservation status (e.g., listed species and fully protected species may warrant larger buffers than non–special-status species) but typically, these buffer distances are between 300 feet and 650 feet for raptors and between 50 feet and 250 feet for other nesting birds. The extent of the buffers

will be determined by the qualified wildlife biologist(s) and will be established by taking into consideration they type and extent of the proposed activity occurring near the nest, the duration and timing of the activity, the line of sight between the nest and the disturbance, the sensitivity and the habituation of the birds and raptors to existing conditions, and the dissimilarity of the proposed activity to ambient levels of noise and other disturbances. The qualified wildlife biologist(s) will mark the extent and locations of non-disturbance buffers on maps to present to construction personnel at morning tailboards or will use flagging, fencing, or other suitable physical markers, depending on the species of birds, the size of the buffers, and the construction activities to be conducted in the work area.

4. Nest Monitoring. The qualified wildlife biologist(s) will monitor construction activities in the vicinity of the nests to ensure that construction activities do not affect nest success. Reduced buffers (described above) may be allowed if a full-time qualified biologist is present to monitor the nest. Active nests will be monitored to track progress of nesting activities until the biologist determines that the young have fledged and are capable of independent survival or the nest site is no longer active.

5. Authority of Qualified Wildlife Biologist(s). If, during construction, the qualified wildlife biologist(s) determines that a nesting bird is disturbed by construction activities to the point where continued activities could lead to nest failure, the qualified wildlife biologist(s) will have the authority to immediately stop work. The qualified wildlife biologist(s) will determine additional if protective measures (including increasing the non-disturbance buffer distance) need to be implemented and will continue monitoring the nest until the qualified biologist(s) determine that bird behavior has normalized.

Mitigation Measure BIO-36b: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of White-Tailed Kite

All Project Alternatives

The following measures will be required for activities occurring in suitable white-tailed kite habitat.

1. Preconstruction Surveys. Preconstruction surveys will be conducted by a qualified biologist(s) to identify the presence of potential white-tailed hawk nest trees on within 0.25 mile of project sites, where accessible. Transportation routes along public roads (roads leading to and from work areas) are considered disturbed, and no surveys or monitoring are required for nests along those roadways unless they are within 0.25 mile of work areas. Surveys for nesting white-tailed kites will be conducted, following a protocol approved by CDFW, within 30 days prior to construction to ensure nesting activity is documented prior to the onset of construction activity during the nesting season. White-tailed kite nest in the study area between approximately March 15 and September 15. While many nest sites are traditionally used for multiple years, new nest sites can be established in any year. Therefore, construction activity that is planned after March 15 of any year will require surveys during the year of the construction. If construction is planned before March 15 of any year, surveys will be conducted the year immediately prior to the year of construction. DWR will provide survey results to CDFW by phone or email no less than 5 days prior to commencement of construction activities. The qualified biologist(s) will conduct a second survey of potential nesting trees and active nests and monitor white-tailed kite nests no more than 72 hours prior to construction. If no nesting activity is found, then construction

can proceed with no restrictions if construction begins within 3 calendar days. An additional survey will be conducted after any construction breaks of 3 calendar days or more.

2. Timing Restrictions. Where the construction site occurs within 0.25 mile of a white-tailed kite nest, DWR will limit construction activities to outside the white-tailed kite breeding season (March 15 through September 15), to the extent feasible. Where construction activities within 0.25 mile of an active nest cannot feasibly be avoided during the breeding season, DWR will initiate construction prior to egg laying to the greatest extent feasible. This will allow time for white-tailed kites to acclimate to disturbance before eggs are laid. If eggs or young are present in the nest, work will not be permitted to occur until the qualified biologist(s) determines that white-tailed kites have acclimated to disturbance and exhibit normal nesting behavior.

3. No-Disturbance Buffer. Where construction activities must occur within 0.25 mile of an occupied white-tailed kite nest, DWR will establish a 650-foot-radius (198 meters) non-disturbance buffer (buffer) around each white-tailed kite nest tree and the buffer will remain in place until the end of the breeding season or until the last chick has left the nest. DWR will clearly delineate the buffer with fencing or other conspicuous marking. The qualified biologist(s) will monitor occupied nest trees to track progress of nesting activities (see *White-tailed Kite Nest Monitoring* below). DWR will not conduct any construction activities within the buffer while a nest site is occupied by white-tailed kite during the breeding season. The buffer size may be modified based on the field examination and determination by the qualified biologist(s) of conditions that may minimize disturbance effects, including line of sight, topography, land use, type of disturbance, existing ambient noise and disturbance levels, and other relevant factors, as authorized by CDFW. Entry into the buffer will be granted when the qualified biologist(s) determines that the young have fledged and are capable of independent survival, or the nest has failed, and the nest site is no longer active.

4. White-Tailed Kite Nest Monitoring. Where construction activities must occur within 0.25 mile of an occupied white-tailed kite nest tree, DWR will implement the following monitoring plan.

    a. Five days and three days prior to the initiation of construction at any site where a nest is within 650 feet of construction, the qualified biologist(s) will observe the subject nest(s) for at least 1 hour or until normal nesting behavior can be determined. The qualified biologist(s) will document nesting status and behaviors to compare to nesting status and behaviors after construction begins. The results of preconstruction monitoring will be reported to CDFW within 24 hours of each survey.

    b. Where an occupied white-tailed kite nest tree occurs less than 325 feet (99 meters) from construction, the qualified biologist(s) will observe the nest for at least 4 hours per day during construction to ensure the white-tailed kites are engaged in normal nesting behavior.

    c. Where an occupied white-tailed kite nest tree occurs between 325 to 650 feet (99 to 198 meters) from construction, the qualified biologist(s) will observe the nest for at least 2 hours per day during construction to ensure the white-tailed kites are engaged in normal nesting behavior.

d. Where an occupied white-tailed kite nest tree occurs between 650 to 1,300 feet (198 to 396 meters) from construction, the qualified biologist(s) will observe the nest once a day during construction to ensure the white-tailed kites are engaged in normal nesting behavior and to check the status of the nest.

5. Disturbance of Occupied Nest Tree. DWR will prohibit physical contact with an active nest tree from the time of egg laying to fledging, unless approved by CDFW. All workers within 650 feet will be out of the line of sight of the occupied white-tailed kite nest tree during breaks or will take breaks more than 650 feet from an occupied nest tree.

6. Authority of Qualified Biologist(s). The project will be implemented in a manner that will not result in take of white-tailed kite, as defined by Section 86 of the California Fish and Game Code. If during construction, the qualified biologist(s) determines that a nesting white-tailed kite within 0.25 mile of construction is disturbed by construction activities to the point where nest abandonment is likely, the qualified biologist(s) will have the authority to immediately stop work and will immediately notify DWR. A designated representative from DWR will contact CDFW within 24 hours to determine additional protection measures to be implemented. The qualified biologist(s) will:

   a. Stop construction until additional protective measures are implemented unless white-tailed kite behavior normalizes on its own. Potential nest abandonment and failure may be indicated if, in the qualified biologist(s)' professional judgment, the white-tailed kite exhibits distress and/or abnormal nesting behavior, such as swooping or stooping at construction equipment or personnel, excessive distress-call vocalization or agitated behavior directed personnel, failure to remain on nest, or failure to deliver prey items.

   b. Continue monitoring and ensure additional protective measures remain in place until the qualified biologist(s) determine(s) white-tailed kite behavior has normalized.

   c. Determine if additional protective measures are ineffective and stop construction until the additional protective measures are modified.

   d. Continue monitoring until determining that white-tailed kite behavior has normalized.

   e. The DWR representative or qualified biologist(s) will notify CDFW within 24 hours if nests or nestlings are abandoned and if the nestlings are still alive. The qualified biologist(s) will work with CDFW to determine appropriate actions.

7. Nest Tree Avoidance. DWR will avoid removal of known nest trees to the maximum extent feasible. If a known nest tree must be removed for construction activities, DWR will notify and obtain written approval from CDFW. The notification will include the location of the known nest tree, conditions to offset the loss of the nest tree, and the time of removal, which will generally be October 1 through February 1. DWR will not remove any occupied nest tree until the last young have left the nest, as verified by the qualified biologist(s). DWR will compensate for the temporal loss of known white-tailed kite nest trees using the protocol described for Swainson's Hawk in Appendix 3F, *Compensatory Mitigation* (Attachment 3F.1, Table 3F.1-3, CMP-19a: *Swainson's Hawk Nesting Habitat*).

8. Geotechnical Exploration. DWR will conduct geotechnical exploration outside of the breeding season, to the extent practicable. The qualified biologist(s) will delineate with flagging or other visible markers suitable breeding habitat within the geotechnical exploration site. DWR will restrict geotechnical exploration to areas outside of the

delineated breeding habitat. If geotechnical exploration must occur during the breeding season, the qualified biologist(s) will survey the breeding habitat within 0.25 mile for nesting white-tailed kite. DWR will limit geotechnical exploration activities to least 0.25 mile away from any occupied nest tree, unless otherwise approved by CDFW.

9. <u>Measures Specific to Transmission Line Construction</u>. DWR will not use helicopters to string transmission lines or to conduct field investigations within 0.25 mile of an occupied nest tree. DWR will not remove or trim occupied nest trees for transmission line construction until after the breeding season has ended or the last young have left the nest. If removal or trimming of an occupied nest tree needs to occur for human or wildlife safety, DWR will conduct removal or trimming from October 1 to February 1, or with written approval and guidance from CDFW. DWR will avoid removal or trimming of known or suitable nest trees, to the extent practicable, during transmission line stringing and reconductoring activities or during power and pole placement. Where practicable, DWR will place poles and lines outside of breeding habitat, as delineated by the qualified biologist(s). DWR will follow the *Nest Tree Avoidance* measures listed above when removal or trimming of known or suitable nest trees cannot be avoided.

Mitigation Measure BIO-37: Conduct Surveys for Golden Eagle and Avoid Disturbance of Occupied Nests

All Project Alternatives

The following measures will be required to avoid disturbance of occupied golden eagle nests.

1. Prior to the start of construction, DWR will require qualified wildlife biologists (experienced with raptor identification and behaviors) to conduct focused surveys for golden eagle nests in suitable habitat within a 2-mile radius of the construction footprint. Survey methods and survey area boundaries will be determined based on coordination with USFWS and CDFW and all survey results will be submitted to USFWS and CDFW. In addition, prior to conducting surveys, any known breeding area records will be reviewed, and a map of potential nest sites will be created using GIS mapping of suitable nesting habitat.
2. If an occupied golden eagle nest is identified in the survey area, a no-disturbance buffer will be established around the nest site to avoid disturbance or destruction of the site, consistent with the *USFWS Recommended Buffer Zones for Ground-based Human Activities around Nesting Sites of Golden Eagles in California and Nevada* (U.S. Fish and Wildlife Service 2020b:1), or more recent USFWS-approved guidance, if it becomes available. If active eagle nests are identified and avoidance guidelines cannot be feasibly implemented, then DWR will coordinate with the USFWS and CDFW to determine how to implement the project and avoid take.

Mitigation Measure BIO-39: Conduct Preconstruction Surveys and Implement Protective Measures to Minimize Disturbance of Swainson's Hawk

All Project Alternatives

The following measures will be required for activities occurring in suitable Swainson's hawk habitat.

1. Preconstruction Surveys. Preconstruction surveys will be conducted by a CDFW-approved biologist(s) to identify the presence of suitable Swainson's hawk nest trees and known nest trees (occupied within 1 or more of the past 5 years) within 0.5 mile of project sites. DWR will ensure that surveys for nesting Swainson's hawks are conducted in all suitable and known nest trees identified by the CDFW-approved biologist(s) and are consistent with the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee 2000), or methodology modified with written approval from CDFW. DWR will provide survey results to CDFW by phone or email no less than 5 days prior to commencement of construction activities, and in a written report within 30 days after commencement of construction activities. The CDFW-approved biologist(s) will include the location of all known and occupied nest trees (occupied in 1 or more of the last 5 years) present within 0.5 mile of the construction footprint. A nest tree will be considered occupied from the time the Swainson's hawk pair starts constructing the nest until the young leave the nest, or until the CDFW-approved biologist(s) determine(s) the nesting attempt failed and the nest is abandoned.

2. Timing Restrictions. Where the construction site occurs within 0.5 mile of known or occupied nest trees identified by the CDFW-approved biologist(s), DWR will limit construction activities to outside the Swainson's hawk breeding season (March 1 through August 15), to the extent practicable. Where construction activities cannot be restricted to more than 0.5 mile of an occupied nest tree during the breeding season, DWR will restrict the construction activities to not occur during the period of egg laying until after young have fledged, as determined by the CDFW-approved biologist(s), to the extent practicable. If not practicable, DWR will initiate construction activities prior to egg laying to allow time for Swainson's hawk acclimate to disturbance before eggs are laid. Where restricting work to outside the breeding season or during the period of egg laying to post-fledging is not practicable, DWR will submit plans to initiate construction activities to CDFW for written approval.

3. No-Disturbance Buffer. Where construction activities must occur within 0.5 mile of an occupied Swainson's hawk nest tree, DWR will establish a 650-foot-radius no-activity buffer (buffer) around each occupied nest tree, and the buffer will remain in place until the end of the breeding season or until the last chick has left the nest. DWR will clearly delineate the buffer with fencing or other conspicuous marking. The CDFW-approved biologist(s) will monitor occupied nest trees to track progress of nesting activities (see *Swainson's Hawk Nest Monitoring*, below). DWR will not conduct any construction activities within the buffer unless a smaller buffer is approved in writing by CDFW. If a construction activity must occur within 0. 5 miles of an occupied nest tree, DWR will follow the conditions under *Swainson's Hawk Nest Monitoring* below. DWR will not conduct any construction activity within 150 feet of an occupied nest tree.

4. Swainson's Hawk Nest Monitoring. Where construction activities must occur within 0.5 mile of an occupied Swainson's hawk nest tree, DWR will implement the following monitoring plan. If a nesting bird monitoring and management plan is prepared by a CDFW-approved biologist, and approved in writing by CDFW, it will prevail where it differs from the measures below.

    a. Five days and three days prior to the initiation of construction at any site where an occupied nest is within 0.5 mile of construction, the CDFW-approved biologist will observe the subject nest(s) for at least one hour or until nest status can be determined.

The CDFW-approved biologist(s) will document nesting status and behaviors to compare to nesting status and behaviors after construction begins. DWR will report the results of preconstruction monitoring to CDFW within 24 hours of each survey.

b. Where an occupied nest tree occurs between 150 and 325 feet (46 to 99 meters) from construction activities, the CDFW-approved biologist will observe the nest for at least 4 hours per day during construction to ensure the Swainson's hawks are engaged in normal nesting behavior. DWR will limit construction to between 30 minutes after sunrise and 30 minutes before sunset.

c. Where an occupied nest tree occurs between 325 and 650 feet (99 to 198 meters) of construction, the CDFW-approved biologist(s) will observe the nest for at least 2 hours per day during construction to ensure the Swainson's hawk are engaged in normal nesting behavior.

d. Where an occupied nest tree occurs between 650 and 1,300 feet (198 to 396 meters) of construction, the CDFW-approved biologist(s) will observe the nest for at least one hour on at least three days per week during construction to ensure the Swainson's hawk are engaged in normal nesting behavior and to check the status of the nest.

e. Where an occupied nest tree occurs between 1,300 and 2,640 feet (396 to 805 meters) of construction, the CDFW-approved biologist(s) will observe the nest for at least one hour on at least one day per week during construction to ensure the Swainson's hawks are engaged in normal nesting behavior and to check the status of the nest.

5. Disturbance of Occupied Nest Tree. DWR will prohibit physical contact with an occupied nest tree throughout the breeding season (March 1 through August 15). All workers within 650 feet will be out of the line of sight of the occupied nest tree during breaks or will take breaks more than 650 feet from the occupied nest tree.

6. Authority of CDFW-Approved biologist(s). If, during construction, the CDFW-approved biologist(s) determine(s) that a nesting Swainson's hawk within 0.5 mile of the construction site is disturbed by construction activities to the point where nest abandonment is likely, the CDFW-approved biologist(s) will have the authority to immediately stop work and will immediately notify DWR. A designated representative from DWR will contact CDFW within 24 hours to determine additional protective measures to be implemented. The CDFW-approved biologist(s) will:

   a. Stop construction until additional protective measures are implemented, unless Swainson's hawk behavior normalizes on its own. Potential nest abandonment and failure may be indicated if, in the CDFW-approved biologist(s)professional judgment, the Swainson's hawks exhibit distress and/or abnormal nesting behavior, such as swooping/ stooping at equipment or personnel, excessive distress-call vocalization or agitated behavior directed at personnel, failure to remain on nest, or failure to deliver prey items.

   b. Continue monitoring and ensure additional protective measures remain in place until the CDFW-approved biologist(s) determine(s) Swainson's hawk behavior has normalized.

   c. Determine if additional protective measures are ineffective and stop construction until the additional protective measures are modified.

d. Continue monitoring until determining that Swainson's hawk behavior has normalized.

e. The DWR representative or CDFW-approved biologist(s) will notify CDFW within 24 hours if nests or nestlings are abandoned and if the nestlings are still alive. The CDFW-approved biologist(s) will work with CDFW to determine appropriate actions.

7. Nest Tree Avoidance. DWR will avoid removal of known nest trees and suitable nest trees to the maximum extent practicable. If a known nest tree must be removed for construction activities, DWR will notify and obtain written approval from CDFW. The notification will include the location of the known nest tree, conditions to offset the loss of the nest tree, and the time of removal, which will generally be October 1 through February 1. DWR will not remove any occupied nest tree until the last young have left the nest, as verified by the CDFW-approved biologist(s).

8. Geotechnical Exploration. DWR will conduct geotechnical exploration outside of the breeding season, to the extent practicable. The CDFW-approved biologist(s) will delineate with flagging or other visible markers suitable breeding habitat within the geotechnical exploration site. DWR will restrict geotechnical exploration to areas outside of the delineated breeding habitat. If geotechnical exploration must occur during the breeding season, the CDFW-approved biologist(s) will survey the breeding habitat within 0.5 mile for nesting Swainson's hawks. DWR will limit geotechnical exploration activities to least 0.5 mile away from any occupied nest tree, unless otherwise approved by CDFW.

9. Measures Specific to Transmission Line Construction. DWR will not use helicopters to string transmission lines or to conduct surveys for field investigations within 0.5 mile of an occupied nest tree. DWR will not remove or trim occupied nest trees for transmission line construction until after the breeding season has ended or the last young have left the nest. If removal or trimming of an occupied nest tree needs to occur for human or wildlife safety, DWR will conduct removal or trimming from October 1 to February 1 (outside of the breeding season), or with written approval and guidance from CDFW. DWR will avoid removal or trimming of known or suitable nest trees, to the extent practicable, during transmission line stringing and reconductoring activities or during power and pole placement. Where practicable, DWR will place poles and lines outside of breeding habitat, as delineated by the CDFW-approved biologist(s). DWR will follow the *Nest Tree Avoidance* measures listed above when removal or trimming of known or suitable nest trees cannot be avoided.

Mitigation Measure BIO-40: Conduct Surveys and Minimize Impacts on Burrowing Owl

All Project Alternatives

The following measures will be required to minimize impacts on burrowing owl.

1. Surveys.

a. Burrowing owl breeding and wintering surveys will be required within 500 feet of water conveyance work areas and restoration sites where suitable habitat has been identified during habitat assessment surveys where access is available. Surveys will be initiated during the year that precedes construction and will be consistent with the methods described in the Staff Report on Burrowing Owl Mitigation (California

Department of Fish and Game 2012), or a modified methodology with written approval from CDFW.

b. In addition to initial breeding and wintering season surveys, DWR will also require that preconstructions survey be conducted, with one occurring 14 days prior to groundbreaking and/or staging activities and another within 24 hours of these activities. These surveys will confirm whether owls identified during the initial breeding and wintering season surveys are still present or whether the previously unoccupied site has since become occupied by burrowing owls.

2. Avoidance and Minimization. To the extent feasible, burrowing owls will be avoided by relocating work areas with flexible locations, such as geotechnical exploration sites. Within the construction footprint where ground disturbance cannot avoid burrowing owls, owls will be relocated during the nonbreeding season and burrows will be excavated in coordination with CDFW, as described below under *Burrowing Owl Relocation*.

a. If an active burrow is identified near a work area and work cannot be conducted outside of the nesting season (February 1 through August 31), a qualified biologist will establish a non-disturbance buffer that extends a minimum of 328 feet (200 meters) around the burrow. If burrowing owls are present at the site during the nonbreeding season (September 1 through January 31), a qualified biologist will establish a no-activity zone that extends a minimum of 656 feet (100 meters) around the burrow. The extent of non-disturbance buffers will be determined based on time of year and level of disturbance described in the *Staff Report on Burrowing Owl Mitigation* (California Department of Fish and Game 2012:9)

b. If the appropriate no-activity buffer for breeding or nonbreeding burrowing owls cannot be established, a qualified biologist will evaluate site-specific conditions and, in consultation with CDFW, recommend a smaller buffer that still minimizes the potential to disturb the owls (and still allows reproductive success during the breeding season). The site-specific buffer will be established by taking into consideration the type and extent of the proposed activity occurring near the occupied burrow, the duration and timing of the activity, the sensitivity and habituation of the owls to existing conditions, and the dissimilarity of the proposed activity to background activities. If an appropriate buffer cannot be established around the active owl burrows, actions will be taken to exclude the owls from the site per the requirements below.

c. A biological monitor will be present during all construction activities occurring within any reduced buffers. If during the breeding season there is any change in owl nesting and foraging behavior as a result of construction activities, the biological monitor will have the authority to immediately stop work and will work with construction personnel and the environmental manager to provide additional protections to reduce disturbance, such as adding visual and sound curtains; any modifications to the standard protections will be in consultation with CDFW.

d. If monitoring indicates that the nest is abandoned prior to the end of nesting season or the burrow is no longer in use by owls (e.g., chicks have fledged), the no-activity buffer may be removed. If the burrow cannot be avoided by construction activity, the biologist will excavate and collapse the burrow to prevent reoccupation.

3. Burrowing Owl Relocation. No relocation of burrowing owls will occur during the breeding season. If burrowing owls are present within the construction footprint and cannot be avoided during the nonbreeding season (generally September 1 through January 31), they will be relocated through passive relocation, with or without burrow exclusion. Burrow exclusion is the prevention of burrows being re-occupied through the use of one-way doors. Passive relocation will be used when (1) there is a sufficient amount of suitable habitat adjacent to the work area to support nesting and foraging, (2) there are compatible land use practices in the area, and (3) the area is preferably currently under or proposed for conservation. Passive relocation will be conducted during the nonbreeding season; however, passive relocation techniques may be used during the breeding season (February 1 through August 31) if a qualified biologist, coordinating with CDFW, determines through site surveillance that the burrow is not occupied by a breeding pair, young, or eggs. To the extent feasible, passive relocation will first be considered without the use of exclusion devices in order to avoid and minimize harassment of owls. DWR will develop Burrowing Owl Artificial Burrow and Exclusions Plans to be approved by CDFW prior to relocation activities.

   a. <u>Passive relocation without exclusion</u>. Prior to relocating owls, all potential burrowing owl burrows in suitable nesting habitat and within the project footprint and 75 feet (23 meters) around the footprint, will be surveyed for owl use, and excavated if no owls are found. If occupied burrows are found, two natural or artificial burrows will be provided for each occupied burrow, within 165 to 325 feet (50 to 99 meters) of the natural burrow where feasible. Artificial burrows will be installed following the methods in Barclay (2008:53–55) and Johnson et al. (2010:4–32), or more current methodology if it becomes available, upon CDFW approval. Sites used for artificial burrows will either be properties currently used for or proposed for conservation if feasible. After constructing the artificial burrows, the owls will be given 60 days to relocate on their own. The work area will be monitored weekly for up to 60 days to determine whether the owls have left the burrow and to confirm occupancy at the artificial or other nearby burrows. The formerly occupied burrows will then be excavated. Whenever feasible, burrows will be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe (at least 3 inches in diameter) will be inserted into burrows during excavation to maintain an escape route for any animals inside the burrow.

   b. <u>Passive relocation with exclusion</u>. If the burrowing owls found do not relocate on their own through the above methodology, passive relocation will be accomplished by installing one-way doors (e.g., modified dryer vents). The one-way doors will be left in place for a minimum of 48 hours and be monitored twice daily to ensure that the owls have left the burrow. The burrow will be excavated using hand tools, and a section of flexible plastic pipe (at least 3 inches in diameter) will be inserted into the burrow tunnel during excavation to maintain an escape route for any animals that may be inside the burrow.

Mitigation Measure BIO-42: Conduct Surveys and Minimize Impacts on Least Bell's Vireo

All Project Alternatives

The following measures will be required for all construction activities occurring between May 15 through September 1 to avoid and minimize impacts on least Bell's vireo.

1. Prior to the construction, a noise expert will create a sound level contour map showing the 60 dBA sound level contour specific to the type and location of construction to occur in the area.

2. Two weeks prior to construction, a USFWS- and CDFW-approved biologist will conduct daily surveys, consistent with a USFWS- or CDFW- approved survey protocol, in suitable habitat where construction-related noise levels could exceed 60 dBA L_{eq} (1 hour).

3. If a least Bell's vireo is found, construction activities will be limited such that sound will not exceed 60 dBA within 500 feet of the habitat being used until the USFWS- and CDFW-approved biologist has confirmed that the bird has left the area.

4. If surveys find least Bell's vireos in an area where vegetation will be removed, vegetation removal will be conducted when the USFWS- and CDFW-approved biologist has confirmed that least Bell's vireos are not present within 500 feet of vegetation removal activities.

5. Portable and stationary equipment will be located, stored, and maintained as far as possible, with a minimum distance of 500 feet, from suitable least Bell's vireo habitat.

6. All lights will be screened and directed down toward work activities and away from suitable habitat. A biological construction monitor will ensure that lights are properly directed at all times during construction.

Mitigation Measure BIO-44: Conduct Preconstruction Surveys and Implement Protective Measures to Avoid Disturbance of Tricolored Blackbird

All Project Alternatives

The following measures will be required to avoid disturbance of tricolored blackbird.

1. Preconstruction Surveys.

   a. Nesting. Prior to construction, DWR will contact the UC Davis Tricolored Blackbird Portal Project staff, or another group as recommended by CDFW, to acquire recent colony information. Prior to initiation of construction in area given work area and within 1,300 feet (396 meters) of the work area, the CDFW-approved biologist(s) will conduct preconstruction surveys to evaluate the presence of tricolored blackbird breeding colonies and suitable nesting habitat. Surveys will be conducted during the breeding season (March 15 through July 31) 1 year prior to, and then again in the year of, construction. During each year, surveys will be conducted monthly in March, April, May, June, and July. If construction is initiated during the breeding season, the CDFW-approved biologist(s) will conduct three surveys within 15 days of construction, with one of the surveys within 5 days of the start of construction. If there is a break in construction of 1 week or more, surveys will be conducted prior to starting construction again in the area. DWR will use a breeding season survey protocol approved in writing by CDFW. The CDFW-approved biologist(s) will delineate suitable nesting habitat and breeding colonies with flagging or other visible marking. If active tricolored blackbird nesting colonies are identified, the following avoidance measures will be implemented.

   b. Roosting. Prior to initiation of nighttime construction activities (30 minutes before sunset to 30 minutes after sunrise) within 300 feet of a construction site, the CDFW-approved biologist(s) will conduct preconstruction surveys to establish the existence and use of roosting habitat by tricolored blackbird. Surveys will be conducted during the nonbreeding season (August 1 through March 14) the year of construction. If nighttime construction is initiated at a site during the nonbreeding season, the CDFW-approved biologist(s) will conduct three surveys within 15 days prior to the nighttime construction, with one of the surveys within 5 days prior to the start of the nighttime construction. DWR will use a roosting survey protocol approved in writing by CDFW. DWR will consider roosting habitat occupied by large mixed blackbird flocks to be occupied by tricolored blackbird if the CDFW-approved biologist(s) cannot clearly identify tricolored blackbird presence within the flock. During nighttime construction activities (30 minutes before sunset to 30 minutes after sunrise), the CDFW-approved biologist(s) will check suitable roost sites within 300 feet of construction areas that are not occupied at the time of preconstruction surveys each day throughout the nonbreeding season, in accordance with the roosting survey protocol approved by CDFW, to determine whether tricolored blackbird later occupy the roost site.

2. No-Activity Buffer for Breeding. DWR will ensure construction avoids suitable nesting habitat within 1,300 feet, to the extent practicable. If nesting habitat cannot be avoided and a tricolored blackbird breeding colony is detected, DWR will ensure construction does not occur within a 1,300-foot diameter no-activity buffer surrounding the colony and associated habitat during the breeding season (March 15 through July 31). The no-activity buffer may be reduced to a minimum of 300 feet (91 meters), with written approval from CDFW, in areas with dense forest, buildings, or other features between the construction and the breeding colony, where there is sufficient topographic relief to protect the colony from excessive noise or visual disturbance; or where sound curtains have been installed. If tricolored blackbird colonizes habitat adjacent to construction after they have been initiated, DWR will reduce disturbance through establishment of no-activity buffers or sound curtains, as determined in consultation with CDFW.

3. Night Work. DWR will restrict construction to 30 minutes after sunrise to 30 minutes before sunset if occurring within 1,300 feet (396 meters) of a breeding colony occupied by tricolored blackbird to the extent feasible.

4. Daily Monitoring. Where access allows, the CDFW-approved biologist(s) will monitor breeding colonies that are within 1,300 feet (396 meters) of construction for at least 6 hours per day, to verify that construction is not disrupting the colony. If the Designated Biologist(s) determines that construction is causing a disruption to the colony, the CDFW-approved biologist(s) will have the authority to stop construction and will notify DWR immediately. The DWR Representative will notify CDFW within 24 hours to determine additional protective measures that can be implemented. The CDFW-approved biologist(s) will have the authority to:

    a. Stop construction activities that are resulting in the disturbance until additional protective measures are implemented, unless tricolored blackbird breeding behavior normalizes on its own.

    b. Continue monitoring and ensure additional protective measures will remain in place for the duration of construction.

    c. Determine if additional protective measures are ineffective and stop construction as needed until the additional protective measures are modified.

d. Maintain additional protective measures until the CDFW-approved biologist determines tricolored blackbird behavior has normalized and continue monitoring.

Additional protective measures may include, but are not limited to, increasing the size of the buffer, delaying construction until the colony is finished breeding and chicks have left the nest site, temporarily relocating staging areas, and temporarily rerouting access to the construction site. The CDFW-approved biologist(s) will notify CDFW within 24 hours if nests or nestlings are abandoned. If the nestlings are still alive, the CDFW-approved biologist (s) will work with CDFW to determine appropriate actions. Notification to CDFW will be via telephone or email, followed by a written incident report. Notification will include the date, time, location, and circumstances of the incident.

5. No-Activity Buffer for Roosting. DWR will not conduct nighttime construction (30 minutes before sunset to 30 minutes after sunrise) within a 300-foot no-activity buffer surrounding the roost site (no-activity buffer). The no-activity buffer may be modified in areas with dense forest, buildings, or other features between the nighttime construction and the occupied roost site; where there is sufficient topographic relief to protect the roost site from excessive noise or visual disturbance; or where sound curtains are installed, as approved in writing by CDFW. Occupied roost sites that are within 300 feet of nighttime construction that occurs 30 minutes before sunset to 30 minutes after sunrise will be monitored daily (beginning 30 minutes before sunset) by the CDFW-approved biologist(s), for at least 4 hours or until the roost site is no longer occupied, to verify that the activity is not disrupting the roosting birds. If the CDFW-approved biologist(s) determines construction are disrupting roosting activity, DWR will put additional protective measures in place until the tricolored blackbird behavior normalizes. Additional protective measures may include, but are not limited to, increasing the size of the no-activity buffer, delaying nighttime construction until the flock has left the roost site or the end of the nonbreeding season, temporarily relocating staging areas, temporarily rerouting access to the construction site, or installation of sound curtains. DWR will contact CDFW if protective measures are not effectively reducing disruption to the roost site.

6. Disturbance of Breeding Colonies and Roost Sites. DWR will prohibit physical contact with a breeding colony during the breeding season (March 15 through July 31) from the time of nest site selection until after the chicks have fledged. DWR will prohibit physical contact with an occupied roost site during the nonbreeding season (August 1 through March 14). Project personnel will not exit vehicles when inside the established no-activity buffer for breeding or roosting when tricolored blackbird is present.

7. Nesting Habitat Avoidance for Geotechnical Exploration and Transmission Line Construction. The CDFW-approved biologist (s) will delineate breeding colonies and buffers with flagging or other visible marking at construction sites for geotechnical exploration and transmission line construction, including work and staging areas and access roads. DWR will restrict these construction activities to construction sites outside of the delineated habitat. DWR will not conduct these construction activities within no-activity buffers established for breeding colonies.

8. Helicopters. DWR will not use helicopters to conduct field investigations or to string transmission lines within 200 horizontal feet (61 meters) or 150 vertical feet (46 meters) of breeding colonies unless the helicopter is small enough to only cause a down draft of 15 to 18 miles per hour at up to 150 feet (46 meters). DWR will only operate helicopters at these

distances from the breeding colony for up to 3 minutes in duration, once or twice per day, with a minimum of 4 hours between helicopter activities. For larger helicopters or longer work periods, DWR will consult with CDFW to establish the appropriate buffer. DWR will ensure helicopters do not land or take off within 500 feet (152 meters) of any breeding colony. This buffer may be modified in areas with dense forest, buildings, or other features between the helicopter landing/take-off site and the breeding colony, where there is sufficient topographic relief to protect the breeding colony from excessive noise or disturbance; and as approved in writing by CDFW. Helicopters will not be used between 30 minutes before sunset to 30 minutes after sunrise.

Mitigation Measure BIO-45a: Compensate for the Loss of Bat Roosting Habitat on Bridges and Overpasses

All Project Alternatives

If bridge or overpass roosting habitat is lost during bridge or overpass widening, DWR will replace habitat on the same bridge or overpass at a minimum ratio of 1:1 or a functionally equivalent amount of habitat. To the extent practicable, replacement habitat will have similar dimensions and orientation as the habitat that was affected or lost. Replacement habitat on bridges/overpasses and associated monitoring will follow the guidance in *Caltrans Bat Mitigation: A Guide to Developing Feasible and Effective Solutions* (Johnston et al. 2019), or the most recent guidance available at that time, with final plans developed in coordination with CDFW.

Mitigation Measure BIO-45b: Avoid and Minimize Impacts on Roosting Bats

All Project Alternatives

The following measures were designed to avoid and minimize impacts on special-status bats. These measures are in part adopted from *Caltrans Bat Mitigation: A Guide to Developing Feasible and Effective Solutions* (Johnston et al. 2019). Bat species with potential to occur in the study area employ varied roost strategies, from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as buildings and bridges. Daily and seasonal variations in habitat use are common. To obtain the highest likelihood of detection, preconstruction bat surveys will be implemented by DWR approximately 2 years prior to the beginning of construction at a given location, to the extent practicable.

<u>Preconstruction Bridge, Overpass, and Other Structure Surveys</u>

1. Approximately 2 years prior to construction, including demolition, beginning on a bridge, overpass or a structure, a qualified biologist, with knowledge of the natural history of California bats, experience identifying habitat, and experience using full-spectrum acoustic equipment, will conduct a daytime search for bat sign (e.g., guano, urine staining, culled insect parts) on or underneath the bridge, overpass, or structure. This 2-year period prior to construction allows enough time to conduct surveys and plan for evictions, if necessary. Biologists conducting daytime surveys will listen for audible social calls through the use of bat detector, which converts ultrasonic echolocation emissions into frequencies audible to humans in real-time. This field assessment can be performed during any time of year, provided that weather conditions or local flooding do not affect the biologist's ability to do a

thorough evaluation. Visual observations can be made using the naked eye, binoculars, a high-powered flashlight, and or a fiber-optic camera probe to inspect eaves and attics of structures and on bridge or overpass expansion joints, weep holes, and other bridge or overpass features that could house bats. Surveys should include the following methods.

a. Survey under the entire bridge or overpass, as practicable.

b. Identify the type of habitat present (e.g., day and night-roosting habitat).

c. Describe the features that provide the roosting habitat (e.g., expansion joints, hinges, closure pours).

d. Describe signs of bat use with respect to each habitat feature, if present.

e. Include a sketch of the structure showing the locations of suitable habitat features and bat activity in each feature, based on sign or visual detection. A sketch will help in describing the habitat feature and planning for future surveys.

f. Use the preferred method of documenting conditions in the survey area, including evidence of bats: a digital camera capable of capturing high-resolution images that provide scale. Take adequate photos to capture the bridge or overpass size, structural type, and all features that are relevant to bat use. At a minimum, the photographs should document the bridge or overpass signage (with identification number, post mile, and bridge or overpass name [if applicable]); a right-angle (i.e., side perspective) view showing the entire span; the abutments and any details associated with potential roosting habitat; representative images of the soffit, expansion joints, hinges, and closure pours; how the piers support the deck; representative weep holes documenting the presence or absence of screens; and images of various bat sign, such as urine staining and guano on the structure.

g. Because several species may occupy a bridge or overpass, ensure that each type of guano sign is photographed. If bats occupy the bridge or overpass, the survey time under active roosts needs to be limited. Any use of flash photography to document roosting bats will create some level of disturbance. Many digital cameras can take images at very low light; if a flash is required, use a minimum setting such as 1/8 power or less.

h. Estimate dimensions (i.e., length, width, depth) of each roost habitat type. Dimensions should be taken into consideration when designing mitigation habitat.

i. Describe surrounding environmental conditions, including the dominant habitat type present, aquatic features, and other potential roost habitat (e.g., tree snags or large sycamores with cavities) on-site and in its vicinity. Survey the entire project site plus a 100-foot-wide buffer for potential roosting habitat.

2. If no habitat or sign of bats is observed, no further surveys are warranted. The biologist will carefully document the reasons for determining that no bat habitat is present on the bridge, overpass, or structure, and why further surveys are not merited. If habitat is present, but no sign of bats is observed, additional surveys would be necessary to support the conclusion that bats are not present because small colonies and individuals may often not produce obvious signs of occupancy and depending on the timing of the habitat assessment bats may have migrated or are not occupying the habitat at that time.

3. If suitable habitat or signs of bat use are observed during the preliminary field assessment, focused surveys should be performed by a biologist to determine whether colonies are present and the approximate size of the colony or colonies and the species present. Caution should be taken when conducting field surveys at active roosts. To ensure that disturbance is kept to a minimum, the biologist and any field assistants should not loiter directly underneath known or suspected occupied roosts longer than is necessary to record data. Surveys should be performed in the summer, fall, spring, and winter to determine how the site is used by bats. Information collected during focused surveys should include an estimate of the number of bats and species present during the summer, fall or spring, and winter to provide an assessment of spatial and temporal use, as described below.

    a. Maternity season surveys. In California, the maternity season generally occurs from March 1 to August 31. The exact timing of the maternity season surveys will be determined by the biologist and take into consideration conditions in a given year. The following methods will be used for maternity season surveys.

        i. Conduct a daytime inspection to determine if bats are present and to identify areas of high use. While daytime inspections are usually sufficient to determine the presence of night-roosting habitat, nighttime roost inspections (2 to 3 hours after sunset) are recommended if special-status species are suspected to occur.

        ii. Conduct a follow-up dusk emergence count survey. Dusk emergence count surveys should be conducted on a warm night when nighttime lows are not less than 45°F and during dry weather conditions. Surveys should be conducted from approximately 15 minutes before sunset to 1 hour after sunset. Prior to any dusk emergence count, the biologist should understand the primary locations where bats are day roosting so these locations can be targeted during the emergence count. Depending on the locations and number of roost exit points, multiple surveyors may be needed. Surveyors should each be assigned a specific area that does not overlap with other surveyors' locations. Surveyors should station themselves such that roost exit points are backlit by the sky. If possible, night-vision goggles should be used to assist in the counting.

        iii. Use bat detectors that produce an audible sound, which is helpful in identifying and counting bats as they emerge from the roost. Conduct active acoustic monitoring concurrent with exit count surveys to determine species or frequency group of bats.

    b. Fall and spring migratory period surveys. At least one daytime site inspection and one dusk emergence count should be conducted between March and April, and between early September and mid-October, to assess if bats are present and to count individuals.

    c. Winter surveys. At least one daytime site inspection should be conducted in January or February to determine if winter hibernacula or overwintering habitat for bats are present. Crevice-roosting species typically roost deep in crevices in the winter, and they may not be visible during winter inspections. Therefore, visual surveys, in combination with the use of an extendable fiber-optic camera probe to view inside crevices may be required for some bridges, overpasses, or structures.

Preconstruction Tree Surveys

4. If tree removal or trimming is necessary for project construction, approximately 1 year prior to construction at a given location a biologist will examine trees to be removed or trimmed for suitable bat roosting habitat. High-value habitat features (e.g., large tree cavities, basal hollows, loose or peeling bark, larger snags, palm trees with intact thatch) will be identified and the area around these features searched for bats and bat sign (e.g., guano, culled insect parts, staining). Riparian woodland, orchards, and stands of mature broadleaf trees should be considered potential habitat for solitary foliage-roosting bat species.

5. If bat sign is detected, biologists will conduct evening visual emergence survey of the source habitat feature, from a half hour before sunset to 1 to 2 hours after sunset for a minimum of 2 nights within the season that construction would be taking place. Methodology should follow that described above for the bridge or overpass emergence survey.

6. Additionally, if suitable tree-roosting habitat is present, acoustic monitoring with a bat detector will be used to assist in determining species present. These surveys will be conducted in coordination with the acoustic monitoring conducted for the bridge, overpass, or structure.

Protective Measures for Bats Using Bridges, Overpasses, Structures, and Trees

7. Avoidance and minimization measures will be necessary if it is determined that bats are using a bridge, overpass, or structure or trees as roost sites and/or sensitive bats species are detected during acoustic monitoring. Appropriate measures will be determined by DWR in consultation with CDFW and will include, as applicable, the following measures.

    a. Ensure that bats are protected from noise, vibrations, and light that result from construction activities associated with project infrastructure as well as operations and maintenance of aboveground water conveyance facilities. This would be accomplished by either directing noise barriers and lights inward from the disturbance or ensuring that the disturbances do not extend more than 300 feet from the point source.

    b. Avoid disturbance of the bridge, overpass, or structure between March 1 and August 31 (the maternity period) to avoid impacts on reproductively active females and dependent young.

    c. Installation of exclusion devices from March 1 through October 31 to preclude bats from occupying the bridge or overpass during construction. Exclusionary devices will only be installed by or under the supervision of an experienced biologist.

    d. Avoid tree removal between April 15 and September 15 (the maternity period for bat species that use trees) to avoid impacts on pregnant females and active maternity roosts (whether colonial or solitary).

    e. Conduct tree removal between September 15 and October 31 to the maximum extent practicable, which corresponds to a time period when bats would not likely have entered winter hibernation and would not be caring for flightless young. If weather conditions remain conducive to regular bat activity beyond October 31, later tree removal may be considered in consultation with CDFW.

    f. Remove trees in pieces, rather than felling the entire tree.

g. If a maternity roost is located, whether solitary or colonial, leave that roost undisturbed with a buffer as determined in consultation with CDFW until September 15 or until a biologist has determined the roost is no longer active.

h. If a non-maternity roost is found, avoid that roost to the maximum extent practicable and use an appropriate buffer established in consultation with CDFW. Every effort will be made to avoid the roost to the maximum extent practicable, as methods to evict bats from trees are largely untested. However, if the roost cannot be avoided, eviction will be attempted and procedures designed in consultation with CDFW to reduce the likelihood of mortality of evicted bats. In all cases:

   i. Eviction will not occur before September 15 and will match the timeframe for tree removal approved by CDFW.

   ii. Biologists will carry out or oversee the eviction tasks and monitor the tree trimming or removal.

   iii. Eviction will take place late in the day or in the evening to reduce the likelihood of evicted bats falling prey to diurnal predators.

   iv. Eviction will take place during weather and temperature conditions conducive to bat activity.

   v. Special-status bat roosts will not be disturbed.

   vi. Evictions will not occur until temporary or permanent replacement roosting habitat is established in close proximity to the roost. Replacement habitat plans will be reviewed and approved by CDFW. Habitat will be replaced at a ratio of 1:1 and will be functionally equivalent.

8. Eviction procedures will include but are not limited to:

   a. Pre-eviction surveys to obtain data to inform the eviction approach and subsequent mitigation requirements. Relevant data may include the species, sex, reproductive status, and number of bats using the roost, and roost conditions such as temperature and dimensions. Surveys may include visual emergence, night vision, acoustic, and capture.

   b. Structural changes may be made to the roost, performed without harming bats, such that the conditions in the roost are undesirable to roosting bats and the bats leave on their own (e.g., open additional portals so that temperature, wind, light, and precipitation regime in the roost change).

   c. Uninjurious harassment at the roost site to encourage bats to leave on their own, such as ultrasound deterrents or other sensory irritants.

Mitigation Measure BIO-46: Conduct Preconstruction Survey for San Joaquin Kit Fox and Implement Avoidance and Minimization Measures

As properties become accessible for initiating project activities within areas of modeled San Joaquin kit fox habitat, DWR will require suitability assessments of the modeled habitat by a biologist qualified to identify suitable habitat for this species.

1. For areas verified as being suitable for San Joaquin kit fox, preconstruction surveys will be initiated within 14 to 30 days prior to ground disturbance, vegetation removal, or

establishment of staging areas related to project activities. A USFWS- and CDFW-approved biologist with experience surveying for and observing the species will survey the project footprint and the area within 200 feet beyond the footprint to identify known or potential San Joaquin kit fox dens. Adjacent parcels under different land ownership will not be surveyed unless access is granted within the 200-foot radius of the project footprint. The biologists will conduct these searches by systematically walking 30- to 100-foot-wide transects throughout the survey area; transect width will be adjusted based on vegetation height and topography. The biologist will conduct walking transects such that 100% visual coverage of the worksite footprint is achieved. Dens will be classified in one of the following four den status categories outlined in the *Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance* (U.S. Fish and Wildlife Service 2011:8–9).

a. **Potential den.** Any subterranean hole within the species' range that has entrances of appropriate dimensions for which available evidence is sufficient to conclude that it is being used or has been used by a San Joaquin kit fox. Potential dens comprise any suitable subterranean hole or any den or burrow of another species (e.g., coyote, badger, red fox, or ground squirrel) that otherwise has appropriate characteristics for kit fox use. If a potential den is found, the biologist will establish a 50-foot buffer using flagging.

b. **Known den.** Any existing natural den or artificial structure that is used or has been used at any time in the past by a San Joaquin kit fox. Evidence of use may include historical records; past or current radiotelemetry or spotlighting data; kit fox sign such as tracks, scat, or prey remains; or other reasonable proof that a den is being or has been used by a kit fox. If a known den is found, the biologist will establish a 100-foot buffer using flagging.

c. **Natal or pupping den.** Any den used by San Joaquin kit foxes to whelp or rear their pups. Natal or pupping dens may be larger with more numerous entrances than dens occupied exclusively by adults. These dens typically have more kit fox tracks, scat, and prey remains near the den and may have a broader apron of matted dirt or vegetation at one or more entrances. A natal den, defined as a den in which kit fox pups are actually whelped but not necessarily reared, is a more restrictive version of the pupping den. In practice, however, it is difficult to distinguish between the two types of dens; therefore, for purposes of this definition, either term applies. If a natal or pupping den is discovered, the biologist will establish a buffer of at least 200 feet using fencing but a final buffer will be established in coordination with USFWS and CDFW.

d. **Atypical den.** Any artificial structure that has been or is being occupied by a San Joaquin kit fox. Atypical dens may include pipes, culverts, and diggings beneath concrete slabs and buildings. If an atypical den is discovered, the biologist will establish a 50-foot buffer using flagging.

2. Disturbance to all San Joaquin kit fox den status categories (described directly above) will be avoided to the extent possible. Where avoidance is not possible, limited den destruction may be allowed provided the following procedures are observed.

3. If an atypical, natal or pupping, known or potential San Joaquin kit fox den is discovered within a project footprint, the den will be monitored for 3 days by a USFWS- and CDFW-approved biologist using a tracking medium or an infrared beam camera to determine if the den is currently being used.

4. If an active natal or pupping den is found within a project footprint, USFWS and CDFW will be notified immediately. The den will not be destroyed until the pups and adults have vacated and then only after further coordination with USFWS and CDFW.

5. If San Joaquin kit fox activity is observed at the potential, known, or atypical den during the preconstruction surveys, den use will be actively discouraged with the approval of the USFWS- and CDFW-approved biologist, as described below, and monitoring will continue for an additional 5 consecutive days from the time of the first observation to allow any resident animals to move to another den. For dens other than natal or pupping dens, use of the den can be discouraged by partially plugging the entrance with soil such that any resident animal can easily escape. Alternatively, if the animal is still present after 5 or more consecutive days of plugging and monitoring, the den may have to be excavated by hand when, in the judgment of a biologist, it is temporarily vacant (i.e., during the animal's normal foraging activities). If at any point during excavation a San Joaquin kit fox is discovered inside the den, the excavation activity will cease immediately and monitoring of the den, as described above, will be resumed. Destruction of the den may be completed when, in the judgment of the biologist, the animal has escaped from the partially destroyed den.

6. Construction requirements from *Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or during Ground Disturbance* (U.S. Fish and Wildlife Service 2011:5–9) or the latest guidelines will be implemented.

7. If potential, known, atypical, or natal or pupping dens are identified within temporary work areas or within a 200-foot buffer of a temporary work area, exclusion zones around each den entrance or cluster of entrances will be demarcated. The configuration of exclusion zones will be circular, with a radius measured outward from the den entrance(s). No activities will occur within the exclusion zones. Exclusion zone radii for atypical dens and potential dens will be at least 50 feet and will be demarcated with four to five flagged stakes. Exclusion zone radii for known dens will be at least 100 feet and will be demarcated with staking and flagging that encircle each den or cluster of dens but do not prevent access to the den by the foxes.

8. Written results of the surveys will be submitted to USFWS and CDFW within 5 calendar days of the completion of surveys and prior to the beginning of ground disturbance and/or construction activities in San Joaquin kit fox modeled habitat.

During construction, the following measures will be implemented for all activities in suitable San Joaquin kit fox habitat (as determined by a USFWS- and CDFW-approved biologist):

9. The USFWS- and CDFW-approved biologist for San Joaquin kit fox will be the contact source for any employee or contractor who might incidentally kill or injure a kit fox or who finds a dead, injured, or entrapped kit fox.

10. Any personnel who are responsible for incidentally killing or injuring a San Joaquin kit fox will immediately report the incident to the USFWS- and CDFW-approved biologist. The USFWS- and CDFW-approved biologist will contact USFWS immediately in the case of a dead, injured, or entrapped kit fox.

11. USFWS and CDFW will be notified immediately of the accidental death or injury to a San Joaquin kit fox. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal and any other pertinent information. The USFWS contact is the Assistant Field Supervisor of Endangered Species.

12. New sightings of kit fox will be reported to the CNDDB. A copy of the reporting form and a topographic map clearly marked with the location of where the kit fox was observed will also be provided to USFWS at the address below.

Mitigation Measure BIO-47: Conduct Preconstruction Survey for American Badger and Implement Avoidance and Minimization Measures

All Project Alternatives

DWR will require a qualified biologist to survey for American badger concurrently with the preconstruction surveys for burrowing owl within 14 days prior to the start of ground disturbance. If an active den is detected within the work area, DWR will establish a suitable buffer distance and avoid the den until the biologist determines that the den is no longer active through direct monitoring, using wildlife cameras, or using a camera probe. Potential dens that are determined to be inactive by one or more of the aforementioned methods will be collapsed by hand to prevent occupation of the den between the time of the survey and construction activities.

Mitigation Measure BIO-53: Avoid and Minimize Impacts on Terrestrial Wildlife Connectivity and Movement

All Alternatives

Design and Construction

The following measures will be implemented during project design and construction to avoid and minimize impacts on terrestrial wildlife connectivity and movement. The design of the wildlife crossing structure will include wildlife fencing and will be developed in coordination with a biologist qualified and experienced in wildlife crossing planning and design.

1. As part of project access road improvement planning, design, and construction, the project will upgrade the existing culvert on SR 12 (identified by CDFW [2020d:11] as a priority barrier to wildlife movement in the region; Barrier ID W031) to a dedicated wildlife crossing structure to facilitate movement of both aquatic and terrestrial wildlife. The wildlife crossing structure will span the banks of the channel to the maximum extent possible and will incorporate design elements to facilitate movement and connectivity of giant garter snake, western pond turtle, mink, river otter, beaver, all other reptiles and mammals inhabiting the area.
2. The new intersection for Byron Highway and the extension of Armstrong Road (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c) will include wildlife crossing structures where the new road intersects with Brushy Creek. The wildlife crossing structure will span the banks of the channel to the maximum extent possible and will incorporate design elements to facilitate movement and connectivity of California red-legged frog, western pond turtle, and other aquatic, semi-aquatic, and terrestrial wildlife species inhabiting the area.
3. Contiguous habitat connectivity along riparian banks and corridors will be maintained during construction, to the extent practicable, to maintain connectivity at riparian banks and corridors at levees, intakes, and other facilities located along or within riparian banks and corridors. Riparian vegetation and canopy will be avoided and maintained to the maximum extent possible during construction. Design will include wildlife fencing where applicable to

prevent wildlife access to construction areas that may be dangerous for wildlife, such as roads and other facilities. Fencing will also be designed and placed in a manner that facilitates wildlife movement through or between the riparian banks and corridors during constriction. Design and maintenance of habitat contiguity and fencing will be developed and overseen in coordination with a biologist qualified and experienced in wildlife crossing planning and design and will be managed in coordination with the qualified biologist during construction phasing.

Operations

4. Contiguous habitat connectivity along riparian banks and riparian corridors will be maintained during operations to maintain connectivity at riparian banks and corridors at levees, intakes, and other facilities located along/within riparian banks and corridors. The native riparian vegetation and canopy in these areas will be maintained to the maximum extent possible during operation. Where maintaining and reestablishing the riparian vegetation and canopy is not possible, plans will include landscaping with native plants that will provide the maximum amount of cover and heterogeneity possible and will also consider the use of other non-vegetative options to provide cover and heterogeneity to facilitate wildlife movement such as rock piles, snags, and human-made materials, such as faux rocks and trees that provide cover, yet are lightweight and not load-bearing. Design will include wildlife fencing where applicable to prevent wildlife access to roads and facilities. Fencing will also be designed and placed in a manner that facilitates wildlife movement through or between the riparian banks and corridors during constriction. Design of habitat contiguity, revegetation, and fencing will be developed in coordination with a biologist qualified and experienced in wildlife crossing planning and design.

3.6 Climate Change

N/A

3.7 Cultural Resources

Mitigation Measure CUL-1: Prepare and Implement a Built-Environment Treatment Plan in Consultation with Interested Parties

1. All mitigation will be completed under the oversight of individuals who meet the Secretary of the Interior's professional qualifications and have demonstrable experience conducting the following recommended measures. DWR will perform the following measures as part of mitigation and monitoring for compliance with CEQA.

   a. A built-environment treatment plan (BETP) will be prepared for each built-environment historical resource affected by the project. The BETP will be prepared by an architectural historian with demonstrated experience preparing treatment for similar kinds of resources and reviewed by relevant parties prior to any demolition or ground-disturbing activity with potential to affect a built-environment resource. Property-specific impacts are identified in Delta Conveyance Project Draft EIR Appendix 19C, *Impact Analysis of Project Alternatives on Built-Environment Historical Resources*, Tables 19C-1 through 19C-4, and mitigation will be implemented in accordance with the specifics developed in the BETP. Resource-specific BETPs would reduce project impacts by tailoring avoidance and minimization treatments to each resource.

   b. DWR will consult with relevant parties during preparation of the BETPs. Such parties may include but are not limited to the State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation, local historical societies, and other interested parties such as local preservation and community organizations with a demonstrated interest in the resource that is the subject of the BETP. Consulting with relevant parties will reduce the impact of the project by helping to ensure that stakeholder concerns regarding the resource's integrity are factored in to the BETP.

   c. The following treatments may be appropriate for inclusion in the BETPs for built-environment historical resources that are in close proximity to the project but that are not anticipated to be directly affected by demolition or construction but which may be subject to direct effects such as vibration or inadvertent damage activities. These treatments will reduce project impacts by developing a clear plan to stabilize resources, resulting in avoidance or minimization of potential impacts to the resource's integrity of design, materials, or workmanship. Furthermore, these treatments would help avoid damage to built-environment historical resources. These treatments also provide guidance on conducting repairs when inadvertent damage occurs to built-environment historical resources. These treatments are designed to avoid direct effects such as vibration that may result in structural damage or other physical damage.

      i. Historic Structures Reports will be prepared for built-environment historical resources adjacent to the project for which detailed information is required to develop protection measures (National Park Service 2005a). These will be done for buildings and structures that appear to be in poor condition and adjacent to construction, therefore, potentially sensitive to construction-related activities such as vibration. Preconstruction stabilization of these buildings may be necessary. The Historic Structure Report would also outline a treatment plan, based on the

Secretary of the Interior's Standards[9], should the historical resource sustain unanticipated damage (National Park Service n.d.).

ii. For each BETP prepared, DWR will review mitigation measures from other resource topics in this EIR, such as noise and visual, to identify other mitigation activities related to the historical resources that is the subject of the treatment plan.

iii. Preconstruction condition assessments will be prepared for built-environment historical resources adjacent to the project that are stable but could be unintentionally damaged during construction. The preconstruction survey will include an evaluation of potential construction vibration to ensure that it will not reach levels to damage historical resources. Should there be any question as to whether or not the project caused damage, these condition assessments will provide confirmation of the preconstruction condition. As part of this preconstruction condition assessment, a stabilization plan will be prepared for the historical resource based on National Park Service guidance on stabilizing historic buildings (National Park Service 1993).[10]

iv. Precautions to protect built-environment historical resources from construction vehicles, debris, and dust may include fencing or debris meshing. Temporary mothballing and fire and intrusion protection may be needed if the buildings are unoccupied during construction (National Park Service 1993).

v. Protective treatments will be field checked as needed during construction by a qualified architectural historian with demonstrated experience conducting monitoring of this nature. Vibration monitoring would be required for buildings determined to be susceptible to vibration damage that are in close proximity to construction activities or machinery that cause vibrations in exceedance of a single-event source vibration generating a peak particle velocity (PPV) in inches per second of 0.3 PPV, or when a continuous source causes vibration at 0.12 PPV.

vi. Redesign of relevant facilities will be used to avoid destruction or damage to a built-environment historical resource or its setting, where feasible, taking into account costs, logistics, technological and environmental considerations of potential indirect impacts on other resources, to the extent where the design changes are consistent with the objectives of the project.

d. For built resources that will be directly and adversely affected, the BETP will specify resource-specific treatments such as, but not limited to, the following treatments for minimization or compensation for effects on built-environment resources. These treatments would reduce project impacts by ensuring that new project features, to the extent feasible, are designed in a manner consistent with setting, in order to retain the resource's integrity of setting, feeling, and association. As an effort to mitigate damage to or destruction of a built-environment historical resource, documentation and recordation of the resources would mitigate the loss by preserving the history of the resource and its role within the region's history for the public's benefit and

[9] *The Secretary of the Interior's Standards for the Treatment of Historic Properties* are available at https://www.nps.gov/tps/standards.htm (National Park Service n.d.)

[10] This guidance can be found in *Preservation Brief 31: Mothballing Historic Buildings* and is available at https://www.nps.gov/tps/how-to-preserve/briefs/31-mothballing.htm#stable

understanding. Where damage would occur to built-environment historical resources, the damage would be mitigated by repairing damage in accordance with the Secretary of the Interior's Standards.

i. Design standards consistent with the Secretary of the Interior's Standards to minimize visual impacts and to ensure context-appropriate design. This can include screening features, plantings, or other design changes that can minimize impacts.

ii. Historic American Building Survey (HABS) documentation will be prepared for CRHR- and NRHP-eligible buildings and structures that will be demolished or altered. These reports will include written and photographic documentation of the significant and character-defining features of these properties. These reports will minimize the adverse impacts by capturing and preserving a description of the significant information and characteristics associated with the resource.

iii. As applicable, Historic American Landscape Survey (HALS) records and Historic American Engineering Record (HAER) documents will be prepared for historic water-associated resources (National Park Service 2005b). The levees and other linear CRHR- and NRHP-eligible features will be recorded following HAER guidelines. Additionally, the settings will be recorded following HALS guidelines. These reports will include written and photographic documentation of the significant and character-defining features of these properties. The HALS and HAER reports will minimize the significant impacts by capturing and retaining a description of the significant engineering and design information associated with the resource.

iv. In recent years, the National Park Service and National Archives have issued directives indicating that they will not accept formal submissions under the HABS, HALS, and HAER programs unless the resource being documented is a rare, unusual, or exceptionally high-quality example of its type, due to the huge volume of submissions generated by environmental mitigation requirements. Therefore, the BETP will indicate whether the documentation will be formally submitted to the National Park Service for review and approval, based on a consideration of the rarity or caliber of the resource being mitigated, or instead will be prepared informally for distribution to local repositories or for re-use for interpretive or educational programs.

v. As applicable for rural cultural landscape historic districts, prepare a Landscape Treatment Plan. The Landscape Treatment Plan will follow guidance published by the National Park Service (1998) and will serve to document the history and significance of the landscape and provide treatment recommendations that conform with the Secretary of the Interior's Standards.

vi. Preparation of interpretive or educational media such as displays in public spaces, print materials, or websites. Interpretive and educational media may incorporate written, photographic, and archival documentation (such as those compiled for informal HABS/HAER/HALS reports), oral history interviews, video, or animation to tell the story of the heritage represented by the affected resource. Interpretive media is an appropriate mitigation for resources that are CRHR- or NRHP-eligible because they are associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage or that are associated with persons important in our past for their association with historical trends or people, rather than for their design qualities.

vii. Salvage of materials will be performed to the extent feasible to enable the restoration of similar buildings or structures outside of the area of direct impact. Salvage will further minimize significant impacts by using salvaged materials to ensure that similar resources are restored and maintained in manner that will ensure the significance of the resource is preserved.

viii. Relocation of historic buildings that would otherwise be demolished.

ix. Following the Secretary of the Interior's standards to restore built resources outside of the area of direct effect that are of the same type as resources that will be demolished by the Delta Conveyance Project.

x. Other appropriate treatment methods that are identified in relation to particular resources that are affected.

Mitigation Measure CUL-2: Conduct a Survey of Inaccessible Properties to Assess Eligibility, Determine If These Properties Will Be Adversely Affected by the Project, and Develop Treatment to Resolve or Mitigate Adverse Impacts

1. Because DWR does not have legal access to the majority of the project footprint, a built resources inventory has not been completed for the entire project footprint. Before construction, DWR will have access to all property needed for an inventory and evaluation report to ensure that all areas of impacts will be surveyed. This subsequent survey will be conducted in a manner consistent with the 2021 survey (ICF 2021). The project impacts will be minimized with this measure by ensuring that built-environment historical resources have been identified, so Mitigation Measure CUL-1 can be applied.

    a. The scope of the inventory will include the entire area where impacts may occur that were inaccessible or partially inaccessible in the first survey efforts. Such impacts consist of direct disturbance, damage through vibration, or changes to the setting.

    b. The work will be led or supervised by architectural historians that meet the Secretary of the Department of the Interior's professional qualification standards provided in 36 CFR Part 61.

    c. Inventory methods and evaluation will include pedestrian surveys, photographic documentation, historical research using both primary and secondary sources, and interviews and oral histories.

    d. Newly identified resources will be mapped and described on applicable California Department of Parks and Recreation (DPR) 523-series forms. Mapping will be performed by recording data points with GPS hardware that can be imported and managed digitally.

    e. For all identified resources, DWR will evaluate the resources to determine if they are any of the following:

        i. Historical resources (CEQA Guidelines § 15064.5(a))

        ii. Historic properties (36 CFR § 60.4)

f. The recorded resources and the resource evaluations will be summarized in an inventory report. The inventory report will include a determination of whether individual resources qualifying as historical resources or historic properties will be subject to significant impacts. DWR will make such a finding if the project would result in the following:

i. Demolish or materially alter the qualities that make the resource eligible for listing in the CRHR (CEQA Guidelines § 15064.5[b][2][A],[C]).

ii. Demolish or materially alter the qualities that justify the inclusion of the resource on a local register or its identification in an historical resources survey meeting the requirements of California Pub. Resources Code Section 5024.1(g), unless DWR establishes by a preponderance of evidence that the resource is not historically or culturally significant (CEQA Guidelines § 15064.5[b][2][B]).

iii. Alter, directly or indirectly, the qualities that make a resource eligible for listing in the NRHP (36 CFR § 800.5[a][1]).

g. Where built-environment historical resources that are listed or qualify for listing in the CRHR or NRHP, or that have been designated in a qualified local register, will be subject to significant impacts, these resources will be added to the BETP prepared in accordance with Mitigation Measure CUL-1.

Mitigation Measure CUL-3a: Prepare and Implement an Archaeological Resources Management Plan

1. DWR will prepare an Archaeological Resources Management Plan (ARMP) prior to future field investigations and construction activities to guide the archaeological resources technical studies and resource-specific treatments to be conducted prior to and during construction activities. The ARMP will describe procedures that have been identified for avoiding, minimizing, and mitigating known or potential project impacts on archaeological resources. The first step in each procedure will be to implement feasible avoidance of archaeological resources, if possible.

a. The ARMP will be developed during the permitting and design process and will be adopted prior to land acquisition. Preparers of the ARMP will meet professional qualification standards established in the Secretary of the Interior's Professional Qualification Standards for archaeology and architectural history. The content of the ARMP will follow industry standards, including guidance prepared by the California Office of Historic Preservation and the National Park Service. Each procedure will be attached to the ARMP, as each is completed in accordance with the timing and responsibilities identified below.

b. The ARMP will include procedures for the following:

i. Archaeological Resources Phased Identification

ii. Archaeological Treatment

iii. Post-Review Discovery

iv. Archaeological Monitoring

Archaeological Resources Phased Identification Procedures (PIP)

c. Purpose: DWR, or its qualified contractors, will conduct pedestrian and subsurface surveys to complete the identification of archaeological resources located in the area of direct impact (ADI). The PIP will provide details about the current cultural resources data gaps and requirements for completing phased identification surveys prior to construction for areas where DWR currently does not have access. Once these surveys are conducted and DWR has information about specific resources, DWR will be able to assess resource-specific project impacts and consider avoidance options and the applicability of other procedures in the ARMP, such as treatment plans or monitoring.

d. Outcome: Implementing the PIP will ensure that DWR fills the current data gaps for archaeological resources and is fully aware of the presence of archaeological resources that may be affected by the project. As part of the reporting requirements when implementing the PIP, the survey and evaluation reports will recommend further procedures required to avoid, minimize, or mitigate project impacts on those resources found to be significant that are not currently known due to limited access.

e. Content: The PIP will include guidance for phased surveys and CRHR evaluations for archaeological resources and assessment of impacts, should any resources be newly identified. The PIP will specify the ways in which surveys might be phased, taking into consideration the mechanisms for acquiring access to currently inaccessible properties and the schedule for design development.

Archaeological Treatment Procedure

f. Purpose: DWR and its qualified contractors will prepare a procedure that provides a range of treatment options for archaeological resources identified as part of implementing the PIP or previously identified as NRHP/CRHR eligible.

g. Outcome: The Archaeological Treatment Procedure will ensure that all archaeological resources potentially affected by the project will be treated according to best practices and professional standards, and that treatment options will include a range of interventions from avoidance and minimization of impacts to mitigation for the loss of the physical resource.

h. Content: The Archaeological Treatment Procedure will provide detailed guidance on the professional standards and best practices for a range of treatment types for avoiding and minimizing impacts on archaeological resources, as well as other treatments for how to record the significance of an archaeological resource when impacts cannot be avoided or minimized. This procedure will identify when it is appropriate to prepare a resource-specific treatment plan and establish the minimum contents and standards for such plans.

Post-Review Discovery Procedure

i. Purpose: DWR and its qualified contractors will prepare a procedure that identifies the critical path actions that must be followed if an unanticipated discovery of cultural materials occurs at any time during project construction.

j. Outcome: The Post-Review Discovery Procedure will ensure that any archaeological resources that are disturbed in the course of project construction will be assessed by qualified archaeologists prior to further ground-disturbing activities, and that treatment options for the avoidance, minimization, or mitigation of further disturbance are developed and applied prior to resumption of construction activity.

k. Content: The Post-Review Discovery Procedure will specify the steps required for stopping work, assessing the find, coordinating with appropriate agencies or interested parties, developing appropriate treatment, and determining when construction or other activities can continue in the vicinity of any unanticipated discoveries of archaeological resources. This procedure will include a research design and guidance for evaluation and treatment of post-review archaeological discoveries.

Archaeological Monitoring Procedure

l. Purpose: DWR and its qualified contractors will prepare a procedure for archaeological monitoring that will be performed during project related ground disturbance.

m. Outcome: The Archaeological Monitoring Procedure will ensure that qualified staff perform monitoring during project-related ground disturbance to identify any unanticipated discoveries and to implement the Post-Review Discovery Procedure.

n. Content: The Archaeological Monitoring Procedure will establish the methods and standards for when and how archaeological monitoring activities will be conducted, identify the roles and responsibilities of monitors and construction crews, and specify communication protocols and reporting requirements. This procedure will address monitoring required during project-related ground disturbance.

Mitigation Measure CUL-3b: Conduct Cultural Resources Sensitivity Training

2. Prior to the start of ground disturbance, DWR will ensure that a qualified archaeologist will conduct a mandatory archaeological sensitivity training for all personnel involved in ground-disturbing work about cultural resources sensitivity in the project footprint and cultural resources that could be encountered during work. Participants will be required to sign a form stating that they have received and understand the training. DWR will maintain the record of training and make it available to project interested parties, upon request. The project foreman will ensure that the new personnel brought onto the project receive the mandatory training before starting work.

Mitigation Measure CUL-3c: Implement Archaeological Protocols for Field Investigations

3. All areas associated with field investigations would be reviewed by a qualified archaeologist to evaluate the potential for impacts, if any, on cultural resources. DWR will also implement the following protocols:

   a. Locations that have no previous survey coverage must be surveyed by, or under the direct supervision of a qualified archaeologist prior to the start of any ground-disturbing activities.

   b. If the archaeologist observes cultural resources within the field investigation area or associated resource buffer as identified by a qualified archaeologist, the location will be shifted the minimum distance necessary to reduce the potential for significant cultural resource impacts without significantly increasing potential impacts to other resources.

c. If a suitable location cannot be determined within adjacent areas, then the soil investigation at that location would not be conducted. If relocation or termination are not feasible, field investigations will not be conducted until Mitigation Measure CUL-3a has been completed.

  i. Should any unexpected cultural resources be exposed during field investigations, all work would immediately stop in the immediate vicinity (e.g., within 100 feet [30 meters]) of the find until it can be evaluated by a qualified archaeologist and an appropriate plan of action can be determined.

Mitigation Measure CUL-4: Follow State and Federal Law Governing Human Remains if Such Resources are Discovered During Construction

If human remains are discovered, DWR and the construction contractors will coordinate with the county coroner and California Native American Heritage Commission (NAHC) to make the determinations and perform the management steps prescribed in California Health and Safety Code Section 7050.5 and California Public Resources Code Section 5097.98. The provisions of these state laws apply unless discoveries occur on land owned or controlled by the federal government. For discoveries on federal land, procedures for Native American Graves Protection and Repatriation Act will be followed. Compliance with state law for discoveries occurring on private or state lands requires notification of the county coroner so the coroner may determine if an investigation regarding the cause of death is required. It the coroner determines that the remains are of early Native American origin, the coroner will notify the NAHC.

Upon notification the NAHC will identify the most likely descendant (MLD). DWR will coordinate with the MLD to ascertain whether the Tribe has standard procedures for treatment of burials or human remains. DWR will coordinate closely with the Tribe to develop an appropriate treatment plan for the reinterment or other consideration of the remains. If the NAHC fails to identify the MLD, or if the parties cannot reach agreement as to how to treat the remains as described in California Public Resources Code Section 5097.98(e), DWR will reinter the remains at a location not subject to further disturbance. DWR will ensure the protections prescribed in California Public Resources Code Section 5097.98(e) are performed, such as the use of conservation easements and recording of the location with the relevant county and CHRIS Information Center.

3.8 Environmental Justice

N/A

3.9 Flood Risk Management

N/A

3.10 Geology, Soils, and Paleontological Resources

Mitigation Measure SOILS-5: Conduct Site-Specific Soil Analysis and Construct Alternative Wastewater Disposal System as Required

1. At each proposed wastewater disposal system site, a site-specific analysis of soil characteristics and groundwater conditions will be conducted to determine the soil saturated hydraulic conductivity, depth to seasonal high-water table, and other factors that affect the suitability of the site for use for on-site wastewater disposal. Should a site analysis determine that a conventional disposal system could fail, an alternative wastewater disposal system, such as a mound system or a pressure-dosed mound system. The components of on-site wastewater systems typically consist of a septic tank for pretreatment, a pump with a small diameter pipe network, and an absorption area (also known as a leach field). A mound-type leach field consists of an elevated mound of suitable imported soil that is constructed atop the native soil to provide 1 to 2 feet of treatment media (i.e., suitable soil), in which distribution drain lines are installed in trenches. The imported soil used to form the mound is unsaturated and allows soil microbes to feed on the waste and nutrients in the wastewater, thereby effectively treating the wastewater before it percolates into the underlying native soil and groundwater. In a pressure-dosed mound system, the wastewater is dispersed into imported fill soil consisting of rapidly permeable sands that contain a high volume of free air within the pore space. This mitigation measure, where necessitated at a particular site, will reduce the impact to a less-than-significant level by requiring construction contractors to provide soil material of sufficient thickness and permeability that is an adequate distance from the groundwater level to ensure that the effluent is treated and does not contaminate groundwater. Implementation of this mitigation measure would not result in an impact.

Mitigation Measure PALEO-1a: Prepare and Implement a Monitoring and Mitigation Plan for Paleontological Resources

1. Before ground-breaking construction begins, DWR will retain a qualified professional paleontologist (as defined by the SVP Standard Procedures [Society of Vertebrate Paleontology 2010:10]) to develop a comprehensive Paleontological Resources Monitoring and Mitigation Plan (PRMMP) for the project, to help avoid destroying unique paleontological resources.
2. The PRMMP will be consistent with the SVP Standard Procedures (Society of Vertebrate Paleontology 2010) and the SVP Conditions of Receivership (Society of Vertebrate Paleontology 1996:1,2) and will require the following:
    a. **Paleontological qualifications:** A paleontological resources specialist (PRS) will be designated or retained for construction activities. The PRS will have paleontological resources management qualifications consistent with the description of a qualified professional paleontologist in the SVP Standard Procedures (Society of Vertebrate Paleontology 2010). The PRS will be responsible for implementing all aspects of the PRMMP, managing any additional paleontological monitors needed for construction activities, and serving as a qualified resource in the event of unanticipated paleontological finds. The PRS may, but need not necessarily, be the same individual who prepared the PRMMP.

b. **Preconstruction surveys:** Preconstruction surveys (with salvage and/or protection in place, as appropriate) will be conducted in areas where construction activities would result in surface disturbance of geologic units identified as highly sensitive or undetermined for paleontological resources. The PRS will be responsible for determining where and when paleontological resources monitoring would be required prior to breaking ground.

c. **Coordination procedures and communications protocols:** Preconstruction and construction-period coordination procedures and communications protocols will be established, including procedures to alert all construction personnel involved with earthmoving activities about the possibility of encountering fossils as set forth in Mitigation Measure PALEO-1b and communications regarding the *stop work, evaluate and treat appropriately response* in the event of a paleontological discovery, as discussed in “e” below.

d. **Monitoring:** All ground-disturbing activities involving highly sensitive units will be monitored by qualified monitors (as defined by the SVP Standard Procedures [Society of Vertebrate Paleontology 2010:10]). Monitoring will initially be conducted full time for grading and excavation in those areas identified by the PRS as having potential to damage paleontological resources, but the PRMMP may provide for monitoring frequency in any given location to be reduced once 50% of the ground-disturbing activity in that location has been completed, if the reduction is appropriate based on the implementing PRS’s professional judgment in consideration of actual site conditions. The PRS will have the authority to stop work if paleontological resources are discovered and as described in “e” below.

e. **Stop work, evaluate, and treat appropriately when a unique or significant fossil is encountered:** DWR will require that if potentially unique or significant fossil remains are discovered during ground-disturbing activities, the construction crew will be directed to immediately cease work in the vicinity of the find and notify the PRS, consistent with the PRMMP described under Mitigation Measure PALEO-1a.

f. **Sampling and data recovery procedures:** Sampling and data recovery procedures that are consistent with the SVP Standard Procedures (Society of Vertebrate Paleontology 2010) and the SVP Conditions of Receivership (Society of Vertebrate Paleontology 1996:1,2) will be established.

g. **Repository plan and curation:** A repository plan will be developed that provides for appropriate curation of recovered materials, if necessary. Procedures for preparing, identifying, and analyzing fossil specimens and data recovered will be established, consistent with the SVP Conditions of Receivership (Society of Vertebrate Paleontology 2010) and any specific requirements of the designated repository institution.

h. **Reporting:** Mitigation monitoring report preparation guidelines will be established that are consistent with the SVP Standard Procedures guidelines (Society of Vertebrate Paleontology 2010) and approved by DWR. The report will include, at a minimum, discussions of effects, regulatory requirements, purpose of mitigation, regional geologic context, project area stratigraphy, stratigraphic and geographic distribution of paleontological resources, field and laboratory methods and procedures, fossil recovery, and paleontological significance. The report will also include geological cross sections and stratigraphic sections depicting fossil discovery localities and excavated rock units;

maps showing the activity location and vicinity, as well as geology and location of discovered fossil localities; appropriate illustrations depicting monitoring conditions, field context of collecting localities, and laboratory activities; and appendices including an itemized listing of catalogued fossil specimens, complete descriptions of all fossil collecting localities, an explanation of report acronyms and terms, and a signed curation agreement with an approved paleontological repository.

i. **90% design submittal for project elements requiring excavation:** DWR will have a qualified individual review the 90% design submittals to finalize the identification of construction activities involving geologic units considered highly sensitive for paleontological resources for the purpose of determining monitoring location and schedule. Evaluation will consider the anticipated depth of disturbance, the selected construction technique, and the geology of the alignment. The evaluation may be carried out by the PRS or an individual meeting the SVP's requirements for a qualified professional paleontologist (per Society of Vertebrate Paleontology 2010) and will be conducted in collaboration with the design and geotechnical teams. If the evaluation is performed by a professional paleontologist, it will be reviewed and verified by a California-licensed professional geologist. The purpose of this evaluation will be to develop specific language identifying how the mitigation measures will be applied to the various phases of construction along the alignment (e.g., which areas would require monitors).

Implementation of this measure will require that unique or significant paleontological resources identified during surface excavation are protected from destruction or treated and documented appropriately to preserve their scientific value. Unique paleontological resources will be systematically identified, documented, avoided, or protected from destruction, where feasible, or recovered and curated so they remain available for scientific study.

Mitigation Measure PALEO-1b: Educate Construction Personnel in Recognizing Fossil Material

1. DWR will require that all construction personnel receive training provided by a qualified professional paleontologist experienced in teaching non-specialists, so they can recognize fossil materials in the event any are discovered during construction. Training will include information on the possibility of encountering fossils during construction, the types of fossils likely to be seen and how to recognize them, and proper procedures in the event fossils are encountered. All field management and supervisory personnel and construction workers involved with ground-disturbing activities will be required to take this training prior to beginning work. Training materials will include an informational brochure that provides contacts and summarizes procedures in the event paleontological resources are encountered.

Implementation of this measure will help ensure that unique or significant paleontological resources have a better likelihood of being identified during construction so they can be temporarily avoided or immediately treated, as appropriate.

3.11 Groundwater

Mitigation Measure GW-1: Maintain Groundwater Supplies in Affected Areas

Prior to construction, the location of existing wells would be determined within the anticipated area of influence of project sites at which dewatering would occur during construction or maintenance. These sites include the north Delta intakes (construction and maintenance), the Southern Forebay Spillway and Outlet Structure (only used during construction dewatering), and the Bethany Complex Surge Basin (only used during construction dewatering). Initially, the area of influence would be considered to be within 0.5 mile of the dewatering areas for each site and will be validated or refined during the design phase.

Based on available information, site investigations and desk studies, the location of existing wells, depths of the wells and the depth to groundwater within these wells would be determined. During geotechnical explorations and construction, new monitoring wells would be installed sufficiently close to the groundwater dewatering sites and along the Sacramento River (for the intakes) and Italian Slough (for the Southern Forebay). Existing monitoring wells or new monitoring wells (to be installed as part of field investigations during the design phase) inside and outside the area of influence would also be used. Monitoring would be conducted to assess changes in water levels attributable to dewatering activities and maintenance by comparing changes in groundwater elevations within and outside the dewatering area of influence. Monitoring wells at the intakes would continue to be used as part of a conveyance operations monitoring program.

No monitoring would occur near tunnel shaft locations because dewatering would be limited to volume within the constructed tunnel shaft after the shaft has been isolated from the aquifer.

Monthly groundwater monitoring would be initiated as soon as access to existing wells was obtained (wherever applicable) and as soon as new monitoring wells were installed. Monitoring would continue through the construction phase for up to 6 months following termination of construction dewatering activities and for at least 5 years after commencement of conveyance operations at the intakes.

Monitoring preparation would include:

- During the design phase, the locations of existing wells that would require monitoring would be determined. The information would be used to determine the need and location for construction of new monitoring wells. Groundwater levels would be monitored in accessible existing wells. Monitoring of groundwater levels in accessible existing wells would be conducted on a weekly or monthly basis for the durations stated above, as needed.
    - The area of influence of construction dewatering operations and conveyance operations would be refined from the assumed 0.5-mile radius based upon the location of potentially affected existing wells and existing available groundwater and hydrogeologic information.
- Additional monitoring wells would be installed at the intakes, Southern Forebay structures, and Bethany Reservoir Surge Basin, as needed, during future geotechnical explorations and the construction phase. Groundwater levels would be monitored in the newly-constructed monitoring wells and existing wells (as noted above). Monitoring of groundwater water

levels in new monitoring wells would be conducted on a weekly or monthly basis for the durations stated above, as needed.

   - New monitoring wells would be constructed outside the slurry cutoff walls and/or sheet piles, but within the project right-of-way.

- All monitoring data would be reported to the public on a monthly basis and in an annual summary report. The monthly reports would contain tabular water level data as well as changes in water levels from the previous months. The annual report would summarize monthly data and show the most recent water level contour map as well as the preconstruction contour map and hydrographs. The final report would include water level contour maps for the area of the groundwater aquifer that is affected by dewatering showing initial, preconstruction water levels, construction phase water levels, post-construction water levels, and annual conveyance operations water levels, as applicable.
- The results of preconstruction and construction-related monitoring and geotechnical and hydrogeologic testing during field investigations would be used to determine if supplemental re-injection and/or extraction wells would be needed.

During construction or maintenance dewatering, if the results of groundwater monitoring described above indicate that the difference between average groundwater elevation declines in monitoring wells inside the area of influence of dewatering and control (background) monitoring well outside the area of influence is more than 10% of the depth of the shallowest known well inside the area, mitigation of impacts to groundwater supplies would be needed. For wells that may be impacted by groundwater level declines described herein, the following would be implemented:

- Reinject groundwater using injection wells; potable supplies would be brought in temporarily while injection wells are constructed and the groundwater basin recharges, if needed.

The following additional measures would also be implemented if injection wells are not feasible in an area or not sufficient to offset potential impacts on groundwater levels in the area of influence:

1. Deepen or modify (e.g., lower pump intakes) wells used for domestic or agricultural purposes; potable supplies would be brought in temporarily while wells are modified, if needed.
2. Secure a temporary water supply or compensate farmers for production losses due to a reduction in available groundwater supplies.

3.12 Hazards, Hazardous Materials, and Wildfire

Mitigation Measure HAZ-2: Perform a Phase I Environmental Site Assessment Prior to Construction Activities and Remediate

1. Prior to construction, DWR will conduct a Phase I environmental site assessment in conformance with the American Society for Testing and Materials Standard Practice E1527-05. All environmental investigation, sampling, and remediation activities associated with properties in the project area will be conducted under a work plan approved by the regulatory oversight agency (e.g., DTSC, EPA) and will be conducted by an appropriate environmental professional.
   a. Areas to be excavated as part of construction (e.g., for water conveyance facilities, shaft locations, concrete batch plants, intake locations, RTM areas, staging areas) where historical contamination has been identified or where contamination is suspected (e.g., as evidenced by soil discoloration, odors, differences in soil properties, abandoned underground storage tanks [USTs]) will undergo soil and/or groundwater testing at a certified laboratory provided that existing data are not available to characterize the nature and concentration of the contamination. A Phase I environmental site assessment must include the following components (40 CFR § 312.20).
      i. An on-site visit to identify current conditions (e.g., vegetative dieback, chemical spill residue, presence of aboveground or underground storage tanks [ASTs or USTs]).
      ii. An evaluation of possible risks posed by neighboring properties.
      iii. Interviews with persons knowledgeable about the site's history (e.g., current or previous property owners, property managers).
      iv. An examination of local planning files to check prior land uses and any permits granted.
      v. File searches with appropriate agencies (e.g., State Water Board, fire department, county health department) having oversight authority relative to water quality and groundwater and soil contamination.
      vi. Examination of historical aerial photography of the site and adjacent properties.
      vii. A review of current and historical topographic maps of the site to determine drainage patterns.
      viii. An examination of chain-of-title for environmental liens and/or activity and land use limitations.
   b. If the Phase I environmental site assessment indicates likely site contamination, a Phase II environmental site assessment will be performed (also by an appropriate environmental professional).
   c. A Phase II environmental site assessment will comprise the following components.
      i. Collection of original surface and/or subsurface samples of soil, groundwater, and building materials to analyze for quantities of various contaminants.
      ii. An analysis to determine the vertical and horizontal extent of contamination (if the evidence from sampling shows contamination).

d. If contamination is uncovered as part of Phase I or II environmental site assessments, remediation will be required. If materials such as asbestos-containing materials, lead-based paint, or PCB-containing equipment are identified, these materials will be properly managed and disposed of prior to or during the demolition process.

e. Any contaminated soil identified on a project site must be properly disposed of in accordance with the DTSC regulations in effect at the time.

f. If, during construction/demolition of structures, soil or groundwater contamination is suspected, the construction/demolition activities will cease and appropriate health and safety procedures will be implemented, including the use of appropriate personal protective equipment (e.g., respiratory protection, protective clothing, helmets, goggles).

Mitigation Measure HAZ-5: Wildlife Hazards Management Plan and Wildlife Deterrents (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, 4c)

1. The FAA requires public service airports to maintain a safe operation, including conducting hazard assessments for wildlife attractants within 5 miles of an airport. The hazard assessment is submitted to FAA, which determines if the airport needs to develop a Wildlife Hazard Management Plan (15 CFR Part 139). The airport's Wildlife Hazard Management Plan contains measures to reduce wildlife hazards, including habitat modification (e.g., vegetation management, filling in of wetlands), wildlife control measures (e.g., harassment, trapping and removing), and use of a radar-based alert system.

a. DWR will consult with the Contra Costa Airport Land Use Commission during the project-level environmental assessments, when site-specific locations and design plans are finalized. At that time, appropriate management plans, strategies, and protocols will be developed to reduce, minimize, and/or avoid wildlife hazards on air safety. Wildlife deterrent measures will include one or more physical, mechanical, visual, or biological devices and features to deter avian wildlife attraction to the Southern Forebay.

b. DWR will incorporate the following wildlife (specifically bird) deterrents:

Conduct periodic (e.g., biannual) removal of roosting/nesting materials from DWR-managed structures near the Byron Airport.

Nonmigratory birds, left undisturbed, will establish territories on building roofs, ledges, and open girders associated with nearby waterbodies such as the Southern Forebay. Techniques to exclude birds from the area will be incorporated into final project design. Examples include anti-perching devices (spikes or other obstructions) installed on ledges, roof peaks, rafters, signs, posts, and other roosting and perching areas; netting and wire can also be used for larger areas.

3.13 Land Use and Planning

N/A

3.14 Navigation

N/A

3.15 Noise

N/A

3.16 Parks and Recreation

N/A

3.17 Socioeconomics

Mitigation Measure PH-1a: Avoid Creating Areas of Standing Water During Preconstruction Future Field Investigations and Project Construction

1. DWR will eliminate standing water to reduce potentially suitable mosquito breeding areas at field investigation sites and construction sites (including staging areas). Actions will include, but not necessarily be limited to:
   a. Avoid leaving containers that can accumulate water in an uncovered or upright position. This includes wheelbarrows, drums, buckets, cans, tarps and other containers. If uncovered containers must remain onsite, create drainage holes.
   b. Store building materials under shelter/cover that does not collect water.
   c. Grade all work areas to drain.
   d. Fill in potholes and other areas where water is likely to accumulate and/or clear pooled, stagnant water regularly.
   e. Routinely remove garbage and other debris that may collect water.
   f. Periodically pump out water from trenches, ditches, or other ground areas where water could accumulate for several days and potentially provide mosquito breeding habitat.

Mitigation Measure PH-1b: Develop and Implement a Mosquito Management Plan for Compensatory Mitigation Sites on Bouldin Island and at I-5 Ponds

1. To aid in vector management and control, DWR will develop and implement a mosquito management plan for the compensatory mitigation sites where freshwater marsh, lake/pond, riparian, or seasonal wetland habitat is created/enhanced on Bouldin Island and at the I-5 Ponds. Bouldin Island and the I-5 Ponds are located in San Joaquin County and thus DWR will consult with the San Joaquin County MVCD with respect to habitat creation and enhancement activities at these locations. Consultation will include, but may not be limited to, review of the mosquito management plan and best management practices (BMPs) to be implemented at the compensatory mitigation sites, review of proposed mosquito monitoring efforts at the sites, and assistance with monitoring efforts where feasible. In addition, DWR will consult with the San Joaquin County MVCD during all phases of habitat creation and enhancement (i.e., design, implementation, and operations).
2. The Central Valley Joint Venture's Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands (Kwasny et al. 2004), the California Department of Public Health's Best Management Practices for Mosquito Control in California (California Department of Public Health 2012), and other guidelines will be used to help design appropriate habitat creation and enhancement features to the extent feasible, consistent with the biological goals and objectives of the Delta Conveyance Project.
3. The mosquito management plan will address aquatic habitat design considerations, water management practices, vegetation management, biological controls, and habitat maintenance. BMPs included in the mosquito management plan will include (as applicable), but may not be limited to:

a. Implement monitoring and sampling programs to detect early signs of mosquito population problems.

b. Implement freshwater habitat management to include water-control-structure management, vegetation management to reduce mosquito production, mosquito predator management, drainage improvements, and coordination with California Department of Fish and Wildlife regarding these strategies and specific techniques to help minimize mosquito production.

c. Maintain permanent ponds that increase the diversity of waterfowl yet decrease the introduction of vectors through constant circulation of water, vegetation control, and periodic draining of ponds.

d. Utilize water sources with mosquito predators (e.g., mosquito-eating fish or invertebrate predators) for flooding.

e. Manage vegetation routinely; activities such as annual thinning of rushes and cattails and removing excess vegetative debris enables natural predators to hunt mosquito larvae more effectively in permanent wetlands. Vegetation in shallow, temporary wetlands can be mowed when dry.

f. Time flooding of seasonal wetlands to reduce overlap with peak mosquito activity.

g. Excavate deep channels or basins to maintain permanent water areas (>2.5 feet deep) within a portion of seasonal managed wetlands. This provides year-round habitat for mosquito predators that can inoculate seasonal wetlands when they are irrigated or flooded.

h. Provide adequate water control structures for complete drawdown and rapid flooding.

i. When possible, include independent inlets and outlets in the design of each wetland unit.

j. Construct or enhance swales so they are sloped from inlet to outlet and allow maximum draw-down.

k. Use biological agents, such as mosquito fish (*Gambusia affinis*), to limit larval mosquito populations.

l. Use larvicides and adulticides, as necessary, in compliance with all applicable federal and state regulations (e.g., Clean Water Act, Endangered Species Act). Use only larvicides and adulticides that are currently registered by the California Department of Pesticide Regulation. These pesticides will be applied only by trained personnel and according to label directions. If larvicides and/or adulticides are required, DWR will evaluate the effects of these chemicals and, if required, prepare a monitoring program for review by fish and wildlife agencies to evaluate effects, if any, application would have on macroinvertebrates and associated covered fish and wildlife species.

3.18 Surface Water

N/A

3.19 Transportation

Mitigation Measure TRANS-1: Implement Site-Specific Construction Transportation Demand Management Plan and Transportation Management Plan

1. Prior to construction, DWR will require that provisions be included in construction contracts stating that contractors' crews and schedules are to be coordinated to reduce total construction employee VMT during construction periods through the use of park-and-ride lots and carpooling/vanpooling, and that the plans and specifications that are developed as part of the project alternatives design are being followed. The project will also require development of site-specific TDMs and TMPs that address the specific steps to be taken before, during, and after construction to minimize VMT as a result of construction employees driving alone in their single occupancy vehicles to and from park-and-ride lots and construction sites. Construction contractors will be responsible for developing the TDMs and TMPs in consultation with the following applicable transportation entities.
    - Caltrans for state and federal roadway facilities
    - Local agencies for local roadway and intersection facilities (vehicles, pedestrians, and bicyclists)
    - Transit providers
    - Commuter and Freight Rail operators
    - U.S. Coast Guard
    - Federal, California, city, and county parks departments
2. DWR will be responsible for verifying that the TDMs and TMPs are implemented prior to beginning construction at each project feature. If necessary, to minimize unexpected operational and safety related impacts or delays during construction, DWR will also be responsible for modifying the TDMs and/or the TMPs to reduce potential effects identified by the applicable transportation entities identified above throughout the duration of the contract. The following shall be prepared by the contractor(s) and approved by DWR prior to beginning construction at each project feature:
    a. Develop of a TDM plan that will reduce the reliance of construction employees on single occupancy vehicles. The TDM plan shall include the following performance standards:
        - Incentivize carpooling and vanpooling to and from park-and-ride facilities to achieve the goal of a 25% reduction in single occupancy vehicles.
        - Require 100% compliance by construction workers to use park-and-ride facilities and transfer to project transit vehicles to travel to and from feature construction sites.
        - Incentives can include a combination of monetary (i.e., carpool/vanpool gas cards) and non-monetary (i.e., preferential parking spaces and express transit boarding to and from park-and-ride facilities and construction site for employees who carpool/vanpool).
        - Quarterly and yearly TDM reports will be prepared to quantify the performance toward meeting the goal of 25% reduction in the use of single-occupancy vehicles at

each of the park-and-ride facilities based on number of passengers compared to vehicles parked.

b. Incorporate TDM measure to incentivize the use of alternative travel modes such as transit and bicycling to park-and-ride facilities.

- Incentives can include a combination of monetary (i.e., transit passes) and non-monetary (i.e., preferential transit boarding to and from park-and-ride facilities and construction site for employees who use transit).
- Quarterly and yearly TDM reports will be prepared to quantify the performance of transit and bicycling to park-and-ride facilities based on surveys on how construction workers arrived at the park-and-ride facilities (drove alone, carpool/vanpool, transit, or bicycling).

3. Each TMP will address the following, as needed.

a. Coordination with the affected agency during the construction and operation of the five park-and-ride facilities to be served by alternative fuel vehicles to and from construction sites.

- Hood-Franklin Park-and-Ride Lot (Alternatives 1, 2b, 3, 4b, and 5)
- Charter Way Park-and-Ride Lot (Alternatives 1, 2b, 3, 4b, and 5)
- Rio Vista Park-and-Ride Lot (Alternatives 1 and 2b)
- Byron Park-and-Ride Lot (Alternatives 1, 2b, 3, and 4b)
- Bethany Park-and-Ride Lot (Alternatives 1, 2b, 3, and 4b)

b. Coordination with the affected agency during the construction of the following major road improvements.

- Intake haul road (Alternatives 1, 2b, 3, 4b, and 5)
- Twin Cities Complex (Alternatives 1, 2b, 3, 4b, and 5)
- New Hope Tract (Alternatives 1 and 2b)
- Bouldin Island (Alternatives 1, 2b, and 3)
- Bacon and Mandeville Islands (Alternatives 1 and 2b)
- New Hope Tract (Alternatives 3, 4b, and 5)
- Terminous Tract (Alternatives 3, 4b, and 5)
- Lower Roberts Island (Alternatives 3, 4b, and 5)
- Southern Complex on Byron Tract (Alternatives 1, 2b, 3, and 4b)
- Southern Complex West of Byron Highway (Alternatives 1, 2b, 3, and 4b)
- Bethany Reservoir Pumping Plant and Surge Basin (Alternative 5)
- Bethany Reservoir Aqueduct (Alternative 5)
- Bethany Reservoir Discharge Structure (Alternative 5)

c. Coordination with the affected agency during the construction of the following shaft site improvements:

- New Hope Tract, Staten Island, and Mandeville Island (central alignment alternatives)
- New Hope Tract, Canal Ranch Tract, King Island, and Upper Jones Tract (eastern alignment alternatives); and
- New Hope Tract, Canal Ranch Tract, King Island, Upper Jones Tract, and Union Island (Bethany Reservoir alignment).

d. Notifications in the multiple languages spoken in the Delta for the public, emergency providers, cycling organizations, bike shops, and schools, the U.S. Coast Guard, boating organizations, marinas, city and county parks departments, and California Department of Parks and Recreation, where applicable, describing construction activities that could affect transportation and water navigation.

e. Alternate access routes via detours, including Americans with Disabilities Act-compliant facilities where required to maintain continual circulation for local travelers in and around construction zones and site access driveways, including bicycle riders, pedestrians, and boaters, where applicable.

f. Scheduling for oversized material deliveries to the work site and haul routes during off-peak times.

g. Provisions that direct haulers are required to pull over to the side of the road if an emergency vehicle is approaching in either direction. If an emergency vehicle is approaching on a narrow two-way roadway, specify measures to require that construction vehicles use appropriate maneuvers to allow continual access for emergency vehicles at the time of an emergency.

h. To eliminate potential hazards from a geometric design, DWR will require that geometric design plans that meet geometric standards be prepared and approved by the applicable transportation entity (i.e., Caltrans, county, or city public works department) for the major road improvements included in the conceptual design of the project alternatives.

i. Scheduling closures for road and bridge improvements to night-time hours and limit closure periods to reduce traffic effects associated with detours.

j. Designing park-and-ride lot entrances and exits to avoid construction employee queuing on higher volume roadways, providing adequate turn lanes and signage or signals (if needed) for lot entrances and exits and scheduling park and ride lot arrivals and departures to reduce employee traffic volumes during peak morning and evening commute periods.

k. To reduce potential conflicts with existing land uses, DWR will require that staged construction plans, roadway closure reports, and detour plans be prepared for major road improvements and approved by the applicable transportation entity (i.e., Caltrans, county, or city public works department).

l. A project information website in the multiple languages spoken in the Delta will be developed to inform residents, business owners, and farmers of provisions that have been implemented to reduce VMT in the project study area and forthcoming construction in coordination with events and harvest activities in the Delta.

m. The contractor will coordinate with emergency responders to identify routes traditionally used by voluntary responders to access fire stations, and emergency responders to access the communities from the police and fire stations.

n. During construction, each week, the contractor will coordinate with emergency responders, including ambulance dispatchers, to identify road construction and high-volume construction traffic events (e.g., during hours of material deliveries).

o. During road construction, the contractor will have designated staff monitor emergency response calls with immediate communications with construction crews at every site to facilitate movement of emergency responders.

p. The contractor will post on a weekly basis information on the project information website in the multiple languages spoken in the Delta to inform residents, business owners, and farmers of daily road construction and high-volume construction traffic events (e.g., during hours of material deliveries).

q. The contractor will either maintain at least one shoulder along existing access roads to be free of debris or provide detours during short-term, overnight closures (maximum of 2 nights per week) to allow access of fire engines, ambulances, and police cars that need to travel at high speeds.

r. During road construction, the contractor will have several steel plates and equipment available at all times to cover trench sites when there is no construction activity (i.e., after hours or weekends) to provide access for emergency responders over temporary excavations.

3.20 Utilities and Public Services

N/A

3.21 Water Quality

Mitigation Measure WQ-6: *Develop and Implement a Mercury Management and Monitoring Plan*

This mitigation measure will be implemented as part of the CMP described further in Appendix 3F. DWR will minimize methylmercury generation and mobilization into the food chain resulting from CMP implementation by developing a Mercury Management and Monitoring Plan (MMMP) to guide tidal habitat siting, design, monitoring, and adaptive management. The MMMP will require evaluation of site-specific conditions to assess whether the creation and existence of new tidal habitats would make the current Delta mercury impairment discernibly worse and will include siting, design, monitoring, and adaptive management elements to minimize conditions within new tidal habitats that may be conducive to the creation or increased availability of methylmercury while still achieving most or all of the desired CMP benefits.

The MMMP objective will be to control levels of bioavailable methylmercury within the CMP tidal habitats such that aquatic organisms in waters within and immediately adjacent to the new tidal habitats will not have measurably higher body burdens compared to those in comparable reference locations in the Delta, and thus CMP implementation will not make the current Delta mercury impairment discernably worse. The MMMP will serve as the framework for site-specific mercury management plans to be prepared for each proposed new tidal habitat site that address the MMMP elements (defined below) based on site-specific conditions.

Current and ongoing research programs are providing information regarding mercury cycling in tidal wetlands. These include data from the Yolo Wildlife Area Tidal Wetland in the Yolo Bypass, Blacklock Tidal Wetland in Suisun Marsh, North Lindsey Slough Tidal Wetland in the Cache Slough Complex, and the Westervelt Cosumnes River Tidal Wetland east of the confluence of the Cosumnes and Mokelumne Rivers (California Department of Water Resources 2020:7). Several other tidal wetland restoration projects are being planned that will contribute to the available data informing management actions to minimize methylmercury generation and bioaccumulation in tidal wetlands. The CMP ecosystem restoration objectives will be considered throughout the development of the MMMP.

Mercury Management and Monitoring Plan Elements

1. DWR will retain a qualified water quality specialist, wildlife biologist, or fisheries biologist with expertise in methylmercury management to develop the MMMP.
2. The MMMP will address the following elements to minimize and control measured mercury methylation and methylmercury bioavailability within CMP tidal habitats.
    a. **Predesign field studies**—The MMMP will define the predesign field studies to be conducted at potential tidal habitat sites to characterize mercury sources and concentrations of mercury, methylmercury, organic carbon, iron, and sulfate in surface water and sediment to inform tidal habitat design and post-restoration monitoring.
    b. **Siting, design, source control, and management measures**—The MMMP will define tidal habitat siting, design, source control, and management measures to minimize mercury bioaccumulation into the foodweb so that mean tissue mercury concentrations in fish collected within and immediately adjacent to the CMP tidal habitats are not significantly greater than mercury tissue concentrations for the same species in similar

tidal habitat elsewhere in the Delta. Siting, design, source control, and management measures that will be considered and evaluated in the MMMP will include, but not be limited to, the following.

i. Avoid siting tidal habitats in areas that currently have high soil or sediment mercury levels and minimize exposure of mercury-containing soils.

ii. Design for favorable water and sediment exchange with adjacent Delta waters to manage elemental mercury input and export of methylmercury over time (Davis et al. 2012:20).

iii. Minimize microbial methylation of mercury associated with anoxic or near-anoxic conditions by managing the amount of organic material at a restoration site and dissolved oxygen levels. This can be affected by managing vegetation to reduce this organic carbon source, which fuels mercury methylation by bacteria (California Department of Water Resources et al. 2020:7-1; Alpers et al. 2014:285).

iv. Manage vegetation to reduce organic carbon, which fuels mercury methylation by bacteria, by mechanical removal (California Department of Water Resources et al. 2020:7-1; Alpers et al. 2014:285; Windham-Myers et al. 2009:10).

v. Minimize seasonal wetting/drying cycles that encourage mercury methylation (California Department of Public Health 2013:12).

vi. Minimize drainage through soils where mercury methylation is greatest (Bergamaschi et al. 2011:1369).

vii. Enhance photo-demethylation that converts methylmercury into a biologically unavailable, inorganic form of mercury (California Department of Public Health 2013:2).

viii. Control sediment mobilization into the tidal habitat if particulates or sediment is determined to be a key source of mercury (California Department of Water Resources et al. 2020:7-1).

ix. Remediate tidal habitat soils with iron to reduce methylation in sulfide rich soils (McCord and Heim 2015:732).

c. **Monitoring**—The MMMP will describe strategies to monitor and collect data to determine how well the design, source control, and management measures are affecting methylmercury concentrations in fish tissue at the new tidal habitats relative to comparable reference locations.

d. **Adaptive management**—The MMMP will describe actions to be taken to further reduce methylmercury concentrations in sediment, the water column, and fish tissues should they be shown to exceed performance standards. Adaptive management strategies will be fully developed as part of the MMMP and will inform future tidal habitat siting and initial and future management actions.

Site-Specific Mercury Management Plans

3. The MMMP will be implemented by DWR through development and implementation of site-specific mercury management plans for each CMP tidal habitat site. Relevant MMMP design elements will be integrated into project-specific designs or an explanation of why a

particular element is not applicable to the site will be provided. Where site-specific siting, design, source control, and management measures could limit the ecosystem benefits of CMP tidal habitat, such as by limiting the amount of carbon supplied to the Delta as a whole or by requiring flows inconsistent with the habitat type, discussions among involved resource agencies will be held to resolve such technical issues. In addition to relevant design elements from the MMMP, the site-specific mercury management plans will include the following components.

a. A review of predicted changes in hydrology at the new tidal habitat site, expected changes in conditions affecting mercury methylation, expected changes in bioavailable methylmercury concentrations, and possible changes in bioaccumulation by fish.

i. A determination of whether preconstruction sampling for baseline characterization of mercury and methylmercury concentrations in water, sediment, and/or biota is warranted. If this work was recently completed for a comparable reference location, then repeating the preconstruction sampling may not be needed. Decisions will be made on a site-specific basis.

ii. A description of characterization sampling and post-restoration monitoring at each tidal habitat project site that includes a Quality Assurance/Project Plan specifying sampling procedures, analytical methods, data review requirements, data analysis approaches (e.g., statistical tools), and data management and reporting procedures.

Site-Specific Monitoring and Adaptive Management

4. DWR will conduct monitoring at the new tidal habitat sites in accordance with the site-specific mercury management plans.

5. DWR will implement adaptive management based on monitoring results.

a. Adaptive management will be implemented if monitoring results indicate that tissues of fish collected from within and immediately adjacent to the new tidal habitat have statistically significant and higher average mercury concentrations than tissues of the same species of fish collected from appropriate reference habitats elsewhere in the Delta. Conversely, if the mean mercury concentrations in fish tissues collected within and immediately adjacent to the new tidal habitat are not significantly greater than mercury concentrations in tissues of the same species collected from appropriate reference habitats in the Delta, then the new tidal habitat will be determined to not be making the current mercury impairment discernably worse. This statistical analysis serves as a performance standard for this mitigation measure and identifies when adaptive management actions will need to be implemented. This performance standard will be defined as an action level for adaptive management in the site-specific mercury management plans.

i. Adaptive management actions will be developed in coordination with the State Water Board and Central Valley RWQCB and based on monitoring findings. Adaptive management actions for newly created tidal habitats could include modifications to the type and frequency of monitoring being conducted and modifications to various ongoing management actions that affect vegetation, water and sediment exchange, dissolved oxygen levels, water depths, and sediment chemistry. Adaptive management actions for future CMP tidal habitats will be based on information gained from newly created tidal habitats and could include modifying criteria for siting future tidal habitats or modifying design criteria that affect tidal and sediment exchange, depth, dissolved oxygen levels, vegetation management, and sediment chemistry.

Oversight and Coordination

6. DWR will identify a qualified specialist in methylmercury cycling and biological effects who will oversee all aspects of implementing this mitigation measure. The methylmercury specialist will review and approve all mercury and methylmercury-related conclusions and recommendations generated from the tidal habitat component of the CMP, including site-specific mercury management plans. The methylmercury specialist will develop a Quality Assurance/Project Plan to describe all sampling, analyses, and reporting as part of any site-specific mercury management plan. The specialist will also be responsible for integrating new, relevant information generated by research over the course of this program.
7. DWR will develop and implement methylmercury management approaches consistent with the Delta Methylmercury TMDL (Central Valley Regional Water Quality Control Board 2010a:iv, 73, 80, 88, 134, 197) developed to control methylmercury generation and loading in the Delta. The Delta Mercury Control Program in the Central Valley RWQCB WQCP, which establishes an implementation program for the TMDL, states, in part, "In subareas needing reductions in methylmercury, proponents of new wetland and wetland restoration projects scheduled for construction after 20 October, 2011 shall (a) participate in methylmercury Control Studies, or shall implement site-specific study plans, that evaluate practices to minimize methylmercury discharges, and (b) implement methylmercury controls as feasible. New wetland projects may include pilot projects and associated monitoring to evaluate management practices that minimize methylmercury discharges." (Central Valley Regional Water Quality Control Board 2018:4-93) DWR has participated in these studies.

Timing and Phasing

8. DWR will develop the MMMP prior to siting any CMP tidal habitat. Site-specific mercury management plans will be developed by DWR as part of the design and implementation of individual CMP tidal habitat projects.

3.22 Water Supply

N/A

Appendix C3
Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources

The information in this appendix is presented as it was provided by the California Department of Water Resources (the applicant) in the *Delta Conveyance Project Draft Environmental Impact Report* Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources* (California Department of Water Resources 2022) and therefore is presented from the California Environmental Quality Act perspective. However, the U.S. Army Corps of Engineers relied on this information when preparing its Draft Environmental Impact Statement. All chapter references in this appendix are to those in the Draft EIR. Please refer to the Draft EIR for any information cross referenced.

3F.1 Introduction

This Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources (CMP) identifies compensatory mitigation options to address impacts on habitat for special-status plant and wildlife species (including fish) as well as natural communities (including wetlands and other waters or "aquatic resources") that may result from the construction and operation of the Delta Conveyance Project (project).[1] This CMP has been developed using the best available science, following the criteria of relevance, inclusiveness, objectivity, transparency, and timeliness (Delta Stewardship Council 2013:Appendix 1A). The scientific information used to identify the ecological requirements of wetland communities (Chapter 13, *Terrestrial Biological Resources)*, natural history and habitat requirements of special-status species (Chapter 12, *Fish and Aquatic Resources*, Chapter 13, Appendix 13B, *Species Accounts*), and ecological restoration practices is germane to the Sacramento–San Joaquin Delta (Delta) ecosystem and inclusive of relevant information from multiple disciplines.

Specifically, in order to propose feasible mitigation for potential significant impacts on aquatic resources and species habitat, this CMP first identifies several sites that could support habitat creation and enhancement actions. From among those sites where habitat creation and enhancement is deemed feasible, specific mitigation actions would be implemented to reduce the impact on aquatic resources and species habitat to a less-than-significant level under the California Environmental Quality Act (CEQA) or otherwise mitigate significant impacts. This document further explains the methodology used to identify those sites and discusses other approaches that may be used to secure appropriate compensatory mitigation for the project.

The compensatory mitigation approach described herein is based on anticipated mitigation needs for the proposed alternatives as presented in the Delta Conveyance Project Draft Environmental Impact Report (Draft EIR). The final compensatory habitat mitigation needs for the project will be

[1] Although there are many potential compensatory mitigation needs for resources as described in the Draft Environmental Impact Report, this document focuses on the needs for special-status terrestrial species and aquatic species and for natural communities including aquatic resources (including wetlands and other waters of the United States and waters of the State).

determined once all regulatory permits and approvals are secured. The conceptual approaches described herein would contribute to the mitigation of significant impacts of project construction, operation, and maintenance on affected certain resources, including special-status species and aquatic resources, as described in Chapter 12 and Chapter 13. Although the mitigation approaches described in this appendix (including the mitigation work plan described in Section 3F.4, *Mitigation Work Plan*, and Attachment 3F.1, *Compensatory Mitigation Design Parameters*) are of sufficient detail to meet the requirements of CEQA, National Environmental Policy Act (NEPA), and other laws, it is anticipated that additional design and management planning, including more detailed performance standards, monitoring methods, and adaptive management actions, may be added between the project approval under CEQA and NEPA and project initiation. Other mitigation actions, including mitigation/conservation bank credit purchases and habitat protection, may also occur during that time.

The initial sites described herein are proposed to address the compensatory mitigation needs for many terrestrial and aquatic resources (Figure 3F-1). However, not all compensatory mitigation needs would likely be met through these sites; for those additional needs, mitigation credits from approved banks as well as other approaches are expected to be used, including a proposed "Tidal Habitat Mitigation Framework." The effects of mitigation on species are evaluated, to the level of detail available, in the Draft EIR as well as in other applicable regulatory documents (e.g., biological assessment). At this time, siting and design detail is available for the initial mitigation sites. As siting and design detail becomes available for additional restoration sites, the California Department of Water Resources (DWR) will confer with the applicable regulatory agencies regarding the efficacy of these initial site-specific mitigation options as well as the other potential approaches to compensatory mitigation described herein.

Table 3F-1 summarizes the compensatory mitigation approaches that are addressed in this document by resource type. In some cases, multiple approaches may be considered for mitigation, such as the use of mitigation banks in combination with a tidal wetland restoration approach.

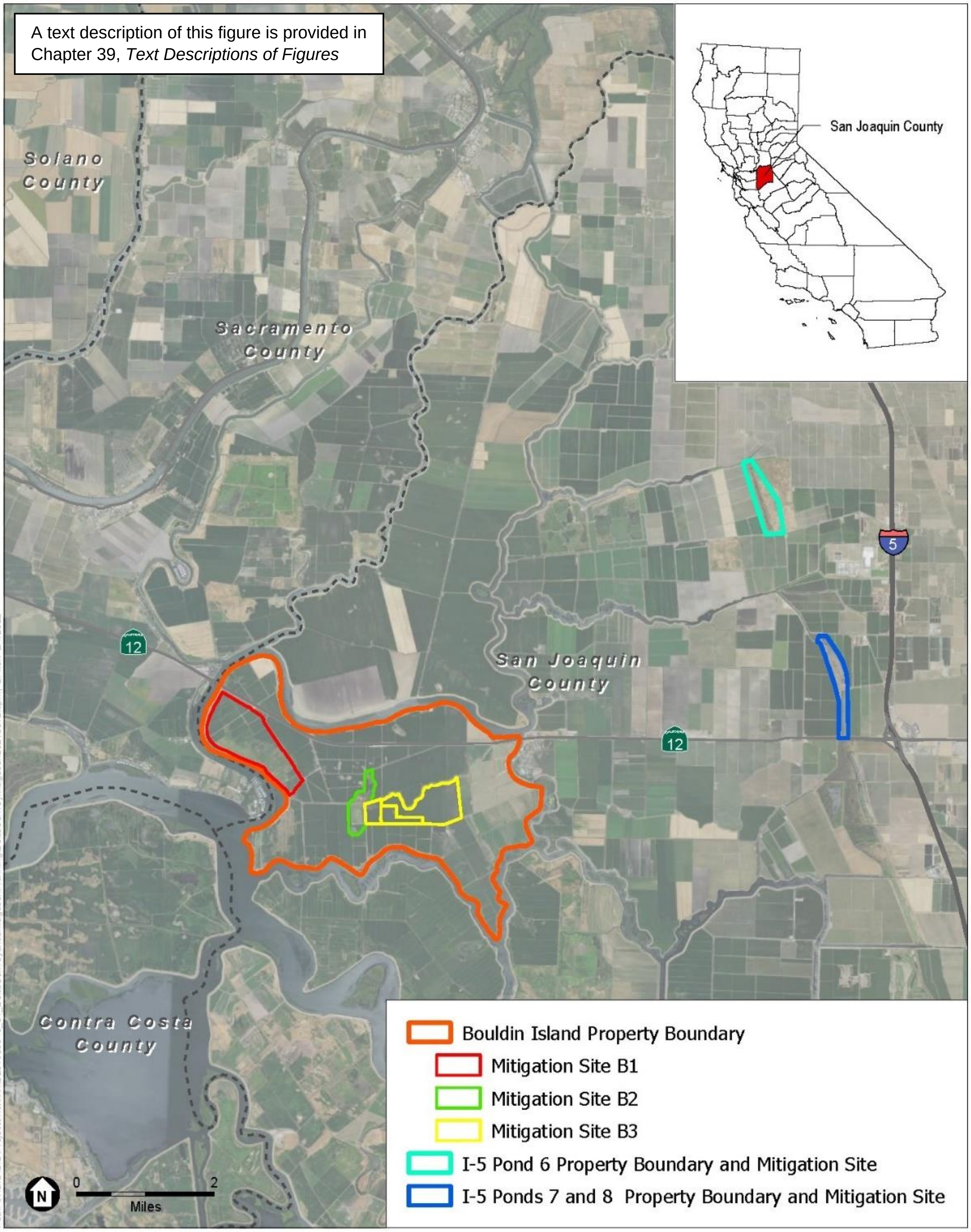


Figure 3F-1. Mitigation Site Location

Table 3F-1. Compensatory Mitigation Approaches

Aquatic Resources and Species Habitats	Habitat Description	Initial Mitigation Sites			Mitigation Credits & Site Protection Instruments	Tidal Habitat Mitigation Framework
		Bouldin Island	I-5 Pond 6	I-5 Ponds 7 & 8		
Aquatic Resources						
Wetlands	–	–	–	–	X	–
Alkaline wetland	–	X	–	–		–
Forested and scrub-shrub wetland	–	X	–	–	X	X
Emergent wetland	–	X	–	–	–	–
Seasonal wetland	–	–	–	–	X	–
Vernal pool	–	–	–	–	–	–
Other Waters	–	X	–	–	–	–
Agricultural ditch	–	X	–	–	–	–
Conveyance channel	–	X	–	–	–	–
Depression (lake/pond)	–	X	–	–	–	–
Natural channel	–	–	–	–	X	X
Tidal channel	–	–	–	–	X	–
Species Habitats						
Special-status plant species	Vernal pool, alkaline seasonal wetland, emergent wetland, perennial aquatic	X	X	X	X	X
Burrowing owl	Grassland, agriculture	X	X	X	X	–
California black rail	Tidal wetland	–	–	–	–	X
California red-legged frog	Aquatic and upland	–	–	–	X	–
California tiger salamander	Aquatic and upland	–	–	–	X	–
Fisheries	Tidal wetland	–	–	–	–	X
Fisheries	Channel margin	X	–	–	–	X
Giant garter snake	Aquatic (freshwater marsh)	–	X	X	–	–
Giant garter snake	Upland (grassland)	–	X	X	–	–
Greater sandhill crane	Roosting (freshwater marsh, agriculture)	X	–	–	X	–
Greater sandhill crane	Foraging (freshwater marsh, agriculture)	X	–	–	X	–
Least Bell's vireo	Recolonization (riparian)	X	–	–	–	–
Tricolored blackbird	Breeding (freshwater marsh)	X	X	X	X	–
Tricolored blackbird	Foraging (grassland, agriculture)	X	X	X	X	–
Swainson's hawk	Nesting (riparian)	X	–	–	X	–
Swainson's hawk	Foraging (grassland/ agriculture)	X	X	X	X	–
Valley elderberry longhorn beetle	Riparian	X	–	–	–	–

Aquatic Resources and Species Habitats	Habitat Description	Initial Mitigation Sites: Bouldin Island	Initial Mitigation Sites: I-5 Pond 6	Initial Mitigation Sites: I-5 Ponds 7 & 8	Mitigation Credits & Site Protection Instruments	Tidal Habitat Mitigation Framework
Vernal pool fairy shrimp, vernal pool tadpole shrimp	Vernal pool complex	–	–	–	X	–
Western yellow-billed cuckoo	Migration (riparian)	X	–	–	–	–

I- = Interstate.

3F.1.1 Plan Purpose

The purpose of this CMP is to describe the approaches used to provide compensatory aquatic resource and special-status species habitat mitigation for the project, including the associated habitat creation and enhancement actions that would be taken. This CMP does not address other, non-habitat compensatory mitigation needs, such as replacing the loss of agricultural lands. In addition to providing for the compensatory mitigation needs necessary under CEQA, the CMP may be used to support several environmental and regulatory compliance efforts for the project, including:

1. Fulfilling the joint requirements of the U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (EPA) under Code of Federal Regulations (CFR) Title 33, Parts 325 and 332 (*Compensatory Mitigation for Losses of Aquatic Resources*, or Mitigation Rule).
2. Fulfilling the requirements of the State Water Resources Control Board's (State Water Board) 2019 *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* (State Wetland Procedures)), particularly Appendix A, Subpart J (*Compensatory Mitigation for Losses of Aquatic Resources*).
3. Supporting applications for incidental take under Section 2081 of the California Endangered Species Act and consultations under Section 7 of the federal Endangered Species Act (ESA), particularly as those consultations relate to the compensatory mitigation needs associated with the loss of habitat for listed species as it relates to the potential for incidental take as defined under the ESA.
4. Supporting the process to develop an agreement with the California Department of Fish and Wildlife (CDFW) under Section 1602 of the California Fish and Game Code, if needed, particularly as it relates to reasonable measures necessary to protect the resource associated with impacts on fish and wildlife resources regulated under that section of code.

3F.1.2 Parties Responsible for Implementation

As the CMP is a component of the project, the primary party responsible for implementing it is DWR. Other parties that may be involved in oversight of the CMP as the landowner include, but are not limited to, the Metropolitan Water District of Southern California (Metropolitan) for the Bouldin Island mitigation sites.

3F.1.3 Document Overview and Organization

This CMP has been prepared to guide planning for the compensatory mitigation needs of the project. It consists of the following sections:

- **Section 3F.1, *Introduction***, provides an overview of the document purpose and parties responsible for implementation.
- **Section 3F.2, *Project Impacts***, summarizes the aquatic resources and listed species habitat potentially affected by the construction and operation of the project.
- **Section 3F.3, *Mitigation Approach*,** outlines the approach taken for providing compensatory mitigation for aquatic resources and special-status species.
- **Section 3F.4, *Mitigation Work Plan*,** describes the initial compensatory mitigation sites and other potential compensatory mitigation sites that are under consideration. This section also summarizes approaches for providing compensatory mitigation for tidal wetland and channel margin habitats, as well as the potential use of mitigation/conservation banks and site protection instruments.
- **Section 3F.5, *Assurances,*** describes DWR's financial commitments associated with construction, operation, and maintenance of the mitigation sites as well as a summary of the site protection instrument.
- **Section 3F.6,** *Maintenance and Management**,*** discusses short- and long-term management actions for the mitigation sites, and adaptive management.
- **Section 3F.7,** *Performance Standards and* ***Monitoring,*** discusses performance standards, metrics, monitoring, and reporting.
- **Section 3F.8, *References Cited*,** provides the full references for the literature and other resources cited in this document.

3F.2 Project Impacts

3F.2.1 Project Overview

The project consists of the construction, operation, and maintenance of new State Water Project (SWP) water diversion and conveyance facilities in the Delta in coordination with the existing SWP facilities. The new water conveyance facility would create a new conveyance mechanism that would divert water from the north Delta and convey it through a single tunnel to a new Southern Forebay on Byron Tract and from the forebay to existing SWP export facilities (Alternatives 1, 2b, 2c, 3, 4b, and 4c) and potentially to existing Central Valley Project (CVP) export facilities (Alternatives 2a and 4a). 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. These new facilities in the south Delta are collectively called the *Southern Complex*. Alternative 5 (the proposed project) would bring water directly to a new pumping plant along Byron Highway for conveyance to the Bethany Reservoir on an alignment similar to the eastern alignment but without the construction or use of the Southern Complex. Operating the new conveyance facilities in conjunction with SWP's existing south Delta export facilities at Clifton Court Forebay would create a *dual conveyance* system. Please see Chapter 3, *Description of the Proposed Project and Alternatives*, for more details on the project and alternatives.

3F.2.1.1 Project Location

The project is located in the Delta and adjacent regions, 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 (Figure 3F-2). The Delta is formed at the western edge of the Central Valley by the confluence of the Sacramento and San Joaquin Rivers and lies just east of where the rivers enter Suisun Bay. The watersheds of the Sacramento and San Joaquin Rivers are at the core of California's water system, which conveys water to millions of Californians throughout the San Francisco Bay Area (Bay Area), Central Valley, Central Coast, and Southern California.

The study area, defined as the area in which impacts may occur (Section 13.1.1 *Study Area*), primarily comprises the statutory Delta, as delineated under the Delta Protection Act (California Water Code [Wat. Code] § 12220) as well as a few areas east of this boundary, to capture project infrastructure and areas southwest of the legal Delta to include the area around Bethany Reservoir for Alternative 5 (Mapbooks 13-1, 13-2, and 13-3).

3F.2.1.2 Affected Watersheds

Figure 3F-2 displays the hydrologic unit code (HUC) 8 and HUC 10 watersheds that the project occurs within. This includes watersheds associated with the Sacramento and San Joaquin Rivers. As indicated in the figure, the proposed mitigation sites are located within the same watersheds as where impacts would occur under multiple project alternatives.

3F.2.1.2.1 Basin Plan Considerations

As stated in the Draft EIR, beneficial uses of surface waters are designated by California's nine Regional Water Quality Control Boards (RWQCBs) for waters in their jurisdictions within their respective water quality control plans (WQCPs). In addition, the State Water Board has designated beneficial uses for the statutory Delta in its WQCP for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary (Bay-Delta WQCP). The Delta also falls within the jurisdictions of the Central Valley and San Francisco Bay RWQCBs, which have designated uses for the Delta within their respective WQCPs. More information regarding Basin Plan considerations, including beneficial uses, can be found in Chapter 9, *Water Quality*.

3F.2.1.3 Mitigation Measures

The Draft EIR describes measures to avoid, minimize, or mitigate impacts on sensitive resources, including aquatic resources and special-status species habitat. This includes siting facilities under each alternative to avoid sensitive resources such as wetlands and suitable habitat to the greatest extent feasible. All the mitigation measures in Chapters 12 and 13 would apply during construction of mitigation sites, as summarized in Table ES-2.

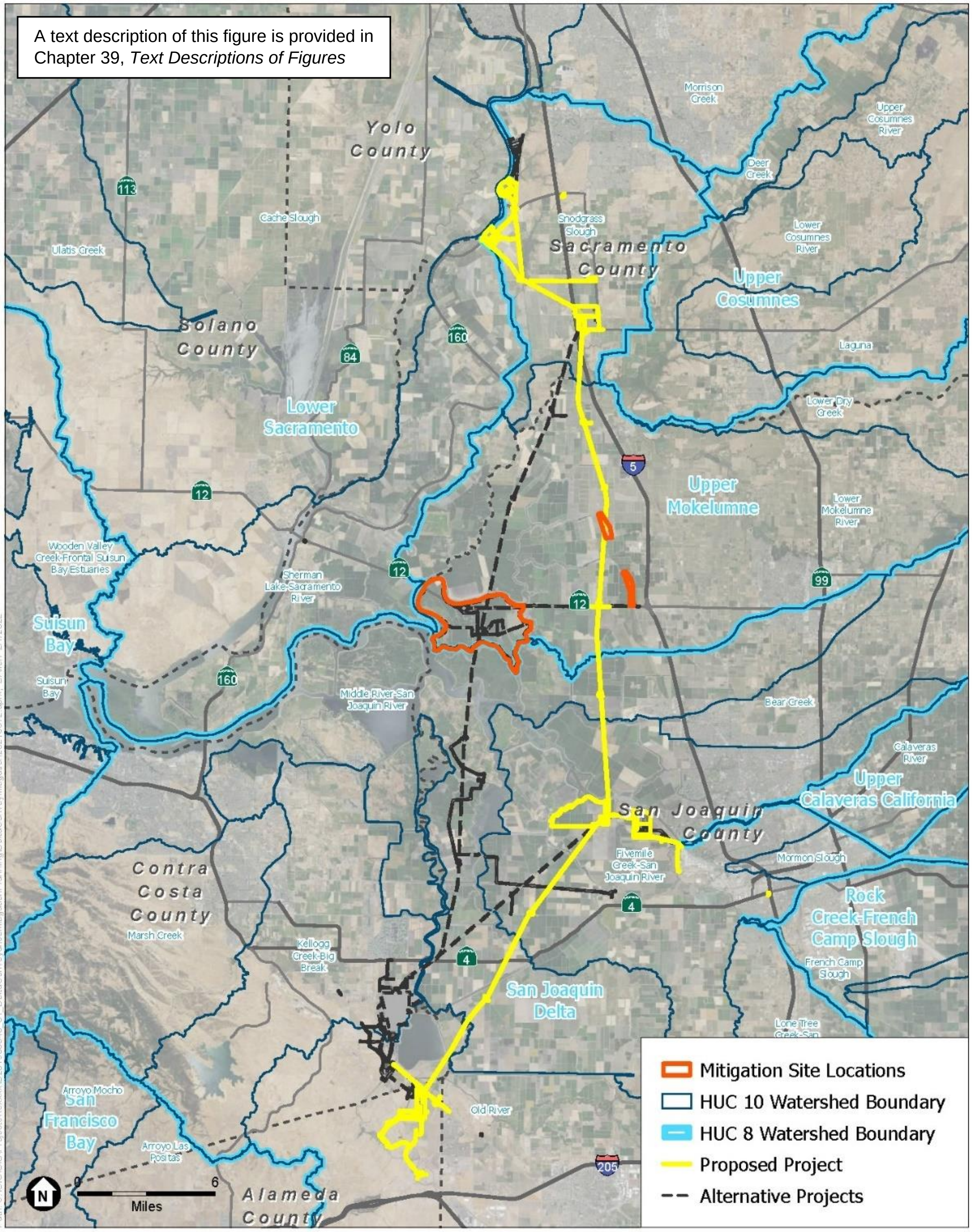


Figure 3F-2. Watershed Boundaries

3F.2.2 Impacts on Waters of the United States and State

The term *waters of the United States* is an encompassing term for areas that are subject to federal regulation under the Clean Water Act (CWA), including Section 404 (*Section 13.1.4, Wetlands and Other Waters of the United* States). For purposes of Section 404, waters of the United States are categorized as wetlands (i.e., wetlands that meet the definition of waters of the United States) or other waters. Wetlands are areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Other waters of the United States are waterbodies but do not typically display all three of the wetland indicators. Linear features and open water habitats that may qualify as other waters of the United States were categorized based on tidal influence as nontidal or tidal. Nontidal waters include natural channels, depressions, and agricultural ditches. Tidal classifications include tidal channel, including major waterways, which was used for conveyance features associated with the SWP and CVP. As described in Section 13.1.4, an aquatic resources delineation was conducted via aerial imagery interpretation for the study area.

In accordance with the Porter-Cologne Water Quality Control Act and the associated State Wetland Procedures *(State Water Resources Control Board 2019),* the State Water Board and the RWQCBs also regulate discharges of waste, which includes discharges of dredged and fill material, that may affect the quality of waters of the State*.* Waters of the State include features that are defined as wetlands, as well as other waters that meet the definition of waters, including the oceans, lakes, and rivers. The wetland definition used by the state encompasses the full range of wetland types commonly recognized in California, including some features not considered in the federal definition of wetlands.

To determine effects on these aquatic resources that may result from project construction, a geographic information system (GIS) layer of potentially jurisdictional wetlands and other waters was intersected with the layer of project footprint surface features for each proposed alternative. The resulting polygons identify the areas of potential impacts on potentially jurisdictional waters. Acreages of each type of affected wetland or other water were calculated for each alternative and are presented in the wetlands and waters impact discussions in Chapter 13 of the Draft EIR. Based on this assessment, the following aquatic resources would be potentially affected by the project, and are therefore addressed within this CMP:

- Agricultural ditch
- Alkaline wetland
- Conveyance channel
- Depression (lake/pond)
- Forested and scrub-shrub wetland
- Emergent wetland
- Natural channel
- Seasonal wetland
- Tidal channel
- Vernal pool

Because the delineation includes all aquatic resources in the study area, DWR intended that the delineation also represents what would be considered waters of the State. Therefore, the analyses and conclusions for effects on waters of the United States in Chapter 13 also apply to waters of the State.

3F.2.3 Impacts on Special-Status Species

For the purposes of the Draft EIR (Section *13.1.3, Special-Status Species*), special-status species are species that are legally protected or otherwise considered sensitive by federal, state, or local resource agencies. Detailed information on the plant and wildlife species habitat requirements, distribution, and occurrences within the study area is presented in the species accounts in Appendix 13B, *Species Accounts*. Species accounts also contain the habitat suitability models, which are GIS-based models used for establishing the amount of potential habitat for a species within the study area and for estimating effects on the species. Permanent and temporary (generally limited to one construction season) impacts on terrestrial species from construction were quantified in GIS by overlaying the project alternative facility footprints on conservatively modeled habitat for the species and species occurrences (Section *13.3.1.2, Evaluation of Construction Activities*). It is anticipated that preconstruction field surveys will verify habitat suitability for special-status species. Therefore, these preliminary impact estimates may be revised once surveys are completed. Because the modeling is conservative, field surveys likely will result in reduced acreages of impacts. Agency coordination between permitting and final implementation could also lead to changes to the restoration design, location, and construction timing.

The CMP is designed to define compensatory habitat mitigation for impacts on special-status species where compensatory mitigation is proposed as discussed in the draft EIR (*Chapters 12 and 13*). This includes the species and habitats presented in Table 3F-2.

Table 3F-2. Special-Status Fish and Wildlife Species and Habitats

Species	Life Stage/ Habitat Function	Habitats
Burrowing owl	Nesting and foraging	Grassland, vernal pool complex, agricultural (pasture, alfalfa, grain, annual crops)
California black rail	Nesting and foraging	Tidal and nontidal freshwater emergent wetland, tidal and nontidal brackish emergent wetland
California red-legged frog	Aquatic	Nontidal perennial aquatic (depression/pond)
California tiger salamander	Aquatic and upland	Vernal pool complex
Fisheries	Migration/rearing	Tidal perennial aquatic
Fisheries	Migration/rearing	Channel margin/riparian (linear ft)
Giant garter snake	Aquatic	Nontidal freshwater perennial emergent wetland (freshwater marsh)
Giant garter snake	Upland	Grassland
Greater sandhill crane	Roosting	Freshwater perennial emergent wetland, agricultural (flooded post-harvest corn or rice)
Greater sandhill crane	Foraging	Freshwater perennial emergent wetland, grassland, agricultural (corn, rice, wheat, pasture)

Species	Life Stage/ Habitat Function	Habitats
Least Bell's vireo	Recolonization	Valley/foothill riparian
Swainson's hawk	Nesting	Valley/foothill riparian
Swainson's hawk	Foraging	Grassland and agricultural (alfalfa, dry pasture, grain, hay)
Tricolored blackbird	Nesting	Nontidal freshwater perennial emergent wetland (freshwater marsh)
Tricolored blackbird	Foraging	Grassland and agricultural (grain, pasture, alfalfa)
Valley elderberry longhorn beetle	All	Valley/foothill riparian
Vernal pool fairy shrimp, vernal pool tadpole shrimp	All	Vernal pool complex
Western yellow-billed cuckoo	Migration	Valley/foothill riparian (forested)

3F.2.4 Mitigation Design Parameters

Design commitments and guidelines for compensatory mitigation are provided in Attachment 3F.1. These design parameters address critical life functions for certain species. These provisions also describe a framework to ensure that any habitat conversions associated with site development are accounted for so adverse effects related to these conversions are avoided or minimized.

In addition to these parameters, DWR will request input from California Native American Tribes that are traditionally and culturally affiliated with the project area and chose to consult with DWR about the project on siting, design, construction, management and stewardship of compensatory mitigation sites. The "good neighbor" policies in the *Agriculture and Land Stewardship Framework and Strategies* (California Department of Water Resources 2018:8, 31–39) would also be implemented.

3F.3 Mitigation Approach

This CMP outlines three primary approaches in providing compensatory mitigation to mitigate 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 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 (*Antigone 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 into 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 Section 3F.4, *Mitigation Work Plan*.

3F.3.1 Applicable Policies and Guidance Documents

The selection of potential mitigation sites described in this document was informed by the mitigation policies and guidance documents from several resource agencies, including the following:

- USACE and EPA's joint requirements under 33 CFR Parts 325 and 332 (*Compensatory Mitigation for Losses of Aquatic Resources*, or Mitigation Rule)
- The State Water Board's State Wetland Procedures, particularly Appendix A, Subpart J (Compensatory Mitigation for Losses of Aquatic Resources)
- U.S. Fish and Wildlife Service (USFWS) Mitigation Policy (*Federal Register*, Vol. 46, No. 15, January 23, 1981, as corrected in the *Federal Register* of February 4, 1981)

In addition to these general guidance documents and policies, several additional resources such as the Delta Plan were reviewed to guide site selection and design criteria for special-status species, as noted later in this document.

3F.3.2 Approach to Aquatic Resources Mitigation

3F.3.2.1 Hierarchal Approach

For aquatic resources, including mitigation for impacts on waters of the United States and State, the approach to compensatory mitigation considered the requirements of 33 CFR Section 332.3(b), including the hierarchal order when considering compensatory mitigation options, as follows: (1) Mitigation bank credits; (2) In-lieu fee program credits; (3) Permittee-responsible mitigation under a watershed approach; (4) Permittee-responsible mitigation through on-site and in-kind mitigation; and (5) Permittee-responsible mitigation through off-site and/or out-of-kind mitigation. When considering these options, credit or site availability was often a controlling factor. For example, where the compensatory mitigation need for an aquatic resource type (e.g., vernal pools) was expected to be relatively small and mitigation banks with agency-approved service areas (typically based on watersheds and eco-regions for aquatic resources) covering the impact footprint that are known to have available credits for the aquatic resource type to be affected, option 1 was selected. However, in many circumstances, the compensatory mitigation needs of the project are such that mitigation banks or in-lieu fee programs are not an option due to lack of credit availability based on the number of credits that are potentially needed. In these cases, and as noted in 33 CFR Section 332.3(b)(4), compensatory mitigation may then be provided through option 3, permittee-responsible mitigation under a watershed approach. Therefore, compensatory mitigation for aquatic resources would be provided in accordance with the procedures set forth in 33 CFR Section 332.3(b), and would be provided for through either mitigation bank credits or permittee-responsible mitigation under a watershed approach.

3F.3.2.2 Watershed Approach

A watershed approach was used to avoid a net loss in the overall abundance, diversity, and condition of aquatic resources within the watershed profile. Because compensatory mitigation for aquatic resources would be typically located within the same watersheds as where project impacts would occur, no net loss is anticipated on a watershed basis. Per the State Wetland Procedures, "*[i]f the compensatory mitigation and project impacts are located in multiple watersheds, no net loss will be determined considering all affected watersheds collectively.*" Figure 3F-1 shows the location of proposed mitigation sites for several aquatic resources. Figure 3F-2 shows the location of these sites in relation to local watersheds and project alternatives.

3F.3.2.3 Emergent Wetland, Seasonal Wetlands, Valley/Foothill Riparian, and Other Non-Tidal Waters

Compensatory mitigation for these aquatic resources would be located on Bouldin Island at Mitigation Site B1 (detailed in Section 3F.4.1.3, *Bouldin Island Mitigation Sites*) (Figure 3F-1). This site includes areas that already exhibit wetland characteristics due to a high groundwater table, seepage, site elevation, and drainage patterns, as explained further in Section 3F.4.1.3. In addition, peat soils are prevalent at the site, providing a suitable combination of surface and subsurface hydrology as well as hydric soils. Lastly, the majority of project impacts on these aquatic resource types occur in similar ecological conditions to those found at Bouldin Island; namely, remnant wetlands and human-made channels found adjacent to existing agricultural fields.

The design approach to Mitigation Site B1 was to develop an analog of a remnant oxbow of the Mokelumne River near the junction of the San Joaquin River, including open water, valley riparian habitat (including scrub/shrub and forested), freshwater emergent wetland, and seasonal wetlands. This mix of wetland habitats once dominated the Delta (Whipple et al. 2012:xx–xxiii), and the re-creation of these aquatic resources at the mitigation site would result in compensatory mitigation that has a higher number of functions and services than the affected resources.

3F.3.2.4 Vernal Pools and Alkaline Wetlands

Compensatory mitigation for impacts on vernal pools and alkali seasonal wetlands would be provided through purchasing wetland creation credits at an approved mitigation bank. Several existing and proposed mitigation banks have available or soon-to-be-available credits with service areas that encompass the project. In the instance that bank credits are not available, a non-bank site approved by the relevant regulatory agencies supporting the necessary habitat would be used as mitigation.

3F.3.2.5 Tidal Wetlands and Waters

Compensatory mitigation for tidal emergent wetlands and tidal channel would be provided by the proposed Tidal Habitat Mitigation Framework (see Section 3F.4.3, *Tidal Habitat Mitigation Framework*). A secondary option that may be used is to purchase wetland creation credits at an approved mitigation bank. Several existing and proposed mitigation banks have available or soon-to-be-available credits with service areas that encompass the project's impacts to this habitat type.

3F.3.3 Approach to Special-Status Species Mitigation

The general approach to identifying suitable mitigation sites and developing conceptual restoration plans for special-status species included reviewing life history information for affected species, with a specific emphasis on federally listed and state-listed species. Design parameters were also considered in the siting and design of compensatory mitigation (Attachment 3F.1, *Compensatory Mitigation Design Parameters*). In addition, recovery plans (where available), mitigation plans, and conservation guidance documents were reviewed, including:

- *Recovery Plan for the Giant Garter Snake (Thamnophis gigas)* (U.S. Fish and Wildlife Service 2017a: II-1–II-11)
- *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus)* (U.S. Fish and Wildlife Service 2017b)
- *Recovery Plan for the California Red-legged Frog (Rana aurora draytonii)* (U.S. Fish and Wildlife Service 2002:12–16)
- *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (U.S. Fish and Wildlife Service 2005)
- *Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander (Ambystoma californiense)* (U.S. Fish and Wildlife Service 2017c:II-3–II-6)
- *Staff Report regarding Mitigation for Impacts to Swainson's Hawks (Buteo swainsoni) in the Central Valley of California* (California Department of Fish and Game 1994)
- *Staff Report on Burrowing Owl Mitigation (California Department of Fish and Game 2012)*
- *Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the DPS of California Central Valley Steelhead* (National Marine Fisheries Service 2014:128–142)
- *Final Recovery Plan for the Southern Distinct Population Segment of North American Green Sturgeon (Acipenser medirostris)* (National Marine Fisheries Service 2018:12–13, 18)
- *Sacramento–San Joaquin Delta Native Fishes Recovery Plan* (U.S. Fish and Wildlife Service 1995:27–29, 48–49)

The mitigation needs for special-status species may be addressed through the creation or enhancement of natural communities so they may provide suitable conditions for various life functions of the species. Often these communities can provide benefits for more than one species. For example, freshwater marsh habitat hydrologically connected or adjacent to open water can provide suitable aquatic habitat for giant garter snake (*Thamnophis gigas*) while also providing suitable breeding (nesting) habitat for tricolored blackbird. This correlation makes it possible to provide compensatory habitat for more than one species at a particular mitigation site.

The final designs for targeted habitats will be informed by species-specific parameters. This includes design parameters that target key life cycle needs for the targeted species, such as water (including water quality), cover, and foraging habitat. It also includes parameters that enhance the long-term resiliency of the created habitat, such as buffer distances, consideration of predators, and hydrological factors. Lastly, other design parameters consider landscape and movement/migration dynamics to ensure species can both access the created habitat as well as disperse to adjacent suitable habitat. Measures that specifically address design goals for species are highlighted in Attachment 3F.1.

3F.3.3.1 Freshwater Marsh and Riparian Terrestrial Species

The Interstate (I-) 5 pond mitigation sites were selected as the primary location for developing compensatory mitigation for species dependent on freshwater marsh and associated uplands, including giant garter snake. The sites are located within the White Slough Management Unit of the Delta Basin Recovery Unit for giant garter snake (U.S. Fish and Wildlife Service 2017a:II-10–II-11), and would extend connectivity between occupied sites at Stone Lakes National Wildlife Refuge and the CDFW Woodbridge Ecological Reserve further south with the creation of protected suitable habitat (Pond 6 is approximately 0.7 mile southeast and Ponds 7 and 8 are approximately 2 miles south of Woodbridge). The location also has suitable elevations, water supply, and access. These mitigation sites would also provide suitable breeding and foraging habitat for tricolored blackbird.

Significant impacts on riparian-dependent species, including valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), Swainson's hawk nesting, least Bell's vireo (*Vireo bellii pusillus*), and western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), would be mitigated by the creation of habitat at Bouldin Island Mitigation Sites B1 and B2. Mitigation Site B1 would also provide additional suitable freshwater marsh habitat for tricolored blackbird.

3F.3.3.2 Grassland Species and Agricultural Lands

Bouldin Island Mitigation Site B3 would provide suitable mitigation for grassland species, including burrowing owl (*Athene cunicularia*). It would also provide suitable foraging habitat for bird species such as Swainson's hawk and tricolored blackbird.

In addition, as described in more detail below, site protection instruments may also be used to protect and enhance agricultural and other lands that provide suitable habitat for species such as greater sandhill crane, burrowing owl, Swainson's hawk, and tricolored blackbird.

3F.3.3.3 Vernal Pool Species, California Tiger Salamander, and California Red-Legged Frog

For species associated with the vernal pool complexes and alkali wetland habitats, as well as perennial pond features and grasslands in the south Delta, compensatory mitigation would be provided in the form of species conservation credits at a USFWS- and CDFW-approved mitigation/conservation bank. This includes mitigation credits for vernal pool invertebrates, California tiger salamander, and California red-legged frog. Several existing and proposed mitigation banks have available or soon-to-be-available credits with service areas that encompass the project. Credits for California tiger salamander will be prioritized in the Concord/Livermore Recovery Unit, is possible.

3F.3.3.4 Fisheries and California Black Rail

Compensatory mitigation for fisheries, including salmonids, delta smelt (*Hypomesus transpacificus*), longfin smelt (*Spirinchus thaleichthys*), and green sturgeon (*Acipenser medirostris*), as well as California black rail (*Laterallus jamaicensis coturniculus*), would be provided through the Tidal Habitat Mitigation Framework (*Section 3F.4.3*), which includes the development of tidal wetland mitigation sites and channel margin habitat. These sites would be constructed ahead of project impacts on these habitat types.

3F.4 Mitigation Work Plan

3F.4.1 Initial Mitigation Sites

3F.4.1.1 Purpose

Initial compensatory mitigation actions for the project are focused on lands owned by DWR (I-5 Ponds 6, 7, and 8) or partners (Bouldin Island). This approach allows compensatory mitigation for many resources to be quickly advanced following final designs and receipt of permits and approvals, thereby in many cases allowing establishment of created and enhanced habitats ahead of impacts.

Many of the anticipated compensatory mitigation needs of the project would be fulfilled with developing these initial mitigation sites. This includes the anticipated mitigation needs for freshwater emergent wetland, riparian, seasonal wetland, and many other aquatic resources. It also includes the compensatory habitat needs of many special-status species, such as giant garter snake, tricolored blackbird, Swainson's hawk, valley elderberry longhorn beetle, and least Bell's vireo.

The net gain in habitat, once changes from existing land cover are accounted for, are summarized for wetlands and other waters in Table 3F-3. As noted previously, mitigation sites on Bouldin Island (specifically Sites B1 and B2) would be designed to provide compensatory mitigation for aquatic resources impacts. The mitigation acres provided below (Table 3F-3) include habitat creation for species (Table 3F-4), hence the additional acreage shown for some habitat types that far exceed the anticipated compensatory mitigation needs for federal and state wetlands (e.g., freshwater emergent wetland). Compensatory mitigation for special-status species, which would be constructed at all the proposed mitigation sites, is summarized in Table 3F-4. Site protection instruments, including conservation easements, may also be implemented at or near the sites.

The detailed restoration design work and management planning, which will include fully detailing performance standards, monitoring methods, and adaptive management actions, will occur between the project permitting phase and project completion. Other mitigation actions, including bank credit purchases and habitat protection, will also occur between permitting and project construction completion. To inform the mitigation planning process between permit issuance and mitigation land construction or preservation, DWR will prepare Draft and Final Habitat Mitigation Plans for affected species and wetlands. Compensatory mitigation would be secured in phases in accordance with the progress of construction.

Table 3F-3. Summary of Compensatory Mitigation for Wetlands and Other Waters Created at Bouldin Island Mitigation Sites B1 and B2

Aquatic Resources	Created (Loss) (Acres) [a]
Wetlands	
Alkaline seasonal wetland	*0*
Nontidal freshwater emergent wetland	*49.88*
Valley/foothill riparian (forested and scrub-shrub) [b]	*193.72*
Seasonal wetland	*92.21*
Tidal freshwater emergent wetland	*0*
Vernal pool	*0*
Total wetlands	*321.28*
Other Waters	
Agricultural ditch	(13.32)
Conveyance channel	0
Depression (lake/pond)	10.29
Natural channel	0
Tidal channel	0
Total other waters	(3.03)
Total all aquatic resources (net gain)	332.78

[a] Land cover types with a negative value reflect conversion to another type of wetland and other waters (not to uplands). Acreage subject to rounding.

[b] Valley/foothill riparian, as a natural community, could include a subset of jurisdictional waters, namely forested and scrub-shrub wetland.

Table 3F-4. Summary of Compensatory Mitigation for Special-Status Species Habitat Created or Enhanced at Initial Mitigation Sites (acres)

		Habitat Created (Loss) (Acres) [a]			
Species	Life Requirement (Habitats)	Bouldin Island	I-5 Pond 6	I-5 Ponds 7 & 8	Total All Sites
Burrowing owl [b]	Nesting, foraging (grassland, vernal pool complex, agricultural)	(299.95)	112.98	67.68	(119.29)
California black rail	Breeding (tidal emergent wetland)	N/A	N/A	N/A	0
California red-legged frog	Aquatic (depression)	N/A	N/A	N/A	0
California red-legged frog	Upland (grassland)	N/A	N/A	N/A	0
California tiger salamander	Aquatic and upland (vernal pool complex)	N/A	N/A	N/A	0
Fisheries	Tidal emergent wetland	0	0	0	0
Fisheries	Channel margin/riparian (linear feet)	Up to 4,900 linear feet [c]	0	0	0
Giant garter snake [d]	Aquatic (freshwater emergent wetland)	N/A	47.78	28.58	76.36
Giant garter snake [d]	Upland (grassland)	N/A	112.98	67.68	180.66
Greater sandhill crane [c]	Roosting (freshwater emergent wetland)	49.88	N/A	N/A	72.39
Greater sandhill crane [c]	Foraging (freshwater emergent wetland, agricultural)	(621.55)	N/A	N/A	(621.55)
Least Bell's vireo	Recolonization (riparian)	193.72	(30.98)	(5.83)	156.91
Swainson's hawk [b]	Foraging (grassland, agricultural)	(383.95)	112.98	67.68	(119.29)
Swainson's hawk [b]	Nesting (riparian)	193.72	(30.98)	(5.83)	156.91
Tricolored blackbird	Breeding (freshwater emergent wetland)	49.88	37.56	58.60	146.04
Valley elderberry longhorn beetle	Breeding (riparian)	193.72	(30.98)	(5.83)	156.91
Vernal pool fairy shrimp/tadpole shrimp	Vernal pool complex	N/A	N/A	N/A	0
Western yellow-billed cuckoo	Migration (riparian)	193.72	-30.98	-5.83	156.91

N/A = Suitable habitat not created at site.

[a] Land cover types with a negative value reflect conversion to another type of wetland and other waters (not to uplands). Acreage subject to rounding.

[b] Conversion of agriculture to other habitat types (wetlands, grassland) would result in a net decrease of foraging habitat for burrowing owl, greater sandhill crane, and Swainson's hawk. The actual decrease would be somewhat less than estimated because not all agricultural land is in crops used by these wildlife.

[c] Rearing and refuge needs for outmigrating juvenile salmonids could also be met by tidal wetland and floodplain habitats in addition to channel margin habitat. While the creation of channel margin habitat at Bouldin is not currently proposed, it is listed here as a potential future phase.

[d] Bouldin Island is not being designed specifically for the giant garter snake, although Bouldin Island could potentially be used by the species.

3F.4.1.2 Natural Communities Targeted at Initial Mitigation Sites

The initial mitigation sites are designed to compensate for several types of aquatic and upland habitats that may be affected by the project. This section provides a general description of the major habitat types that were targeted for creation and enhancement at the initial sites. The descriptions below are based on the Draft EIR (Section 13.1.2.2, *Natural Community Descriptions*, Section 13.1.4, *Wetlands and Other Waters of the United States*). Types used in the wetland delineation are shown in parentheses, where applicable.

3F.4.1.2.1 Aquatic Resources

Valley/Foothill Riparian (Forested and Scrub-Shrub)

Riparian habitats are plant communities that support woody vegetation. Scrub-shrub wetlands within the study area are dominated by woody vegetation less than 20 feet tall, often forming dense thickets. Shrubs include sandbar willow (*Salix exigua*), Himalayan blackberry (*Rubus armeniacus*), red twig dogwood (*Cornus sericea* [syn. *C. alba*]) buttonwillow (*Cephalanthus occidentalis*), and California wild rose (*Rosa californica*). Fremont's cottonwood (*Populus fremontii* [syn. *P. deltoides*]) seedlings or saplings may also be present. Herbaceous species are generally lacking or are a minor component of the vegetation assemblage, as the canopy cover in scrub-shrub wetlands is high and low-growing herbaceous species do not receive sufficient light for survival.

Forested wetlands are defined by woody vegetation that is 20 feet tall or taller with a tree canopy cover equal to or greater than 25%. Riparian trees common in the study area include Goodding's black willow (*Salix gooddingii*), red willow (*S. laevigata*), box elder (*Acer negundo*), Oregon ash (*Fraxinus latifolia*), Fremont's cottonwood, white alder (*Alnus rhombifolia*), black walnut (*Juglans hindsii*), and valley oak (*Quercus lobata*). Forested wetlands generally have a shrub component, typically in canopy openings and along the forested edge. The presence of an herbaceous layer is variable.

The valley/foothill riparian natural community usually occurs as long, linear patches separating other terrestrial biological communities and agricultural or urban land, or in low-lying, flood-prone patches near river bends, canals, or breached levees. Patches of riparian vegetation are also found on the interior of leveed Delta islands, along drainage channels and pond margins, and in abandoned low-lying fields.

Riparian habitat provides important food, nesting habitat, cover, and movement corridors. Over 135 species of California birds such as the willow flycatcher (*Empidonax traillii*), western yellow-billed cuckoo, and red-shouldered hawk (*Buteo lineatus*) completely depend upon riparian habitats or may use them preferentially at a particular stage of their life history. Riparian habitat also provides riverbank protection, erosion control, and improved water quality.

Nontidal Freshwater Emergent Wetland

Nontidal freshwater emergent wetlands, including freshwater marshes, are perennial wetlands frequently or continually inundated with water, and dominated by herbaceous emergent plants such as California tule (*Schoenoplectus californicus*), hard-stem tule (*S. acutus*), narrow-leaf cattail (*Typha angustifolia*), broad-leaf cattail (*T. latifolia*), and floating water primrose (*Ludwigia peploides*). Shallow emergent wetlands (water less than 3 feet deep) are dominated by thick, tall, highly productive stands of tules and cattails. The higher elevation edges of freshwater marsh gradients may be characterized by abrupt transitions to terrestrial vegetation, or they may transition into vegetation of alkali seasonal wetlands, riparian woodland, or riparian scrub. These perennial wetlands are among the most productive habitats for wildlife. Covered wildlife species that depend on nontidal freshwater marsh include giant garter snake, tricolored blackbird, and western pond turtle (*Emys marmorata*).

Proposed freshwater marshes would maximize localized topography and hydrology to limit the amount of grading. Freshwater marsh habitat would be interwoven with seasonal wetlands, riparian, and grassland habitats as conditions allow.

Seasonal Wetland

Seasonal wetlands are areas that may only be saturated or hold water from late fall to late spring. In the Central Valley and Delta, seasonal inundation events are typically associated with winter storms or Sierra snowmelt. The hydrology of these features is driven by winter storm events or when increased flows raise the water table to an elevation sufficient to wet the area. By midsummer, most seasonal wetlands are dry or moist. Numerous seasonal wetlands were mapped in active agricultural fields in the Delta. Although groundwater levels are controlled on many Delta islands, including Bouldin, using a system of pumps and drainage ditches to maintain water levels on the subsided islands, a high water table persists in some areas.

At the landscape level, most seasonal wetlands are less than an acre (or even a half-acre) in size. Vegetation tends to be dominated by hydrophytic grasses, sedges (*Carex* spp.), or rushes (*Juncus* spp.). Seasonal wetlands provide an important food source for migratory birds, waterfowl, breeding and feeding areas for amphibians and reptiles, and critical winter food supplies for birds and mammals that may be present.

Depression (Lake/Pond)

Depressions are nontidal open-water features that are permanently or seasonally inundated, with little to no rooted vegetation on an unconsolidated or mud bottom. At the mitigation sites, these features may be artificially created as a result of borrow material excavations, agricultural activities, or for stormwater detention, or may result from a high water table. Depressions are generally less than 20 acres in size and have a water depth of less than 6 feet. These waterbodies are often created by excavation and are diked or otherwise artificially impounded.

Depressions may be colonized by floating plant species such as common duckweed (*Lemna minor*), mosquito fern (*Azolla* spp.), or water hyacinth (*Eichhornia crassipes*), but generally lack rooted vegetation except on depression margins. Waterfowl in particular use this habitat type for foraging and rest.

3F.4.1.2.2 Upland Communities

Grasslands

The grassland natural community is dominated by introduced or native annual and perennial grasses and herbaceous forbs. Native perennial grasses are generally found only in areas that have not been converted to agricultural uses. Native grasslands support over 300 species of native grasses and about 40% of California’s total native plant species. Grasslands provide important breeding and foraging habitat for many species of wildlife, including covered wildlife species such as tricolored blackbird, Swainson's hawk, burrowing owl, and giant garter snake.

3F.4.1.3 Bouldin Island Mitigation Sites

3F.4.1.3.1 Site Objectives

The proposed compensatory mitigation actions to be undertaken on Bouldin Island would retain agriculture land uses in most locations, preserve existing habitat, and create or enhance new habitat in areas where it could be sustained with little maintenance. The Bouldin Island mitigation sites would support multiple habitat types, including freshwater marsh, seasonal wetland, riparian, ponds (depressions), and grasslands.

Three separate mitigation sites are proposed on Bouldin Island: B1, B2, and B3. Sites B1 and B2 would support the creation and enhancement of extensive wetland habitat and other aquatic resources. They would be designed and managed specifically to fulfill federal and state wetland mitigation requirements, while also providing suitable habitat for several special-status species. Mitigation Site B3 would support the creation of native perennial grassland habitat where reusable tunnel material (RTM) would be stored under the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c).

3F.4.1.3.2 Site Selection Criteria and Baseline Conditions

Site Selection Criteria

Bouldin Island was selected because it is located within the same watersheds where impacts would occur and because existing soils and hydrology provide ideal conditions for the establishment of wetland habitats. It is owned by Metropolitan and therefore construction activities to enhance and create aquatic resources could begin shortly after project approval, assuming Metropolitan supports the project. The existing land cover, hydrology (high water table), and soils (hydric soils) would facilitate creation and enhancement of wetland habitats. Habitat creation and enhancement would result in the establishment of sustainable aquatic resources, while also benefitting species such as tricolored blackbird, western yellow-billed cuckoo, least Bell's vireo, valley elderberry longhorn beetle, and Swainson's hawk. It was also noted that areas that have become too wet to farm over the years have reverted in many cases to wetland habitat (primarily riparian and seasonal wetland), as observed in several areas within Mitigation Sites B1 and B2 (see Figures 3F-3 and 3F-4).

Property Location and Description

Bouldin Island is an approximately 5,900-acre island that is bounded to the north by the South Mokelumne River, to the east by Little Potato Slough, to the south by Potato Slough, and to the west by the Mokelumne and San Joaquin Rivers (Figure 3F-5). State Route (SR) 12 crosses the northern part of Bouldin Island. A swing bridge over the Mokelumne River on SR 12 connects the northwestern part of the island to Andrus Island. Near the northeastern tip of Bouldin Island, a high-level bridge on SR 12 spans Little Potato Slough connecting the island to the small community of Terminous. Currently the island consists of roughly 98% farmland with the remaining 2% being wetlands, riparian, or open water habitat. Site elevations on Bouldin Island range from -24 feet North American Vertical Datum of 1988 (NAVD 88) to 19 feet NAVD 88, with an average elevation of -13 feet NAVD 88.

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

Figure 3F-3. Emergent and Forested Wetland Habitat on Bouldin Island

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

Figure 3F-4. Emergent, Scrub-Shrub, and Seasonal Wetland Habitat on Bouldin Island

There are three mitigation sites being proposed for Bouldin Island: B1, B2, and B3 (Figure 3F-5). Mitigation Site B1 is near the northwest corner of the island, just south of SR 12. The site is currently dominated by agricultural fields (primarily row crops) as well as seasonal wetlands within the farmed fields. Ditches and maintenance roads are also present. It is bounded by the perimeter levee to the west, SR 12 to the north, and irrigation ditches to the south and east. Mitigation Site B2 and Mitigation Site B3 are near the center of the island. Mitigation Site B2 contains a mixture of agricultural fields, patches of valley/foothill riparian habitat, and open water (remnants of a borrow pit). Mitigation Site B3 includes agricultural fields and roads.

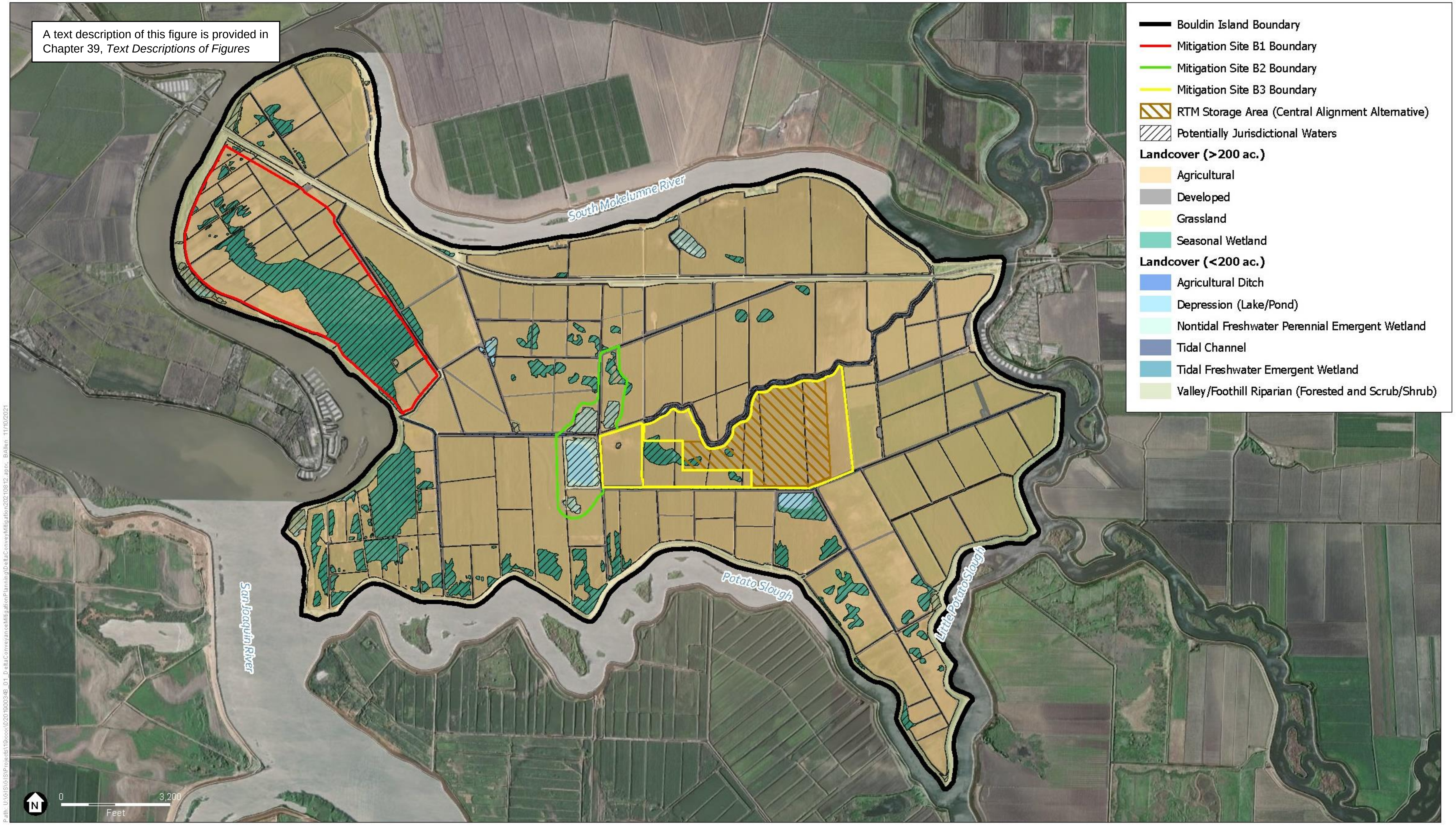


Figure 3F-5. Bouldin Island Existing Conditions with Central Alignment

Soils

Soils on the sites primarily consist of muck, including Rindge muck, Valdez silt loam, and Ryde clay loam (Natural Resources Conservation Service 2021:11). The soils on Bouldin Island consist of organic and highly organic mineral soils (Attachment 3F.2, *GHG Emissions and Removals Associated with Proposed Compensatory Mitigation for the Delta Conveyance Project*). All of the soils are hydric.

Existing Land Cover

The proposed mitigation sites include agricultural fields, roads, irrigation ditches and canals, borrow pits, and several wetland features. Existing aquatic features mapped for the project consist of farmed seasonal wetlands, forested and scrub-shrub riparian, perennial depressions (ponds), and ditches. Table 3F-5 summarizes the approximate acreages of existing land cover types at Bouldin Island, which are also shown in Figure 3F-5.

Table 3F-5. Bouldin Island Baseline Land Cover (acres)

Land Cover	Mitigation Site B1	Mitigation Site B2	Mitigation Site B3	Remainder on Bouldin	Total for Bouldin[a]
Agricultural ditch	8.60	3.51	1.93	95.02	109.06
Agriculture	337.53	42.77	291.13	3,697.28	4,368.70
Depression (lake/pond)	0	<0.01	0	32.55	32.56
Developed	8.76	12.21	11.86	337.96	370.79
Nontidal freshwater emergent wetland	0	22.49	0.03	25.85	48.37
Grassland	0	7.13	0	446.45	453.58
Seasonal wetland	196.71	3.52	4.37	293.54	498.14
Tidal channel	0	0	0	18.89	18.89
Tidal freshwater emergent wetland	0	0	0	2.54	2.54
Valley/foothill riparian[c]	0.61	2.67	0.46	93.60	97.34
Total	552.21	94.30	309.79	5,043.6746	5,999.97

[a] Acreages to the nearest 0.01, may be subject to rounding.
[b] Baseline developed land cover includes project infrastructure that would occur under the Central Alignment (e.g., tunnel shaft, access road improvements, RTM storage), as well as existing roadways and structures.
[c] Valley/foothill riparian vegetation community includes potentially jurisdictional wetlands (forested and scrub-shrub) and other riparian vegetation.

Potential Waters of the United States and State

A delineation of potentially jurisdictional wetlands and other waters mapped from aerial imagery for Bouldin Island (California Department of Water Resources and GEI Consultants 2020; California Department of Water Resources 2020, 2021) is summarized in Table 3F-6.

Table 3F-6. Bouldin Island Baseline Potentially Jurisdictional Wetlands and Other Waters (acres)

Aquatic Resource	Mitigation Site[a] B1	B2	B3	Remainder on Bouldin	Total for Bouldin
Wetlands					
Nontidal freshwater emergent wetland	0	22.49	0.03	25.85	48.37
Forested and scrub-shrub wetland	0.61	2.48	0.42	24.34	27.85
Seasonal wetland	196.71	3.52	4.37	293.54	498.14
Tidal freshwater emergent wetland	0	0	0	2.54	2.54
Other Waters					
Agricultural ditch	8.60	3.51	1.93	95.02	109.06
Depression (lake/pond)	0	<0.01	0	32.55	32.56
Tidal channel	0	0	0	18.89	18.809
Total	205.92	32.19	6.79	478.66	723.34

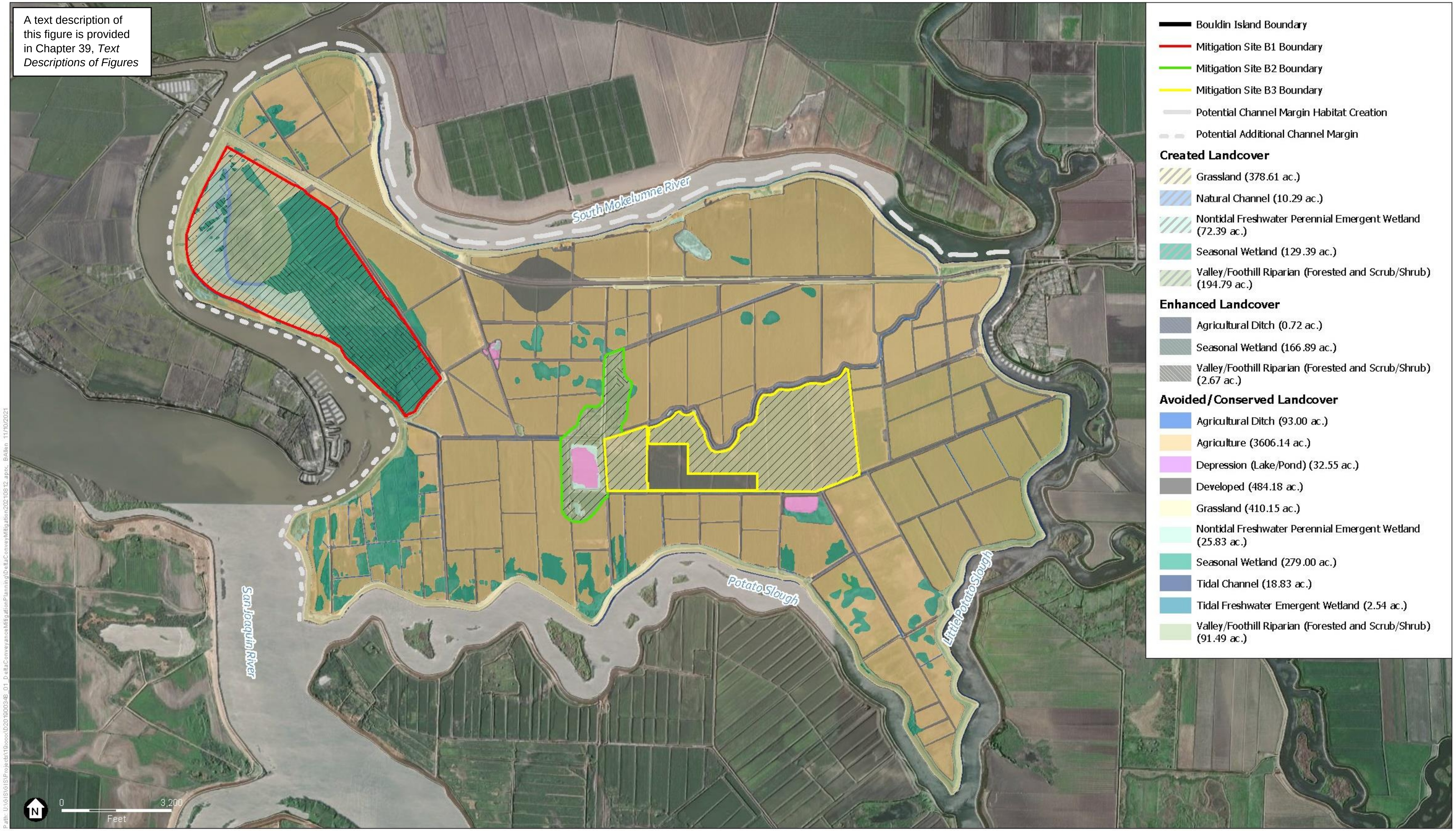
Sources: California Department of Water Resources and GEI Consultants 2020; California Department of Water Resources 2020, 2021.

[a] Acreages to the nearest 0.01, may be subject to rounding

3F.4.1.3.3 Site Design and Development

Conceptual plans for Mitigation sites B1, B2 and B3 are shown in Figure 3F-6. Mitigation Site B1 would include a mosaic of open water, nontidal freshwater emergent wetland, scrub-shrub wetland, forested wetland, and seasonal wetland habitats. This habitat complex would be designed to provide habitat diversity and complexity to support multiple target species, including tricolored blackbird, western yellow-billed cuckoo, Swainson's hawk, least Bell's vireo, and western pond turtle. Aquatic features would be designed to sustain wetland hydrology through considering existing elevations and drainage infrastructure.

In general, target habitats would be created through grading (at Mitigation Site B1), planting, adjusting water management and active maintenance in the establishment period. Habitat creation and enhancement at Sites B2 and B3 would require minimal, if any, grading. Mitigation Site B1 would require more extensive earthwork to create the targeted habitats (Figure 3F-7). The proposed land cover (created and enhanced) and the changes to existing conditions that would occur at all of the proposed mitigation sites are summarized in Table 3F-7.



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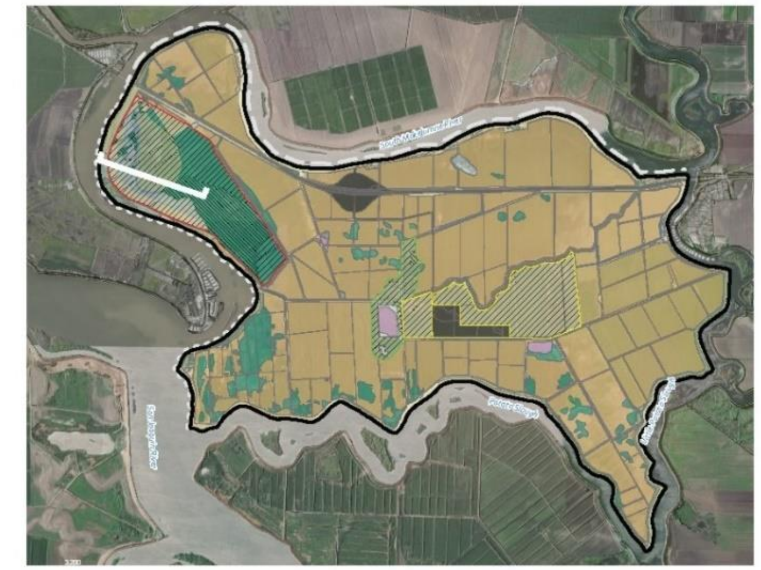
2 **Figure 3F-6. Bouldin Island Conceptual Design**

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



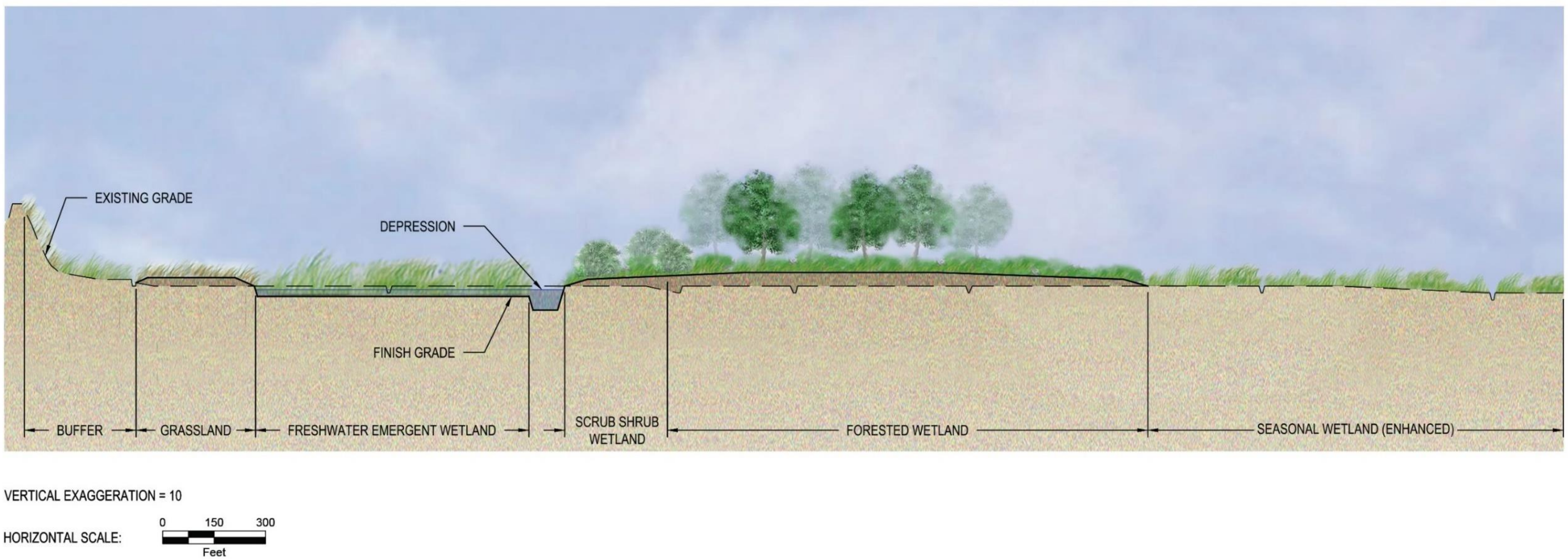


Figure 3F-7. Bouldin Island Conceptual Section

Table 3F-7. Comparison of Existing Bouldin Island Land Cover with Proposed (acres)

		Proposed (acres) [a]									
		Created			Enhanced						
Land Cover	Existing	B1	B2	B3	B1	B2	B3	Total Created/ Enhanced	Remainder on Bouldin	Bouldin Total	Changes in Land Cover
Agricultural ditch	109.06	0	0	0	0.72	0	0	0.72	95.02	95.74	(13.32)
Agriculture	4,368.70	0	0	0	0	0	0	0	3,697.28	3,697.28	(671.43)
Depression (lake/pond)	32.56	10.29	0	0	0	0	0	10.29	32.55	42.85	10.29
Developed	370.79	0	0	0	0	0	0	0	337.96	337.96	(32.83)
Nontidal freshwater emergent wetland	48.37	72.39	0	0	0	0	0	72.39	25.85	98.24	49.88
Grassland	453.58	68.84	0	309.77 [b]	0	0	0	378.61	446.45	825.06	371.48
Valley/foothill riparian [c]	97.33	103.15	91.63	0	0	2.67	0	197.45	93.60	291.06	193.72
Seasonal wetland	498.14	129.93	0	0	166.89	0	0	296.82	293.54	590.36	92.21
Tidal channel	18.89	0	0	0	0	0	0	0	18.89	18.89	0
Tidal freshwater emergent wetland	2.54	0	0	0	0	0	0	0	2.54	2.54	0
TOTAL [b]	5999.97	384.60	91.63	309.77	167.61	2.67	0	956.28	5,043.69	5,999.97	0

[a] Acreages to the nearest 0.01, may be subject to rounding.
[b] Grassland creation at Mitigation Site B3 is proposed only under the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c).
[c] Valley/foothill riparian vegetation community includes potentially jurisdictional wetlands (forested and scrub-shrub) and other riparian vegetation.

Mitigation Site B1 Design and Development

The following outlines the general sequence of anticipated construction activities for Mitigation Site B1:

- **Weed Control:** Herbicide application and mowing would begin several seasons before site grading commences to remove several crops of nonnative annual grass weed seed from the soil's seed bank.
- **Wildlife Protection:** Before commencement of ground-disturbing activities, suitable wildlife avoidance and minimization measures (e.g., pond dewatering, exclusion fencing) would be implemented to protect wildlife. Removal of any nonnative trees would be performed outside the bird nesting season. See Attachment 3F.1, *Compensatory Mitigation Design Parameters*, for additional measures to protect wildlife during construction.
- **Site Preparation:** An on-site staging area would be established that would include a construction trailer, staging of any delivered materials, and an equipment refueling area. On-site utilities would be protected or relocated as needed.
- **Earthmoving:** Existing vegetation would be removed (grubbed) prior to grading. Large equipment would excavate material and move material to create desired elevations. Soils may be temporarily stored on-site in stockpiles. Ditches would be rerouted where necessary to protect adjacent farming operations.
- **Planting and Seeding:** All disturbed areas would be revegetated with native plants. Plants and seeds would be sourced locally to the greatest extent possible. Temporary irrigation equipment would be installed for select plantings for the first 3 to 5 years of plant establishment.
- **Access Improvements:** Improvements would be needed for access during construction, as well as for future site access.
- **Optional Water Control Structures:** Improvements such as temporary pumps and piping may be installed to connect the habitat creation areas with existing drainage ditches or siphons to support target habitats and provide flexibility in future water management.

Portions of this site would be graded to support target habitats. The natural variability in the land surface, existing hydrology, and existing habitat features would be considered in the design to limit the amount of earthwork needed. The most significant earthmoving would be associated with excavations to create freshwater emergent wetland and depressions (lake/pond). Excess fill material would be placed on-site to create suitable elevations to support forested wetland and grassland habitat, resulting in a balanced earthwork site. Existing drainages and canals would be incorporated into the design to support wetland hydrology and site drainage. A large area of the existing farmed seasonal wetlands would not be graded, but rather would be enhanced with plantings and long-term management such as weed control.

Planting palettes would be developed based upon the habitat goals, localized topography, and hydrology. Freshwater wetlands would be planted with sedges, grasses, and emergent plants, with the most hydrophytic species placed in the most frequently inundated locations. Forested wetland areas would include a mix of overstory and understory species, dominated by Fremont cottonwood and willow, to create structural diversity to support Swainson's hawk, yellow-billed cuckoo, and least Bell's vireo. Seasonal wetlands (newly created and/or enhanced existing) would be planted with grasses, sedges, or rushes.

Vegetation, soil, and hydrologic components of created aquatic resources would be supported by existing soil and groundwater conditions (i.e., peat soils with a high water table). During the interim establishment period, the site may experience additional irrigation in the summer months using existing siphons and pumps to pull water from adjacent waterways under existing water rights. Existing intakes would be screened where needed to prevent entrainment of protected fish species from Delta waterways. Additional modifications may be made to the drainage system adjacent to the site to further support habitat creation goals during the establishment period. It is anticipated that agricultural land uses would continue surrounding the site, and that the pumping of water on and off the island at large would continue as it has for decades, including pumping water onto the island in fall for weed control and off the island in late winter for planting.

Based on the existing on-site conditions and site hydrology, including existing elevations, drainage patterns, and groundwater conditions, it is anticipated that Mitigation Site B1 will be self-sustaining after the establishment period and not reliant on the adjacent irrigation system or other artificial hydrology outside of the existing pumping system used for the entire island. As noted in both federal and state wetland regulations for creating compensatory mitigation sites, long-term sustainability is critical for mitigation site success. In particular, assurances are needed to demonstrate that wetland hydrology will be achieved in the long term, especially when that hydrology is supported by pumping actions. In this case, Mitigation Site B1 would be constructed in a location that would largely revert to wetland habitats absent farming practices based on existing soils, elevation, and hydrology. Nevertheless, when considering long-term sustainability for Mitigation Site B1, site maintenance needs for the existing drainage systems and siphons will be considered as needed to ensure habitats are maintained in perpetuity.

Once constructed, the mitigation site will be monitored on an annual basis during the establishment period (generally 3–5 years) to ensure performance criteria, including wetland hydrology and water quality, are being met. Water supply and drainage management practices may be altered at this time if monitoring indicates improvements are needed. Most of the water would be retained on-site, although during high-flood conditions in winter, some water may be discharged from the wetlands to adjacent Delta waterways through existing drains or outfalls. Based on existing groundwater conditions, water management is not anticipated. Following the establishment period, long-term monitoring would continue to occur on a more infrequent basis (typically once every 5 years).

Creation of freshwater emergent perennial wetlands, seasonal wetlands, and tidal habitats has the potential to affect water quality within the Delta relative to existing conditions (Chapter 9*, Water Quality*). Mercury methylation occurs under anoxic conditions in sediments, flooded shoreline soils, and, to a lesser degree, in the water column. Increased methylmercury is also associated with wetting and drying cycles. These new sources of methylmercury could result in higher methylmercury concentrations in adjacent Delta waters and uptake into the tissues of fish residing within and immediately adjacent to these wetland habitats where elevated levels of methylmercury could be created.

Several factors would minimize the potential impact of the initial Bouldin Island compensatory mitigation sites on methylmercury within the Delta. First, the freshwater emergent perennial wetlands and seasonal wetlands on Bouldin Island would not be directly connected hydrodynamically with adjacent Delta waters; instead, discharge from the site would be circulated through the island's large ditch drainage system. Second, the source water for these wetlands would be predominantly groundwater, which is expected to have a lower mercury concentration than Delta surface water. Third, as part of adaptive management, monitoring of the discharge from the wetlands to the existing island drainage system would be conducted and the discharges modified if necessary (e.g., to a detention basin), should monitoring results show the wetland discharges to be a net exporter of methylmercury to Delta waters. Mitigation Measure WQ-6: *Develop and Implement a Mercury Management and Monitoring Plan* would minimize generation of methylmercury in new habitats. Thus, the wetlands to be created on Bouldin Island would not contribute to measurable increases in methylmercury concentrations in waters and biota of the Delta or make the existing mercury-related CWA Section 303(d) impairment within the Delta measurably worse.

Mitigation Sites B2 and B3 Design and Development

Two additional mitigation sites near the center of Bouldin Island would be restored without excavation or grading (Figure 3F-8). Mitigation Site B2 would expand and enhance existing riparian vegetation around an existing depression to create a larger patch of forested wetland through plantings. Under the central alignment alternatives (Alternatives 1, 2a, 2b, and 2c), Mitigation Site B3 near the center of Bouldin Island would include the restoration of sites that may be disturbed as a result of tunnel shaft construction and the storage of RTM. The area surrounding the proposed tunnel facility would serve as a temporary construction staging and RTM handling and long-term storage area. Grasslands would be created at Mitigation Site B3 through vegetation clearing and grubbing, soil preparation, and planting with native grasses (Figure 3F-8). The exact location of grassland creation areas on Bouldin Island may change during further design refinement, particularly if an alternative that does not use the central alignment is selected (i.e., Alternative 3, 4a, 4b, 4c, or 5).

3F.4.1.3.4 Construction Methods and Equipment

Wetland grading at Mitigation Site B1 would entail up to approximately 500,000 cubic yards of excavation and fill, assuming 10% losses between cut and fill. The material would be placed to construct a riparian planting island, seasonal wetlands, and grasslands. Large land-based earthmoving equipment like bulldozers, excavators, loaders, dump trucks, water trucks, scrapers, and compactors would move earth around the sites to meet finish grades. Earthwork volumes are approximate and may change as necessary to meet site design requirements in later design phases.

Nontidal Freshwater Emergent and Seasonal Wetlands

Earthmoving and targeted active revegetation are the primary activities needed for habitat creation. The most significant construction activity would be earthmoving, including excavating existing ground to create open water channels and freshwater emergent wetland. Open water channels would be excavated to an average depth of 6 feet and freshwater marsh would be excavated to an average depth of approximately 3 feet. It is anticipated approximately 400,000 cubic yards of excavation would be required for freshwater emergent wetland, while no excavation or fill would be required for seasonal wetland.

Valley/Foothill Riparian (Forested and Scrub-Shrub)

At Mitigation Site B1, forested and scrub-shrub wetlands would be created adjacent to newly created open water and freshwater emergent wetland habitat. These riparian areas would be raised an average of 1 to 2 feet to create suitable elevations to support plantings. Grading would be achieved by placing approximately 240,000 cubic yards of fill generated from excavating open water and emergent wetlands. At Mitigation Site B2, no excavation or fill would be required for riparian wetland enhancements and creation.

Riparian planting areas at Sites B1 and B2 would be disced and planted with native materials. Vegetative materials (e.g., cuttings, seed, plugs, container plants) would be transported on the site using trailers pulled by pickup trucks and all-terrain vehicles. A temporary irrigation system would be installed to support plant establishment. The riparian areas would be managed during a 3- to 5-year establishment period, during which small farm tractors and all-terrain vehicles would be used to mow and apply herbicides.

Depression (Lake/Pond)

An open water feature (depression) would be created in the southwest portion of Mitigation Site B1 to provide aquatic habitat and support wetland and riparian habitats. This open water feature would be excavated to an average of 6 feet below grade, requiring approximately 100,000 cubic yards of excavation. It is assumed that excavated material would be used to support adjacent riparian and grassland habitats. Large land-based earthmoving equipment like bulldozers, excavators, loaders, dump trucks, water trucks, scrapers, and compactors would move earth around the sites to meet finish grades. Trucks and other vehicles would transport construction workers and equipment to the site. Other lakes and ponds that currently exist on the island, and the mature riparian habitats surrounding them would be avoided.

Native Grasslands

Native grassland habitats would be created along the western and northern edge of the site grading limits at Mitigation Site B1. It is assumed that approximately 260,000 cubic yards of material generated from on-site excavation would be placed to raise native grassland areas 1 to 3 feet to suitable elevations. Native grasslands could also be restored at Mitigation Site B3 on top of any unused RTM. Native grassland areas would be disced using a large farm tractor to prepare the soil for seeding. Native grassland habitats would be drill seeded with a blend of native grasses and forbs that mimic interior and or coastal grasslands, including plant species that would provide foraging habitat for bumble bees. The seed drill would be pulled using a medium-sized farm tractor.

3F.4.1.3.5 Construction Equipment

Table 3F-8 provides the estimated total days that various construction equipment would be operated to complete the work. The estimated number of "equipment days" assumes that excavation of open water and freshwater wetlands and fill placement for riparian and grassland habitats is performed as one coordinated operation.

Table 3F-8. Estimated Construction Equipment Use—Bouldin Island

Equipment	Total Working Days [a]	Average Days/Year (over 2 years)
Excavators	98	49
Off-road trucks	98	49
Scrapers large	287	144
Rubber tired loaders	98	49
Track-mounted bulldozer	483	242
Tractors/backhoes	37	19
Sheepsfoot compactor	287	144
Water truck	770	385

[a] Total working days is independent of the number of equipment in each category. To calculate the number of working days for a single equipment unit, divide the total working days by the number of equipment units (i.e., 10 excavator working days can represent 10 excavators working 1 day each or 1 excavator working 10 days). Construction equipment quantities would be determined by the construction contractor.

3F.4.1.3.6 Construction Schedule

The mitigation sites would be built out over a multi-year period, with construction beginning once relevant permits and approvals have been acquired for the project. Construction would likely occur over a period of 2–4 years given the scale of the mitigation site.

3F.4.1.3.7 Greenhouse Gas Emissions and Removals

The net greenhouse gas effect of conversion from current land uses (baseline) to created and enhanced land cover (freshwater emergent wetlands, seasonal wetlands, riparian, open water, and grasslands) was estimated for the three mitigation sites on Bouldin. Details are provided in Attachment 3F.2.

3F.4.1.4 DWR I-5 Ponds

3F.4.1.4.1 Site Objectives

DWR owns three rectangular former borrow pits near West Woodbridge Road and SR 12, known as I-5 Ponds 6, 7, and 8 (Figure 3F-1). They are in the White Slough Wildlife Area and within 2 miles of Woodbridge Ecological Reserve. The three ponds, totaling approximately 345 acres, were excavated between 1974 and 1978 to provide fill for freeway construction. Currently, all three ponds are managed by CDFW as wildlife areas. The borrow pits are fed by groundwater and by periodic overland flow from precipitation, irrigation runoff, and high canal flows, creating three perennial ponds characterized by deep open water, steep vegetated banks, and relatively flat adjacent uplands.

The proposed design at these sites would reconfigure the three ponds to develop compensatory habitat to mitigate project impacts on giant garter snake and other species. The creation of additional perennial wetland habitat in this area is consistent with the recovery goals identified in the *Revised Draft Recovery Plan for the Giant Garter Snake* (U.S. Fish and Wildlife Service 2017a:I-2–I-4). The proposed mitigation design would incorporate all habitat requirements for giant garter snake, including:

- Adequate water during the giant garter snake active season (approximately May 1st to October 1st) to provide habitat for prey.
- Emergent, herbaceous wetland vegetation for escape, cover and foraging habitat during the active season.
- Sloped grassy banks, habitat rock and openings in waterside vegetation for basking sites and hibernation burrows.
- Higher-elevation uplands for cover and refuge from flood waters during the giant garter snake dormant season (winter).
- Critical north-south habitat linkages for known giant garter snake populations in San Joaquin County.

3F.4.1.4.2 Site Selection Criteria and Baseline Conditions

Site Selection Criteria

Site selection is consistent with siting and design criteria from the Draft EIR (Attachment 3F.1). The creation of additional perennial wetland habitat in this area is consistent with recovery goals (U.S. Fish and Wildlife Service 2017a:II-1). The I-5 ponds are well suited for giant garter snake habitat, due to their location within the White Slough Management Unit of the Delta Basin Recovery Unit (U.S. Fish and Wildlife Service 2017a:II-10–II-11). The presence of known giant garter snake populations just south of the sites and its proximity to Woodbridge Ecological Reserve less than 2 miles to the north suggests that recolonization of the ponds could occur without intervention. Creating and enhancing wetland habitat in this area would promote population viability and genetic connectivity among otherwise isolated populations in the Delta (Wood et al. 2015).

Property Location and Description

Pond 6

Pond 6 lies north of West Woodbridge Road, approximately 1.65 miles west of I-5. The north edge of the site includes Hog Slough and its earthen levee, with an on-site water delivery ditch extending from a tide gate in the slough around the north and east edges of the property. To the east is the CDFW Woodbridge Ecological Reserve. To the west are agricultural fields in grape vines and row crops. Pond 6's current site uses are as a Class C wildlife area open to the public for hunting and fishing, managed by CDFW. The main access point is from the southeastern corner off of West Woodbridge Road.

Pond 6 is long and relatively narrow, is approximately 20 feet deep, and is located along the western edge of the site. The site generally slopes from the perimeter toward the pond. Past soil excavation activities have created many depressions, artificial drains, grade breaks and impediments to overland flow. Perimeter ditches and existing water conveyance systems surround the site on all sides, leaving the site isolated from surface flows except during exceptionally high-water events. The site has a relatively high groundwater table depth.

Ponds 7 and 8

Ponds 7 and 8 lie directly south of West Cotta Road approximately 1 mile west of I-5, bounded by a high-line irrigation delivery canal to the west and row crops to the east. The access point for both ponds is off West Cotta Road in the north via a gravel parking area. Pond 7 sits in the northern half of the site, while Pond 8 occupies the narrow southern portion of the site. Pond 7 is approximately 3,000 feet long by 300 feet wide and roughly 20 feet deep. Pond 8 is approximately 18 feet deep. Currently, the site is maintained by CDFW as a Class C wildlife area open to the public for hunting and fishing.

Pond 7 runs from northwest to south with a bend of approximately 30 degrees in the middle of the pond along the old canal alignment. Slopes on the site generally fall away from a perimeter berm around the edge of the pond. This berm is relatively steeply sloped on the water side, with a level or gently sloping grade away from the top of the berm on the west side of the pond. Site topography is relatively flat east of the pond's perimeter berm. Perimeter ditches, levees, and existing water conveyance systems surround the site on all sides, leaving the site isolated from surface flows except during exceptionally high-water events. Depressions along the toe of the levee on the western side of the site indicate possible borrow areas that may be up to 2 feet lower than surrounding grade. Several relict water delivery and drainage structures also exist on the site. One feature contains parts of an old concrete-lined highline, while another deep drainage ditch bisects the parcel north to south and divides Pond 7 in the north from Pond 8 in the south.

Pond 8 has a rim of high ground around the pond that generally slopes away from the pond toward the edge of the site in the west. Unlike Pond 7, Pond 8 has a gentle slope from the top of the berm to the water's edge. There are depressional areas adjacent to the levee on the west side, and a high, flat bench on the east side near the neighboring agricultural fields.

Soils

Pond 6

Pond 6 soils are dominated by Guard clay loam and Dello soil series (Natural Resources Conservation Service 2018). Guard clay loam is an alluvial soil with some clay content characteristic to basin rims and floors. The series may exhibit inclusions of coarser soil series or textures like sands and silts but usually has slow permeability and is poorly drained (Natural Resources Conservation Service 2018). Dello soils typically consist of sands or sandy loams sometimes overlaying clay lenses. Upper horizons tend toward high permeability and would not support wetland hydrology unless underlying clay lenses were present and intact. Soils on-site would have historically supported seasonal and semi-permanent marsh.

Ponds 7 and 8

Ponds 7 and 8 soils are dominated by Guard clay loam soil series, which is described for Pond 6. Soils on the site would have historically supported seasonal and semi-permanent marsh. Ponds 7 and 8 have a relatively high groundwater table depth.

Existing Land Cover

Pond 6

The Pond 6 site includes a historic irrigated pasture, an intermediate bench around the pond that contains riparian vegetation and depressional wetlands, and a long linear pond surrounded by a high berm with nearly vertical banks. In some places, the high berm has "blown out" and seasonal high groundwater from the pond inundates shallow depressions fringing the pond. Existing land cover at Pond 6 is displayed in Figure 3F-8, and approximate acreages of existing land cover are summarized in Table 3F-9.

Vegetation at the Pond 6 site includes common nonnative annual grasses and forbs in uplands to hydrophytes in marsh areas. Mature willows and Fremont cottonwood have naturally recruited in low-elevation depressions near the pond. Tule patches occur in some lower areas around the pond. Higher terrace vegetation includes upland herbaceous plants (e.g., filaree [*Erodium* spp.], hemlock [*Conium maculatum*], and thistle [*Cirsium* spp.]), as well as some species that are more indicative of wetland soil conditions (e.g., salt grass [*Distichlis* spp.] and rushes). Woody plants in the higher terrace include Himalayan blackberry and quail bush (*Atriplex lentiformis*).

Table 3F-9. Pond 6 Baseline Land Cover

Land Cover	Acres
Agricultural ditch	3.41
Agriculture	0.55
Depression (lake/pond)	4.02
Developed	2.47
Nontidal freshwater emergent wetland	3.11
Grassland	130.73
Tidal channel	0.80
Tidal freshwater emergent wetland	0.02
Valley/foothill riparian (forested and scrub-shrub) [a]	36.36
Total	181.47

[a] Valley/foothill riparian vegetation community includes potentially jurisdictional wetlands (forested and scrub-shrub) and other riparian vegetation.

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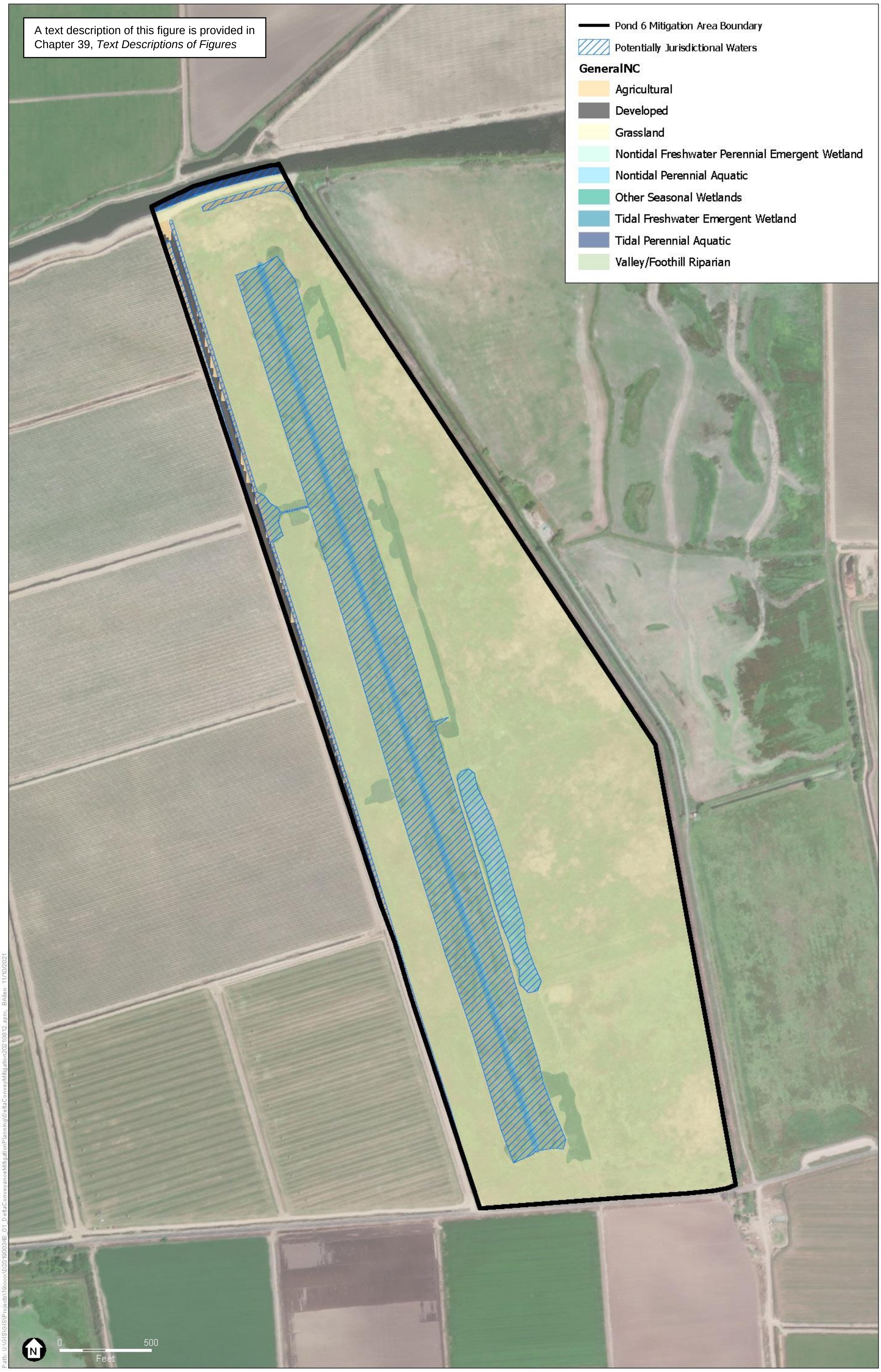

Figure 3F-8. DWR I-5 Ponds, Pond 6 Existing Land Cover

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Ponds 7 and 8

Ponds 7 and 8 are both rimmed with tules. The Pond 7 area includes an existing wetland/riparian marsh complex in the northeast along West Cotta Road. An upland area spans the west side of both ponds. Additional upland is immediately north and south of Pond 7. Existing land cover at Ponds 7 and 8 is displayed in Figure 3F-9, and approximate acreages of habitat types are summarized in Table 3F-10.

Table 3F-10. Ponds 7 and 8 Baseline Land Cover

Land Cover	Acres
Agricultural ditch	2.25
Agricultural	0.00
Depression (lake/pond)	60.57
Nontidal freshwater emergent wetland	0.41
Grassland	90.00
Seasonal wetland	0.24
Valley/foothill riparian (forested and scrub-shrub) [a]	7.78
Total	161.25

[a] Valley/foothill riparian vegetation community includes potentially jurisdictional wetlands (forested and scrub-shrub) and other riparian vegetation.

Vegetation at the Pond 7 site ranges from annual grasses and forbs in the uplands to hydrophytes in marsh areas. Mature valley oaks, willows, and cottonwoods have naturally recruited along relict agricultural features in the uplands, in the riparian forest at the northwest corner of the site area, and along the toe of the levee on the west side of the pond. A narrow thicket of tule circles the entire perimeter of the pond with only small breaks in cover where fishermen have trampled vegetation to access the water. Higher terrace vegetation includes upland herbaceous plants like filaree, hemlock, and thistle, as well as salt grass and rushes. Woody plants in the higher terrace generally consist of coyote brush (*Baccharis* spp.), sandbar willow, and quail bush.

Vegetation at the Pond 8 site ranges from annual grasses and forbs in the uplands to hydrophytes in wetland areas. A narrow band of tule circles the perimeter of the pond with occasional small breaks in cover along the pond's edge. Mature oaks, willows, and cottonwoods have naturally recruited in low-elevation depressions along the toe of the levee to the west of the pond. Higher terrace vegetation includes upland herbaceous plants like filaree, hemlock, and thistle, as well as salt grass and rushes. Woody plants in the higher terrace consist of coyote brush, sandbar willow, and quail bush.

Figure 3F-9. DWR I-5 Ponds, Ponds 7 and 8 Existing Land Cover

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Potential Waters of the United States and State

An aquatic resources delineation was conducted using aerial imagery interpretation for the study area, which encompassed the I-5 ponds (Section *13.1.4, Wetlands and Other Waters of the United States*). Potentially jurisdictional wetlands and other waters are summarized in Table 3F-11 for Pond 6 and in Table 3F-12 for Ponds 7 and 8.

Table 3F-11. Pond 6, Baseline Potentially Jurisdictional Wetlands and Other Waters

Aquatic Resource	Acres
Wetlands	
Nontidal freshwater emergent wetland	3.10
Forested and scrub-shrub wetland	31.49
Other Waters	
Agricultural ditch	3.41
Depression (lake/pond)	4.00
Tidal channel	0.80
Total	42.80

Sources: California Department of Water Resources and GEI Consultants 2020; California Department of Water Resources 2020, 2021.

Table 3F-12. Ponds 7 and 8, Baseline Potentially Jurisdictional Wetlands and Other Waters

Land Cover Type	Acres
Wetlands	
Nontidal freshwater emergent wetland	0.41
Forested and scrub-shrub wetland	0.40
Seasonal wetland	0.24
Other Waters	
Agricultural ditch	2.25
Depression (lake/pond)	60.57
Total	63.87

Sources: California Department of Water Resources and GEI Consultants 2020; California Department of Water Resources 2020, 2021.

3F.4.1.4.3 Site Design and Development

The sites would be graded to create a gradient of complex freshwater marsh habitats at varying elevations across the site, including:

- Maximizing "hemi-marsh," consisting of a mix of open water/submerged vegetation and emergent vegetation.
- Creating basking shelves that are near open water, and preferably south and east facing.
- Creating a mix of open water (6–8 feet maximum depth) interspersed with emergent vegetation benches (approximately 3 feet deep), of varying width (average of 60–80 feet wide).

Conceptual restoration plans for Pond 6 and Ponds 7 and 8 are shown on Figures 3F-10 and 3F-11, respectively. A schematic cross-section of the Pond 7 conceptual plan is shown in Figure 3F-12. Site-specific grading by pond is described further below in sections *Pond 6 Design* and *Pond 7 and 8 Design*.

The goal is to create a mosaic of high-quality, low-maintenance freshwater emergent wetland, open water, and associated natural habitats for giant garter snake. In addition, existing riparian habitat would be preserved to the extent feasible. If any existing riparian habitat is affected by construction, it would be replaced with newly created riparian habitat.

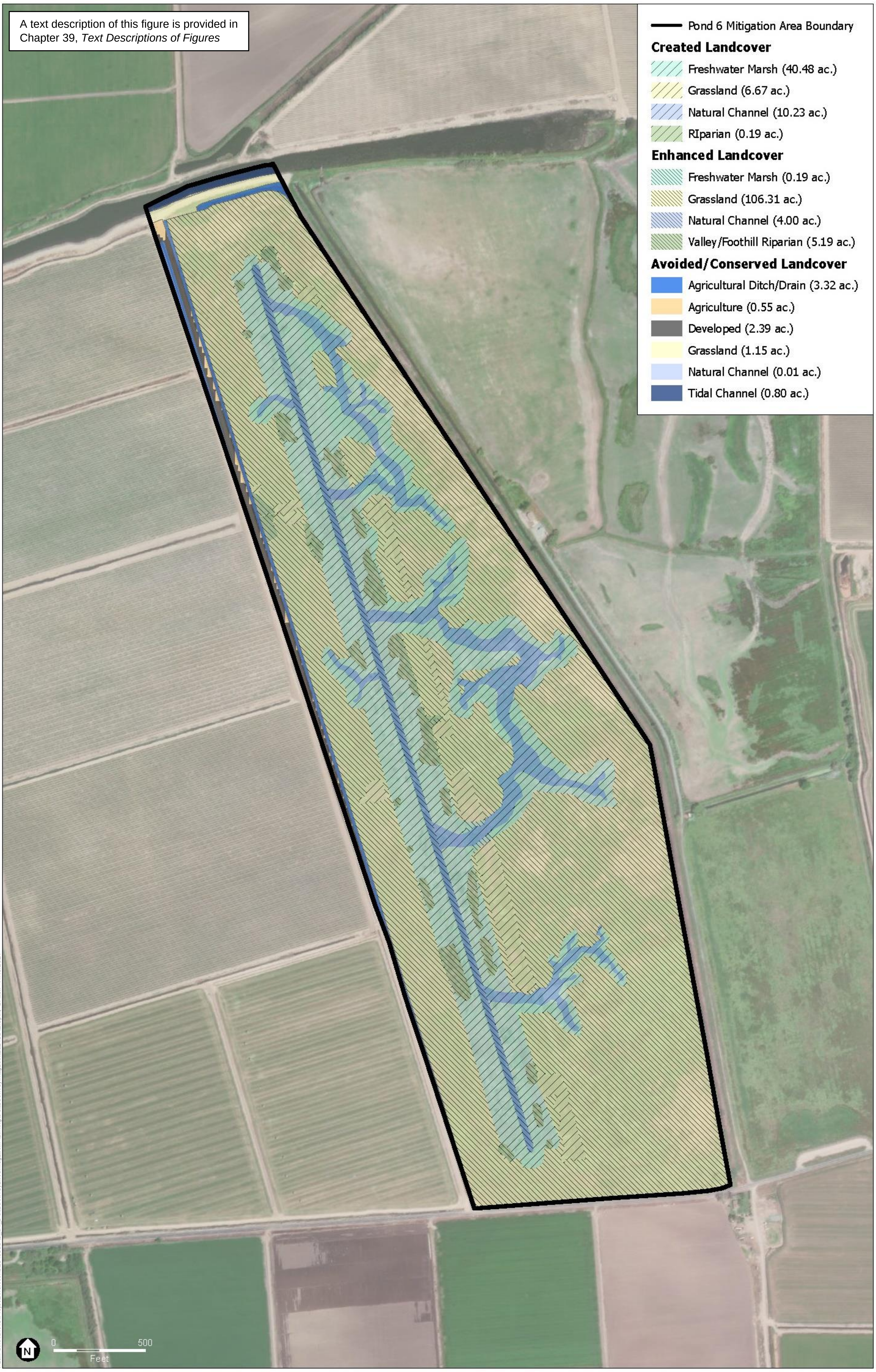


Figure 3F-10. DWR I-5 Ponds, Pond 6 Conceptual Design

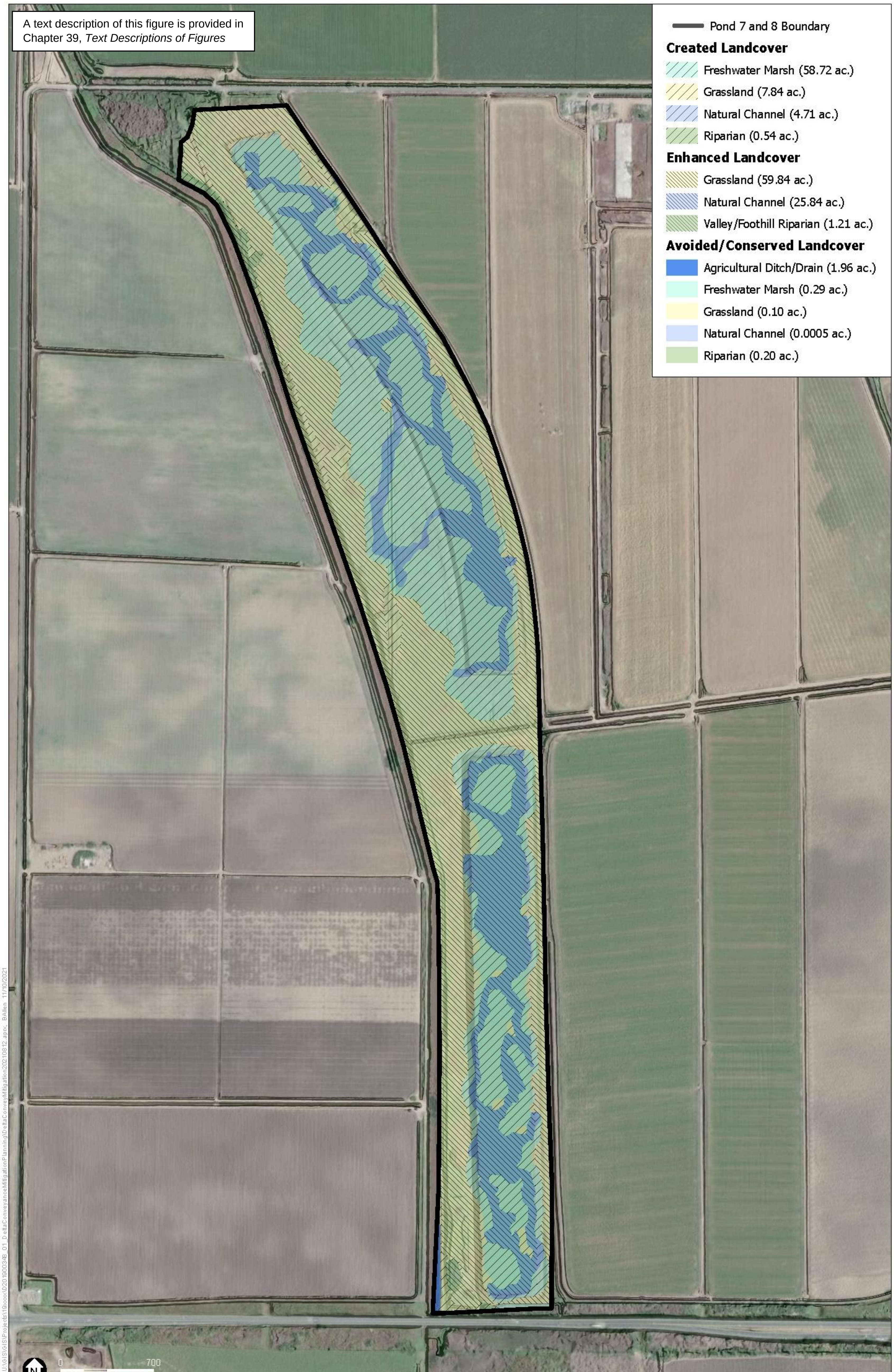
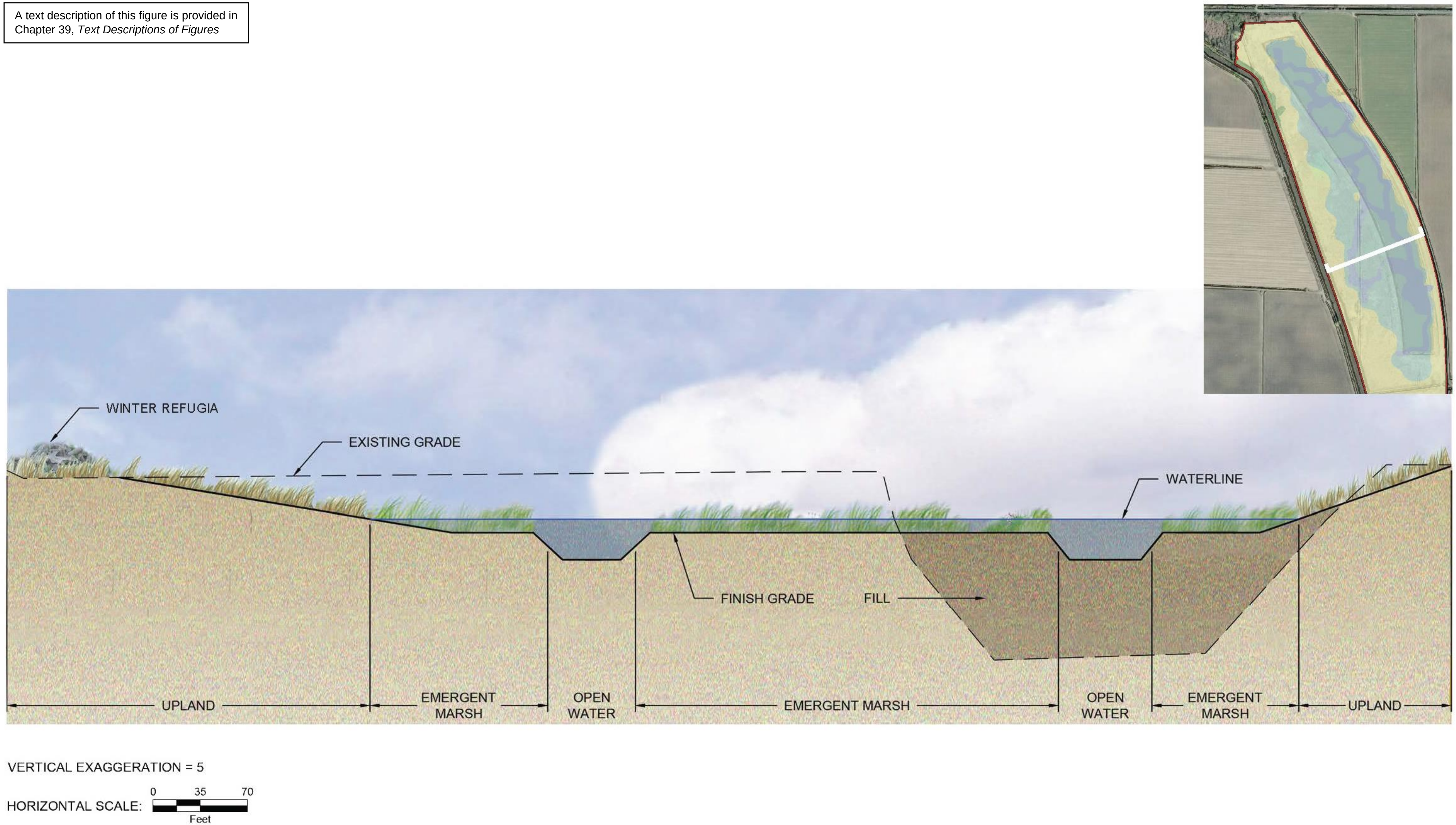


Figure 3F-11. DWR I-5 Ponds, Pond 7 and 8 Conceptual Design

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



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2 **Figure 3F-12. DWR I-5 Ponds, Pond 7 Conceptual Section**

Pond 6 Design

Select upland areas would be excavated at Pond 6 to lower elevations to access the groundwater table and be recolonized by native wetland vegetation (e.g., tule, rushes) similar to that which currently exists near the pond's edge. Existing wetlands and riparian vegetation along the existing pond edge would be preserved to the extent possible.

Large open water areas would also be excavated (to approximately 6 feet elevation below existing grade or lower) to provide aquatic habitat for giant garter snake prey. Hemi-marsh and smaller open water channels would be excavated to create foraging and refugia habitat for giant garter snake. In addition, the remnant pasture on the west of the pond would be lowered to match the elevation of existing wetlands around the pond. Some excavated material would be placed on-site to grade uplands in a manner that improves habitat conditions for giant garter snake. Excess excavated material would be transported and placed on Ponds 7 and 8, as described below.

Pond 6 proposed land cover (created and enhanced) and the change from existing conditions are summarized in Table 3F-13. Restoration would result in a net gain of freshwater marsh and open water (pond or depression), and a loss of riparian and grassland. Habitat loss would be mitigated by restoration at Bouldin Island of riparian wetland (Mitigation Sites B1 and B2) and grassland (Mitigation Site B3) (Table 3F-7).

Table 3F-13. Comparison of I-5 Pond 6 Existing Land Cover with Proposed (acres)

		Proposed				
Land Cover Type	Existing	Created	Enhanced	Avoided	Total	Created (Loss)
Agricultural ditch	3.41	0	0	3.32	3.32	(0.09)
Agriculture	0.55	0	0	0.55	0.55	0.00
Developed	2.47	0	0	2.39	2.39	(0.08)
Nontidal freshwater emergent wetland	3.11	40.48	0.19	0	40.67	37.56
Grassland	130.73	6.67	106.31	1.15	114.13	(16.60)
Depression (lake/pond)	4.02	10.23	4.00	0.01	14.24	10.22
Valley/foothill riparian	36.36	0.19	5.19	0	5.38	(30.98)
Tidal channel	0.80	0	0	0.80	0.80	0.00
Total[a]	181.47	57.57	115.69	8.22	181.47	0.0[a]

[a] Totals may be subject to rounding errors.

Pond 7 and 8 Design

Pond 7 would be graded to create a large side channel to the west of the pond that would be fed by groundwater. Large open water areas would also be excavated (to approximately 6 feet elevation below existing grade or lower) to improve giant garter snake dispersal and foraging on the site. Hemi-marsh and smaller open water channels would also be excavated to create habitat for young snakes and aquatic prey species, and provide refugia for giant garter snake. An expanded tule bench with occasional berms and open water fingers would be created around the edge of the pond to increase habitat complexity and increase multispecies benefits. Portions of the uplands would be excavated several feet to provide fill material for raising the bottom elevation of the existing ponds to a depth better suited for giant garter snake. Other portions of the site's uplands would be graded into mounds to provide high-elevation refugia from seasonal flooding.

Given that Pond 8 takes up most of its site, portions of the pond would be filled or raised to create a marsh complex that better supports a range of giant garter snake habitats. Open water expanses would be maintained to enhance water quality via wind mixing and to increase tule edge habitat. Hemi-marsh areas and upland islands would also be included to create a full set of giant garter snake habitats.

Ponds 7 and 8 proposed land cover (created and enhanced) and the change from existing conditions are summarized in Table 3F-14. Restoration would result in a net gain of freshwater marsh and grassland, and a loss of open water (depression) and riparian. Habitat creation at Bouldin Island would fully mitigate losses of riparian wetland (Mitigation Sites B1 and B2) and open water (Mitigation Site B1) (Table 3F-7).

Table 3F-14. Comparison of I-5 Ponds 7 and 8 Existing Land Cover with Proposed (acres)

		Proposed				
Land Cover Type	Existing	Created	Enhanced	Avoided	Total	Created (Loss)
Agricultural ditch	2.25	0	0	1.96	1.96	(0.29)
Agriculture	0	0	0	0	0	0.00)
Depression (lake/pond)	60.57	4.71	25.84	0	30.55	(30.02)
Freshwater emergent wetland	0.41	58.72	0	0.29	59.01	58.60
Grassland	90.00	7.84	59.84	0.10	67.78	(22.22)
Seasonal wetland	0.24	0	0	0	0	(0.24)
Valley/foothill riparian	7.78	0.54	1.21	0.20	1.96	(5.83)
Total [a]	161.25	71.81	86.89	2.55	161.25	0.0 [a]

[a] Acreages to the nearest 0.01 may be subject to rounding.

3F.4.1.4.4 Construction Methods and Equipment

The following outlines the general sequence of anticipated construction activities for the three pond sites:

- **Weed Control**—Herbicide application and mowing would begin several seasons before site grading commences to remove several crops of nonnative annual grass weed seed from the soil's seed bank.
- **Wildlife Protection**—Before commencement of ground-disturbing activities, suitable wildlife avoidance and minimization measures (e.g., pond dewatering, exclusion fencing) would be implemented to protect any giant garter snake or other protected wildlife. Removal of any nonnative trees would be performed outside the bird nesting season. See *Chapter 13* for additional measures to protect wildlife during construction.
- **Site Preparation**—An on-site staging area would be established that would include a construction trailer, staging of any delivered materials, and an equipment refueling area. On-site utilities would be protected or relocated as needed.

- **Earthmoving—**Existing vegetation would be removed (grubbed) prior to grading. Large equipment would move material from uplands into the existing ponds to create higher-quality giant garter snake aquatic habitat in the footprint of existing ponds and uplands. Soils may be temporarily stored on-site in stockpiles. In addition, some fill would be placed to repair the existing perimeter berm that protects neighboring farms.
- **Planting and Seeding—**All disturbed areas would be revegetated with native plants. Plants and seeds would be sourced locally to the greatest extent possible. Temporary irrigation equipment would be installed for select plantings for the first 3 to 5 years of plant establishment.
- **Access Improvements—**Improvements would be needed for access during construction, as well as for future site access. A new gravel-surfaced access road would be created on the west boundary of the Ponds 7 and 8 site, and would include a vehicular crossing at the agricultural drainage ditch separating Ponds 7 and 8. A boat ramp may be installed for future water access for maintenance. Finally, cattle exclusion fencing would be installed as needed if future land uses of the site include grazing.
- **Optional Water Control Structures—**Improvements such as temporary pumps, piping, or both may be installed to connect the expanded ponds with existing drainage ditches or Hog Slough to support target habitats and provide flexibility in future water management. In addition, the existing culvert under SR 12 may be replaced with a larger bridge or arch culvert so that giant garter snakes have a mud-substrate-bottomed link between Pond 8 and adjacent giant garter snake habitat south of SR 12.

Earthmoving and targeted active revegetation are the primary construction activities. The most significant construction activity would be earthmoving, including excavating uplands to create new wetlands and expanded open water, and fill placement to improve upland habitat conditions for giant garter snake and partially fill Ponds 7 and 8. Assuming approximately 10% losses between cut and fill, grading would entail up to approximately 1.2 million cubic yards of on-site cut and on-site fill. Approximately 0.4 million cubic yards of excess material generated on the Pond 6 site would be transported and used as fill at Ponds 7 and 8.

Large land-based earthmoving equipment like bulldozers, excavators, loaders, dump trucks, water trucks, scrapers, and compactors would move earth around and between the sites to meet finish grades. Excess Pond 6 material would be transported to Ponds 7 and 8 using highway-rated haul trucks. Large delivery trucks and dump trucks would bring construction materials to the sites. Trucks and other vehicles would transport construction workers and equipment to the sites.

The estimated total days that various construction equipment would be operated to complete the work is summarized in **Table 3F-15.** The average number of days per year is based on an assumed 3-year construction period.

Table 3F-15. Estimated Construction Equipment Use—DWR Ponds 6, 7 and 8

Equipment	Total Working Days [a]	Avg Days/Year (over 3 years)
Excavators	1,190	397
Off-road trucks	1,763	588
Rubber tired loaders	1,224	408
Highway-rated trucks	1,854	618

Equipment	Total Working Days [a]	Avg Days/Year (over 3 years)
Track-mounted bulldozer	2,414	805
Water truck	1,224	408
Tractors/backhoes	10	3

[a] Total working days is independent of the number of equipment in each category. To calculate the number of working days for a single equipment unit, divide the total working days by the number of equipment units (i.e., 10 excavator working days can represent 10 excavators working 1 day each or 1 excavator working 10 days). Construction equipment quantities would be determined by the construction contractor.

3F.4.1.4.5 Construction Schedule

The mitigation sites would be built out over a multiyear period, with construction beginning once relevant permits and approvals have been acquired for the project. Each parcel would require approximately one construction season for initial establishment; however, the timing could overlap so various parcels would undergo restoration simultaneously.

Construction would likely occur over a period of 2 to 4 years. Pond 6 would most likely be built first due to the abundance of upland habitat that could be created. Construction would likely occur on the Pond 7 site before the Pond 8 site given the site access constraints for Pond 8. Initial ground-disturbance activities would be conducted during the giant garter snake active season (May 1 to October 1) to minimize potential impacts on giant garter snake.

3F.4.1.4.6 Greenhouse Gas Emissions and Removals

The net greenhouse gas effect of conversion from current land uses (baseline) to created and enhanced land cover (freshwater emergent wetlands, seasonal wetlands, riparian, open water, and grasslands) was estimated for the I-5 ponds. Details are provided in Attachment 3F.2.

3F.4.2 Mitigation Credits and Site Protection Instruments

The second approach for this CMP is to obtain credits from approved mitigation/conservation banks or to develop site protection instruments to meet mitigation needs for certain natural community types, including some types of wetlands and other waters, and for species. There are a number of approved and pending mitigation/conservation banks with service areas that overlap the proposed alternative footprints. For example, the Elsie Gridley Mitigation Bank with existing and pending alkaline wetland and vernal pool credits, along with vernal pool fairy shrimp (*Branchinecta lynchi*) and vernal pool tadpole shrimp (*Lepidurus packardi*) credits (Lee pers. comm.). Additionally, the pending Doolan Canyon Conservation Bank is in the process of getting California tiger salamander, as well as California red-legged frog, credits approved (Moss pers. comm.).

3F.4.2.1 Mitigation Credits from Approved Banks

The final amount of mitigation credits to be secured for aquatic resources and species habitats will be determined during the permitting phase of the project. Preconstruction surveys have the potential to reduce mitigation needs. On-the-ground land cover surveys and presence/absence surveys will inform more precise impact calculations and likely reduce the final mitigation burden. In some instances, reduced impact calculations may not result in changes to restoration design and implementation.

3F.4.2.1.1 Wetlands and Other Waters

Impacts on the following wetlands/waters may be mitigated through use of an approved mitigation bank:

- Alkaline wetland
- Vernal pool
- Tidal emergent wetland
- Tidal channel

Alkaline wetlands occur on alkaline soils with ponded or saturated soil conditions for prolonged periods during the growing season. The vegetation of alkaline wetlands is composed of plant species adapted to wetland conditions and high alkalinity levels. These wetlands are rare in the study area (the statutory Delta and a few areas southwest around Bethany Reservoir), occurring primarily around Clifton Court Forebay and southern Solano County. Vernal pools are seasonal wetlands that form in shallow depressions underlain by hardpan or a dense clay subsurface layer. These depressions fill with rainwater and surface runoff; the subsurface layers restrict infiltration into the subsoil and the depressions remain inundated throughout the winter and sometimes as late as early summer. Vernal pools are found in areas of level or gently undulating topography in the lowlands of California, especially in the grasslands of the Central Valley. Both of these wetland types require site-specific soil and hydrology factors to create. For these reasons, purchase of wetland creation credits at an approved mitigation bank whose service area includes the project may be the preferred option for compensating impacts on these resources.

Impacts on tidal habitats may also be compensated through wetland creation credits at an approved bank. Another option is to compensate for these impacts through the Tidal Habitat Mitigation Framework, as described in Section 3F.4.3, *Tidal Habitat Mitigation Framework*.

3F.4.2.1.2 Targeted Species

Agency-approved mitigation banks may be used to meet compensatory mitigation requirements for the following species that have habitat needs in excess of the habitat created at the identified mitigation sites or require habitat types that would not occur at those mitigation sites:

- California tiger salamander—aquatic and upland habitat
- California red-legged frog—aquatic and upland habitat
- Vernal pool fairy shrimp and vernal pool tadpole shrimp—vernal pool habitat

3F.4.2.2 Site Protection Instruments

Another approach to provide on- or off-site mitigation is to use real estate protection instruments and other site protection instruments to ensure the long-term protection of a mitigation site (Wood and Martin 2016:4–10). Examples include conservation easements, deed restrictions, transfer of title, or other documents such as Conservation Land Use Agreements. The site protection instrument would describe site ownership, management, and enforcement of any use restrictions. This approach would be useful to protect habitat functions provided by certain lands for targeted species such as:

- Greater sandhill crane—foraging habitat, roosting habitat (e.g., flooded post-harvest rice or corn fields, pasture, rangeland)
- Swainson's hawk—foraging habitat (e.g., pasture, alfalfa, rangeland)
- Tricolored blackbird—nesting habitat (e.g., active breeding sites)

Once the final compensatory habitat mitigation needs for the project are determined, DWR will coordinate with the implementing entities for the adopted habitat conservation plans, natural community conservation plans, and other regional conservation plans that overlap with the study area identified in Chapter 13, before decisions are made on acquiring site protection instruments within their respective plan areas. The goal of this coordination is to ensure that DWR's acquisitions to meet mitigation needs do not result in conflicts with these plans and their ability to achieve their biological goals and objectives.

3F.4.3 Tidal Habitat Mitigation Framework

3F.4.3.1 Programmatic Approach

The construction and operations of water conveyance facilities would potentially affect tidal perennial aquatic habitat (e.g., permanent and temporary loss of habitat due to construction) and alter hydrodynamics (e.g., reduce Sacramento River flows downstream of the north Delta intakes) (Chapter 12, *Fish and Aquatic Resources*, Section 12.3.3.2, *Impacts of the Project Alternatives on Fish and Aquatic Resources*).

In summary, approximately 18 to 60 acres of tidal perennial habitat and approximately 1,700 to 4,900 linear feet of channel margin habitat would be required as compensatory mitigation for construction impacts. Approximately 1,600 to 2,800 linear feet of channel margin habitat for salmonids, up to approximately (to be determined) acres of tidal habitat for salmonids, approximately 1,100 to 1,400 acres of tidal habitat for delta smelt, and approximately 110 to 140 acres of tidal habitat for longfin smelt would be required as compensatory mitigation for operations impacts. Coordination is ongoing with the regulatory agencies to refine and finalize the tidal habitat mitigation requirements.

This section describes the general approach to identify and construct mitigation sites for channel margin and tidal wetland habitats. It includes a description of the factors considered for site selection as well as the design concepts that may be applied once a site is selected and acquired. Once developed, it is anticipated these mitigation sites will provide suitable habitat for affected fish and aquatic species, including salmonids, delta smelt, and longfin smelt. Creation of tidal wetlands in the north Delta could influence hydrodynamics in ways that may beneficially affect routing and survival conditions for outmigrating anadromous salmonids by decreasing the fraction of Sacramento River flow (and fish) that enters Georgiana Slough (Perry et al. 2018).

Opportunities for habitat restoration in the Delta are constrained by the elevation of land, which determines the potential to reestablish land-water connections that sustain wetland and floodplain habitat (Delta Stewardship Council 2020a:4–12). Much of the Delta has subsided too deeply to restore its original ecological functions. Farming practices on subsided islands that expose peat soils to oxidation contribute to ongoing subsidence. However, some practices can also reverse subsidence, by creating or promoting accumulation of new soil layers. Examples include managed wetlands, placement of fill, and levee breaching to reestablish hydrological connections (Delta

Stewardship Council 2020b:Q2-3). Managed wetlands that are designed to promote subsidence reversal and carbon sequestration would be appropriate for lands at these elevations (Delta Stewardship Council 2020b:Q2-5). For example, restoration of freshwater wetlands on Bouldin Island would contribute to halting or reversing subsidence on the island and is therefore an important element proposed in this CMP.

For tidal habitats, wetland restoration is not appropriate at elevations that are too far below the intertidal range (i.e., below mean lower low water). The Tidal Habitat Mitigation Framework therefore focuses first on the suitable restoration areas identified in the Delta Plan, such as the tidally influenced regions of Cache Slough and lower Yolo Bypass. However, it is uncertain that all tidal wetland habitat needs can be feasibly met in this region. In addition, while the proposed approach considers existing elevations, it also considers other benefits beyond wetland habitat structure, such as hydrodynamic effects of tidal mitigation (subtidal, intertidal, and transition habitats) on fish migration and survival through the Delta. Therefore, other locations and project types have been considered based on the best available science, as well as feasibility criteria. This includes the beneficial reuse of tunnel material to raise elevations if available nearby (with consideration of other impacts from moving material).

Similarly, enhancing and creating channel margin habitat along the lower Sacramento River mainstem from Freeport to Rio Vista may be challenging due to elevations or levee status (i.e., federal project levees), which could constrain opportunities for levee setbacks and waterside modifications. Other options will be considered to provide the functions of the impacted channel margin habitat, such as enhancing channel margin habitat on distributary sloughs (e.g., Sutter Slough, Steamboat Slough) and enhancing and creating additional foraging and refugia habitat in tidal wetlands and seasonally inundated floodplains (Takata et al. 2017).

3F.4.3.2 Targeted Habitats

3F.4.3.2.1 Channel Margin

The construction of flood protection levees throughout the Delta has led to a reduction in the range of shoreline habitats by eliminating the shallow, slow-velocity river margins, overhanging riparian vegetation, and future woody debris sources (*Chapter 13*). Channel margin habitat occupies the transition zone between open water and upland terrestrial vegetation (e.g., grasslands, woodlands) along the shorelines of rivers and sloughs. This includes tidal freshwater marsh, riparian habitats, and associated shallow water. These habitats are needed for foraging and as refugia for juvenile fish and salmonids to escape fast currents, deep water, and predators (Bureau of Reclamation 2008:5-17; National Marine Fisheries Service 2009:78).

3F.4.3.2.2 Tidal Perennial Aquatic

The tidal perennial aquatic natural community is defined as deep-water aquatic (more than 10 feet deep from mean lower low tide) and shallow aquatic (less than or equal to 10 feet deep from mean lower low tide) zones of estuarine bays, river channels, and sloughs (*Chapter 13*). Under existing conditions, tidal perennial aquatic in the Delta is mainly freshwater habitat, with brackish and saline conditions occurring in the western Delta at times of high tides and low flows into the western Delta. The Yolo Bypass is fresh water.

Tidal channels may have floating aquatic vegetation and submerged aquatic vegetation. Floating aquatic vegetation extends over the open water surface, either as free-floating plants or as colonies extending from plants rooted in banks. Most floating aquatic vegetation in the Delta consists of highly invasive nonnative plants such as water hyacinth, which commonly occurs in dense floating mats that can create anoxic conditions or smother marsh vegetation with decomposing masses of debris.

Submerged aquatic plants are fully submerged and often have root systems reduced to minimal anchorage structures. Many native species, including pondweeds and stoneworts, are valuable food plants for waterfowl and nursery habitat for aquatic invertebrates and fish. In the Delta, nonnative invasive submerged aquatic species such as Brazilian waterweed (*Egeria densa*) and alligatorweed (*Alternanthera philoxeroides*) dominate and replace native species in naturally open water slough beds. These plants create suitable cover and shelter for predatory nonnative fish in tidal slough beds.

Wildlife species associated with tidal aquatic habitats vary with water depth and other habitat features. Deeper open water areas without vegetation provide foraging habitat for wildlife such as terns, gulls, osprey, diving ducks (e.g., ring-necked duck [*Aythya collaris*] and canvasback [*Aythya valisineria*]), and river otters (*Lontra canadensis*), which feed primarily on fish, crayfish, and other aquatic organisms. Shallower water with submerged or floating aquatic vegetation provides foraging habitat for reptiles, such as western pond turtle, and dabbling ducks, such as American widgeon (*Mareca americana*) and northern pintail (*Anas acuta*), which feed on a variety of invertebrates and plant material. Special-status wildlife species include giant garter snake and western pond turtle.

Tidal channels serve as migration corridors for Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*Oncorhynchus mykiss*), as well as migration, spawning, and rearing habitat for delta smelt and longfin smelt. Restored tidal habitat areas would have positive effects on delta smelt (Sommer and Mejia 2013) and longfin smelt (Lewis et al. 2020) through greater habitat extent (e.g., as shown for Liberty Island in the north Delta; Sommer and Mejia 2013) and greater food availability on-site or in nearby areas (Hammock et al. 2019).

3F.4.3.2.3 Tidal Emergent Wetlands

The tidal freshwater emergent wetland natural community is typically a transitional community between tidal perennial aquatic and valley/foothill riparian or terrestrial upland communities across a range of hydrologic and soil conditions (*Chapter 13)*. In the study area, the tidal freshwater emergent wetland community often occurs at the shallow, slow-moving or stagnant edges of freshwater waterways or ponds in the intertidal zone and is subject to frequent long-duration flooding. Tidal freshwater emergent wetland vegetation naturally occurs along a hydrologic gradient in the transition zone between open water and riparian vegetation or upland terrestrial vegetation such as grasslands or woodlands. In the study area, there are often abrupt transitions to agricultural cover, managed wetlands, and boundaries formed by levees and other artificial landforms.

Wildlife species composition in sparsely vegetated areas in low-elevation tidal freshwater emergent wetland is similar to the composition described above under tidal perennial aquatic natural community. Other wildlife species that could utilize these low-elevation tidal freshwater emergent wetlands include western pond turtle, wading birds (egrets and herons), waterfowl (ducks, geese, and swans), shorebirds (e.g., rails, plovers, sandpipers), and perching birds. Common nesting birds include red-winged blackbird (*Agelaius phoeniceus*), marsh wren (*Cistothorus palustris*), common yellowthroat (*Geothlypis trichas*), and black-crowned night heron (*Nycticorax nycticorax*). American beaver (*Castor canadensis*) and muskrat (*Ondatra zibethicus*) forage on marsh plants and use them for cover and den material. Several special-status plant and wildlife species occur in the tidal freshwater emergent wetland natural community, including side-flowering skullcap (*Scutellaria lateriflora*) and giant garter snake.

Restored tidal habitat areas would have the potential for positive effects on juvenile salmonids, for example by providing foraging habitat along marsh edges (Brown 2003) or a greater extent of inundated vegetated habitat for occupancy (Hellmair et al. 2018).

3F.4.3.3 Channel Margin Habitat Mitigation Approach

3F.4.3.3.1 Purpose

Channel margin enhancements would seek to improve rearing and outmigration habitat for juvenile salmonids along migration corridors that has been degraded by construction of flood protection levees. Channel margin restoration would be expected to increase rearing habitat; improve conditions along migration corridors by providing increased habitat complexity, overhead and in-water cover, and prey resources for covered fish species; and improve connectivity between patches of existing, higher-value channel margin habitat. Creation of this habitat would also have the potential to increase resting habitat for migrating adult covered fish species, as well as increase spawning habitat for covered fish that spawn in area, including delta smelt and longfin smelt. There could be some rearing benefit for green sturgeon and white sturgeon (*Acipenser transmontanus*) from channel margin enhancement as well.

The focus would be to provide enhanced channel margin habitat along important juvenile salmonid migration routes; consequently, the measure would improve connectivity between patches of higher-value enhanced channel margins and primary channels. This is particularly necessary for reaches that currently have low habitat value for covered fishes and are heavily used by migrating and rearing fish—for example, the Sacramento River between Freeport and Georgiana Slough. Enhanced channel margin in the vicinity of the proposed north Delta intakes (upstream, between the intakes, and downstream) would provide resting spots and refuge for fish moving through this reach.

It is anticipated that channel margin habitat would be restored to mitigate construction impacts, depending on alternative. Channel margin restoration would be accomplished by improving channel geometry and restoring riparian, marsh, and mudflat habitats on the water side of levees along channels that provide rearing and outmigration habitat for juvenile salmonids in particular, similar to what is current practice by USACE and other flood management agencies when implementing levee improvements. Channel margin restoration associated with federal project levees would not be implemented on the levee, but rather on benches to the waterward side of such levees, and flood conveyance will be maintained as designed. Channel margin enhancements associated with federal project levees may require permission from USACE in accordance with USACE's authority under the Rivers and Harbors Act (33 United States Code § 408) and levee vegetation policy. Any restoration will be designed, constructed, and maintained to ensure no reduction in performance of the federal flood project.

Channel margin restoration would be achieved by site-specific projects. The following habitat suitability factors would be considered when evaluating sites for potential location and design of restored channel margins.

- Existing poor habitat quality and biological performance for listed species of fish combined with extensive occurrence of listed species of fish.
- Locations where migrating salmon and steelhead are likely to require rest during high flows.
- The length of channel margin that can be practicably restored and the distance between restored areas (there may be a tradeoff between restoring multiple shorter reaches that have less distance between them and enhancing relatively few longer reaches with greater distances between them).
- The potential for native riparian plantings to augment habitat for non-aquatic listed species using riparian habitat, such as Swainson's hawk, least Bell's vireo, western yellow-billed cuckoo, or tricolored blackbird, in proximity to known occurrences.
- The potential cross-sectional profile of enhanced channels (elevation of habitat, topographic diversity, width, variability in edge and bench surfaces, depth, and slope).
- The potential amount and distribution of installed woody debris along restored channel margins.
- The extent of shaded riverine aquatic overstory and understory vegetative cover needed to provide future input of large woody debris.

As with tidal wetland restoration, siting, design, and performance criteria for channel margin restoration would be developed. As necessary and reflecting permitting requirements, a collaborative technical team that includes DWR and fishery agency representatives would be formed to select the most biologically appropriate and cost-effective restoration sites, as well as review designs, performance criteria, and management plans for the sites.

3F.4.3.3.2 Site Selection Criteria

Approaches to creating channel margin habitat can vary and are dependent on location. Channel margin enhancements would likely occur along migration corridors that also provide a certain level of flood protection for adjacent properties. To maintain the current extent of in-water habitat and level of flood protection, the existing levee would need to be reconstructed to be further set back from the shoreline. Waterside and landside improvements would be implemented to create enhanced channel margin habitat and provide continued flood protection.

The following criteria would be used to screen potential sites for channel margin habitat enhancement.

- **Benefits to species**—Consider the geography and functions of targeted habitat features for affected species, population segment, and life stages where appropriate. Projects that benefit multiple species will be prioritized, to be cost-effective and efficient with restoration efforts.
- **Ownership**—Focus on DWR- or publicly owned lands first.
- **Existing opportunities**—Look for opportunities to incorporate habitat restoration or creation into project construction, such as channel margin habitat creation as part of levee improvements.

- **Engineering feasibility**—Consider geotechnical or other issues that might limit options, be cost-prohibitive, or delay implementation.
- **Enhance habitat function**—Channel margin habitat projects should be focused in the migration corridor for listed anadromous fishes in the Sacramento River (winter-run Chinook salmon, spring-run Chinook salmon, Central Valley steelhead, and southern distinct population segment of green sturgeon). For the purposes of this program, sites would be targeted within the same general geography of the project, including the north Delta along the Sacramento River mainstem, north Delta along Sacramento River tributaries (e.g., Steamboat, Sutter, and Elk Sloughs), lower Yolo Bypass, and the Cache Slough Complex.
- **Velocity**—Sites that have a lower-velocity environment or where a lower-velocity environment can be created are well suited to channel margin enhancement. However, sedimentation in this depositional environment can bury instream woody material and plantings, so the potential for deposition of sediment must be taken into consideration. Another consideration is locations where migrating salmon and steelhead are likely to require rest during high flows.
- **Depth**—Sites where shallow-water habitats can be created. Avoid sites with steep banks, as it would likely be cost prohibitive because of the amount of necessary material and feasibility of placement.
- **Proximity**—Prioritize sites near each other or existing suitable habitat to create more continuous habitat. Another consideration is the length of channel margin that can be practicably restored and the distance between restored areas (there may be a tradeoff between restoring multiple shorter reaches that have less distance between them and enhancing relatively few longer reaches with greater distances between them).
- **Elevation**—Existing land surface/relationship connectivity to adjacent hydrologic stage range. Channel margin defined as zone within the waterline -5 feet to +10 feet.
- **Linear miles of channel margin**—Projects should seek to maximize the length of channel margin at a single site. Maximize cost effectiveness and ecological function by selecting few sites with longer channel margin.
- **Human disturbance**—Avoid areas with heavy recreational uses.
- **Multispecies benefit**—The potential for native riparian plantings to augment habitat for non-aquatic listed species using riparian habitat, such as Swainson's hawk, least Bell's vireo, western yellow-billed cuckoo, tricolored blackbird, or riparian brush rabbit (*Sylvilagus bachmani riparius*), in proximity to known occurrences.

3F.4.3.3.3 Design Criteria and Concepts

The following criteria were considered in the development of concept designs for channel margin habitat.

- **Bank slope**—Gentle bank slopes of 10:1 provide shallow-water habitat that creates areas of refuge from predators and high-velocity flows and feeding and rearing opportunities. Additionally, it is more difficult to maintain soil on steep slopes.
- **Benches**—Rock benches are relatively flat areas within the levee slope that create a buffer against toe scour and shear stress, provide a space for planting riparian vegetation, and create a

platform for aquatic habitat features. They also create shallow-water habitat for juvenile fish rearing and refugia.

- **Instream woody material**—Provides habitat complexity and high-quality cover and velocity refugia for juvenile Chinook salmon.
- **Bank substrate and emergent vegetation**—Vegetation can provide bank stabilization as well as habitat complexity, refugia for fish, and shade. Riparian vegetation is planted on rock benches that are seasonally inundated.
- **Shade**—Riparian vegetation also contributes to instream woody material and overhanging shade.

Design criteria should also take into account geotechnical issues and feasibility, since many areas in the Delta could have challenges with new loading on existing levees or construction of new setback levees.

Enhancement would generally entail replacing armored or otherwise altered channel banks with more natural shoreline habitats that provide shallow, slow-velocity river margins, overhanging riparian vegetation, and future woody debris sources. Approaches to creating channel margin habitat enhancement can vary and are dependent on location. Channel margin enhancements would likely occur along migration corridors that also provide a certain level of flood protection for adjacent properties. To maintain the current extent of in-water habitat and level of flood protection, the existing levee would need to be reconstructed to be set back from the shoreline. Waterside and landside improvements would create enhanced channel margin habitat and provide continued flood protection.

Waterside improvements would entail degrading the existing levee to create gently sloping banks that gradually transition from tule marsh to riparian vegetation on the face of the new setback levee. While enhanced habitat would primarily be provided by native vegetation, ballasted large wood may be incorporated into the channel bank in some locations for enhanced complexity and refugia. While the heavily vegetated bank would provide some wave attenuation value, erosion protection may still be required along the waterside of the setback levee. Bio-technical bank treatments, which combine cobble and other erosion resistant materials with willows and other plantings, would be employed as much as possible. Following all grading, the site would be revegetated, likely through a combination of active and passive methods. Riparian and upland areas would be actively seeded, planted, and temporarily irrigated during the initial establishment period. Intertidal wetland areas would be revegetated through a combination of active planting and passive natural recruitment.

Landside improvements would include the construction of a new setback levee behind and connected to the existing levee. The actual extent of earthmoving required for levee construction would vary significantly by site depending on the degree of land subsidence and the level of flood protection needed. It is generally anticipated that imported fill would be needed to construct some or all of the new setback levee. Material generated by degrading the existing levee would be reused in the new levee construction as much as feasible based on timing, soil suitability, and other factors.

Figure 3F-13 provides a conceptual design for channel margin habitat creation with no setback levee while Figure 3F-14 depicts a design for sites needing a setback levee. For example, there is an opportunity for channel margin habitat improvements at Bouldin Island along the waterside of the Mokelumne River levee (Figure 3F-6).

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

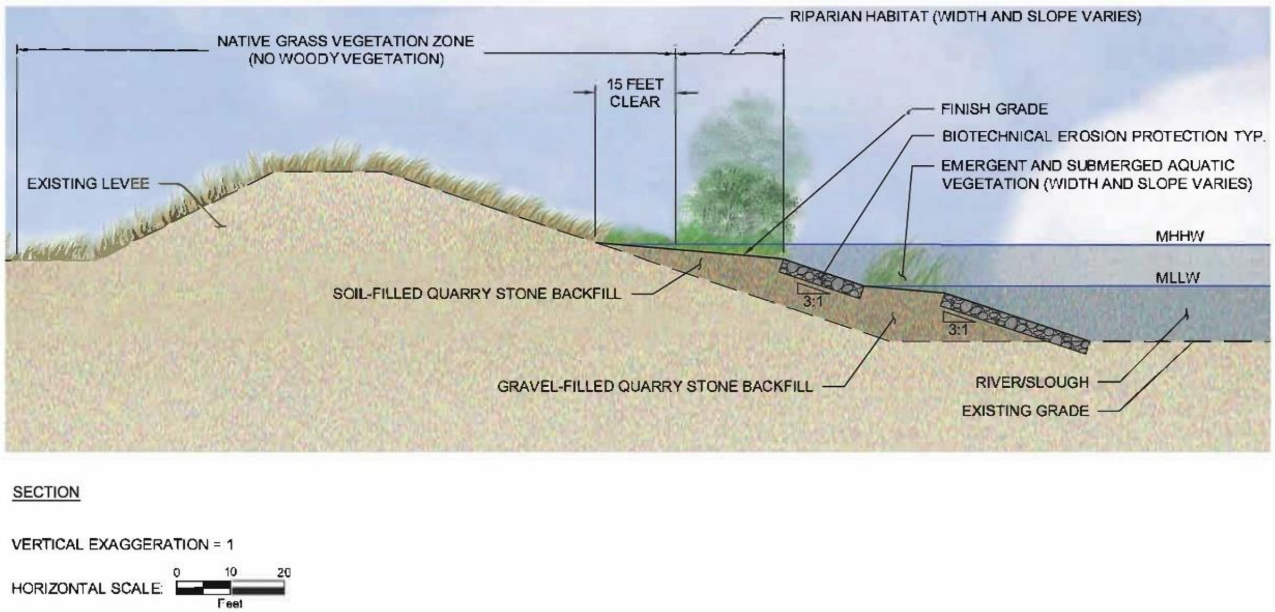

Figure 3F-13. Channel Margin No Setback Levee

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

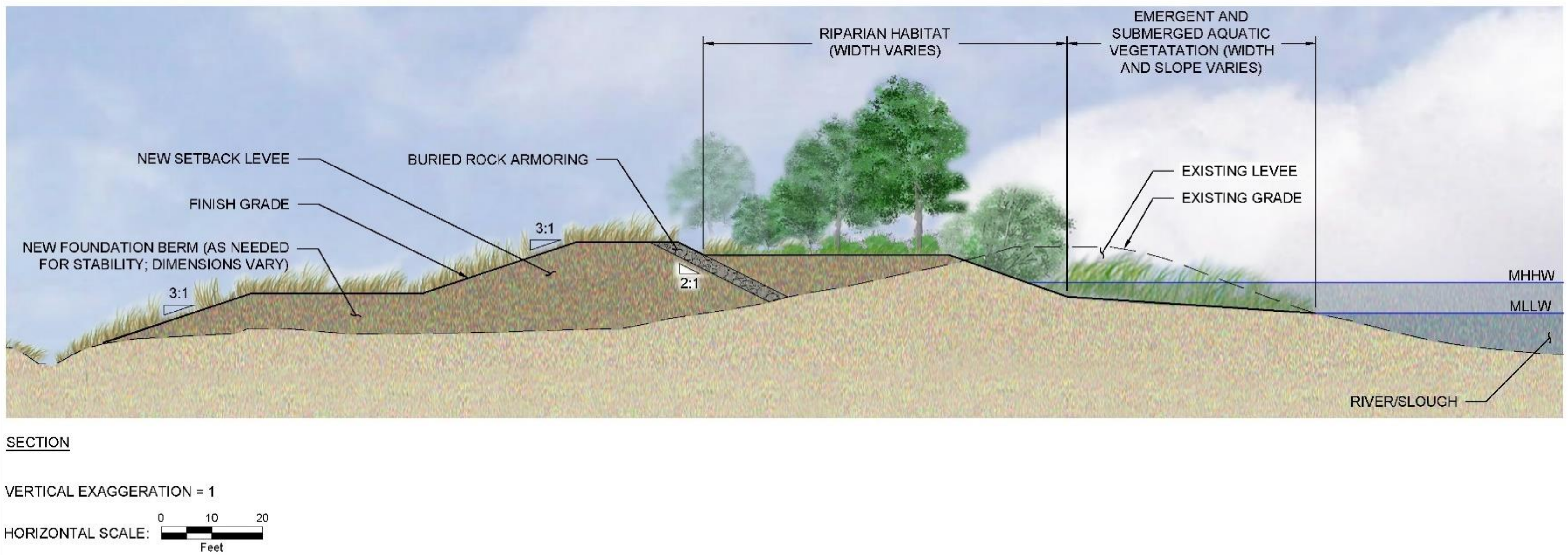

Figure 3F-14. Channel Margin Setback Levee

Channel margin enhancement construction is expected to be performed in the following manner.

- Use of large mechanized equipment (typically, a trackhoe) to remove riprap from channel margins.
- Use of grading equipment such as trackhoes and bulldozers to modify the channel margin side of levees or setback levees to create low floodplain benches with variable surface elevations that create hydrodynamic complexity and support emergent vegetation.
- Use of construction equipment such as trackhoes, bulldozers, and cranes to install large woody material (e.g., tree trunks, stumps) into constructed low benches or into existing riprapped levees to provide physical complexity.

3F.4.3.4 Tidal Wetland Habitat Mitigation Approach

3F.4.3.4.1 Purpose

The construction and operations of water conveyance facilities would potentially affect tidal perennial aquatic habitat (e.g., permanent and temporary loss of habitat due to construction) and alter hydrodynamics (e.g., reduced Sacramento river flows downstream of the north Delta intakes). Restoration of tidal wetlands is one approach to mitigate for these impacts. Tidal perennial aquatic and tidal freshwater emergent wetland habitats in the Delta play a critical role for native fish, including providing improved foraging opportunities and refuge from predators. The restoration of tidal wetlands containing dendritic channels and shallow subtidal areas is intended to mitigate impacts by providing habitat to support survival and growth (including food production) of one or more life stages of delta smelt, longfin smelt, and Chinook salmon (Sherman et al. 2017:29–30, 276–277, 316–321). Depending on the location and size, tidal wetland creation in the north Delta may also have a beneficial effect on flow reversals in Georgiana Slough (Perry et al. 2018), which would benefit migrating Chinook salmon juveniles.

3F.4.3.4.2 Site Selection Criteria and Tools

Tidal wetland habitat mitigation would generally be achieved at suitable locations by reconnecting former wetland areas to adjacent tidal sloughs and rivers. Factors to be considered when evaluating sites for potential location and design of tidal perennial habitat restoration include provision of suitable habitat features such as those suggested by the San Francisco Estuary Institute (2020:7–12) and Sommer and Mejia (2013).

- **Benefits to species**—Consider the geography and functions of targeted habitat features for affected species, population segment, and life stages where appropriate. Projects that benefit multiple species will be prioritized, to be cost-effective and efficient with restoration efforts.
- **Ownership**—Focus on DWR- or partner-owned lands first, as well as other public lands.
- **Mineral Rights**—Preferably, the mineral rights would be intact with the land title. In the instance where the mineral rights are severed, a remoteness opinion would be provided documenting the minimal risk of future surface disturbance for mineral purposes.
- **Geography**—Prioritize sites within the North Delta Habitat Arc, especially those areas within the lower Yolo Bypass and Cache Slough Complex. These areas would provide greater benefits for target fish species.

- **Elevation—Prioritize existing land surfaces that have high hydrologic connectivity to adjacent lands within the tidal stage range, consistent with Delta Plan policy ER P2 *Restore Habitats at Appropriate Elevations* (23 California Code of Regulations § 5006).**
- **Lateral extent/surface area—The potential lateral extent of land surface connectivity to the tidal range is important to maximize the surface area of created wetland habitat.**
- **Sea level rise accommodation—Similar to lateral extent, sites that offer sufficient interior land area that could accommodate landward retreat in face of sea level rise should be prioritized.**
- **Water quality—Siting would consider factors such as local hydraulics, source water, drainages, and location of nearby drinking water supply intakes. Harmful algal blooms of cyanobacteria (CHABs) have not been problematic in the Cache Slough region because** water quality conditions in the North Delta Habitat Arc (Cache Slough to Suisun Marsh) are generally not conducive to *Microcystis* growth and aggregation (Environmental Science Associate 2022). **The risk for increased selenium bioaccumulation would be minimized by locating new tidal habitat in the north Delta, away from selenium sources from the San Joaquin Valley. The risk of dissolved organic carbon in drainage water from oxidizing peat soils (Fleck et al. 2007) would be minimized because sites with suitable intertidal elevations would have more mineral-based soils due to geography (Cache Slough and lower Yolo Bypass areas) or design (e.g., build up elevations with RTM or dredge spoil).**
- **Feasibility**—Consider factors such as type of levee (federal project or non-federal, existing condition and easements), other regulatory permitting, land ownership, geotechnical feasibility, implementation readiness, easements, and infrastructure.

3F.4.3.4.3 Design Criteria and Considerations

The following criteria were considered in the development of concept designs for tidal wetland habitat.

- **Tidal marsh landmasses—**Tidal marsh elevations should allow exchange between adjacent tidal marsh areas and channel habitats during high tides. Marsh plains should generally slope toward the channel for effective draining.
- **Intertidal channels—**Channel network with dendritic channels ranging in size. Channels should be sinuous and branching, similar to natural channel networks. Channels should be largest (deepest and widest) where they enter the marsh and smallest at their terminus inside the marsh.
- **Large patch size**—Where feasible, designs should favor creation of larger patches that can be more sustainable. Large marsh patches (around 250 acres) can support well-developed channel systems and a range of physical and ecological features.
- **Minimize distance to nearest marsh "neighbor"—This allows greater habitat connectivity and cumulative benefits.**
- **Increase core habitat**—Core areas provide productivity to edge habitats, are less accessible to many predators, buffered from human disturbance.
- **Water quality—Designs should consider hydrologic regime (sites that experience frequent wetting/drying may foster greater methylation of mercury) and channel**

morphology (backwater areas with low velocities and high residence time can create conditions that foster harmful algal blooms and bioaccumulation of selenium) to minimize potential effects related to methylmercury generation, selenium bioaccumulation and CHABs.

Siting, design, and performance criteria for tidal perennial habitat restoration would be developed based on assessments of topography, local hydrodynamic conditions and sediment transport. As necessary and reflecting permitting requirements, a collaborative technical team including DWR and fishery agency representatives would be formed to select the most biologically appropriate and cost-effective restoration sites, design the restoration plan, set performance criteria, and develop the restoration unit management plan for the sites.

Tidal wetland habitat mitigation would be achieved at suitable locations by reconnecting former wetland areas to adjacent tidal sloughs and rivers. Restoration would primarily occur through breaching or setback of levees to restore tidal fluctuation to land parcels currently isolated behind those levees. Where practicable and appropriate, some areas would be raised to elevations that would support tidal marsh vegetation following levee breaching. Figure 3F-15 provides a conceptual design for tidal wetland creation at unsubsided sites while Figure 3F-16 depicts a design for subsided sites.

Typical actions required to create suitable tidal marsh habitat at these sites include grading, planting, and infrastructure modifications. Earthwork often includes breaching an existing levee or berm to reintroduce tidal action to the site. Other grading may be performed prior to breaching to create wetland features that enhance habitat function, including tidal channels, tidal pannes and tidal ponds. In addition, for certain sites, more significant earthmoving may be required to raise subsided areas to intertidal elevations or to reinforce surrounding levees. Depending on the project location, it also may be necessary to construct an entirely new flood control levee along portions of the project perimeter to protect adjacent properties. Where feasible, transitional riparian and other habitat may be graded between the marshplain and high elevation areas. The actual extent of earthmoving required can vary significantly depending on the existing topography of the site.

Following earthwork and grading, the site would be revegetated, likely through a combination of active and passive methods. Any riparian or upland areas would be actively seeded, planted, and temporarily irrigated during the initial establishment period. Depending on site-specific conditions and monitoring results, patches of native emergent vegetation may be planted to accelerate the establishment of native marsh vegetation on restored marsh plain surfaces. Following reintroduction of tidal exchange, tidal marsh vegetation is expected to establish and maintain itself naturally at suitable elevations relative to the tidal range.

Various infrastructure modifications, such as protection, removal, or relocation of existing utilities, pumping systems, and other water management structures, would occur as needed. Typically work would be sequenced so that grading and infrastructure improvements occur first, followed by planting and finally breaching of the existing levee to reintroduce tidal action.

Levee breaching would require removing levee materials from within and adjacent to tidal and other aquatic habitats. Levee breaching would entail in-water work using construction equipment such as bulldozers, backhoes, and barges; any in-water work would be performed during an in-water work window to be approved by CDFW, the National Marine Fisheries Service (NMFS), and USFWS. Removed levee materials would be placed on the remaining levee sections, placed within the restoration area, or hauled to a disposal area previously approved by CDFW, NMFS, and USFWS.

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

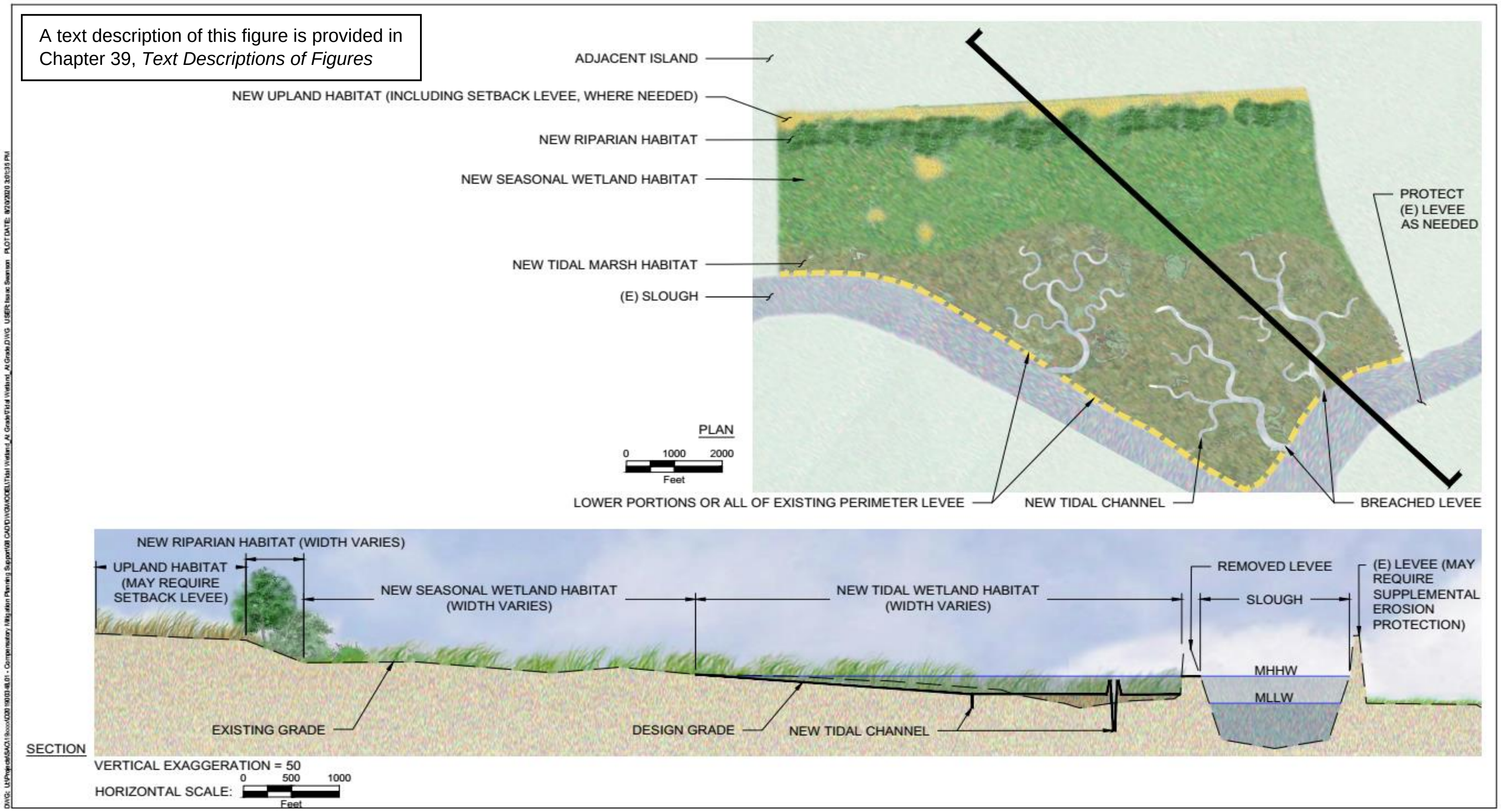

Figure 3F-15. Tidal Wetland Unsubsided Conceptual Section

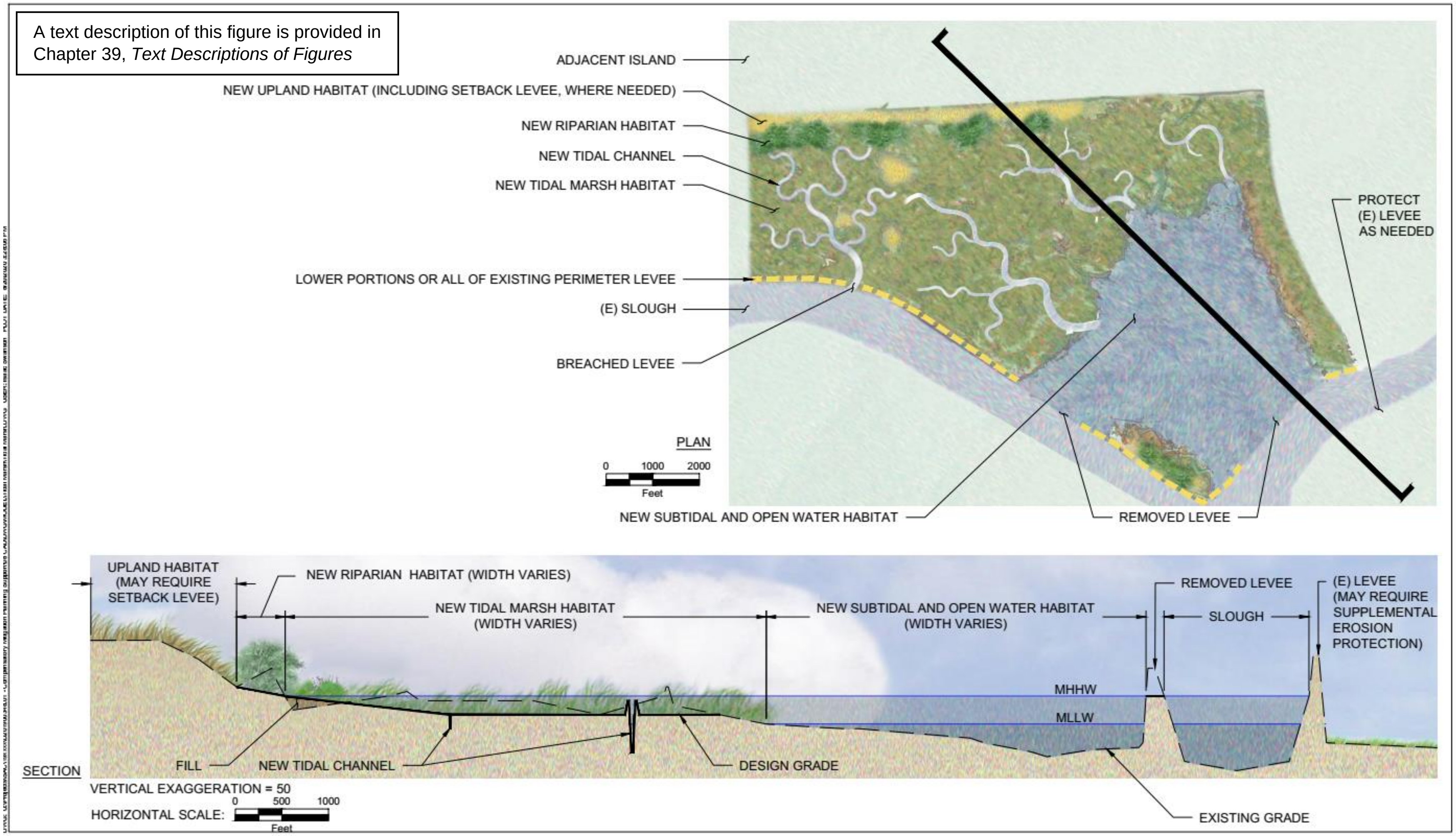

Figure 3F-16. Tidal Wetland Subsided Conceptual Section

3F.4.3.4.4 Water Quality Management

Implementation of compensatory mitigation could affect water quality in the Delta, namely levels bioaccumulation of methylmercury and, selenium, levels of dissolved organic carbon, and *harmful algal blooms of cyanobacteria (CHABs) such as Microcystis (*EIR Chapter 9Section 9.3.3.2, *Impacts of the Project Alternatives on*, *Water Quality).* The creation of tidal wetland habitats, which would be hydrodynamically connected to Delta channels, could create conditions conducive to methylation of mercury, promote uptake and bioaccumulation of methylmercury and selenium in fish and aquatic-dependent birds within and adjacent to new tidal habitats, and create areas where water residence time and water temperatures could be sufficiently high to support *CHABs* where such blooms do not currently exist. Tidal wetland habitats would be sited in the Cache Slough region, where water quality conditions are generally not conducive for *Microcystis*.

Freshwater emergent wetland and depressions on Bouldin Island (Mitigation Site B1) have potential to create conditions favorable for methylmercury formation. However, these emergent wetlands would not typically be hydrodynamically connected to Delta channels except during winter when high flood conditions could result in discharge, which would be monitored for mercury and discharged to a detention basin, if necessary. CHABs form in the summer months and thus do not have potential to be discharged into Delta waters. However, there is potential for CHABs to form within the newly created emergent wetlands where terrestrial species such as giant garter snake, least Bell's vireo and yellow-billed cuckoo occur. While CHAB formation is not expected, monitoring would be performed, and any identified concerns would be adaptively managed. Valley/-foothill riparian habitats are not associated with these water quality stressors. As such, these other types of new habitats would not affect methyl mercury, selenium, or CHAB formation within Delta waterways, relative to existing conditions.

To mitigate for these potential effects, tidal habitat siting, design, and maintenance would be guided by the design criteria stated above. DWR will implement site-specific monitoring and management plans (Mitigation Measures WQ-6: *Develop and Implement a Mercury Management and Monitoring Plan,* and WQ-14: *Develop and Implement a CHAB Management Plan*) to minimize generation of methylmercury resulting from CMP activities that could potentially promote mobilization of methylmercury into the food chain within new tidal habitats. DWR will develop a Mercury Management and Monitoring Plan (MMMP) to guide tidal habitat siting, design, monitoring, and adaptive management. The MMMP will require evaluation of site-specific conditions and include implementation design elements that minimize conditions that would be conducive to the creation or increased availability of methylmercury in tidal habitats while still achieving most or all of the restoration benefits desired. The MMMP will also require preparation of site-specific mercury management plans that will address MMMP elements for sites selected for new tidal habit, as appropriate, based on site-specific conditions. For non-tidal sites, methylmercury and CHABs would be monitored and adaptively managed to meet specific performance criteria as part of the site-specific maintenance and management plans described in Section 3F.6, *Maintenance and Management*, and Section 3F.7, *Performance Standards and Monitoring*.

3F.5 Assurances

3F.5.1 Financial Assurances

DWR commits to providing the funding for the initial establishment and long-term management of the mitigation sites to ensure that the mitigation sites continue to meet the established goals of the CMP and any subsequent management plans. This includes the initial 5-year establishment period for the mitigation sites and all activities associated with ongoing maintenance.

Payment of the costs of constructing and operating the mitigation sites is assured by DWR's long-term water supply contracts and applicable state law. DWR is a party to a long-term water supply contract with each of the SWP water contractors. These contracts are the foundation of the SWP's fiscal strength. DWR has not experienced payment delinquencies or defaults by the contractors that have had a materially adverse effect on the operation or maintenance of the SWP, or the ability of DWR to pay its obligations when due.

Construction and operation (i.e., associated management costs) of the proposed mitigation sites for the project are expected to be paid by DWR and charged to participating SWP water contractors. DWR would issue revenue bonds to fund construction costs. As part of the Delta Conveyance Project, the long-term water supply would be amended to provide for the payment of construction and operation and maintenance costs, including all mitigation and monitoring costs incurred during and after construction.

All lands protected and restored for compensation of impacts from construction and operation of the project on aquatic resources and special-status species, as appropriate and consistent with the specific mitigation, would be protected and managed in perpetuity. DWR, as project applicant, would ensure appropriate long-term funding for the compensatory mitigation and designation of the party or entity that will be responsible for long-term management of the mitigation sites.

3F.5.2 Site Protection Instrument

The mitigation sites on Bouldin Island and I-5 ponds would be owned and managed by the state or its designee. Long-term management plans would be developed as a part of each individual site. Conservation easements would be used to ensure long-term legal protection of the mitigation sites. Other methods of long-term legal protection could be used at other sites through deed restrictions, transfer of title, etc.

3F.6 Maintenance and Management

3F.6.1 Approach

This CMP provides the broad framework for the maintenance and management of mitigation sites. It is anticipated that more detailed, site-specific interim and long-term management plans would be prepared for each mitigation site as designs progress and, in the case of tidal and channel margin sites, additional mitigation sites are selected.

3F.6.2 Establishment Period Maintenance and Management

DWR would prepare an interim management plan for the establishment period for each site (generally the first 5 years following construction). This plan would address site establishment issues such as weed control and irrigation.

Weed control and vegetation maintenance would occur in all restoration areas for 5 years following restoration, as appropriate, based on performance standards described below. Approved herbicides, mowing, or grazing may be used to manage weeds, as appropriate.

Irrigation systems at mitigation sites would be maintained in working order for at least 1 year or until vegetation becomes established. Once the installed plants are established and irrigation is no longer needed, all temporary irrigation materials would be removed from the mitigation site.

3F.6.3 Long-Term Maintenance and Management

3F.6.3.1 General Approaches

DWR would prepare and implement a long-term management plan for each mitigation site at Bouldin Island and the I-5 ponds. These plans would address long-term maintenance needs at each site, including vegetation management, weed control, trash management, and facilities maintenance, as well as identify the qualified staff or third-party entities responsible for overseeing the maintenance and management. The plans would be working documents that are updated and revised as needed to incorporate new acquisitions suitable for coverage under the same management plan and to document changes in management approach that have been agreed to by all parties, consistent with their authority.

Basic elements of long-term site maintenance may include the following.

- General site maintenance
  - Site visits
  - Checks for trespassing
  - Removal of trash
  - Maintenance and replacement of signs, fences, and gates
- Vegetation management
  - Mapping of nonnative invasive plant species
  - Control of nonnative invasive plant species
  - Mowing
  - Controlled burns
  - Grazing
  - Discing
- Levee and channel maintenance
  - Levee inspection
  - Dredging of sediment

- Monitoring of erosion
- Road gravel replenishment
- Grading
- Rodent abatement and damage repair

Annual reports would be prepared for each mitigation project site. The annual reports would include a summary of work completed to date, milestones, current status, constraints, and relative accrued benefits of the project. The report would specify remedial actions or management responses, as described in Section 3F.6.4, *Adaptive Management*.

3F.6.3.2 Giant Garter Snake Management at I-5 Pond Sites

In addition to the general maintenance activities described above, the I-5 Pond sites would be subject to management activities designed to achieving sustainability for giant garter snake habitat. Long-term management would require access to the sites to perform ongoing vegetation and water management. Sites may need to accommodate access of large equipment and boats into marsh areas to chop and disc vegetation, excavate sediment, and to repair berms and water control structures. Ongoing water management and the ability to selectively isolate, dewater, and rewater separate management units are essential to maintain giant garter snake habitat at the I-5 pond sites.

Giant garter snake mitigation areas usually discourage the establishment of large stands of woody vegetation to minimize shading as well as potential predation of giant garter snake by birds of prey. Grazing, mowing, controlled burns, and discing can be used to minimize the growth of woody vegetation and to reduce fire risk in uplands. Grazing would require installing an exclusion fence, gates, and watering troughs to keep grazing animals out of sensitive wetland habitat and open water areas. Other fencing to dissuade trespassing may also be incorporated.

3F.6.4 Adaptive Management

Adaptive management is a science-based, flexible approach to resource management decision making. The Delta Reform Act of 2009 identified adaptive management as the desired approach to reduce the ecological uncertainty associated with the management of the Delta system. An adaptive management and monitoring plan would be prepared for each mitigation site to ensure habitat creation goals are met, consistent with the Delta Plan's adaptive framework (Delta Stewardship Council 2013:Appendix 1B).

The Adaptive Management Program for the project would outline key uncertainties for tidal wetlands, channel margin, riparian, and floodplain restoration projects intended to benefit listed terrestrial and fish species. Effectiveness monitoring and research studies would be necessary to examine the ecological function of planned restoration.

For each of the mitigation project sites, a monitoring and adaptive management plan would be prepared, as described below (3F.7.2 Monitoring)*. These site-specific plans would track* progress toward performance standards, to improve understanding of restoration effectiveness, and to trigger remedial actions as needed to adjust management to achieve mitigation goals.

3F.7 Performance Standards and Monitoring

3F.7.1 Performance Standards

As part of the development of the site-specific maintenance and management plans, performance standards would be established for each mitigation site to provide the basis for annual monitoring parameters and help determine the need for possible remedial actions after project implementation. Development of performance standards assumes an adaptive management approach. Failure to reach one or more of the performance standards does not necessarily imply failure of the mitigation project. Rather, all monitoring results obtained during annual monitoring would be evaluated and provide the basis for discussion with the resource agencies.

Performance standards would be provided for each habitat type described herein, consistent with current USACE uniform performance standards for compensatory mitigation monitoring (U.S. Army Corps of Engineers 2012). Monitoring categories and examples of potential metrics include the following.

- **Hydrologic**—Wetland hydrology, soil saturation, inundation, hydric soils
- **Vegetation**—Survivorship of installed plants, dominance of native vegetation representative of the target natural community, percent cover of invasive nonnative vegetation, species richness, recruitment of native plants
- **Physical**—Topography, channel geomorphology, bank stability

Performance standards are not included for special-status species directly since the objective of the project mitigation is to establish compensatory suitable habitat rather than to ensure occupancy. Therefore, the successful establishment of aquatic, wetland, and upland habitats based on the floristic, physical, and hydrologic components of the habitats would be used to evaluate the success of special-status species habitat compensatory mitigation. Species-specific habitat requirements, as outlined in the design parameters (Attachment 3F.1, *Compensatory Mitigation Design Parameters*), would also be considered as performance criteria. Examples could include:

- **Giant garter snake**—Amount and configuration of open water, emergent vegetation, and upland refugia.
- **Fisheries**—Amount of shaded riverine aquatic habitat, water quality (temperature, dissolved oxygen, turbidity)

Monitoring would also examine threats to habitat quality and wildlife health that could occur at mitigation sites. Examples of metrics could include:

- **Water quality** — concentrations of CHABs (which produce cyanotoxins) and methylmercury
- **Invasive species**—percent cover of native or non-native invasive plant species or presence of invasive wildlife species.

See Attachment 3F.1 for more criteria for design and performance for mitigation sites.

3F.7.2 Monitoring

A monitoring and adaptive management plan would be prepared to guide post-construction monitoring and management during a 3- to 5-year establishment period. Compliance monitoring would be conducted to document in a GIS database the extent of natural communities and species habitats restored by measuring constructed outputs (e.g., acres restored, as-built topography and elevations, hydrology). Regulatory permits may also require specific monitoring actions. Effectiveness monitoring would be conducted to evaluate progress toward objectives and performance standards by measuring indicators of ecological status and function ("metrics") (Section 3F.7.1, *Performance Standards*). A key metric would be the establishment of native and invasive nonnative plants in restored natural communities. Species-specific habitat features, such as upland refugia, or the production of toxins, such as methylmercury or cyanotoxins would be considered as well.

The initial monitoring period would last 5 years and would evaluate establishment success of aquatic resources and special-status species habitats at the mitigation sites. The year 5 performance standards in most cases would match those identified by USACE in the Uniform Performance Standards for Compensatory Mitigation Monitoring (U.S. Army Corps of Engineers 2012). Performance standards for flora in years 1 through 4 are related to year 5 standards by assuming that each year following installation habitats should demonstrate an increase in cover of native hydrophytes, number of native recruits, species richness, and a decrease in percent cover of invasive nonnative species. Monitoring would be conducted annually.

Long-term monitoring would focus on conformance with the long-term management plan. The long-term management plan would identify remedial actions in the event that monitoring indicates performance standards may not be on track for success beyond the establishment period. Examples of remedial actions could include, but are not limited to, additional plantings, topographic recontouring, weed control, erosion control, and further monitoring to diagnose the source of the problem. Long-term monitoring of the sites would occur every 5 years.

Tidal wetlands monitoring would be performed at the scale of the individual restoration site using consistent sampling techniques developed by the Tidal Wetland Monitoring Project Work Team of the Interagency Ecological Program (IEP Tidal Wetlands Monitoring Project Work Team 2017).

3F.7.3 Reporting

For the establishment period, an annual report would be prepared that includes a summary of management tasks conducted, general site conditions, and monitoring results, including status of resources and progress toward performance standards. The annual report would include description of any management problems and recommendations regarding remedial actions to resolve or reduce (e.g., weed control, security, vegetation removal, erosion control, methylmercury or CHAB production).).

The source and extent of funding for postconstruction monitoring would dictate the scale and sampling frequency of monitoring (season and number of years). The monitoring frequency of various metrics would likely be adjusted each year to account for changing environmental conditions (e.g., floods, drought) and current status of performance standards.

In the long term, it is anticipated that monitoring and reporting may be downscaled to once every 5 years based on results and recommendations to ensure that the project continues to perform as expected.

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3F.8.2 Personal Communications

Skip Moss. Chief Strategic Officer. Natural Resources Group. West Sacramento, CA. April 19, 2022—email to Melissa Denena, Environmental Science Associates.

Lee, Peggy. Ecological Solutions Manager. Resource Environmental Solutions. Sacramento, CA. April 19, 2022—email to Melissa Denena, Environmental Science Associates.

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Attachment C3.1
Compensatory Mitigation Design Parameters

> The information in this appendix is presented as it was provided by the California Department of Water Resources (the applicant) in the *Delta Conveyance Project Draft Environmental Impact Report* Attachment 3F.1, *Compensatory Mitigation Design Parameters* (California Department of Water Resources 2022) and therefore is presented from the California Environmental Quality Act perspective. However, the U.S. Army Corps of Engineers relied on this information when preparing its Draft Environmental Impact Statement. All chapter references in this appendix are to those in the Draft EIR. Please refer to the Draft EIR for any information cross referenced.

3F.1.1 Design Commitments and Guidelines

This attachment provides design commitments and guidelines for compensatory mitigation of impacts analyzed in the Draft Environmental Impact Report (Draft EIR) for special-status natural communities, wetland and other waters, and special-status species (Chapter 12, *Fish and Aquatic Resources*, and Chapter 13, *Terrestrial Biological Resources*). Avoidance and minimization measures that would apply during construction of the project (including but not limited to construction of the compensatory mitigation sites themselves) are contained in Appendix 3B, *Environmental Commitments and Best Management Practices*.

Table 3F.1-1. Summary List of Compensatory Mitigation Design Commitments and Guidelines

Number	Biological Resource
CMP-1	Tidal Perennial Aquatic Habitat
CMP-2	Tidal Freshwater Emergent Wetlands
CMP-3	Valley/Foothill Riparian Habitat
CMP-4	Nontidal Perennial Aquatic Habitat
CMP-5	Nontidal Freshwater Perennial Emergent Wetland
CMP-6	Nontidal Brackish Emergent Wetland
CMP-7	Alkaline Seasonal Wetland Complex
CMP-8	Vernal Pool Complex
CMP-9	Special-Status Plants
CMP-10	Mason’s Lilaeopsis
CMP-11	Vernal Pool Aquatic Invertebrate Habitat
CMP-12	Valley Elderberry Longhorn Beetle Habitat
CMP-13	California Tiger Salamander Habitat
CMP-14	California Red-Legged Frog Habitat
CMP-15	Giant Garter Snake Habitat
CMP-16	Western Yellow-Billed Cuckoo Habitat
CMP-17	California Black Rail Habitat
CMP-18	Sandhill Crane Habitat
CMP-19	Swainson’s Hawk Nesting and Foraging Habitat

Number	Biological Resource
CMP-20	Occupied Burrowing Owl Habitat
CMP-21	Least Bell's Vireo
CMP-22	Tricolored Blackbird Habitat
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
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
CMP-27	Tidal Perennial Habitat Restoration for Operations Impacts on Delta Smelt
CMP-28	Tidal Perennial Habitat Restoration for Operations Impacts on Longfin Smelt

Table 3F.1-2. Design Commitments and Guidelines for Compensatory Mitigation of Natural Communities, Wetlands, and Other Waters

Number	Habitat	Detailed Description of Measure or Design Guideline
CMP-0	General Design Guidelines	These design guidelines address critical life functions for certain species. It also includes a framework to ensure that any habitat conversions associated with site development are accounted for so there would be no significant loss in habitat or habitat for species.
CMP-1	Tidal Perennial Aquatic Habitat	Tidal perennial aquatic habitat will be created or acquired and permanently protected to compensate for project impacts to ensure no significant loss of tidal perennial aquatic habitat functions and values. A restoration and monitoring plan will be developed and implemented concurrently with project construction. The plan will describe how tidal perennial aquatic habitat will be created and monitored, including funding mechanisms and appropriate long-term management measures, and agency reporting requirements.
CMP-2	Tidal Freshwater Emergent Wetland	Tidal freshwater emergent wetland will be created or acquired and permanently protected to compensate for project impacts to ensure no significant loss of tidal freshwater emergent wetland functions and values. A restoration and monitoring plan will be developed and implemented concurrently with project construction. The plan will describe how tidal freshwater emergent wetland will be created and monitored, including funding mechanisms and appropriate long-term management measures, and agency reporting requirements.
CMP-3	Valley/Foothill Riparian Habitat	Valley/foothill riparian habitat will be created or restored and permanently protected to compensate for project impacts to ensure no significant loss of valley/foothill riparian habitat functions and values. In addition, valley/foothill riparian habitat will be acquired and permanently protected to further compensate for project impacts. A restoration and monitoring plan will be developed and implemented concurrently with project construction. The plan will describe how valley/foothill riparian habitat will be created and monitored, including funding mechanisms and appropriate long-term management measures, and agency reporting requirements.

Number	Habitat	Detailed Description of Measure or Design Guideline
CMP-4	Nontidal Perennial Aquatic Habitat	Nontidal perennial aquatic habitat will be created or acquired and permanently protected to compensate for project impacts to ensure no significant loss of nontidal perennial aquatic habitat functions and values. A restoration and monitoring plan will be developed and implemented concurrently with project construction. The plan will describe how nontidal perennial aquatic habitat will be created and monitored, including funding mechanisms and appropriate long-term management measures, and agency reporting requirements.
CMP-5	Nontidal Freshwater Perennial Emergent Wetland	Nontidal freshwater perennial emergent wetland will be created or acquired and permanently protected to compensate for project impacts to ensure no significant loss of nontidal freshwater perennial emergent wetland functions and values. In addition, nontidal freshwater perennial emergent wetland will be acquired and permanently protected to further compensate for project impacts. A restoration and monitoring plan will be developed and implemented concurrently with project construction. The plan will describe how nontidal freshwater perennial emergent wetland will be created and monitored, including funding mechanisms and appropriate long-term management measures, and agency reporting requirements.
CMP-6	Nontidal Brackish Emergent Wetland	Nontidal brackish emergent wetland will be created or acquired and permanently protected to compensate for project impacts to ensure no significant loss of nontidal brackish emergent wetland functions and values. In addition, nontidal brackish emergent wetland will be acquired and permanently protected to further compensate for project impacts. A restoration and monitoring plan will be developed and implemented concurrently with project construction. The plan will describe how nontidal brackish emergent wetland will be created and monitored, including funding mechanisms and appropriate long-term management measures, and agency reporting requirements. This mitigation measure does not apply to Alternatives 1, 2a, 2b, and 2c.
CMP-7	Alkaline Seasonal Wetland Complex	Alkaline seasonal wetland complex will be created or acquired and permanently protected to compensate for project impacts to ensure no significant loss of alkaline seasonal wetland complex functions and values. In addition, alkaline seasonal wetland complex will be acquired and permanently protected to further compensate for project impacts. A restoration and monitoring plan will be developed and implemented concurrently with project construction. The plan will describe how alkaline seasonal wetland complex will be created and monitored, including funding mechanisms and appropriate long-term management measures, and agency reporting requirements.
CMP-8	Vernal Pool Complex	Vernal pool complex will be created or acquired and permanently protected to compensate for project impacts to ensure no significant loss of vernal pool complex functions and values. In addition, vernal pool complex will be acquired and permanently protected to further compensate for project impacts. A restoration and monitoring plan will be developed and implemented concurrently with project construction. The plan will describe how vernal pool complex will be created and monitored, including funding mechanisms and appropriate long-term management measures, and agency reporting requirements.

Table 3F.1-3. Design Commitments and Guidelines for Compensatory Mitigation to Compensate for Loss of Special-Status Species Habitat

Number	Species Habitat	Detailed Description of Measure or Habitat Design Guideline
CMP-9	Special-Status Plants	Impacts on special-status plants and their habitat will be offset through restoration of suitable habitat. Suitable habitat is defined as habitat that currently supports the species for which mitigation is being implemented or meets habitat requirements for the species, as identified in the species models used in the impact analysis. Habitat requirements for the species include consideration of factors such as the natural community types associated with the species, soil map units associated with the species, and whether the species is or was known to occur at the proposed mitigation site. Suitable habitat also includes habitat that historically supported the species for which mitigation is being implemented, if a good-faith effort to re-establish the species into that habitat is attempted. A good-faith effort may include actions such as transplanting, propagation of seed, weed abatement, restoration of microtopography, and siting near existing occurrences. Mitigation habitat will consist of existing, off-site suitable habitat acquired in fee, through conservation easements, or from a certified conservation bank. At least 2 acres of habitat will be restored and protected for every 1 acre that would be lost. A restoration and monitoring plan will be developed and implemented concurrently with project construction. The plan will include success criteria, specify the length of the monitoring period, and contain assurances of implementation, monitoring, and maintenance. Restored special-status plant habitat will be carried out concurrently with sensitive natural community mitigation and sited in areas near extant populations of the affected species that could provide vegetative or seed propagules. Restored habitat will be sited in locations subject to CDFW approval. The mitigation habitat will be monitored annually to verify that the habitat suitability is maintained. Annual monitoring reports will be submitted to CDFW for review and determination that the project remains in compliance with the mitigation.
CMP-10	Mason's Lilaeopsis	Impacts on Mason's lilaeopsis habitat will be offset through restoration of suitable habitat. Restored Mason's lilaeopsis habitat will be a subset of tidal restoration mitigation and sited in areas near extant populations of Mason's lilaeopsis that could provide vegetative or seed propagules. Restored habitat will be sited in locations subject to CDFW approval.
CMP-11	Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat	Compensatory mitigation for vernal pool fairy shrimp and vernal pool tadpole shrimp habitat directly or indirectly affected will consist of the preservation of habitat and the creation of habitat at either a USFWS-approved mitigation bank or at a non-bank site approved by USFWS supporting habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp. Mitigation at a non-bank location will be prioritized in the Altamont Hills recovery area, which is one of the core recovery areas identified in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (U.S. Fish and Wildlife Service 2005).
CMP-12	Valley Elderberry Longhorn Beetle Habitat	Generally following the guidance in USFWS's *Framework for Assessing Impacts on Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus)* (U.S. Fish and Wildlife Service 2017a), the permanent loss of suitable riparian habitat will be offset with riparian creation and enhancement consistent with the restoration guidance in the Framework. All temporarily affected areas will be restored on-site and where on-site restoration is not possible the habitat will be replaced. All elderberry shrubs that are 1 inch or more in diameter at

Number	Species Habitat	Detailed Description of Measure or Habitat Design Guideline
		ground level in riparian habitat that will be affected will be transplanted to mitigation areas identified in the CMP. All elderberry shrubs in non-riparian areas that will be affected will be transplanted to mitigation areas identified in the CMP if they contain exit holes.
CMP-13	California Tiger Salamander Habitat	To the extent possible, California tiger salamander habitat protection will be located in mitigation bank or other site protection instruments in the Concord/Livermore Recovery Unit, which is identified in USFWS's *Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander (Ambystoma californiense)* (U.S. Fish and Wildlife Service 2017b). If a mitigation bank is not used, land acquisition for California tiger salamander will be prioritized based on the following characteristics. • Large contiguous landscapes that consist of grasslands, vernal pool complex, and alkali seasonal wetland complex and encompass the range of vegetation, hydrologic, and soil conditions that characterize these communities. • Lands that maintain connectivity with protected grassland, vernal pool complex, and alkali seasonal wetland complex landscapes near proposed construction sites, including connectivity with lands that have been protected or may be protected in the future under the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan. • Grasslands containing stock ponds and other aquatic features that provide aquatic breeding habitat for California tiger salamander.
CMP-14	California Red-Legged Frog Habitat	To mitigate for the loss of California red-legged frog aquatic and upland habitat, DWR will protect suitable habitat. California red-legged frog aquatic breeding and upland habitat will be prioritized for protection within the East San Francisco Bay core recovery area as described in the *Recovery Plan for the California Red-Legged Frog (Rana aurora draytonii)* (U.S. Fish and Wildlife Service 2002), at a location subject to USFWS approval. All lands protected and restored for compensation of effects on California red-legged frog habitat will be protected and managed in perpetuity. Land acquisition for California red-legged frog habitat management lands will be prioritized based on the following characteristics. • Lands that connect with existing protected grassland, vernal pool complex, and alkali seasonal wetland complex landscapes, including those in the East San Francisco Bay core recovery area for California red-legged frog.
CMP-15	Giant Garter Snake Habitat	Where identified and delineated giant garter snake habitat cannot be avoided, compensation for the loss of the habitat will occur for aquatic and upland habitat, with in-kind habitat type compensation. The following measures will be considered when selecting mitigation sites. • Giant garter snake upland mitigation will be placed and protected adjacent to aquatic habitat protected for giant garter snake. The upland habitat will not exceed 200 feet from protected aquatic habitat (unless research shows a larger distance is appropriate and USFWS and CDFW agree). • Incidental injury or mortality of giant garter snakes within protected and restored habitat will be avoided and minimized by establishing 200-foot buffers between protected giant garter snake habitat and roads (other than those roads primarily used to support adjacent cultivated lands and levees).

Number	Species Habitat	Detailed Description of Measure or Habitat Design Guideline
		• Protected and restored giant garter snake habitat will be at least 2,500 feet from urban areas or areas zoned for urban development. • Characteristics of restored and protected habitat may change from the above descriptors if new information and best available science indicate greater benefits as agreed upon by USFWS and CDFW. Siting and design requirements for the restoration and protection of giant garter snake nontidal wetland habitat are listed below. • For in-kind mitigation sites, the aquatic and upland habitat quality, character, and location must be of equal or greater value than the habitat quality that was lost. • Conservation mitigation sites will be characterized as nontidal marsh and will meet the following design criteria. ○ Restored nontidal marsh will be characterized by sufficient water during the giant garter snake's active summer season (May 1–October 1) to supply constant, reliable cover and sources of food such as small fish and amphibians. ○ Restored nontidal marsh will consist of still or slow-flowing water over a substrate composed of soil, silt, or mud characteristic of those observed in marshes, sloughs, or irrigation canals. ○ Restoration designs will not create large areas of deep, perennial open water that would support nonnative predatory fish. The restored marsh will be characterized by a heterogeneous topography providing a range of depths and vegetation profiles consisting of emergent, herbaceous aquatic vegetation that will provide suitable foraging habitat and refuge from predators. ○ Aquatic margins or shorelines will transition to uplands consisting of grassy banks, with the dense grassy understory required for sheltering. These margins will consist of approximately 200 feet of high ground or upland habitat above the annual high-water mark to provide cover and refugia from floodwaters during the dormant winter season. ○ The upland habitat will have ample exposure to sunlight to facilitate giant garter snake thermoregulation and will be characterized by low vegetation, bankside burrows, holes, and crevices providing critical shelter for snakes throughout the day. All giant garter snake upland and aquatic habitat will be established at least 2,500 feet from urban areas or areas zoned for urban development. ○ The loss of tidal aquatic habitat for giant garter snake may be mitigated through restoration of tidal habitat with a design that provides equal or greater habitat value for the species as agreed upon by USFWS. ○ Topography of the restored wetlands will be designed to provide adjacent terrestrial refuge persisting above the high-water mark. Terrestrial features will be sited in close proximity to aquatic foraging areas at all tide levels, with slopes and grading designed to avoid exposing largely denuded intertidal mud flats during low tide.
CMP-16	Western Yellow-Billed Cuckoo Habitat	DWR will offset the loss of western yellow-billed cuckoo habitat through the creation or restoration of riparian habitat in the study area. DWR will develop a riparian restoration plan that will identify the location and methods for

Number	Species Habitat	Detailed Description of Measure or Habitat Design Guideline
		riparian creation or restoration, and this plan will be subject to USFWS approval.
CMP-17	California Black Rail Habitat	DWR will offset the loss of California black rail habitat through the creation or restoration of tidal emergent wetland habitat in the study area. DWR will develop a restoration plan that will identify the location and methods for tidal emergent wetland creation or restoration, and this plan will be subject to CDFW approval.
CMP-18a	Sandhill Crane Roosting Habitat	Create suitable sandhill crane roosting habitat in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area with consideration of sea level rise and local seasonal flood events. Roosting habitat may be created on Bouldin Island or in suitable lands that provide connectivity between the Stone Lakes National Wildlife Refuge boundary and the Cosumnes River Preserve, subject to CDFW approval.
CMP-18b	Sandhill Crane Foraging Habitat	Protect high- to very high-value foraging habitat for greater sandhill crane (corn, rice, wheat, and freshwater emergent wetlands), with at least 80% maintained in very high-value types (corn and rice) in any given year, subject to CDFW approval. This foraging habitat will be within 2 miles of known roost sites and will consider sea level rise and local seasonal flood events, and the location of foraging habitat loss. The patch size of protected cultivated lands will be at least 160 acres.
CMP-19a	Swainson's Hawk Nesting Habitat	Swainson's hawk nesting habitat will be restored and protected at a location agreed upon in writing by CDFW at that time. Lands protected and restored as compensatory mitigation for impacts on Swainson's hawk foraging habitat will meet the following criteria. • Swainson's hawk suitable nesting habitat includes mature trees (20 feet or greater) in riparian systems as well as in single, isolated, and roadside trees. • Nest sites are generally adjacent to or within easy flying distance to alfalfa or hay fields or other habitats or agricultural crops which provide an abundant prey source. • The following tree types are known to be preferred by Swainson's hawk: ○ Valley oak (*Quercus lobata*) ○ Freemont cottonwood (*Populus fremontii*) ○ Willows (*Salix* spp.) ○ Sycamores (*Platanus* spp.) ○ Walnuts (*Juglans* spp.) <u>Nest Site Replacement</u> In addition to the compensatory mitigation listed above, DWR will compensate for the temporal loss of suitable Swainson's hawk nest sites (defined as a 125-acre area where more than 50% of suitable nest trees [20 feet or taller] within the 125-acre block are removed). To establish a new nest site, DWR will transplant five mature suitable nest trees (at least 20 feet tall) and 15 five-gallon-container-sized suitable nest trees to a location specified in a Vegetation Restoration Plan that is within preserved mitigation lands and approved in writing by CDFW. Planting larger, mature trees, including transplanting trees scheduled for removal, and supplemented with additional saplings, is expected to accelerate the development of potential replacement

Number	Species Habitat	Detailed Description of Measure or Habitat Design Guideline
		nest sites, offset the temporal loss of habitat, and compensate for the impact on Swainson’s hawk populations in the Delta. DWR may obtain transplanted mature trees from nursery stock or trees transplanted from construction sites. DWR will plant a combination of five mature trees and 15 saplings at each replacement nest site to provide longevity to the nest site and ensure a sufficient number of trees will meet replacement nest tree success criteria and will survive to continue to provide Swainson’s hawk nesting habitat over the long term. To determine the number of affected suitable nest sites, a grid of 125-acre blocks will be placed over each component of project footprint in which trees are to be removed. The grid will be overlain in a manner that places the most complete squares of the grid in the project footprint (i.e., the grid will be adjusted so that, to the extent possible, entire squares rather than portions of squares will overlap with the project footprint). To ensure that transplanted trees and saplings establish new Swainson’s hawk nest sites, DWR will: • Establish replacement nest sites at least 0.5 mile apart • Establish replacement nest sites at least 0.25 mile from any existing suitable nest tree and at least 0.5 mile from any existing occupied nest tree • Establish replacement nest sites as close as possible to the impacted nest site, unless such location would have low long-term conservation value due to threats such as ongoing disturbance, seasonal flooding, or sea level rise • Plant the five mature trees and 15 saplings in sites within or adjacent to conserved suitable foraging habitat • Plant mature nest trees and saplings before impacts on suitable nest sites to reduce temporal impacts resulting from the loss of mature nest trees <u>Compensation for Lost Suitable Nest Trees</u> For each suitable nest tree removed for the project, DWR will plant five native trees (5-gallon container size) suitable for Swainson’s hawk nesting to replace lost suitable nest trees at sites within or adjacent to conserved foraging habitat. <u>Replacement Nest Tree Monitoring and Success Criteria</u> DWR will monitor and maintain all replacement nest trees (mature trees and saplings) for a period of 10 years to assure survival and appropriate growth and development. Success will be measured as an 80% survival rate of saplings at 5 and 10 years after planting. After the first 10 years, DWR will monitor replacement nest trees every 5 years to verify their continued survival and growth. For every tree lost during the 10-year time period, DWR will immediately plant a replacement tree upon the detection of failure. DWR will provide all necessary maintenance (i.e., fertilizing, irrigation) to ensure successful establishment. DWR will irrigate trees for a minimum of 5 years after planting, and then gradually wean the trees off the irrigation during a period of approximately 2 years. If larger stock is planted, DWR may reduce the number of years of irrigation accordingly. If the 80% establishment success criteria cannot be met, DWR will coordinate with CDFW to determine additional measures.

Number	Species Habitat	Detailed Description of Measure or Habitat Design Guideline

CMP-19b	Swainson's Hawk Foraging Habitat	Swainson's hawk foraging habitat will be protected at locations subject to CDFW approval and will meet the following criteria.
		• Foraging habitat will be protected within 3 miles of a known Swainson's hawk nest tree and within 50 miles of the project footprint.
		• Where feasible, protected foraging habitat will have land surface elevations equal to or greater than -1 foot NAVD88, or will maintain levees around protected habitat, to minimize the risk of flooding and loss of suitable habitat due to future sea level rise.
		• Individual patches of foraging habitat will be at least 40 acres in size.
		• Swainson's hawk prey populations will be supported by establishing 20- to 30-foot-wide hedgerows along field borders and roadsides at a minimum rate of 400 linear feet per 100 acres of protected cultivated lands.
		• The use of rodenticide will be prohibited on compensation lands to mitigate for Swainson's hawk foraging habitat.
		• Mitigation acres will be provided for all acres of habitat lost in the very high, high, medium, and low value classes (see Table 13B.72-1 in Appendix 13B, *Species Accounts*, Section 13B.72.5, *Species Habitat Suitability Model*, for definitions of Swainson's hawk foraging habitat value). Cultivated lands will be maintained in nonpermanent crop types as follows:
		  ○ At least 37.5% of Swainson's hawk mitigation lands will be in high-value foraging habitat on an annual basis.
		  ○ The amount of high-value habitat used for mitigation will increase to at least the amount lost to project activities, if it is more than 37.5% of the total affected Swainson's hawk foraging habitat.
		  ○ At least 25% of Swainson's hawk mitigation lands will be in medium-value foraging habitat and other grasslands managed for Swainson's hawk use on an annual basis.
		  ○ No more than 15% of Swainson's hawk mitigation lands will be in low-value foraging habitat on an annual basis.

CMP-20	Occupied Burrowing Owl Habitat	If burrowing owls have been documented to occupy burrows at a project site in the last 3 years, current scientific literature supports the conclusion that the site should be considered occupied and mitigation is required (California Department of Fish and Game 2012:11). Suitable burrowing owl habitat will be protected, using the best practices described in the Staff Report on Burrowing Owl Mitigation (California Department of Fish and Game 2012:11–14). If construction activities result in take or if an active burrow must be relocated, as appropriate, DWR will consult with CDFW to develop effective mitigation alternatives.
CMP-21	Least Bell's Vireo	DWR will offset the loss of least Bell's vireo habitat through the creation or restoration of riparian habitat in the study area. DWR will develop a riparian restoration plan that will identify the location and methods for riparian creation or restoration, and this plan will be subject to USFWS approval.
CMP-22a	Tricolored Blackbird Habitat – Nesting Habitat	Occupied tricolored blackbird nesting habitat, or previously occupied tricolored blackbird colonies (colonies that have been active within the past 15 years) will be permanently protected or restored and managed at a location subject to CDFW approval, and in close proximity to the nearest breeding colony observed within the past 15 years if possible. Protected or

<table>
<tr><th>Number</th><th>Species Habitat</th><th>Detailed Description of Measure or Habitat Design Guideline</th></tr>
<tr><td></td><td></td><td>restored nesting habitat will be managed to provide young, lush stands of bulrush/cattail emergent vegetation and prevent vegetation senescence; or other nesting substrate determined to be location and use appropriate and agreed to by CDFW.

Nesting habitat protection or restoration will be prioritized based on the following characteristics. Alternative nesting habitat can be considered based on best available science (e.g., protection of upland tricolored blackbird nesting habitat including blackberries or some of the other upland vegetation species frequently used by tricolored blackbirds for nesting).

• Occupied or recently occupied (i.e., within the last 15 years) stands of bulrush/cattail emergent vegetation.
• Wetland marsh habitat that contains standing water to a depth of approximately 1 foot in most years from late January through late July to encourage dense development of cattail and bulrush vegetation and to provide protection from predators until nesting is completed; and that is within 6 kilometers of high- or very high-quality foraging habitat.
• Management and enhancement of tricolored blackbird nesting habitat will be consistent with the recommendations provided by Kyle (2011). The following criteria will guide site selection and management of emergent wetland habitat to benefit tricolored blackbird:
  ○ Burn, mow, or graze bulrush/cattail vegetation every 2 to 5 years, or an appropriate interval necessary and agreed to by CDFW to remove dead growth and encourage the development of new vegetative structure.
  ○ Maintain large continuous stands of bulrush/cattail that are at least 30 to 45 feet wide to provide adequate space for breeding as well as protection from predators.
  ○ Establish seasonal buffer zones around restored tricolored blackbird nesting habitat to reduce disturbance and improve foraging habitat for tricolored blackbirds. Where conditions permit, stands of emergent vegetation, native blackberry, or other native vegetation will be established along ditches and canals to provide suitable nesting substrate for tricolored blackbird. These stands will be located near foraging sites and, where feasible, within the dispersal range of existing tricolored blackbird nesting colonies.</td></tr>
<tr><td>CMP-22b</td><td>Tricolored Blackbird Habitat – Foraging</td><td>Foraging habitat will be protected at a location subject to CDFW approval within 6 kilometers of (1) protected or restored nesting habitat that is managed for tricolored blackbird or (2) recently or historically (to encourage recolonization) occupied tricolored blackbird nesting habitat. To allow for normal crop rotation, 50% of land protected as tricolored blackbird breeding foraging habitat must be planted in high- and very high-value crop types in any given year (see Appendix 13B, Section 13B.85.5.2, Habitat Model Description, for definitions of foraging habitat values).

Foraging habitat protection will be prioritized based on the following characteristics.

• Large contiguous landscapes that consist of high- or very high-value cultivated lands, grasslands, vernal pool complex, and alkali seasonal wetland complex.
• Cultivated lands that incorporate riparian corridors, water conveyance channels, grasslands, and wetlands.</td></tr>
</table>

Number	Species Habitat	Detailed Description of Measure or Habitat Design Guideline
		• Cultivated lands that provide opportunities to maintain a mosaic of crop types and allow for the periodic rotation of essential crop types (those crop types with very high, high, and moderate foraging habitat values) to nonessential crop types to ensure acreage commitments. • Cultivated lands that expand upon or provide connectivity between existing conservation lands. Small patches of important wildlife habitats associated with protected cultivated lands will be maintained, including isolated valley oak trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water conveyance channels, grasslands, ponds, and wetlands. On cultivated lands managed as high- to very high-value foraging habitat for tricolored blackbirds, insecticide use will be minimized to the greatest extent practicable during the spring growing season until tricolored blackbird nestlings have fledged or it is documented that no nearby nesting is occurring. This is to ensure that an abundant insect prey population is available to support egg development and feeding of the young, as well as to minimize the risk of pesticide toxicity effects.
CMP-23	Tidal Perennial Habitat Restoration for Construction Impacts on Habitat for Fish and Aquatic Resources	Tidal perennial habitat (e.g., including consideration of shallow water habitat components consistent with agency/regulatory requirements) would be restored to mitigate for both temporary and permanent construction impacts. Tidal perennial habitat restoration site selection and design will occur in coordination with CDFW, USFWS, and NMFS. Restoration will primarily occur through breaching or setback of levees, thereby restoring tidal fluctuation to land parcels currently isolated behind those levees. Factors to be considered when evaluating sites for potential location and design of tidal perennial habitat restoration include provision of suitable habitat features such as those suggested by the San Francisco Estuary Institute (2020) and Sommer and Mejia (2013). Where practicable and appropriate, portions of restoration sites will be raised to elevations that will support tidal marsh vegetation following levee breaching. Depending on the degree of subsidence and location, lands may be elevated by grading higher elevations to fill subsided areas, importing clean dredged or fill material from other locations, or planting tules or other appropriate vegetation to raise elevations in shallowly subsided areas over time through organic material accumulation. Surface grading will create a shallow elevation gradient from the marsh plain to the upland transition habitat if not already present on a restoration site. Based on assessments of local hydrodynamic conditions, sediment transport, and topography, restoration activities may be designed and implemented in a manner that accelerates the development of tidal channels within restored marsh plains. Following reintroduction of tidal exchange, tidal marsh vegetation is expected to establish and maintain itself naturally at suitable elevations relative to the tidal range. Depending on site-specific conditions and monitoring results, patches of native emergent vegetation may be planted to accelerate the establishment of native marsh vegetation on restored marsh plain surfaces. Siting, design, and performance criteria for tidal perennial habitat restoration will be developed based on assessments of topography, local hydrodynamic conditions, and sediment transport. As necessary and reflecting permitting requirements, a collaborative technical team including DWR and fishery agency representatives will be formed to select the most biologically appropriate and cost-effective restoration sites, design the restoration plan,

Number	Species Habitat	Detailed Description of Measure or Habitat Design Guideline
		set performance criteria, and develop the restoration unit management plan for the sites. Construction may involve the following activities: • Prior to breaching, recontouring the surface to maximize the extent of surface elevation suitable for establishment of tidal marsh vegetation by scalping higher elevation land to provide fill for placement on subsided lands to raise surface elevations. • Prior to breaching, importing dredge or fill material and placing it in shallowly subsided areas to raise ground surface elevations to a level suitable for establishment of tidal marsh vegetation. • Excavating channels to encourage the development of sinuous, high-density dendritic channel networks within restored marsh plain. • Revegetation through active planting and/or passive establishment of native marsh vegetation. • Modifying ditches, cuts, and levees to encourage more natural tidal circulation and better flood conveyance based on local hydrology. • Removal or breaching of existing levees or embankments or creation of new structures to allow restoration to take place while protecting adjacent land. • Constructing dikes, relocating water diversion infrastructure, or other activities as necessary to maintain agricultural activity in lands adjacent to tidal habitat restoration.
CMP-24	Channel Margin Habitat Restoration for Construction Impacts on Habitat for Fish and Aquatic Resources	Channel margin habitat would be restored to mitigate construction impacts for both temporary and permanent impacts. Channel margin restoration will be accomplished by improving channel geometry and restoring riparian, marsh, and mudflat habitats on the water side of levees along channels that provide rearing and outmigration habitat for juvenile salmonids in particular, similar to what is currently done by the USACE and others when implementing levee improvements. Channel margin restoration associated with federal project levees will not be implemented on the levee, but rather on benches to the waterward side of such levees, and flood conveyance will be maintained as designed. Channel margin enhancements associated with federal project levees may require permission from USACE in accordance with USACE's authority under the Rivers and Harbors Act (33 USC § 408) and USACE levee vegetation policy. Sites for channel margin restoration will be subject to approval by NMFS and CDFW. Any restoration will be designed, constructed, and maintained to ensure no reduction in performance of the federal flood project. As necessary and reflecting permitting requirements, a collaborative technical team including DWR and fishery agency representatives will be formed to identify the most biologically appropriate and cost-effective restoration sites, design the restoration plan, set performance criteria, and develop the restoration unit management plan for the sites for DWR's selection. Types of channel margin enhancement actions may include the following: • Remove riprap from channel margins. • Modify the channel margin side of levees or setback levees to create low floodplain benches with variable surface elevations that create hydrodynamic complexity and support emergent vegetation.

Number	Species Habitat	Detailed Description of Measure or Habitat Design Guideline
		• Install large woody material (e.g., tree trunks and stumps) into constructed low benches or into existing riprapped levees to provide physical complexity. • Plant riparian and emergent wetland vegetation on created benches.
CMP-25	Tidal Habitat Restoration to Mitigate North Delta Hydrodynamic Effects on Chinook Salmon Juveniles	DWR will undertake tidal habitat restoration in the north Delta to mitigate for potential hydrodynamics-related effects such as a greater frequency of Sacramento River reverse flows below Georgiana Slough compared to existing conditions, as reflected in the results of the hydrodynamic analyses and through-Delta juvenile Chinook salmon survival modeling. The mitigation approach will be focused on offsetting the incremental effects of the project alternatives. The extent of this tidal habitat restoration will be determined in coordination with CDFW, NMFS, and FWS and in consideration of the following factors: 1) The extent to which required or planned restoration under other projects or programs (e.g., as summarized by CDFW [2020:127] for restoration related to SWP/CVP operations and by DWR [2019] for restoration under the EcoRestore program and required restoration mitigation for other impacts of the alternatives minimizes hydrodynamic differences between existing conditions and the project alternatives to standards established during federal Endangered Species Act/California Endangered Species Act permitting; 2) The efficacy of the required Georgiana Slough Salmonid Migratory Barrier under the SWP Incidental Take Permit (California Department of Fish and Wildlife 2020:94–95); 3) Sea level rise, climate change, and associated changes in north Delta hydrodynamics projected to occur at the commencement of operation of the north Delta intakes. This may include evaluating relationships between flow and hydrodynamic changes at various downstream locations (e.g. Georgiana Slough junction) to help isolate potential effects of the project alternatives. Restoration opportunities for this measure will align with species recovery needs and be guided by information in the Sacramento Valley Salmon Resiliency Strategy (California Natural Resources Agency 2017). A monitoring program will be included to assess the performance of the mitigation and modify the mitigation approach as necessary through the Adaptive Management Program to offset the effects of the project alternatives as they become better understood. The efficacy of tidal habitat restoration in affecting north Delta hydrodynamics has been demonstrated through modeling studies (Resource Management Associates 2020). 4) The extent to which tidal habitat restoration to mitigate for DCP operational changes identified for both delta and longfin smelt can contribute to the appropriate type and degree of hydrodynamic mitigation necessary to address the modeled, project-driven, flow changes (e.g. changes in frequency of Sacramento River reverse flows below Georgiana Slough).
CMP-26	Channel Margin Habitat Restoration for Operations Impacts on	DWR will undertake channel margin habitat restoration to mitigate for potential flow-related impacts on riparian and wetland bench habitat used by juvenile Chinook salmon for rearing. The extent of this mitigation was calculated by multiplying the largest negative deficits in bench inundation index between each alternative and existing conditions in each geographic group (Chapter 12, *Fish and Aquatic Resources*, Table 12-33) by the total

Number	Species Habitat	Detailed Description of Measure or Habitat Design Guideline
	Chinook Salmon Juveniles	length of benches in each geographic group, which gives a total length of deficit (Table 12-34). This channel margin habitat restoration will be in addition to the channel margin habitat restoration included to mitigate construction impacts on channel margin habitat. The efficacy of channel margin habitat restoration has been demonstrated by studies in the Sacramento River documenting occurrence and abundance of juvenile Chinook salmon that is greater than at riprapped sites and similar to natural sites (Hellmair et al. 2018).
CMP-27	Tidal Habitat Restoration for Operations Impacts on Delta Smelt	DWR will mitigate potential project-related impacts on delta smelt by restoring tidal habitat, concentrated within the north Delta Arc or other areas deemed appropriate through consultation with USFWS and CDFW. The main objective of this restoration would be to increase the extent of suitable delta smelt habitat (e.g., intertidal and subtidal habitat) (California Department of Fish and Game 2011) with appropriate parameters (e.g., turbidity) providing habitat for occupancy (e.g., Sommer and Mejia 2013) or higher food availability in the vicinity (e.g., Hammock et al. 2019). This mitigation measure's effectiveness will be subject to long-term monitoring and assessed in coordination with USFWS and CDFW as part of the Adaptive Management Program.
CMP-28	Tidal Habitat Restoration for Operations Impacts on Longfin Smelt	DWR will undertake tidal habitat restoration to mitigate for potential flow-related impacts on longfin smelt. The extent of this mitigation was calculated using the method of Kratville (2010), as recently applied by DWR (2019:5-5). The method is described in more detail in Appendix 12B, *Bay-Delta Methods and Results*, Section 12B.19, *Smelt Tidal Habitat Restoration Mitigation Calculation*. With the concurrence of USFWS and CDFW, this habitat restoration mitigation requirement may be partly or fully met by tidal perennial or shallow water habitat restoration for construction effects.

CDFW = California Department of Fish and Wildlife; CMP = Compensatory Mitigation Plan; DWR = California Department of Water Resources; EIR = Environmental Impact Report; NMFS = National Marine Fisheries Service; USACE = U.S. Army Corps of Engineers; USC = United States Code; USFWS = U.S. Fish and Wildlife Service.

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Attachment C3.2
GHG Emissions and Removals Associated with Proposed Compensatory Mitigation for the Delta Conveyance Project

The information in this appendix is presented as it was provided by the California Department of Water Resources (the applicant) in the *Delta Conveyance Project Draft Environmental Impact Report* Attachment 3F.2, *GHG Emissions and Removals Associated with Proposed Compensatory Mitigation for the Delta Conveyance Project* (California Department of Water Resources 2022) and, therefore, is presented from the California Environmental Quality Act perspective. However, the U.S. Army Corps of Engineers relied on this information when preparing its Draft Environmental Impact Statement.

GHG Emissions and Removals Associated with Proposed Compensatory Mitigation for the Delta Conveyance Project

Prepared by HydroFocus, Inc.
Davis, California
June 18, 2021

For

ICF and Environmental Science Associates

Contents

Introduction and Background

The State Water Project (SWP) relies on Delta channels to convey water. Two-thirds of California's water originates in the Sierra Nevada Mountains as snowpack, eventually flowing through the Delta, where it is delivered to more than 27 million Californians and 750,000 acres of farmland. Due to risk to continued conveyance via Delta channels due to sea level rise, earthquakes, and subsidence, the Department of Water Resources (DWR) is acting now to upgrade Delta infrastructure by planning for the Delta Conveyance Project. As part of this project, compensatory mitigation habitat is proposed for Bouldin Island and 2 areas near Interstate 5.

Overall Objective and Approach

The overall objective of this report is to quantify the net GHG effect of the proposed compensatory mitigation habitat on Bouldin Island and areas adjacent to Interstate 5 (I-5). These two compensatory mitigation projects may be built to offset potential impacts resulting from the construction and operation of the Delta Conveyance Project (Project). The proposed mitigation projects are designed to compensate for habitats that may be impacted by the Project. This includes anticipated impacts to most terrestrial habitats and non-tidal wetlands (ESA 2020). The areas near I-5 (Ponds 6, 7 and 8) are remnant borrow pits that supplied fill for the construction of I-5 during the late 1970s and heretofore denoted as I-5 Pond 6, and I-5 Ponds 7 and 8.

To estimate the net GHG effect of creating the proposed mitigation habitat, HydroFocus modeled GHG emissions and removals of local soils based on available soils data and the proposed land use changes. Specifically, we gathered and processed data, obtained model inputs and parameters for estimating baseline and projected project GHG emissions and removals for each of the three mitigation areas.

Area Description and Methods

Area descriptions

Bouldin Island

We estimated the net GHG effect of conversion from current land uses (baseline) to wetlands, grasslands, riparian forest, open water, and seasonal wetlands on a 989 acres mitigation area on Bouldin Island (Figures 1 and 2). The area of the three Bouldin sites proposed for mitigation is underlain by mineral and organic and highly organic mineral soils. The land is currently used primarily for agriculture.

Interstate-5 Ponds

The California Department of Water Resources owns the three ponds formally known as borrow pits near West Woodbridge Road and Highway 12: I-5 Pond 6, and I-5 Ponds 7 and 8. The three ponds, totaling approximately 345 acres, were excavated between 1974 and 1978 to provide fill for freeway construction. Currently, all three ponds are managed by the California Department of Fish and Wildlife (CDFW) as wildlife areas. They are located near the White Slough Wildlife Area (WSWA) and Woodbridge Ecological Reserve (ESA 2020). The borrow pits are fed by groundwater and via periodic overland flow from precipitation, irrigation runoff, and high canal flows, creating three perennial ponds characterized by open water, steep vegetated banks, and relatively flat adjacent uplands. Mineral soils underlie all three ponds. Existing habitats include seasonal wetlands and riparian, open water, grasslands and berms.

Proposed mitigation for the three ponds includes compensatory habitat to offset negative impacts to wetlands and giant garter snake habitat that will occur from the Delta Conveyance Project. Pond 6 lies north of West Woodbridge Road, approximately 1.65 miles west of I-5 (Figures 3 and 4). The north edge of the site includes Hog Slough and its earthen levee, with an on-site water delivery ditch extending from a tide gate in the slough around the north and eastern edges of the property. Ponds 7 and 8 (Figures 5 and 6) lie directly south of West Cotta Road approximately 1 mile west of I-5. The area is underlain by shallow groundwater.

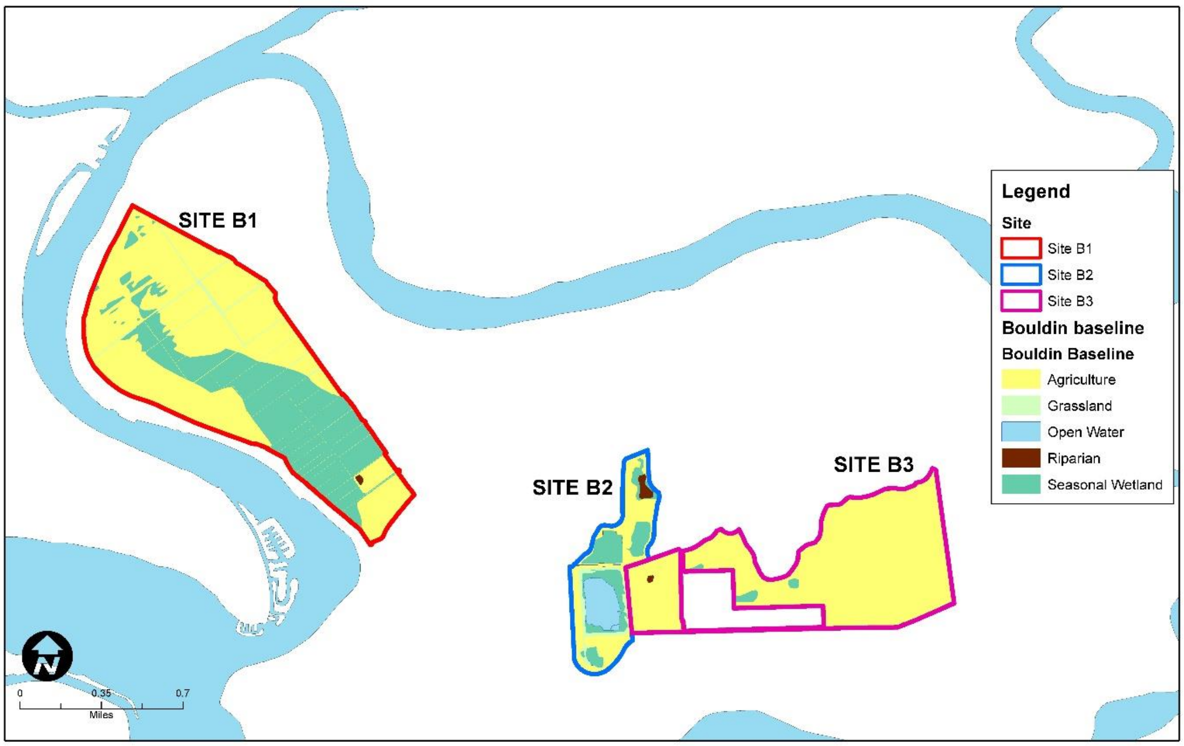

Figure 1. Bouldin Island baseline land uses.

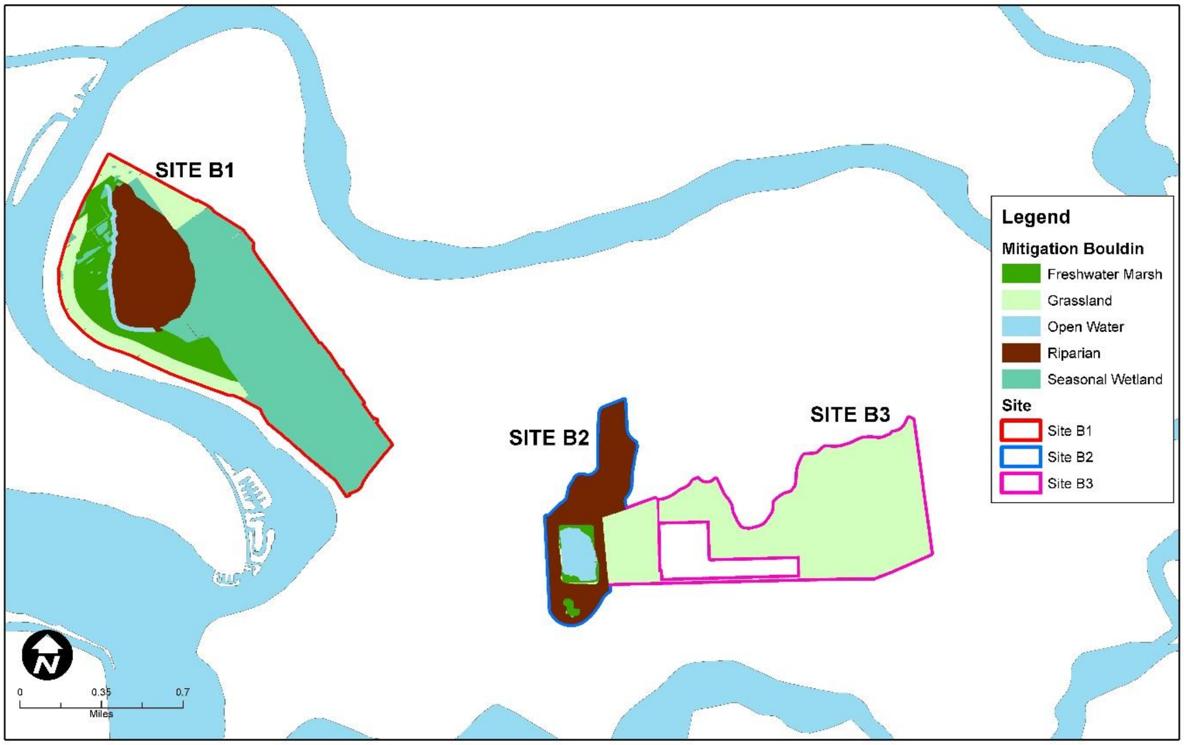

Figure 2. Bouldin Island proposed compensatory mitigation habitat.

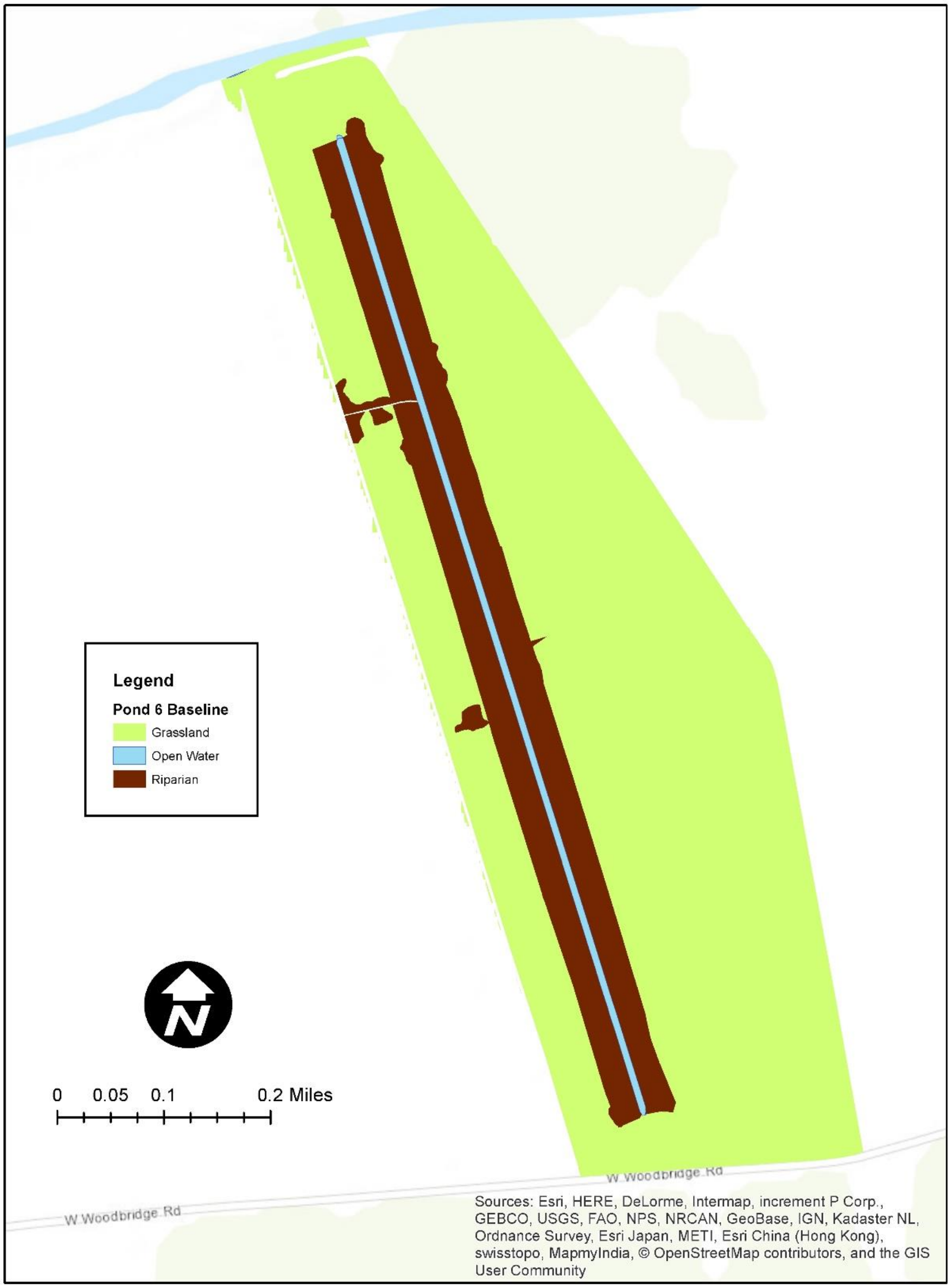

Figure 3. Interstate-5 Pond 6 baseline land use.

Figure 4. Interstate-5 Pond 6 proposed mitigation habitats.

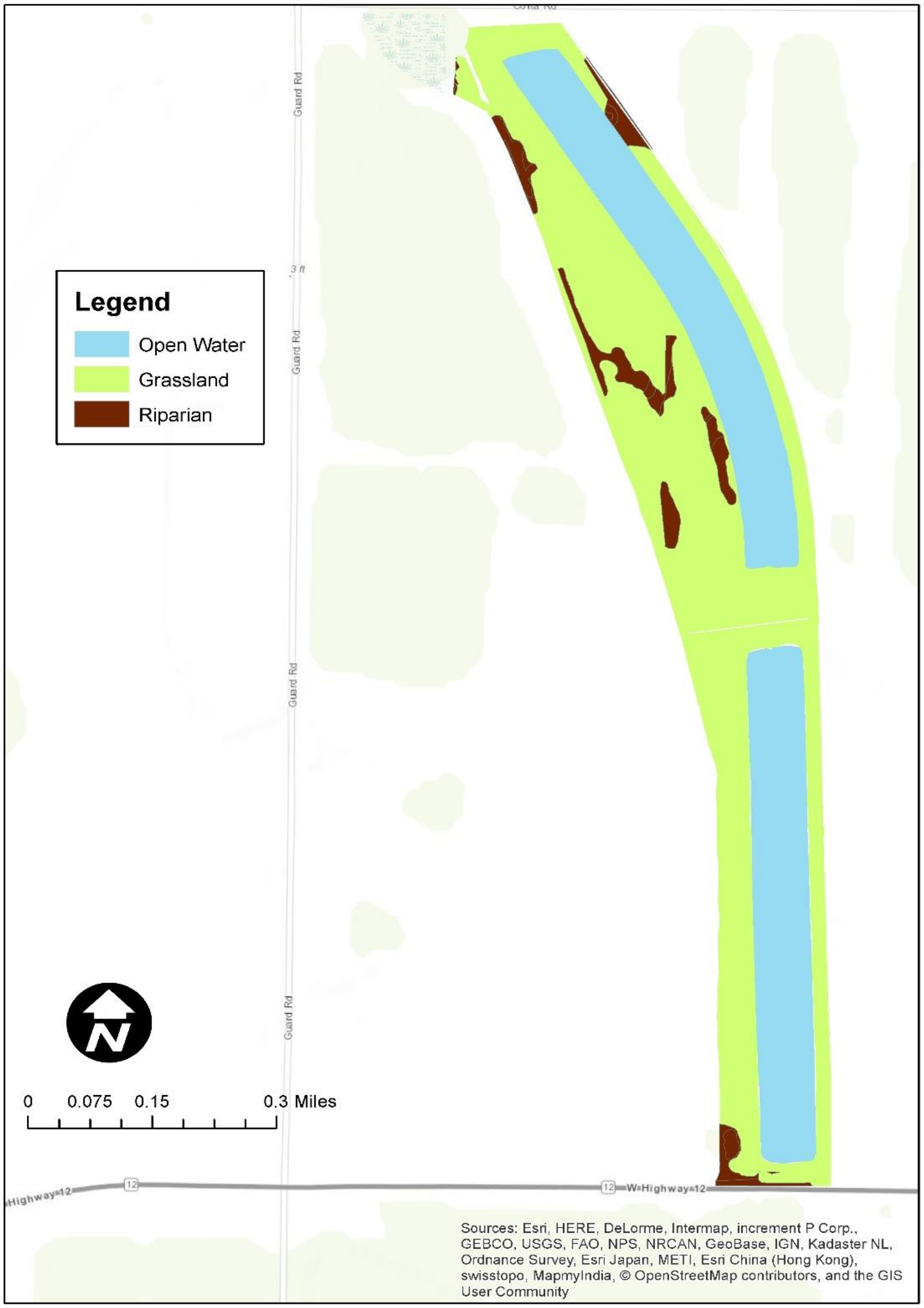

Figure 5. Interstate-5 Ponds 7 and 8 baseline land use.

Figure 6. Interstate-5 Ponds 7 and 8 proposed mitigation habitats.

Methods

GIS and database description

To estimate GHG emissions and removals for baseline and project conditions, data from multiple sources were incorporated into the HydroFocus Geographic Information System (GIS). The HydroFocus GIS is an ARCGIS system which includes multiple shape files and data sources for the Sacramento-San Joaquin Delta. Shape files and data sources include delineations of the proposed restoration areas on Bouldin Island and the I-5 ponds, land use maps provided by Environmental Science Associates, GHG emissions and removals for agricultural land uses and fallowed (idle) soils (Li et al. 2014), soil series[1], GHG emissions from organic and highly organic mineral soils and highly organic mineral soils (Deverel et al. 2016) and peat thickness shapefiles as described in Deverel et al. (2015).

Estimates of GHG Emissions and Removals

We estimated GHG emissions and removals for baseline or mitigation project conditions by calculating the net GHG flux as expressed in equation 1.

$$f_{COND} = \Sigma(f_{LU})_{OS} + \Sigma(f_{LU})_{MS} + e_{ag\ op} \qquad (1)$$

Where f_{COND} is the net emission (+) or removal (-) for current conditions (baseline) or resulting from the proposed mitigation project (project condition). The subscripts OS and MS refer to organic and highly organic mineral soils and mineral soils, respectively. The LU subscript refers to land uses which include agriculture, seasonal wetland, freshwater marsh, riparian vegetation, grassland, and open water.

The $e_{ag\ op}$ represents the emissions due to agricultural operations. Emissions (+) and removal (-) rates are expressed in metric tons of CO_2 equivalents per acre per year (tCO_2-e $acre^{-1}$ yr^{-1}) multiplied by the area in acres. We used a N_2O global warming potential value (GWP) of 265 times the global warming potential of CO_2 of 1 on a 100-year timescale; GWP for methane (CH_4) was 25 (Myhre et al. 2013).

Bouldin Island

Bouldin Island Baseline Conditions

For baseline or reference conditions, we estimated GHG (CO_2, and N_2O) emissions and removals for baseline conditions resultant from the oxidation of organic and highly organic mineral soils and originating from mineral soils, and emissions due to farming activities. Land uses include agriculture (including fallowed/idle areas), seasonal wetlands, riparian vegetation, and grasslands. We estimated the baseline GHG flux as follows.

$$f_{BAS} = f_{OS} + f_{RIP\_OS} + f_{AG\_MS\ ag} + e_{ag\ op} + f_{SW\_MS} + f_{GR\_MS} + f_{RIP\_MS} \qquad (2)$$

Where:
f_{OS} are the emissions from organic and highly organic mineral soils for crops, seasonal wetlands, and grasslands,
f_{RIP_OS} are emissions from riparian vegetation on organic soil,

[1] websoilsurvey.nrcs.usda.gov

f_{AG_MS} are emissions/removals from crops on minerals soils,
$e_{ag\ op}$ are emissions due to farming activities,
f_{SW_MS} are net GHG flux from seasonal wetlands on mineral soils,
f_{GR_MS} are net GHG flux from grasslands on mineral soils,
f_{RIP_MS} are net GHG flux from riparian vegetation on mineral soil.

Calculation details for baseline emissions and removals for each soil and/or land-use type are described below.

Agriculture on organic soils

For baseline GHG emissions from organic and highly organic mineral soils, we utilized the SUBCALC model (Deverel et al. 2016) and data for N_2O emissions from Delta organic and highly organic mineral soils as described in Deverel et al. (2017). The SUBCALC model accounts for the crop emissions and removals on organic and highly organic mineral soils in the Sacramento-San Joaquin Delta based on data and analysis described in Deverel et al. (2016), Deverel and Rojstaczer (1996) and Deverel and Leighton (2010). The SUBCALC modeling approach was used because it is peer reviewed and has been shown to accurately estimate CO_2 emissions for organic Delta soils used for agriculture.

Deverel and Leighton (2010) originally used SUBCALC to integrate available data and quantify and simulate subsidence rates and causes. The SUBCALC model simulates aerobic microbial oxidation of organic carbon, consolidation, wind erosion and burning. Present-day subsidence is primarily the result of oxidation and consolidation. The SUBCALC model simulates microbial oxidation of soil organic carbon to carbon dioxide using Michaelis–Menton enzyme kinetics in which the rate of soil organic-matter oxidation is limited by soil organic carbon content (Deverel and Leighton, 2010; Deverel et al. 2016). Deverel et al. (2016) calibrated SUBCALC with subsidence and carbon flux data for the Delta and the model was used to estimate CO_2 fluxes for organic soil and highly organic mineral soils throughout the Delta.

For N_2O emissions resultant from the oxidation of organic soils and highly organic mineral soils, the approach described in Deverel et al. (2017) was used. Specifically, the relation of N_2O emissions to CO_2 emissions determined on Sherman and Twitchell islands (Teh et al. 2011; Morris 2014; Morris et al. 2017; Yang and Silver 2016) was used to estimate the N_2O emissions due to the oxidation of Delta organic and highly organic mineral soils. We assumed that N_2O emissions due to nitrogen fertilizer application were insignificant relative to N_2O emissions resultant from the oxidation of organic and highly organic mineral soils based on a study described in Deverel et al. (2017), where they were less than 6% of the total N_2O emissions. The uncertainty in the SUBCALC calculations is due primarily to the uncertainty in the spatial variability in soil organic matter content and depth to groundwater. We thus estimated mean, high, and low values for emissions due to oxidation of soil organic matter based on the variability in soil organic matter content.

Seasonal wetlands on organic soils

Based on data presented for the Sherman Island seasonal wetland described in Hemes et al. (2019), and data for Twtichell Island in Deverel et al. (1998), we assumed that seasonal wetlands on organic soils and highly organic mineral soils will emit CO_2 and N_2O similarly to agriculture. This is due to drainage of these wetlands during spring, summer and fall which facilitates oxidation of the soil organic matter. Areas designated as seasonal wetlands within the proposed mitigation area on Bouldin Island are too wet to farm due to poor drainage conditions (Deverel et al. 2015). Inability to adequately drain these areas for farming results in these areas behaving like seasonal wetlands.

Grasslands on organic soils

For grasslands on organic soils, we relied on data presented in (Teh et al.,2011) to conclude that there are net GHG emissions. We therefore used the SUBCALC model to estimate the emissions from existing grasslands on Bouldin Island on organic and highly organic mineral soils.

Riparian Vegetation on organic and mineral soils

To estimate carbon stored in soil and biomass for riparian vegetation, we used the tool described by Matzek et al. (2018). Matzek et al. (2018) defined different riparian vegetation groups. We assumed that willow scrub riparian forest adequately represents the current baseline riparian vegetation. We used the flux calculated from the annual change in carbon stocks of a 50-year-old willow scrub riparian forest as the baseline annual carbon flux. For organic soils, we added to the carbon losses from soils modeled by SUBCALC the carbon sequestered by the riparian vegetation in the ecosystem carbon pools (vegetation, dead vegetation mass, and forest floor). For mineral soils, we used the carbon sequestrated by all carbon pools (vegetation biomass, dead mass, forest floor and soil).

Agriculture on mineral soils

To estimate baseline GHG emissions and removals due to agricultural crop production on mineral soils, we used the results of California statewide modeling and field experiments for over 40 crops described in Li et al. (2014). Li et al. (2014) is the only comprehensive compendium of GHG emissions and removals for crops in California[2]. As shown in Table 1, we aggregated crops into 7 groups and estimated GHG emissions and removals on a per acre basis based on data presented in Li et al. (2014) and Shaffer and Thompson (2015). The estimated GHG emissions and removals for these crop groups in tCO_2-e $acre^{-1}$ yr^{-1} in Table 1 were multiplied times the acreage in the GIS files.

Grasslands on mineral soils

We assumed that grasslands would have an emission factor similar to pasture (Table 1). The uncertainty shown in Table 2 was used to estimate maximum and minimum values for each site for mineral soils.

Seasonal wetland on mineral soils

Based on extensive experience on Bouldin Island, we recognized that the areas delineated as seasonal wetlands are abandoned agriculture fields that are too wet to farm. Thus, for these areas, we used the emission rate for idle land in Table 1.

GHG emissions from farming activities

To estimate GHG emissions from farming activities, we used the estimated GHG emissions from Shaffer and Thompson (2015) (Table 1) for the crop types used in Bouldin, multiplied times the acreage of agricultural land (mineral and organic) in the GIS files. The GHG emission from farming activities was summed to the baseline emissions of the different land uses (as in Equation 2).

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[2] The California Air Resources Board published GHG emissions and removals for agricultural crops but not for individual crops.

Table 1. Greenhouse gas emissions (+) and removals (-) For crop groups on mineral soils (from Li et al. 2014).

Crop group	tCO_2-e acre^{-1} yr^{-1} (Li et al. 2014)	Farming Activities tCO_2-e acre^{-1} yr^{-1} (Shaffer and Thompson, 2015)	Total tCO_2-e acre^{-1} yr^{-1} (sum of columns 2 and 3)	Standard Deviation tCO_2-e acre^{-1} yr^{-1}
1. Trees and vines	-0.7	1.4	0.7	0.5
2. Pasture	0.2	-	0.2	4.1
3. Rice	4.8	2.1	6.9	3.9
4. Field crops (corn, safflower, sorghum, sunflower)	-2.4	1.5	-0.9	0.2
5. Miscellaneous field crops (small grains, dry beans, alfalfa, hay)	-4.2	1.7	-2.5	0.3
6. Vegetable crops	1.9	2.7	4.6	0.6
7. Idle land	0.1	-	0.1	0.2

Bouldin Island Project Conditions

For project conditions, the proposed compensatory mitigation on Bouldin Island includes permanently flooded wetlands, seasonal wetlands, grasslands, open water, and riparian habitat (Figure 2). Thus, the net GHG flux for project conditions ($f_{PR}J$) for the compensatory mitigation on Bouldin Island was estimated using equation 3 for each of the sites.

$$f_{PR}J = f_{WET} + f_{OW} + f_{SW\_OS} + f_{RIP\_OS} + f_{GR\_OS} + f_{GR\_MS} + f_{RIP\_MS} \qquad (3)$$

Where the GHG fluxes for the different land uses are permanently flooded wetlands (f_{WET}), seasonal wetlands (f_{SW}), grasslands (f_{GR}), open water (f_{OW}), and riparian habitat (f_{RIP}).

We estimated net fluxes for each land use/cover separately for mineral and organic soils (subscripts OS, and MS, respectively). The GHG emissions and removals expressed as fluxes in metric tons of CO_2 per acre per year were multiplied times the area in acres of each land cover type. We calculated project GHG emissions and removals (terms in equation 3) for each land use as follows.

- For permanently flooded wetlands, we used the mean annual GHG flux rate of multiple permanently flooded wetlands of different ages restored on Twitchell and Sherman Islands presented in Hemes et al. (2019).
- For seasonal wetlands and grasslands on organic soils, we used the SUBCALC model to simulate emissions. The rationale for this is described above for baseline conditions.

- For riparian vegetation on organic and highly organic mineral soils we added to the losses of CO_2 due to the oxidation of the organic matter modeled by SUBCALC the CO_2 sequestration due to the riparian vegetation described in Maztek et al. (2018) for mixed riparian forest in northern California. For mineral soils, we used all ecosystem carbon pools, including carbon stored in soils.
- For open water, we used GHG fluxes measured on open water in the Delta included in McNicol et al. 2017.
- For grasslands on mineral soils, we used the value for pasture in Table 1, as described for the baseline conditions.

Interstate-5 Ponds 6, 7 and 8

Due to the complexity of multiple baseline land uses, the absence of organic soils, and the current generally degraded status of the habitats, we used a different approach to estimating the change in emissions for the I-5 ponds. We assessed the effect of the mitigation project on GHG emissions and sequestration by estimating and reporting each baseline to proposed mitigation project conversion separately, which is consistent with IPCC (2006) guidelines. The basis for our approach is that the flux of carbon to or from the atmosphere due to a land use conversion is assumed to be equal to the change in carbon stocks between the current and new land use (at maturity), and the biological responses associated with the new land use.

This approach can be generalized and applied to all carbon pools (i.e., aboveground biomass, belowground biomass, dead wood, litter, and soils). Thus, the effect of land use changes on GHG emissions (-) and removals (+) can be expressed as the change in ecosystem carbon stocks (ΔC) before and after conversion from the baseline land use (LU1) to a new land use (LU2) and the annual GHG fluxes for the newly established land use. Ecosystem carbon stocks eventually reach steady state. We assumed this transition to a new equilibrium will occur linearly during a transition period T of 45 years. Thus, the change in ecosystem carbon stocks due to the conversion ($\Delta C_{conversion}$) can be expressed as:

$$\Delta C_{conversion} = \Delta C_{Biom} + \Delta C_{Soils.} = [(C_{Biom\ LU2} - C_{Biom LU1}) + (C_{Soil\ LU2} - C_{Soil LU1})] \text{ x area} \qquad (4)$$

The annual effect can be expressed as

$$\Delta C_{yr} = \Delta C\text{conversion} / T.$$

Where:

ΔC_{Biom} = the change in carbon stock in the biomass,
ΔC_{Soils}= the change in carbon stock in the soil,
$C_{Biom\ LU2}$ = carbon stock in the biomass for land use 2 (project),
$C_{BiomLU1}$ = carbon stock in the biomass for land use 1 (baseline),
$C_{Soil\ LU2}$= carbon stock in the soil for land use 2 (project),
$C_{Soil\ LU1}$ = carbon stock in the soil for land use 1 (baseline),
T = transition period, set to 45 years (2026 to 2070).

Specific assumptions and methods for the land uses follow.

Grasslands

We assumed the restored grasslands would be improved relative to current conditions. Satellite images viewed by HydroFocus staff showed low vegetative cover. Therefore, we assumed that the current condition is degraded relative to the proposed land use change. The proposed land use will increase biodiversity and productivity and accumulate carbon in the soil over the long term. When existing grasslands are replaced by a different land use, the changes in biomass carbon stocks following land use conversion were accounted for in the year of the conversion. For example, if open water replaced grasslands, the vegetation would be lost in the first year.

Grassland soil organic carbon (SOC) was calculated as:

$$SOC = SOC_{REF} \times F_{LU} \times F_{MG} \times F_{I} \tag{5}$$

Where:
The land use factor (F_{LU}) reflects presence of permanent grassland.
The management factor (F_{MG}) represents the status of the grassland (degraded or improved)
The input factor (F_I) is applied only to improved grasslands to account for possible additional management inputs.

Values for the terms in equation 5 were extracted from IPCC (2006). We used F_I =1.0 for improved grasslands. We used F_{LU} = 1.0, assuming all current and proposed grasslands are permanent. For restored grasslands, we used a management factor (F_{MG}) of 1.0 which is characteristic of non-degraded and sustainably managed grassland. For baseline grasslands, we used F_{MG} = 0.7 which represents conditions in which there is a long-term loss of productivity and vegetation cover as indicated by the imagery discussed previously. We assumed that when converting to grasslands from another land use such as ponds, 80% of the SOC_{REF} is reached during the first 20 years, and the total SOC_{REF} during the following 25 years (IPCC 2006).

Ponds

For open water, we used the IPCC (2006) guidelines for flooded land (Chapter 7, and Appendix 3). We assumed a conversion to open water would not affect soil carbon of the previous land use because the anoxic conditions resultant from flooding will minimize oxidation of the organic carbon. However, anerobic conditions would result in CH_4 emissions. For warm temperate dry areas, the IPCC suggests a median CH_4 emissions value of 0.044 kg C ha^{-1} day^{-1} which corresponds to about 0.16 tCO_2-e acre^{-1} yr^{-1} (IPCC 2006). For the baseline ponded condition, we estimated soil carbon content as the average of the values of all current land uses based on the Soil Survey data. Also, biomass accumulations after flooding were set to zero. Due to the lack of water exchange with other water bodies, the aqueous flux of C was assumed to be insignificant.

Riparian vegetation

To estimate carbon stored in soil and biomass for riparian vegetation, we used the tool for riparian vegetation described by Matzek et al. (2018). Matzek et al. (2018) defined different riparian vegetation groups. We assumed that willow scrub adequately represents the current baseline riparian vegetation. We assumed that the proposed mitigation would improve the existing riparian vegetation to a more productive and diverse mixed riparian forest. Matzek et al. (2018) provided tables with annual carbon accumulation values for the different ecosystem pools for the first 100 years for each riparian vegetation type. We included the following carbon pools: trees, dead vegetation, forest floor, understory vegetation, and soil.

Freshwater wetland

We used reference values suggested by the IPCC wetland supplement for soil carbon and CH_4 emission of inland wetlands on mineral soils. For temperate climates, IPCC suggests CH_4 emissions of 235 kg CH_4 ha^{-1} yr^{-1} (2.4 tCO2-e $acre^{-1}$ yr^{-1}) and the value of 30 tC $acre^{-1}$ for the carbon in the soil pool. We assumed that the biomass produced in permanently flooded wetlands on mineral soil would not be significantly different from the biomass of permanently flooded wetlands on organic soils exemplified by the restored wetlands in the San Joaquin-Sacramento Delta. We therefore used 4.6 tC $acre^{-1}$ from Miller and Fujii (2010).

Table 2. Soil carbon stock and annual carbon stock reference values and methane fluxes for land uses in baseline and project conditions for the I-5 Ponds

Land use	Soil carbon stock (tC $acre^{-1}$)	Biomass carbon stock change (tCO_2-e $acre^{-1}$ yr^{-1})	Methane flux (tCO_2-e $acre^{-1}$ yr^{-1})	Reference
Grassland baseline	10.8	1.2	N/A	IPCC table 3.4.2 grassland chapter 6
Grassland project	15.4	1.2	N/A	IPCC table 3.4.2 grassland chapter 6
Lake/pond	11.5	0	0.2	IPCC flooded land. Appendix 3 of the 2006 IPCC guidelines
Wetland Freshwater	29.9	4.6	2.4	Miller and Fujii (2010), IPCC Wetland supplement (2013) [, IWMS Chapter 5.
Riparian baseline (degraded)	1.0	29.4	N/A	Matzek et al. (2018)
Riparian project	4.7	30.6	N/A	Matzek et al. (2018)

Determination of GHG effects of f land use change Interstate-5 Ponds 6, 7 and 8

Because some portions of the mitigation area maintain the same land use, the proposed areas subject to land use change by the mitigation project are smaller than the total mitigation area. Therefore, in the portion of the mitigation area remaining “as is”, the GHG emissions or removals are unaffected by the proposed project. These areas are excluded from the analysis of the effect of the mitigation project on GHG fluxes.

To estimate the effect of the mitigation project on the GHG fluxes we:

1. Determined acreage for each proposed land use conversion,
2. Determined soil and biomass carbon stock of the baseline and proposed mitigation land-uses (before and at the end of the transition period, T, respectively) for each land use conversion,
3. Determined the total carbon stock changes (soil + biomass) as the differences between carbon stocks of the baseline and proposed land use at the end of the transition period,
4. Determined the annual value of the total carbon stock changes (soil + biomass),
5. Added where appropriate the annual CO_2 and CH_4 fluxes to the annual carbon stock change and obtained the annual GHG flux per unit area in tCO_2-e $acre^{-1}yr^{-1}$,

6. Scaled the annual GHG flux value to the actual area of each conversion and calculated the total annual GHG flux for each project area and (tCO_2-e yr^{-1}),
7. Summed net changes in emissions (+) and removals (-) from 2026 to 2040 and 2070.

Results

Bouldin Island

Baseline

For the organic and highly organic mineral soils, baseline land uses consisted primarily of corn and safflower. Non-agricultural land uses included seasonal wetlands, fallow land, riparian vegetation, forested wetlands, and grassland. Table 3 shows the number of acres of the proposed mitigation land uses, the range of associated baseline emissions per acre and the total estimated range of total emissions (i.e., ranges per acre time the number of acres). Table 4 shows the baseline removal rates per acre and total baseline removals on mineral soils. Using medium emission and removal rates (Tables 3 and 4 columns titled "Medium"), we estimated the total present-day annual baseline emissions for the three proposed compensatory mitigation sites on Bouldin Island and the total mitigation area as equal to the sum of total baseline emissions on organic and highly organic mineral soils and removals on mineral soils at 7073 tCO_2-e (i.e., 6401 tCO_2-e minus 378 tCO_2-e removed on mineral soils (Table 4) plus 1,050 tCO_2-e from farming operations).
Using a start date of 2026, the estimated cumulative baseline emissions for 2040 are 19,379 tCO_2-e and cumulative baseline emissions for 2070 are 58,138 tCO_2-e.

Table 3. Annual per acre and total baseline emissions for organic soils and highly organic mineral soils of Bouldin areas associated with the proposed mitigation land uses (excluding emissions from farming activities).

Proposed mitigation		CO_2+ N_2O per acre			CO_2+N_2O total		
	Acres	Low tCO_2-e	Medium tCO_2-e	High tCO_2-e	Low tCO_2-e	Medium tCO_2-e	High tCO_2-e
SITE B1							
Freshwater Marsh	19	3.7	6.4	8.7	72	123	167
Grassland	7	9.1	11.8	14.1	63	81	97
Lake/Pond	4	1.8	4.1	6.2	7	17	26
Riparian	75	2.9	5.5	7.8	219	417	586
Seasonal Wetland	126	5.5	8.4	10.7	690	1049	1350
Total subject to LU change	231	4.5	7.3	9.6	**1051**	**1688**	**2226**
SITEB2							
Freshwater Marsh	8	7.2	10.1	12.6	57	81	100
Grassland	<0.01	15.4	16.0	18.5	0.003	0.004	0.004
Riparian	75	7.9	10.8	13.1	593	806	983
Total subject to LU change	83	7.9	10.8	13.1	**650**	**887**	**1083**
SITEB3							
Grassland	313	9.9	12.2	14.3	3081	3827	4457

Total subject to LU change	313	9.9	12.2	14.3	**3081**	**3827**	**4457**
BOULDIN totals							
Freshwater Marsh	27	4.7	7.5	9.8	129	204	267
Grassland	319	9.8	12.2	14.2	3140	3908	4549
Lake/Pond	4	1.8	4.1	6.2	7	17	26
Riparian	150	5.4	8.1	10.5	811	1223	1569
Seasonal Wetland	126	5.5	8.4	10.7	690	1049	1350
TOTAL MITIGATIO AREA subject to LU change	627				**4781**	**6401**	**7766**

Table 4. Annual per acre and total baseline removals for mineral soils associated with the proposed mitigation land uses on Bouldin Island.

Proposed mitigation		CO_2+ N_2O per acre			CO_2+N_2O total		
	Acres	Low tCO_2-e	Medium tCO_2-e	High tCO_2-e	Low tCO_2-e	Medium tCO_2-e	High tCO_2-e
SITE B1							
Freshwater Marsh	53	-1.9	-2.4	-2.9	-103	-129	-155
Grassland	62	-2.0	-2.5	-3.0	-122	-152	-183
Lake/Pond	6	-1.4	-1.8	-2.1	-9	-11	-13
Riparian	28	-1.7	-2.2	-2.6	-48	-60	-73
Seasonal Wetland	4	-1.7	-2.2	-2.6	-7	-9	-11
Total subject to LU change	153	-1.9	-2.4	-2.8	-290	-362	-435
SITEB2							
Riparian	17	-0.7	-0.9	-1.1	-13	-16	-19
Total subject to LU change	17	-0.7	-0.9	-1.1	-13	-16	-19
SITEB3	0	0	0	0	0	0	0
Total BOULDIN							
Freshwater Marsh	53	-1.9	-2.4	-2.9	-103	-129	-155
Grassland	62	-2.0	-2.5	-3.0	-122	-152	-183
Lake/Pond	6	-1.4	-1.8	-2.1	-9	-11	-13
Riparian	45	-1.4	-1.7	-2.1	-61	-76	-92
Seasonal Wetland	4	-1.9	-2.4	-2.9	-7	-9	-11
TOTAL Bouldin mitigation area subject to LU change	**170**	**-1.8**	**-2.2**	**-2.7**	**-302**	**-378**	**-454**

Proposed Mitigation

The proposed mitigation habitats, freshwater marsh, grassland, ponds, riparian, and seasonal wetlands, freshwater marsh, and riparian habitat, can contribute to offsetting the baseline emissions described above. Tables 5 and 6 show the estimated medium annual emissions (+) and removals (-) for the three proposed mitigation habitats sites. Using medium emission and removal rates (tables 5 and 6), we estimated the total annual project emissions for the proposed compensatory mitigation on Bouldin Island as equal the sum of total emissions on organic and highly organic mineral soils and removals on mineral soils (Table 5) at 5782 tCO_2-e (i.e., 5853 tCO_2-e from Table 5 minus 72 tCO_2-e from Table 6.

Table 5. Annual per acre and total project emissions for organic soils and highly organic mineral soils associated with the proposed mitigation land uses on Bouldin Island[3].

	Site B1		**Site B2**		**Site B3**		**Total Mitigation**	
Proposed mitigation	**Acres**	**Medium tCO_2-e**	**Acres**	**Medium tCO_2-e**	**Acres**	**Medium tCO_2-e**	**Acres**	**Medium tCO_2-e**
Freshwater Marsh	19	12	8	5	0	0	27	17
Grassland	7	81	<0.1	<0.1	313	3840	320	3921
Pond	4	17	0	0	0	0	4	17
Riparian	75	229	75	620	0	0	150	849
Seasonal Wetland	126	1050	0	0	0	0	126	1050
Total	**231**	**1388**	**83**	**625**	**313**	**3840**	**627**	**5853**

[3] Even though riparian vegetation removes CO_2, the removal is counterbalanced by emissions from the oxidation of organic soils which results in a net annual emission.

Table 6. Annual project emissions and removals for mineral soils associated with the proposed mitigation land uses on Bouldin Island.

	Site B1		Site B2		Site B3		Total Mitigation	
Proposed mitigation	Acres	Medium tCO_2-e	Acres	Medium tCO_2-e	Acres	Medium tCO_2-e	Acres	Medium tCO_2-e
Freshwater Marsh	53	32	0	0	0	0	53	32
Grassland	62	12	0	0	0	0	62	12
Pond	6	25	0	0	0	0	6	25
Riparian	28	-80	17	-49	0	0	45	-129
Seasonal Wetland	4	-12	0	0	0	0	4	-12
Total	**153**	**-23**	**17**	**-49**	**0**	**0**	**170**	**-72**

Net GHG effect

We estimated the effects of the proposed compensatory mitigation habitat on GHG emissions and removals as the difference between baseline and project GHG emissions and removals to 2040 and 2070. Specifically, the annual net effect (using medium values for emissions and removal rates) was estimated as 1,291 tCO_2-e yr^{-1}, the difference between baseline emissions (7, 74O $tC0_2$-e yr^{-1}) and project emissions (5,782 tCO_2-e yr^{-1} from tables 3,4,5 and 6). Specifically, GHG emission were reduced by 472 tCO_2-e yr^{-1} for Site B1, 380 tCO_2-e $yr^{-1}$for Site B2, and 440 tCO_2-e yr^{-1} for Site B3

Using 2026 as a start date **we estimated the net emissions-reduction benefit of the proposed mitigation habitat at 19,379 tCO_2-e in 2040 and 58,138 tCO_2-e in 2070.** Most of the estimated benefit is due to the proposed construction of freshwater marsh which will stop emissions from oxidation of the organic and highly organic mineral soils. We estimated the uncertainty the net effect at approximately plus or minus 50% primarily due to the spatial variability in soil characteristics that affect baseline emissions.

Interstate-5 Ponds

Pond 6

Of the 182 acres of proposed compensatory mitigation habitat, 171 acres will be subject to land use change with the mitigation project for Pond 6 will result in the following land use changes.

- Freshwater wetlands will increase by 36 acres.
- Grasslands will decrease by 15 acres.
- Open water will increase by 10 acres.
- Riparian habitat will decrease by 31 acres.

Specifically,

- 109 acres of current degraded grassland will be improved. Of the 15 acre decrease in grasslands
  - 8 acres will be converted to open water; and
  - 13 acres will be converted to freshwater wetlands.
- 5 acres of riparian habitat will be improved. Of the 31 acre decrease in riparian habitat
  - 26 acres will be converted to freshwater wetlands,

- o 4 acre will be converted to open water.

Using methods described above, we estimated net changes range from -0.2 to 2.6 t CO_2-e acre^{-1} year^{-1} where negative values are removals and positive values are emissions. The estimated overall annual net increase in emissions is 37.3 t CO_2-e during the first 20 years and 5.7 during the second 20 years. **Starting in 2026, we estimated a net effect of increased cumulative emissions of 559 t CO_2-e to 2040 and 888 t CO_2-e in 2070.**

The primary uncertainty in our estimates is related to the annual net effect due to conversion of riparian areas to wetland. Specifically, estimates for riparian carbon sequestration contain a large degree of uncertainty (Maztek et al. 2020). For example, Maztek et al. (2020) related that high-end estimates of total C sequestration were more than double the low-end estimate and the range in the 95% confidence interval for a 20-year estimate covered nearly an order of magnitude.

Table 7. Estimated net annual changes (baseline – project) for Pond 6.

Land use change	Annual net effect per acre t CO_2-e acre^{-1} year^{-1}	Annual net effect t CO_2-e acre^{-1} year^{-1}	Overall Net effect
Existing grassland to wetland	0.5	6.7	emissions
Existing grassland to pond	0.4	3.2	emissions
Existing riparian to wetland	2.0	52.2	emissions
Existing riparian to grassland	1.2	4.4	emissions
Existing riparian to pond	2.6	4.4	emissions
Improved riparian	-0.4	-2.14	removal
Improved grassland	-0.3/-0.6	-31.6/-63.2 in the second 20-year period	removal
Total		37.3/5.7[4]	emissions

Ponds 7 and 8

Of the 162 acres of proposed compensatory mitigation habitat for Ponds 7 and 8, 134 acres will be subject to a change in land use. The mitigation will result in changes in land use as follows.

- Freshwater wetlands will increase by 59 acres.
- Grasslands will decrease by 22 acres, and the 60 acres of grasslands left will be enhanced.
- Open water will decrease to 30 acres.
- Riparian habitat will decrease by 6 acres to 2 acres.

Specifically,

- Of the 90-acre of existing grasslands
  - o 60 acres will be enhanced,
  - o 26 acres will be converted to wetlands,

[4] The 5.7 t CO_2-e/ year for the second 20 years results from increased soil sequestration by the grassland.

    - 4 acres will be converted into a pond and,
    - 0.4 acres will be converted to riparian vegetation.
- Of the 8-acre of existing riparian habitat
    - 4 acres will be converted to enhanced grasslands,
    - 2 acre will be converted to enhanced riparian habitat,
    - 2 acres will be converted to wetlands and,
    - 0.6 acres acre will be converted to ponded area.
- Of the 60-acre of existing ponded area
    - 31 acres will be converted to wetlands and,
    - 3 acres will be converted to enhanced grasslands.

Table 8 shows the baseline land uses, grassland and riparian, and the associated soil and biomass carbon stock changes based on methods and references described previously.

Overall, we estimated that there will be avoided annual emissions of -50.1 t CO_2-e/ year for the proposed mitigation for the first 20 years and -68.9 t CO_2-e/ year for the second 20 years. Assuming a start date in 2026, **we estimate a cumulative net emission reduction of -751t CO_2-e in 2040 and -2,724t CO_2-e in 2070.** For Ponds 7 and 8, the largest source of uncertainty is due to grassland carbon removals. The literature indicates that this uncertainty is less than 20% (e.g., Bartholomée et al. 2018; Soussana et al. 2004)

Table 8. Estimated net annual changes (baseline – project) for Pond 7 and 8.

Project land use change	Annual net effect per acre t CO_2-e $acre^{-1}$ $year^{-1}$	Annual net effect t CO_2-e $year^{-1}$	Net effect
Existing grassland to wetland	0.5	12.84	emissions
Existing grassland to Pond	0.4	1.60	emissions
Existing riparian to wetland	2.0	3.95	emissions
Existing riparian to grassland	1.2	4.43	emissions
Existing riparian to Pond	2.6	1.51	emissions
Existing riparian to wetland	2.0	3.95	emissions
Riparian improved	-0.4	-0.74	removal
Grassland improved 1-20 years	-0.3	-16.87	removal
Grassland improved 20-40 years	-0.6	-33.74	removal
Existing pond to wetland	-1.8	-57.37	removal
Grassland improved 1-20 years	-1.0	-3.38	removal
Grassland improved 20-40 years	-1.5	-5.33	removal
Total		-50.1/-68.9[5]	removal

[5] For the first and second 20 years respectively

Summary and Conclusions

We estimated the net GHG effect of the proposed compensatory mitigation on Bouldin Island and Interstate-5 ponds 6, 7 and 8 using available data and documented methods. For Bouldin Island, it is proposed that agriculture (baseline conditions) will be replaced by wetlands, riparian habitat, ponds, and grassland. For the Interstate-5 ponds, it is proposed that grasslands, riparian habitat, and ponds will be replaced by improved grassland, wetland, riparian, and open-water habitat.

We concluded the following.

The proposed mitigation project would reduce annual emissions from the mitigation area on Bouldin Island and the Interstate 5 ponds by an estimated 1,218 – 1,379 tons of CO_2 equivalents. This would result in a cumulative emission reduction of 19,571 tons of CO_2 equivalents by 2040 and 59,975 tons of CO_2 equivalents by 2070.

Bouldin Island

- The proposed land use changes on 796 acres would result in a net estimated reduction in annual emissions of about 1,292 tons of CO_2 equivalents. The Site B1 would reduce emissions by 472 tons of CO_2 equivalents; the site B2 by 380 tons of CO_2 equivalents; the site B3 440 tons of CO_2 equivalents.
- Between 2026 and 2040, the estimated cumulative effect is an emissions reduction of 19,379 tons of CO_2 equivalents.
- Between 2026 and 2070, the estimated cumulative effect is an emissions reduction of 58,138 tons of CO_2 equivalents.

Interstate Ponds

- The estimated effect of the Ponds 6, 7 and 8 is a net emissions reduction of 192 tons of CO_2 equivalents from 2026 to 2040 and 1836 tons of CO_2 equivalents for 2026 to 2070,

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Appendix D
Alternatives Screening Analysis

The Delta Conveyance Project, proposed by the California Department of Water Resources (DWR), requires permission from the U.S. Army Corps of Engineers (USACE) under Section 14 of the Rivers and Harbors Act (RHA) (33 United States Code [U.S.C.] 408) (Section 408) to alter federal levees constructed as part of the Sacramento River Flood Control Program, an approved real estate outgrant for crossing under the Stockton Deep Water Ship Channel (a federal navigation project), authorization under Section 10 of the RHA (33 U.S.C. 403) to conduct work in navigable waters of the United States. The project also requires authorization for the discharge of dredge or fill material into waters of the United States under Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344). The federal action USACE is reviewing is limited to activities that require a federal permission, approval, or permit under these authorities. The scope of the federal action is limited to project construction and future maintenance of the federal levee and does not include future operations of the project.

USACE is the lead agency for preparing an environmental impact statement (EIS) under the National Environmental Policy Act (NEPA) for evaluating the federal action to determine whether to issue a letter of permission under Section 408, approve an application for a real estate outgrant, issue a Department of the Army permit under Section 10 of the RHA, and issue a Department of the Army permit under Section 404 of the CWA. The purpose of the EIS is to evaluate the applicant's proposed action and alternatives and to support the determination in the Record of Decision whether to authorize the proposed action or an alternative. As a regulatory agency, USACE is not a project proponent and does not use the EIS to determine which alternative among a range of alternatives should be implemented. In this case, USACE is analyzing DWR's proposed action, as well as alternatives to that action that may reduce effects on the aquatic ecosystem. All alternatives analyzed must meet the project purpose and be practicable under the U.S. Environmental Protection Agency's 404(b)(1) guidelines. To be practicable, an alternative must be available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

DWR is preparing an environmental impact report (EIR) under the California Environmental Quality Act (CEQA), which will analyze 10 alternatives for the proposed project. USACE has screened potential alternatives and identified six of the alternatives to be fully analyzed in the EIS. While four additional alternatives are included in the EIR, they are not included in the EIS since USACE is not required to analyze all potential alternatives to the proposed project. In the case of Alternatives 2c and 4c (4,500 cubic feet per second [cfs] alternatives) it was determined that analysis of Alternatives 1 and 3 (the 6,000 cfs alternatives) and Alternatives 2b and 4b (3,000 cfs alternatives) would provide sufficient bookends of effects, which would capture the effects of Alternatives 2c and 4c. Additionally, the effects of Alternatives 2c and 4c would be very similar to those for Alternatives 1 and 3 as the same number of intakes would be used, and only the tunnel size would vary. In the case of Alternatives 2a and 4a, it was determined the alternatives would result in additional adverse impacts on the aquatic ecosystem beyond those in the proposed action due to the additional intake facility proposed and the subsequent increase in effects.

The range of alternatives to be evaluated by USACE in the EIS is limited to the following alternatives.

Alternative Analyzed in the EIS	**Alternative in the EIR**
No Action Alternative	No Action Alternative
Alternative 1-Central Alignment, 6,000 cfs, Intakes B and C	Alternative 1
Alternative 2b-Central Alignment, 3,000 cfs, Intake C	Alternative 2b
Alternative 3-Eastern Alignment, 6,000 cfs, Intakes B and C	Alternative 3
Alternative 4b-Eastern Alignment, 3,000 cfs, Intake C	Alternative 4b
DWR's Preferred Alternative -Bethany Reservoir Alignment, 6,000 cfs, Intakes B and C	Alternative 5

D.1 Identification of Water Conveyance Alternatives

The alternatives identification and screening process described in this appendix is presented as provided by the California Department of Water Resources (the applicant) in the Delta Conveyance Project Draft Environmental Impact Report Appendix 3A, *Identification of Water Conveyance Alternatives* and, therefore, is presented from the California Environmental Quality Act perspective. However, the U.S. Army Corps of Engineers (USACE) relied on this information when preparing its Draft Environmental Impact Statement (EIS). This process is summarized and included in Chapter 2, *Project Description and Alternatives*; however, this appendix provides an enhanced level of detail for readers.

Please note that the Draft environmental impact report (EIR) analyzes nine alternatives (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, 4c, and 5), the descriptions of which are included here for consistency with the information presented in the Draft EIR. However, the Draft EIS does not analyze Alternatives 2a, 2c, 4a, or 4c and identifies Alternative 5 as DWR's Preferred Alternative. The information provided in this Appendix on these alternatives helped inform the USACE decision to eliminate them from the Draft EIS analysis. Additional information on that process and reasons for elimination of alternatives is provided in Chapter 2.

3A.1 Introduction and Purpose of this Appendix

The Delta Conveyance Project Draft Environmental Impact Report (Draft EIR) is being prepared to evaluate the potential impacts of implementing the proposed Delta Conveyance Project (project), which would develop new diversion and conveyance facilities in the Sacramento–San Joaquin Delta (Delta) that are necessary 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 2020) and in a cost-effective manner.

This appendix describes the process for identifying and screening alternatives to be evaluated in the Draft EIR, focusing on the project objectives, as laid out in the Notice of Preparation (NOP). These project objectives are discussed in more detail in Chapter 1, *Introduction,* and Chapter 2, *Purpose and Project Objectives*.

This appendix is limited to discussion of alternatives to be considered for detailed analysis in the Draft EIR. Separate analyses have been prepared to describe the development of specific locations and design criteria of intakes and other facilities associated with various conveyance alignment alternatives (Delta Conveyance Design and Construction Authority 2022c).[1]

3A.1.1 Organization of this Appendix

This appendix provides the following: (1) a brief description of the background of the development of the Delta Conveyance Project and the Draft EIR; (2) descriptions of the screening criteria used to identify *potentially feasible alternatives* (a term of art under the CEQA [14 Cal. Code Regs. § 15126.6]) to be evaluated fully in the Draft EIR; and (3) the results of the two filters to define the final range of alternatives to be considered in the Draft EIR.

3A.2 Delta Conveyance Background

The Delta Conveyance Project is proposed in the context of the history of Delta issues as they relate to its ecosystem, SWP and CVP pumping facilities, Delta land use and water supply, and the regulatory environment. For more than 100 years, the State of California and the federal government have worked to develop a long-term water supply program to protect the beneficial uses of the San Francisco Bay and the Delta. In recent decades, priorities have involved balancing the need for SWP water supply reliability and Delta ecosystem health in a manner that addresses increasing statewide water demands, climate change stressors, and the needs of state-listed and federally listed fish and wildlife species. State and federal efforts to address these issues have included proposals to divert water supply that moves through the Delta from alternative locations or in different ways.

Changing the point of diversion for water exported from the Delta was first proposed as part of the SWP in the early 1960s as the Peripheral Canal, which would have included a diversion located on the Sacramento River near Hood, and an open canal that would have conveyed water around the eastern side of the Delta, terminating at the SWP and CVP south Delta pumping plants. State fisheries biologists supported such a canal as a way to eliminate the adverse environmental effects of pumping water from the south Delta. Others sought a canal to help meet increased demand for water supplies. Efforts to build what became known as the Peripheral Canal lasted through 1982, when it was defeated in a ballot initiative.

The next major iteration of a water project to add additional diversion points to convey water outside the confines of the Delta waterways began in 2006, when development of the *Bay Delta Conservation Plan* (BDCP) under Section 10 of the federal Endangered Species Act (ESA) was initiated. The habitat conservation plan[2] initially proposed Conservation Measure 1, which would add five new points of diversion in the north Delta to divert up to 15,000 cfs of water from the Sacramento River and convey water supply in two tunnels under the Delta to the existing SWP export facilities in the south Delta. The BDCP species conservation strategy also proposed avoiding, minimizing, and mitigating for potential impacts on species through restoration and enhancement of more than 165,000 acres of fish and wildlife habitat and reductions in other Delta stressors during a 50-year permit term. In the Delta Reform Act, the California State Legislature expressly recognized

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[1] Throughout this appendix, the general term *alternatives* is used to describe not only those alternative conveyance proposals that are being carried forward in the Draft EIR, but also those other proposals that, for reasons described herein, have been carefully considered, but are not being carried forward.

[2] The BDCP was also proposed to meet state requirements as a Natural Community Conservation Plan.

that the BDCP, including new Delta conveyance, could become a major component of the Delta Plan (the state's plan for how to further the coequal goals of ecosystem restoration and water supply reliability for the Delta). The original Delta Plan (2013) recommended completion of the planning process and implementation of the BDCP. For additional detail about the Delta Plan and the consistency process, see Appendix 3E, *Delta Reform Act Considerations*.

Development of the BDCP conservation strategy involved an extensive alternatives screening process for conveyance facility siting, water diversion operations, and species conservation measures. The BDCP EIR/ EIS) analyzed 15 alternatives that were selected from a three-phase alternatives screening process that considered numerous conveyance facility diversion locations and approaches and conveyance alignments in the eastern, western, and central Delta. The screening analysis was informed by contributions and advice from the BDCP Steering Committee and other ideas gathered during an extensive public review process. In all, up to 20 conveyance facility site alternatives, 10 water supply diversion operation scenarios, and 8 alternatives and components of alternatives that did not require construction of new diversions or conveyance facilities were all considered. The BDCP alternatives screening also included substantial participation from agencies, including the Bureau of Reclamation, State Water Resources Control Board, California Department of Fish and Wildlife (CDFW), Delta Stewardship Council, the Delta Protection Commission, and other interested parties, including Congressman John Garamendi, Restore the Delta, Delta water districts, and property owners over many years and through different stages of the project and EIR/EIS development.

As a result of input on the draft BDCP regarding the availability of resources to sufficiently meet the recovery standard for the proposed covered species, in 2015, the lead agencies proposed three new sub-alternatives to the original 15 evaluated in the Draft BDCP EIR/EIS, including California WaterFix, which proposed construction of water conveyance facilities similar to those proposed as Conservation Measure 1 in the BDCP, but with a reduced scale, to divert up to 9,000 cfs from three intakes in the north Delta, with compensatory habitat mitigation focused on reducing impacts of conveyance facilities. At the same time, then-Governor Jerry Brown announced the California EcoRestore program, which would restore large areas of habitat in the Delta and Suisun Marsh on an independent track. The three new sub-alternatives were developed based on previous alternatives screening analyses for intakes, conveyance facilities, and facility operations criteria and contributions from fish and wildlife agencies and interested parties. A separate EcoRestore program for Delta habitat restoration and enhancement projects has been implemented to improve ecosystem conditions not directly related to a new Delta conveyance. The California WaterFix was approved by DWR in 2017. Consistent with the change in approach from the BDCP to an approach based on new conveyance separate from the habitat restoration program in California EcoRestore, the Delta Stewardship Council adopted a new recommendation in 2018 that the state implement a dual conveyance strategy with new intakes in the north Delta and conveyance facilities to connect it with existing water supply infrastructure in the south Delta.

In 2019, following a change in California's administration, Governor Gavin Newsom proposed a strategy to address water supply reliability issues through a proposal for Delta conveyance at a reduced scale, involving a single main tunnel. As a result, DWR withdrew approval of California WaterFix to begin a new planning and environmental review effort consistent with Governor Newsom's policy. Governor Newsom directed the state to prepare a water resilience portfolio and asked DWR to study a single-tunnel project. The current configuration of the proposed Delta Conveyance Project, as presented in this Draft EIR, builds on previous efforts that have taken place over the past 15 years. A summary of these efforts follows.

- The initial conveyance configuration, the Bay Delta Conveyance Project Pipeline/Tunnel Option (PTO), was documented in the March 10, 2010, *Conceptual Engineering Report* (CER) and the subsequent October 2010 Addendum that described the addition of reaches of pipeline to the conveyance. The original PTO was a 15,000-cfs conveyance facility that consisted of five intakes on the Sacramento River between Freeport and Walnut Grove, pumping plants at each intake, an intermediate pumping plant and intermediate forebay (surface water impoundment) near the intakes, a new forebay near the existing SWP Clifton Court Forebay, and other appurtenant facilities (California Department of Water Resources 2010a:ES-2, 2010b:ES-1).
- The PTO was later modified to the California WaterFix Modified Pipeline Tunnel Option (MPTO) in the 2015 CER, when the maximum design capacity of the program was reduced from 15,000 cfs to 9,000 cfs. Additional changes to the PTO at that time included the reduction in the number of screened intakes from five to three, the elimination of the pumping plants at the intakes and the intermediate pumping plant, an increase in the size of the north and main tunnels to provide for gravity flow of the water from the intakes to a new Clifton Court Forebay pumping plant, and placement of the new forebay within the existing footprint of the Clifton Court Forebay (California Department of Water Resources 2015:2-1). The 2015 CER documented the proposed MPTO facility configuration included in the 2016 Final EIR/EIS for the program. DWR issued a Notice of Determination (NOD) in 2017, in accordance with CEQA, to adopt the MPTO as the California WaterFix project.
- The California WaterFix project concept was proposed to be further modified in 2018 to include consideration of the Byron Tract Option (BTO) (California Department of Water Resources 2018). The main differences between the 2015 California WaterFix MPTO and the proposed 2018 California WaterFix BTO included moving the new forebay to Byron Tract to become the Byron Tract Forebay and eliminating modifications to the Clifton Court Forebay. Certain facilities at the tunnel shafts were relocated to minimize disturbances to wetlands and sensitive biological resource habitat. DWR issued a Draft Supplemental EIR in July 2018 to present the results of the impact analysis of the BTO.
- In February 2019, then newly elected California Governor Newsom announced in his State of the State address (referred to above) that he did not "support WaterFix as currently configured," but did "support a single tunnel" (Newsom 2019:3). On April 29, 2019, Governor Newsom issued Executive Order (EO) N-10-19, directing several agencies, including DWR, to (among other things), "inventory and assess … [c]urrent planning to modernize conveyance through the Bay Delta with a new single tunnel project."
- In light of the Governor's announcement and Executive Order, DWR's Director exercised her discretion to rescind the project approval, decertify the Final EIR, rescind a set of bond resolutions, and withdraw permit applications associated with California WaterFix in May 2019. The CEQA process for the proposed Delta Conveyance Project would, as appropriate, use relevant information from the past environmental planning process for California WaterFix, but the proposed project would undergo a new, stand-alone environmental analysis leading to issuance of a new EIR.
- In 2019, DWR launched a new planning effort for a new project, eventually named the Delta Conveyance Project, that began with a fresh look at the historical planning information, building on areas of agreement and deviating where new concepts or configurations were identified.
- Potential Sacramento River intake sites, including those of the proposed project, were identified previously by a Fish Facilities Technical Team made up of multiple interested parties,

considered, and evaluated in support of the Delta Habitat Conservation and Conveyance Program and the associated California WaterFix project. For the Delta Conveyance Project, the Delta Conveyance Design and Construction Authority (DCA) reviewed and reconsidered the previously considered intake site locations again in 2019 and reexamined the reach of the Sacramento River between Freeport and the confluence with Sutter Slough for other viable intake sites (Delta Conveyance Design and Construction Authority 2022a, 2022b:1). Five candidate sites were analyzed relative to each other based on the following criteria.

- Bathymetry and river encroachment
- Property impacts
- Built environment impacts
- Proximity to existing development
- Geotechnical concerns
- Environmental and habitat disruption
- Roads and traffic impacts

The two intake locations chosen for the proposed project (6,000 cfs) would require the shortest intake structures and minimize conflicts with existing land uses and residential structures. A third intake location for a higher-capacity 7,500 cfs alternative was also selected. For details about how the other intake sites were considered and screened out, see Attachment A to the Engineering Project Reports (Delta Conveyance Design and Construction Authority 2022a, 2022b).

- An NOP, issued in January 2020, officially started the CEQA scoping process to solicit information on the scope for the proposed Delta Conveyance Project Draft EIR.
- 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.

3A.2.1 Delta Conveyance Project EIR Process

This Draft EIR is being prepared for the proposed Delta Conveyance Project by DWR as the CEQA state lead agency. A separate EIS is being prepared by USACE as the NEPA lead agency. This Draft EIR is prepared to meet the requirements of CEQA and the CEQA Guidelines and be compatible with NEPA to facilitate development of the USACE EIS.

On January 15, 2020, DWR issued an NOP under CEQA to prepare an EIR (California Department of Water Resources 2020). The proposed project identified in the NOP was described as new conveyance facilities in the Delta that would add to the existing SWP infrastructure. The NOP also stated that the new north Delta facilities would be sized to convey up to 6,000 cfs of water from the Sacramento River to the SWP facilities in the south Delta. The NOP outlined that DWR was considering alternatives with capacities ranging from 3,000 to 7,500 cfs, with varying degrees for the CVP, including no involvement. The NOP initiated the CEQA scoping process after the public provided input on the scope of the Draft EIR, including concepts for potential alternatives.

From the project's inception, DWR directed DCA to take a fresh look at design and engineering concepts. In addition to the engineering studies and development of project concepts that DCA performed, they also created the Stakeholder Engagement Committee to help advise and inform the DCA's refinement of design concepts to avoid or minimize impacts on the local Delta environment and communities. This work and input have informed project design and engineering conducted by the DCA, resulting in a robust investigation of conveyance facility alignments, facility designs and locations, and project operational considerations.

Initially, two conveyance facility alignments (central and eastern) with varying diversion capacities were considered for further evaluation in this Draft EIR. After considering early environmental results, comments from agencies and interested parties, and additional engineering studies, DWR identified the dual conveyance Bethany Reservoir alignment (DWR's Preferred Alternative), also to be evaluated.

3A.2.2 Proposed Delta Conveyance Project

The existing SWP Delta water conveyance facilities, which include Clifton Court Forebay and the Harvey O. Banks (Banks) Pumping Plant in the south Delta, enable DWR to divert water from the south Delta and lift it into the California Aqueduct for delivery to participating SWP contractors south of the Delta. Similarly, the existing CVP facilities, which include the C.W. "Bill" Jones (Jones) Pumping Plant facilities near Clifton Court Forebay export water from the Delta into the Delta–Mendota Canal.

The Delta Conveyance Project would construct and operate new diversion and conveyance facilities in the northern Delta that would add to the existing SWP infrastructure. New intake facilities, as points of diversion, would be constructed in the north Delta, along the Sacramento River near the community of Hood. Diverted water supply would be conveyed in a tunnel under the Delta to facilities in the south Delta for delivery of water through the SWP. The new intake facilities would provide alternate locations for diversion of water from the Delta, especially during high-flow events or periods when diversions at the Banks Pumping Plant are limited due to the presence of special-status fish species in the south Delta. The new intake facilities would be operated in coordination with the existing south Delta pumping facilities, resulting in a system also known as *dual conveyance* because there would be two complementary methods to divert and convey water for the SWP.

The proposed Delta Conveyance Project was considered first along two alignments: the Central Corridor and Eastern Corridor, as proposed in the DWR NOP (and carried forward for detailed evaluation in this Draft EIR and referred to as the *central* and *eastern alignments*). The proposed Delta Conveyance Project central and eastern alignments would include the following facilities.

- Two intake facilities along the Sacramento River in the north Delta near the community of Hood with fish-screened, on-bank intake structures. The intake sites were chosen after consideration of issues raised in response to prior iterations of the proposal to create a Delta conveyance facility (Delta Conveyance Design and Construction Authority 2022a, 2022b). The three most-feasible potential intake locations in the north Delta have been identified through extensive previous analysis, as well as additional analysis that DCA performed at DWR's request.
- A concrete-lined tunnel and associated vertical tunnel shafts to convey flow from the intakes, about 40 miles to a location west of the existing SWP Clifton Court Forebay.

- A pumping plant to the west of the existing SWP Clifton Court Forebay to lift the water in the tunnel from below-ground and into a new surface water impoundment (Southern Forebay).
- A Southern Forebay capable of receiving flows by gravity directly from the tunnel or from the pumping plant, depending on hydraulic conditions in the Sacramento River and the forebay.
- South Delta Conveyance Facilities located at the outlet of the Southern Forebay, including an outlet structure and dual tunnels to convey water to the approach channel of the Banks Pumping Plant. Two flow control structures would be used to regulate flows from the Delta Conveyance Project and the existing Clifton Court Forebay.
- Other ancillary facilities to support construction of the conveyance facilities, including access roads, concrete batch plants, fuel stations, mitigation areas, and power transmission and/or distribution lines.

In August 2021, when conveyance facility engineering and environmental analyses had progressed further, DWR finalized the process for formally identifying the proposed project. This process took into consideration the feasibility, logistics, cost, and function of each of the alternatives considered on the central, eastern, and Bethany Reservoir alignments. The Bethany Reservoir alignment (Alternative 5) would eliminate the pumping plant, forebay, and South Delta Conveyance Facilities envisioned for the central and eastern alignments. Instead, it would divert water from the two new proposed north Delta intakes via a single tunnel on an eastern alignment directly to a new pumping plant and aqueduct complex near Byron Highway in the south Delta and discharge it to the Bethany Reservoir for delivery to existing SWP export facilities.

Based on the engineering feasibility, conceptual design, constructability, and potential to reduce key environmental impacts on 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 (DWR's Preferred Alternative). The screening process used to select the alternatives to be evaluated in this Draft EIR is described in Section 3A.4, *EIR Alternatives Screening Criteria*.

DWR's fundamental purpose in proposing the project is to develop new diversion and conveyance facilities in the Delta necessary to restore and protect the reliability of the SWP water deliveries south of the Delta, consistent with the *California Water Resilience Portfolio* (California Natural Resources Agency 2020), in a cost-effective manner. The following project objectives are identified for the proposed Delta Conveyance Project.

- 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 of brackish water into 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 of water, 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.

3A.3 Identification of Alternatives under CEQA

DWR initially identified potential alternatives to be considered for analysis in this Draft EIR by reviewing previous alternatives evaluated in the *Bay Delta Conservation Plan/California WaterFix* (BDCP/CWF) *EIR/EIS* that were developed by the DWR engineering team and suggested during previous public scoping meetings. Alternatives identified in the previous BDCP/CWF EIR/EIS were not always directly or fully applicable to the Delta Conveyance Project objectives, which are more narrowly focused than BDCP/CWF objectives (see Section 3A.2.2, *Proposed Delta Conveyance Project*). Where possible, previous alternatives were modified to be more applicable to this alternative screening process. Additional alternatives have been identified during the Delta Conveyance Project public scoping process and from engineering studies provided by the DCA that are based on guidance from EO N-10-19.

Under CEQA, alternatives to be included in an EIR, in addition to the No Project Alternative, must be (1) potentially feasible; (2) attain most of the basic objectives of the project;[3] and (3) avoid or substantially lessen any of the potentially significant effects of the project, even if the alternative would impede to some degree the attainment of project objectives or would be more costly. DWR, as the CEQA Lead Agency, may structure its alternatives analysis around a reasonable definition of a fundamental underlying purpose and need not study alternatives that cannot achieve that basic goal.

The range of alternatives required in an EIR is governed by a *rule of reason* that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice. 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 that do not meet the underlying purpose or are infeasible.

Where the alternatives analyzed in this Draft EIR allow for a wide range of choices with varying degrees of environmental impact, the document may support the ultimate approval of not only the fully developed alternatives, but also what might be called *hybrid* alternatives, whose features and impacts occur within the analytical continuum between the "bookends" created by the least-impactful and most-impactful alternatives, respectively.[4] Regarding such hybrid options, agency staff should prepare a written analysis that addresses the adequacy of the draft document to support approval of the hybrid, citing substantial evidence, as appropriate.

The BDCP/CWF alternatives were retained to the extent possible and combined into similar groups for screening. EO N-10-19 resulted in the 2020 *California Water Resilience Portfolio*, which stated that the Administration was advancing a single-tunnel conveyance project under the Delta

[3] According to the California Supreme Court, CEQA lead agencies have the discretion to eliminate from further consideration an alternative that cannot achieve a project's "underlying fundamental purpose" (in *re Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings* (2008) 43 Cal.4th 1143, 1165.) The requirement that a CEQA alternative must meet "most" project objectives should be understood with this qualification in mind.

[4] See, for example, *Village Laguna of Laguna Beach, Inc. v. Board of Supervisors* (1982) 134 Cal.App.3d 1022, 1028–1029, *California Oak Foundation v. Regents of University of California* (2010) 188 Cal.App.4th 227, 274–277, and *Cherry Valley Pass Acres and Neighbors et al. v. City of Beaumont* (2010) 190 Cal.App.4th 316, 353–356.

(California Natural Resources Agency 2020). The Portfolio also stated that significant public engagement would be conducted to design a project to limit Delta impacts and provide local benefits. Because of the directive to look at a smaller, one-tunnel project, alternatives designed to accommodate a capacity greater than 7,500 cfs were excluded from consideration.

Prior to release of the 2020 NOP, the initial screening effort focused on whether these alternatives could “feasibly attain most of the basic objectives of the project” (CEQA Guidelines § 15126.6 (a)). If the initial screening process indicated that an alternative could meet most of the Delta Conveyance Project objectives, it was retained for consideration in this alternatives screening analysis. At the time of the publication of the NOP, the information related to the potential EIR alternatives was preliminary.

The 2020 NOP stated that the proposed project would construct and operate new conveyance facilities in the Delta that would add to the existing SWP infrastructure. New points of diversion would be located along the Sacramento River, between Freeport and the confluence with Sutter Slough. The new conveyance facility would include a tunnel to convey water from the new intakes to the existing Banks Pumping Plant. The NOP identified two broad “corridors” and a total diversion capacity of 6,000 cfs. These alternatives (Dual Conveyance Central Tunnel Alignment with 6,000-cfs capacity and Dual Conveyance Eastern Tunnel Alignment with 6,000-cfs capacity) are analyzed in this Draft EIR as Alternatives 1 and 3, respectively.

During the EIR scoping process, 3,500 separate comments were submitted in 2,200 letters, emails, and comment cards, and verbal comments from 2,000 individuals were transcribed. More than 500 comments were related to the development of alternatives. After the close of the formal comment period, an additional 44 letters and emails, totaling nearly 150 individual comments, were received. Of the comments received after the close of the formal scoping period, nearly 30 additional comments related to the development of alternatives were identified.

Some comments described specific potential alternatives related to conveyance, but varied in footprint from the proposed project described in the NOP. Some comments described methods to reduce reliance upon Delta water supplies, including water conservation, recycling, and use of other water supplies, such as conjunctive use programs to ensure adequate groundwater recharge operations. The scoping report can be found in Appendix 1A, *July 2020 Delta Conveyance Project Scoping Summary Report and December 2020 Addendum A*.

The alternatives, described below, that met most of the project objectives were grouped into four alternative concepts for consideration in the first-level screening, as follows.

- Dual Conveyance
- Isolated Conveyance
- Through-Delta Conveyance with Proposed Diversion Facility
- Through-Delta Conveyance with No Diversion Facility

3A.3.1 Dual Conveyance

3A.3.1.1 Dual Conveyance Central Tunnel Alignment

The dual conveyance central tunnel alignment alternative would involve building one, two, or three (depending on selected conveyance capacity) new intakes with fish screens on the eastern bank of the Sacramento River in the north Delta, between Freeport and Sutter Slough, to provide operational flexibility for the SWP. Operated in coordination with the existing south Delta pumping facilities, the resulting dual conveyance system would have two complementary methods to divert and convey water. Water diverted at the intakes during high flow periods would be conveyed south in a single tunnel to a new Southern Complex (South Delta Pumping Plant, Southern Forebay, and South Delta Conveyance Facilities) in the south Delta on Byron Tract adjacent to and west of Clifton Court Forebay. Intakes would have a maximum capacity of 3,000 or 1,500 cfs, used in combination, which would achieve the selected capacity. State-of-the-art cylindrical tee fish screens are proposed. The three most feasible potential intake locations in the north Delta have been identified through extensive previous analysis, as well as additional analysis that DCA performed at DWR's request (Delta Conveyance Design and Construction Authority 2022c).

The central tunnel alignment includes options for conveyance capacities of 3,000, 4,500, 6,000, or 7,500 cfs. A single northern tunnel would connect intakes to each other and extend approximately 8 miles south, to the Twin Cities Complex on the eastern side of Interstate (I-) 5, near Lambert Road. The Twin Cities Complex would contain a double tunnel-boring machine (TBM) launch shaft, rail-served materials depot, reusable tunnel material (RTM) treatment and storage, and appurtenant facilities. From the Twin Cities Complex, the central alignment main tunnel would connect with shafts at New Hope Tract; Staten, Bouldin, Mandeville, and Bacon Islands; and the Working Shaft and new South Delta Pumping Plant on Byron Tract, approximately 39 miles from the intakes. Along the route, the tunnel would also pass below Venice and Victoria Islands. The proposed single main tunnel and connecting tunnel reaches would be constructed at a depth of approximately 165 feet below ground surface. Tunnel shafts for launching and retrieving the TBM would be constructed a maximum of 15 miles apart along the tunnel route. The tunnel shaft pads would be constructed with a top elevation of about 1 foot above surrounding levees on the island or tract where the shaft is located. Following completion of the tunnel construction, the tunnel shaft would be raised above the shaft pad to an elevation of the 200-year flood event and sea level rise for Year 2100, as defined by DWR. Additional maintenance shafts would be established approximately every 4 to 6 miles between launch and reception shafts to allow access for inspection, replacement, or repair of TBM components. Excavated material from tunneling (i.e., RTM) would be tested, dried, and stockpiled for reuse as much as possible, such as for constructing the forebay embankments. RTM would be treated and stored at launch shaft sites until needed.

The Southern Complex would consist of a pumping plant to convey water from the tunnel into a 750-acre aboveground forebay (i.e., Southern Forebay) with a normal operating capacity of 9,000 acre-feet, contained by earthen embankments 28 feet high and 32 feet wide at the crest. The forebay embankments would be constructed using materials from excavations and RTM to the extent possible. 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. Facilities were designed for 10.2 feet of sea level rise, which is an extreme estimate and not what DWR anticipates will be the actual sea level rise at 2100. Control and outlet structures would connect the Southern Forebay to new South Delta Conveyance Facilities. The proposed South Delta Conveyance Facilities would extend from the new Southern Forebay to the existing SWP Banks Pumping Plant inlet channel via two tunnels that would pass under Byron Highway. Under the 7,500-cfs capacity option, an additional, single tunnel would extend east from the new control structure adjacent to the SWP Banks Pumping Plant approach channel to the CVP Jones Pumping Plant approach channel.

The central tunnel alignment would also involve roadway and bridge modifications, levee construction or improvements, railroad spur extensions, temporary and permanent parking facilities (i.e., park-and-ride lots), and temporary and permanent power facilities.

3A.3.1.2 Dual Conveyance Eastern Tunnel Alignment

The Dual Conveyance Eastern Tunnel Alignment alternative would be similar to the dual conveyance central tunnel alignment alternative, except for the location of the main tunnel alignment. Major features and components, such as the north Delta intakes, northern tunnels, Twin Cities Complex, and the Southern Complex, would be the same as described for the dual conveyance central tunnel alignment, including the intake capacity options of 3,000 cfs, 4,500 cfs, 6,000 cfs, and 7,500 cfs. The main difference would be that the main tunnel alignment from the Twin Cities Complex to the new Southern Forebay pumping plant would extend farther east in the vicinity of I-5, with tunnel shafts at New Hope Tract, Canal Ranch Tract, Terminous Tract, King Island, Lower Roberts Island, Upper Jones Tract, and the Working Shaft and South Delta Pumping Plant on Byron Tract, approximately 42 miles from the intakes. Along the route, the tunnel would also pass under Brack Tract, Rindge Tract, Lower Jones Tract, and Victoria Island. Launch shafts south of the Twin Cities Complex would be constructed on Lower Roberts Island and Byron Tract (Working Shaft and South Delta Pumping Plant). Five maintenance shafts and three reception shafts also would be constructed.

3A.3.1.3 Dual Conveyance East Canal

The Dual Conveyance East Canal alternative entails the construction and operation of up to three new north Delta intakes, with fish screens and associated pipeline/canal conveyance facilities with a total capacity of 3,000–7,500 cfs, depending on the option selected, and the operation of the SWP as a dual conveyance facility. Water primarily would be conveyed from the north Delta to the south Delta through up to three intakes on the eastern bank of the Sacramento River, between Clarksburg and Walnut Grove. Water would be diverted from the Sacramento River into pipelines leading to intake-pumping plants. Water would travel through sedimentation basins and be pumped into another set of pipelines, eventually reaching a lined or unlined canal approximately 30 miles long. Once in the canal, water would flow by gravity south along the eastern side of the Delta to a new intermediate pumping plant, and then to a new forebay on Byron Tract, adjacent to and south of Clifton Court Forebay. The new canal would cross watercourses through culvert or tunnel siphons. Aboveground facilities would be designed to withstand the 200-year flood event and sea level rise for Year 2100, as defined by DWR. It is anticipated that the amount of materials required for construction of the canal levees would be similar to the amount of material excavated along the canal alignment.

3A.3.1.4 Dual Conveyance West Canal

Under the Dual Conveyance West Canal alternative, up to three intakes with fish screens on the west bank of the Sacramento River between Clarksburg and Walnut Grove would divert water into pipelines leading to intake pumping plants with a total capacity of 3,000–7,500 cfs depending on the option selected, and the operation of the SWP, as a dual conveyance facility. Water would travel through sedimentation basins and be pumped into another set of pipelines to a lined or unlined canal. Water would be carried south along the western side of the Delta to a new intermediate pumping plant and then pumped through a tunnel to a continuing canal to a new forebay on Byron Tract immediately northwest of Clifton Court Forebay. Along the conveyance route, diverted water would travel under existing watercourses and one rail crossing through culvert siphons. This arrangement would enhance water supply operational flexibility, using forebay storage capacity to regulate flows from north Delta intakes to south Delta pumping plants.

New connections would be created between the forebay on Byron Tract and the Banks and potentially the Jones pumping plants, along with control structures to regulate the relative quantities of water flowing from the north Delta and the south Delta. Use of existing SWP/CVP south Delta export facilities would continue. This facility could convey up to 7,500 cfs from the north Delta. The west alignment would be approximately 52 miles long from the north Delta intakes to the forebay on Byron Tract.

3A.3.1.5 Dual Conveyance with New Intakes at Sacramento Weir

A dual conveyance with new intakes at Sacramento Weir alternative would include intake capacities from 3,000 cfs to 7,500 cfs, a tunnel between the Sacramento River near Sacramento Weir and the SWP and CVP pumping plants, and the continued use of the South Delta pumping plants. This alternative would include up to three intakes along the Sacramento River near the Sacramento Weir and a tunnel that would extend more than 30 miles to the Twin Cities Complex tunnel launch shaft site, as described in Section 3A.3.1.1, *Dual Conveyance Central Tunnel Alignment,* near Twin Cities Road and I-5 for connection to a tunnel that would extend more than 30 miles to Clifton Court Forebay. The tunnel between the intakes near the Sacramento Weir and tunnel launch shaft site at the Twin Cities Complex would require at least one tunnel reception shaft and three maintenance shafts to be located near West Sacramento, Freeport, Clarksburg, and Hood.

3A.3.1.6 Dual Conveyance Tunnel with New Intakes at Fremont Weir and Decker Island

The dual conveyance tunnel with new intakes at Fremont Weir alternative would include a sequentially phased conveyance alternative with intakes located near Fremont Weir and Decker Island. The conveyance facility also could be phased sequentially to extend connections to non-SWP/CVP water connections. The intake near the Fremont Weir would provide an intake capacity of 3,000–7,500 cfs, depending on the option selected, with intakes located in the vicinity of the Fremont Weir on the Sacramento River.

The first phase of the alternative would involve construction of a new 3,000–4,000-cfs capacity intake (expandable to 6,000 cfs in the second phase of this plan) on the Sacramento River near Fremont Weir. From there, a 65-mile pipeline/tunnel would be constructed under the Yolo Bypass, the Sacramento River near Decker Island, Sherman Island, the San Joaquin River, Jersey Island, and portions of Contra Costa County near Oakley to a location near Clifton Court Forebay. The pipeline would be constructed in the Yolo Bypass, using open-cut trenches that would be covered following construction. The tunnel would extend from the Yolo Bypass to the location near Clifton Court Forebay with connections to Clifton Court Forebay. The tunnel would require shafts approximately every 4 to 6 miles. Connections to North Bay, northern Delta cities and agencies, South Bay, Contra Costa, and Los Vaqueros Reservoir East Bay Municipal Utility District would be considered.

Three new intakes would be constructed (up to 3,000 cfs each to divert up to 7,500 cfs) on the Sacramento River near Decker Island with a pump station and a pipeline/tunnel under Sherman Island, the San Joaquin River, Jersey Island, and Contra Costa County to Bethany Reservoir, with connections to Clifton Court Forebay established in a later phase. A tunnel would extend from the intakes up to 30 miles under Decker, Sherman, and Jersey Islands and the San Joaquin River to the existing Clifton Court Forebay or Bethany Reservoir. The tunnel would include tunnel launch shafts at Decker Island and either Clifton Court Forebay or Bethany Reservoir. Tunnel maintenance or reception shafts would be located near Jersey Island, Brentwood, and Oakley, and more maintenance shafts possibly would be required for connection to Bethany Reservoir.

It should be noted that CDFW has restored wetlands on approximately 25% of Decker Island, and 70% of the island has been modified by a new sand and soil quarry. The remaining portion of the island is part of the Sacramento Deep Water Ship Channel project facilities and operated by USACE and the Port of West Sacramento.

3A.3.1.7 Dual Conveyance with New Intakes at Decker Island

A dual conveyance with new intakes at Decker Island alternative would include up to three intakes for total capacities from 3,000 cfs to 7,500 cfs, a tunnel between Decker Island and the SWP and CVP pumping plants, and the continued use of the south Delta pumping plants. Placement of more than one intake would be difficult because multiple intakes would be separated by at least 1 mile and the shoreline along the Sacramento River is less than 2 miles long. A tunnel would extend from Decker Island up to 30 miles under Decker, Sherman, and Jersey Islands and the San Joaquin River to the existing Clifton Court Forebay or Bethany Reservoir. The tunnel would include tunnel launch shafts at Decker Island and either Clifton Court Forebay or Bethany Reservoir. Tunnel maintenance or reception shafts would be located near Jersey Island, Brentwood, and Oakley, and more maintenance shafts possibly would be required for connection to Bethany Reservoir.

It should be noted that CDFW has restored wetlands on approximately 25% of Decker Island, and 70% of the island has been modified by a new sand and soil quarry. The remaining portion of the island is part of the Sacramento Deep Water Ship Channel project facilities and operated by USACE and the Port of West Sacramento.

3A.3.1.8 Dual Conveyance Bethany Reservoir Alignment

Interested parties presented several comments about potential impacts on the community of Discovery Bay from construction of a new Southern Forebay. In response, the DCA developed a new alignment that would eliminate the need to construct a new southern forebay and pumping plant adjacent to the existing Clifton Court Forebay. The dual conveyance Bethany Reservoir alignment alternative would have a diversion capacity of 6,000 cfs and use the same two intakes along the east bank of the Sacramento River as the central and eastern alignment, which would provide project design capacity of 6,000 cfs. Each intake would divert a maximum of 3,000 cfs and have the proposed state-of-the-art cylindrical tee fish screens. From the intakes, the tunnel would follow the same route as the central and eastern alignments to the Twin Cities Complex. From the Twin Cities Complex, the tunnel would follow the eastern tunnel alignment as far as the Lower Roberts Island launch shaft, which would be a double launch shaft similar to that at Twin Cities. From there, the tunnel would take a different route to the south of Clifton Court Forebay, with additional shafts at Upper Jones Tract and Union Island, before terminating at the reception shaft at a new set of facilities called the Bethany Complex. The Bethany Complex would be located southeast of Clifton Court Forebay, off Mountain House Road, approximately 0.5 miles south of the intersection with Byron Highway.

The Bethany Complex would consist of the Bethany Reservoir Pumping Plant and Surge Basin, the Bethany Reservoir aqueduct, and the Bethany Reservoir Discharge Structure. The main tunnel would terminate at a reception shaft within the surge basin adjacent to the Bethany Reservoir Pumping Plant. The pumping plant would convey water approximately 2.5 miles through a pipeline aqueduct and raise it to enter Bethany Reservoir, which is at 245 feet above sea level, through a new discharge structure on the bank of the reservoir. The Bethany Reservoir Pumping Plant would be a multilevel underground structure with its roof at grade and appurtenant structures aboveground. The surge basin would extend from existing grade to about 30 or 40 feet below grade. The aqueduct would be laid primarily in trenches and backfilled, but two reaches would require the pipes to be laid in tunnels beneath Jones Pumping Plant discharge penstocks and the existing Bethany Reservoir Conservation Easement. These tunnel reaches would not be as deep as the main tunnel and would be constructed with sequential excavation methods with roadheader machines. Soil material removed from the tunnels and the open-cut trenches would be used to refill the trenches and develop contours adjacent to the aqueduct.

3A.3.2 Isolated Conveyance

Isolated conveyance involves conveying water from the Sacramento River to the south Delta without continued use of the existing south Delta diversions. These alternatives could include potential new points of diversion at various locations in the north Delta and facilities to move water from new points of diversion to the existing SWP and CVP pumping facilities in the south Delta. In some cases, the alternatives involve abandoning the south Delta intakes.

3A.3.2.1 Isolated Conveyance New Intakes at Fremont Weir and Decker Island

Under this alternative, facilities would be the same as the dual conveyance alternative in Section 3A.3.1.6, *Dual Conveyance Tunnel with New Intakes at Fremont Weir and Decker Island,* except it would not involve operation of the existing SWP conveyance facilities. This would be an isolated conveyance, no longer involving operation of the SWP and CVP south Delta diversion facilities at Clifton Court Forebay and Tracy Fish Collection Facility on Old River, respectively. The existing hydraulic connections between the SWP and CVP south Delta diversions at Clifton Court Forebay and Tracy Fish Collection Facility would be closed.

Early in the CEQA analysis of the BDCP, DWR considered, but screened out, an alternative to the conveyance component called the Initial Screening Conveyance Alternative B6, *Isolated Conveyance with a Tunnel between the Sacramento River near Fremont Weir and the SWP and CVP Pumping Plants, Isolated Conveyance with a Tunnel between the Sacramento River near Decker Island to Clifton Court Forebay and Bethany Reservoir, and Continued Use of the South Delta Intakes*. At that time, this alternative was eliminated from further evaluation because it would require a longer alignment than most other isolated conveyance alignments considered and would therefore increase the extent of disturbance to communities and habitat along this conveyance alignment and be drastically more expensive to construct than substantially shorter alignments. This alternative also was eliminated because the amount of water diverted from the Sacramento River would be less than under other isolated conveyance alternatives, and, therefore, the amount of water to be diverted at the south Delta intakes would be greater than under other isolated conveyance alternatives. Based on a 2010 study, it was believed that ability to divert water in the western Delta near Decker Island could also be limited due to the presence of delta smelt (*Hypomesus transpacificus*) in the western Delta. During months where smelt were not in the area, salinity could be too high for diversions from the western Delta, especially as sea level rise progresses.

3A.3.2.2 Isolated Conveyance Tunnel with Sacramento River Intakes

This alternative would be the same as the dual conveyance alternative discussed in Section 3A.3.1.1, with a project design capacity of 7,500 cfs, except it would not involve operation of the existing SWP conveyance facilities. This would be an isolated conveyance, no longer involving operation of the SWP and CVP south Delta diversion facilities at Clifton Court Forebay and Tracy Fish Collection Facility on Old River, respectively. The existing hydraulic connections between the SWP and CVP south Delta diversions at Clifton Court Forebay and Tracy Fish Collection Facility would be closed.

3A.3.2.3 Isolated Conveyance West Canal with Sacramento River Intakes

This alternative would be the same as the Dual Conveyance West Canal alternative discussed in Section 3A.3.1.4, *Dual Conveyance West Canal,* except it would not involve operation of the existing SWP conveyance facilities. This would be an isolated conveyance, no longer involving operation of the SWP and CVP south Delta diversion facilities at Clifton Court Forebay and Tracy Fish Collection Facility on Old River, respectively. The existing hydraulic connections between the SWP and CVP south Delta diversions at Clifton Court Forebay and Tracy Fish Collection Facility would be closed.

3A.3.2.4 Isolated Conveyance East Canal with Sacramento River Intakes

This alternative would be the same as the Dual Conveyance East Canal alternative discussed in Section 3A.3.1.3, *Dual Conveyance East Canal*, except it would not involve operation of the existing SWP south Delta diversion facilities. This would be an isolated conveyance, no longer involving operation of the existing SWP/CVP south Delta points of diversion at Clifton Court Forebay and Tracy Fish Collection Facility on Old River. The existing hydraulic connections between the SWP/CVP south Delta points of diversion at Clifton Court Forebay and the Tracy Fish Collection Facility on Old River would be closed.

3A.3.2.5 Isolated Conveyance East Canal with Feather River Intakes

The *Isolated Conveyance East Canal with Feather River Intakes* alternative would include intakes along the lower Feather River with a project design capacity of at least 7,500 cfs. The intakes would convey water to a pumping plant for continued conveyance in an approximately 150-mile-long canal to discharge river into the American River and Stanislaus River. The water would continue to flow through Delta channels to the existing SWP and CVP south Delta diversions. Aboveground facilities would be designed to withstand the 200-year return flood and sea level rise for Year 2100. It is anticipated that the amount of materials required for construction of the canal levees will be similar to the amount of material excavated along the canal alignment.

Early in the CEQA analysis of the BDCP, DWR considered, but screened out, an alternative to the conveyance component called the Initial Screening Conveyance Alternative B4, *Isolated Conveyance with a Lined or Unlined East Canal between the Sacramento River near the Confluence with the Feather River and the Lower San Joaquin River, and Abandonment of Existing South Delta Intakes*. At the time, this alternative was eliminated from further evaluation because it would be at least three times longer than most other isolated conveyance alignments considered and therefore would increase the extent of disturbance to communities and habitat along this conveyance alignment and be drastically more expensive to construct than substantially shorter alignments. Based on preliminary evaluation, this alternative also was eliminated because the amount of water available for export at the SWP and CVP pumping plants would be substantially less than under the existing conditions. This conveyance alternative does not include use of the existing south Delta intakes, and there would be no opportunity to replace the reduction in exports from these south Delta intakes. Therefore, the total SWP and CVP exports probably would be substantially less than under existing conditions.

3A.3.2.6 Isolated Conveyance with San Joaquin River Intake

This alternative would include an intake and a pumping plant along the San Joaquin River near Antioch or Pittsburg and a tunnel that would extend approximately 20 miles to the approach channels of the existing Banks Pumping Plant, and possibly the Jones Pumping Plant. The intakes would be located to avoid lands within the Antioch Dunes National Wildlife Refuge. The tunnel would include tunnel launch shafts near the existing SWP or CVP pumping plants and at the intakes. The tunnel would include two tunnel maintenance shafts, possibly near Brentwood and Byron. Delta water salinity near Pittsburg in summer and fall months exceeds the salinity near the SWP and CVP diversions along the Old River. Therefore, a desalination facility would be required to treat at least a portion of the diverted flows. A tunnel would be constructed to convey treated water from the desalination facility approximately 18 miles to the existing SWP and CVP pumping plants.

Early in the CEQA analysis of the BDCP, DWR considered, but screened out, an alternative to the conveyance component called the Initial Screening Conveyance Alternative B7, *Isolated Conveyance with Diversion from the San Joaquin River near Antioch and Desalination Facilities, a Tunnel between the Desalination Facilities and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*. At the time, this alternative was eliminated from further evaluation because this alternative would depend upon the capacity of the desalination facility, the intake along the San Joaquin River shoreline could extend more than 3 miles for a 15,000-cfs intake, and the desalination facility could be several square miles in size. This could result in substantial impacts on land use, given the generally dense existing development in the affected areas. In addition, desalination of up to 15,000 cfs of flow would add an enormous ongoing cost not required for other options and result in substantial energy use and, absent the development of practicable "green" power sources that could replace fossil fuel inputs, related substantial greenhouse gas (GHG) emissions. Such emissions could undermine California's ability to meet its legislative mandate under the California Global Warming Solutions Act of 2006 to reduce the state's 2020 GHG emissions to 1990 levels. Other options would convey fresh water that would not need to be desalted prior to transport.

The ability to divert water in the western Delta near Antioch also could be limited due to the presence of delta smelt in the western Delta. Presence of delta smelt and longfin smelt (*Spirinchus thaleichthys*) in the western Delta during the period when high flows would occur in the Sacramento River could reduce the effectiveness of a western Delta intake. During July through November, salinity could be too high for diversions from the western Delta, especially as sea level rise progresses.

3A.3.3 Through-Delta Conveyance with Proposed Diversion Facility

3A.3.3.1 A Water Plan for All of California

Although this alternative (also known as "Congressman Garamendi's Water Plan") was previously considered during alternatives screening for BDCP/CWF, several scoping comments from various interested parties during the 2020 scoping period for the Delta Conveyance Project suggested consideration of this water plan.

This plan includes the following actions.

- Dual conveyance consisting of: (1) a new "Little Sip" north-of-Delta diversion structure on the Sacramento River near West Sacramento with a maximum capacity of 3,000 cfs (Port of West Sacramento intake); (2) use of the Sacramento Deep Water Ship Channel as a means of conveying water approximately 25 miles to a new intake near the southern end of the channel; (3) new boat lock near the southern end of the Deep Water Ship Channel to prevent water diverted from the Sacramento River from flowing into the Delta near Rio Vista; and (4) pumps at the intake near the southern end of the channel to deliver water into a new 12-mile pipeline to convey water through the western Delta and underneath the Sacramento and San Joaquin Rivers between the Deep Water Ship Channel and existing Delta channels leading to the existing SWP and CVP pumping plants in the south Delta.
- Increase in water storage capacity in areas located south of the Delta to store increased Delta diversions in wet years (which the plan refers to as the "Big Gulp") and to provide water supplies in drier years.
- Increase in water recycling and conservation to improve water supply reliability in dry years in areas that use water diverted from the Delta. Integration of water supply operations among water agencies that use water diverted from the Delta to coordinate benefits of water recycling and increased water storage.
- Improvement of Delta levees to reduce vulnerability of Delta water supplies to earthquakes, sea level rise, and climate change impacts.

A scoping comment recommended combining this concept with the Sacramento Weir Widening Project initiated by Sacramento Area Flood Control Agency and the DWR North Bay Aqueduct Relocation Project and using multiple pipelines laid at a shallow depth at the bottom of Suisun Bay to replace the tunnel.

This alternative was first proposed in March 2013 after the scoping period for the BDCP had ended and analysis of the BDCP alternatives was already underway. DWR considered the alternative at the time, but felt that the proposal included portions of previous alternatives considered during the screening process. Some of the proposed actions within this proposal were evaluated in the alternatives considered in detail in the BDCP/California WaterFix EIR/EIS.

3A.3.3.2 Western Delta Intake Concept

The Western Delta Intake Concept includes the following actions:

- Dual conveyance, with relocation of the principal point of diversion for exports from the south Delta to the west Delta.
- Levees around Sherman Island along the Sacramento River and San Joaquin River to be replaced with permeable levees to allow water from the rivers to enter and exit Sherman Island. The water surface inside the Sherman Island Forebay would rise and fall with the tides. Surplus water (available after meeting upstream and in-Delta needs and the Delta outflow requirements) would be extracted through permeable fish screen embankments on Sherman

Island. Water extracted at Sherman Island would be transported to the Clifton Court Forebay in large tunnels, similar to those proposed in the Delta Conveyance Project, but half the length.

- Retain existing south Delta pumps to lift water into the canals going south, but also to extract water directly from the Old River through new state-of-the-art fish screens on the very rare occasions when there are high flows in the San Joaquin and Old Rivers. When the south Delta pumps are extracting water from the Old River, water from Sherman Island that cannot be moved south immediately would be stored temporarily in an enlarged Los Vaqueros Reservoir and/or a new Brushy Creek Reservoir. The objective of this rearrangement of conveyance facilities is to allow the extraction of as much as 30,000 cfs during the limited periods of high flows in the Sacramento and San Joaquin Rivers.
- In the absence of other longer-term solutions, maintain water quality in the south Delta by recirculation as necessary from the export canals to the San Joaquin River.
- Conversion of the Delta Cross Channel gates into a boat lock to prevent fish passage from the Sacramento River into the central Delta.
- New Brushy Creek Reservoir near Clifton Court Forebay (with a capacity of at least 1 million acre-feet), which could be used to store water diverted from Sherman Island when the total Delta exports exceed the 15,000-cfs capacity of the SWP and CVP pumping plants. A conveyance could be constructed between Brushy Creek Reservoir and Los Vaqueros Reservoir for additional storage capacity. If Los Vaqueros Reservoir is expanded (to a capacity of at least 1 million acre-feet), the two reservoirs could be designed with a pumped storage hydro-electric facility.
- A new lined canal to convey water from the SWP California Aqueduct and the CVP Delta-Mendota Canal into the San Joaquin River upstream of Vernalis.
- Ecosystem restoration of tidal and subtidal habitat at the western end of Sherman Island, the proposed Lower San Joaquin River Bypass, and Franks Tract.
- Installation of fish screens along Old River at the entrance to Clifton Court Forebay.

This alternative was first proposed in January 2012, after the scoping period for the BDCP had ended and analysis of the BDCP alternatives was already underway. DWR considered the alternative at the time, but felt that the proposal included portions of previous alternatives considered during the screening process.

3A.3.3.3 SolAgra Water Solution Alternative

The SolAgra Water Solution (SWS) project was initially proposed in 2014 in response to the BDCP/California WaterFix EIR/EIS. During the 2020 scoping period for the Delta Conveyance Project, SolAgra commented again, suggesting that the SWS alternative should be considered for further evaluation.

The SWS alternative would end use of the Banks Pumping Plant. Water typically taken out at the Banks Pumping Plant would flow to the confluence of the rivers at Sherman Island. Half of that water would be brought onto Sherman Island using fish screen sections with low approach velocities totaling 8 miles long. The remaining water would run downstream in the rivers flowing toward Suisun Bay, which would provide environmental benefits.

The SWS would create a dual-plant, interconnected water processing system on Sherman Island. Plant #1 would filter and process incoming fresh water from the Sacramento and San Joaquin Rivers via multiple fish-screened intakes around Sherman Island. Plant #2 would intake brackish water through fish-screened intakes on Sherman Lake and Mayberry Slough, and then would desalinate this low-salinity brackish water. After processing, desalinated water from Plant #2 would be blended with fresh, filtered water from Plant #1. The combining of fresh water with the treated and desalinated brackish water would replace the 2.4 million acre-feet of fresh water currently conveyed through the SWP in a normal water year.

This water (potentially up to 2.4 million acre-feet) would be pumped into a new single 28-foot internal diameter/32-foot outside diameter tunnel, extending 19 miles to Bethany Reservoir, where it would enter the SWP after bypassing the Banks Pumping Plant.

3A.3.3.4 Portfolio-Based Proposal including Water Conveyance Facilities

This portfolio-based alternative would include the following components.

- The proposed Use of Dual Conveyance with a Tunnel alternative included only 3,000 cfs north Delta intake capacity using operation criteria similar to the DWR proposed project, with more emphasis on increased Delta diversions in wet years and reduced Delta diversions in drier years, especially in spring and fall months. It is estimated that there could be exports of 4.0 to 4.3 million acre-feet per year using this conveyance facility and the existing SWP and CVP south Delta diversions. This total long-term diversion volume would be less than historical diversions and require increased alternative water supplies south-of-Delta.
- Continued operation of the south Delta intakes.
- Increases water storage capacity in areas located south of the Delta to store increased Delta diversions in wet years and provide water supplies in drier years.
- Increased water recycling and conservation to improve water supply reliability in dry years in areas that use water diverted from the Delta. Integrate water supply operations among water agencies that use water diverted from the Delta to coordinate benefits of water recycling and increased water storage.
- Improved Delta levees to reduce vulnerability of Delta water supplies to earthquakes, sea level rise, and climate change impacts.
- Provided for Delta floodplain and tidal marsh habitat restoration, but greatly reduced acreages as compared to the BDCP level of restoration.
- Expanded use of science in Delta water management.

This alternative was first proposed in January 2013, after the scoping period for the BDCP had ended and analysis of the BDCP alternatives was already underway. DWR considered this alternative at the time, but felt that the proposal included portions of previous alternatives considered during the screening process. Some of the proposed actions within this proposal were evaluated in the alternatives considered in detail in the BDCP/California WaterFix EIR/EIS.

3A.3.4 Through-Delta Conveyance without New Diversion Facility

Several alternatives that continue to utilize the existing water conveyance facilities have been proposed. The general concept behind these alternatives was to attempt to address water quality and aquatic resource issues without construction of a facility to divert water from a location to the north of the Delta or from the north Delta and facilities to convey water around the Delta water channels.

Under the Through-Delta Conveyance Alternatives, water would be conveyed from north of the Delta to the existing SWP and CVP south Delta diversions through Delta channels. Several of the alternatives would include in-Delta barriers to reduce salinity intrusion from San Francisco Bay or provide separate Delta channels for water as compared to fish passages. Other alternatives would include improvements to existing facilities, including fish screens at the SWP south Delta diversion and levee modifications.

This section includes descriptions of alternatives with salinity control barriers DWR previously analyzed. Several other locations for salinity control barriers were suggested in the scoping process, including a barrier across San Francisco Bay from Alcatraz Island to Marin County with a ship lock (which could also reduce the need for sea walls with climate change) or new intakes.

3A.3.4.1 Western Delta Salinity Control Barrier

Western Delta salinity control facilities have been evaluated since the nineteenth century. Somewhat more recently, DWR has conducted studies about the feasibility of constructing salinity barriers. These studies have included the 1957 DWR Evaluation of Salinity Control Barriers and the 1960 DWR Evaluation of Salinity Control Facilities.

3A.3.4.2 Previous DWR Evaluation of Salinity Control Barriers

Salinity barriers were under consideration as early as 1929. DWR's predecessor agency, the Division of Water Resources, analyzed the feasibility and comparative costs and benefits of constructing a salinity barrier in the Carquinez Strait in Bulletin 25 (California Department of Public Works, Division of Water Resources 1930:117–123). That report concluded that it would be considerably more cost effective to control salinity in the Delta for water supply through upstream reservoir releases. It noted that a salinity barrier could affect commercial fisheries, presumably by impeding fish migration, and would create water quality problems behind the barrier due to lack of flushing flows and increase levee maintenance costs in the Delta. The 1931 Bulletins 27 and 28 reached similar conclusions.

In 1957, DWR prepared Bulletin 60, which investigated methods to (1) convey large quantities of water across the Delta without major losses to Suisun Bay and property damage to Delta property owners; (2) reduce salinity in the Delta; and (3) deliver water to the San Francisco Bay Area. The study results indicated that fresh water could be maintained in the Delta by either of the following methods (California Department of Water Resources 1957).

- Maintain Delta outflows to dilute poor-quality water from Suisun Bay. However, this method would require additional releases of water from upstream reservoirs and reduce the amount of water available for water supplies to be used in other parts of California.

- Isolate poor-quality water from Suisun Bay from high quality Delta water with a physical barrier.

The study evaluated three salinity barrier options: the *Junction Point Barrier Plan, Biemond Plan*, and *Chipps Island Barrier Plan*. The *Junction Point Barrier Plan* and the *Biemond Plan* were similar, with barriers and fish passage facilities located in slightly different positions along the Sacramento River, as described below.

- Operable barriers would be constructed across the Sacramento River and Steamboat Slough to prevent salinity intrusion into the Sacramento River and increase the elevation of the Sacramento River so that the flow would be directed through a new Cross Delta Channel with a diversion structure near Isleton or through the existing CVP Delta Cross Channel with continued flow into the southern Mokelumne River system.
- Channels along the southern Mokelumne River system would be expanded to increase conveyance of freshwater from the Sacramento River to the San Joaquin River.
- A siphon would be constructed under the San Joaquin River to convey water from the Mokelumne River to Middle River for continued conveyance to the south Delta intakes of the SWP and CVP pumping plants.
- Major flood control levees would be constructed throughout the central Delta to maintain flood waters within the Delta, including a flood control structure on the San Joaquin River at Paradise Cut, with a possible channel to divert flood waters to the south Delta intakes of the SWP and CVP pumping plants.
- The North Bay Aqueduct pumping plant and canal would be constructed to deliver water to the northern San Francisco Bay Area counties.
- The South Bay Aqueduct pumping plant and canal would be constructed to deliver water to the southern San Francisco Bay Area counties.

The Chipps Island Barrier Plan would include the following facilities to form a freshwater Delta.

- A 22,000-foot-long barrier with ship locks would be constructed across the Sacramento River from a location near Pittsburg to a location near Collinsville. The barrier would be designed to pass flood waters from the Delta and withstand high tide and wave events from San Francisco Bay.
- Major flood control levees would be constructed throughout the Delta and Yolo Bypass to maintain flood waters within the Delta.
- Major flood control levees would be constructed along Suisun Bay due to increased tidal amplitude that would occur along the Contra Costa and Solano Counties shorelines on the western side of the barrier.
- Methods would be developed to provide mixing within the Delta to dilute waste products from municipal and industrial wastewater treatment plants, high-temperature flows from industrial plants in the Delta, accumulated salts from discharges in the Delta watershed, and salt water that would enter the Delta through the ship locks on the barrier.

The study indicated that these plans would result in adverse impacts on anadromous fish; however, there could be benefits to other fish that could accommodate warmer waters. The study recommended continued evaluation of the Biemond Plan, including levee improvements to reduce flood risks in the Delta, and implementation of the North Bay Aqueduct.

3A.3.4.3 1960 DWR Evaluation of Salinity Control Facilities

In 1960, DWR prepared the Preliminary Edition of Bulletin 76 (California Department of Water Resources 1960), which evaluated the following plans.

- Chipps Island Barrier Project, as described above.
- Single Purpose Delta Water Project, similar to the Biemond Plan, with barriers on the Sacramento River near Walnut Grove, Steamboat Slough, San Joaquin River, Piper Slough, Holland Cut, Old River at Connection Slough, and Head of Old River to maintain the fresh water within the central and south Delta. The Contra Costa Canal would be expanded to provide fresh water to the western Delta communities and industries.
- Typical Alternative Delta Water Project, same as Single Purpose Delta Water Project, with additional levee improvements along the Mokelumne and San Joaquin Rivers to improve flood protection.
- Comprehensive Delta Water Project, same as Typical Alternative Delta Water Project, with additional barriers along the Middle River to improve freshwater flows in the central and western Delta.

These plans were further evaluated by the Coordination of Delta Planning Subcommittee of the Interagency Delta Committee in 1963 in coordination with analysis of a “peripheral canal.” An alternative suggested during the scoping process included construction of an operable flow constrictor at the Carquinez Straight that would allow ships and fish to pass without impediment, but peak tide or storm surge events are moderated in their ability to push salt water and water volume into the Delta.

Early in the CEQA analysis of the BDCP, DWR considered, but screened out, an alternative to the conveyance component called Initial Screening Conveyance Alternative C3, *Through Delta Conveyance with West Delta Salinity Barrier*. At that time, DWR concluded (California Department of Water Resources 2016a:3A-50–3A-51) that this alternative

> would not meet the BDCP objectives of a brackish water system in the Delta that would support the estuarine habitat required by the BDCP covered species and would reduce the ability of fish passage for anadromous fish. This alternative would not support project objectives and aspects of the project purpose and need that focus on creating ecological improvements in the Delta ecosystem and contributing to recovery of declining listed species. Nor would the alternative meet the coequal goal under the 2009 Delta Reform Act of “protecting, restoring, and enhancing the Delta ecosystem.”

3A.3.4.4 Eco-Crescent/Middle River Corridor Conveyance

The Eco-Crescent/Middle River Corridor Conveyance approach would develop an area within the central and south Delta that would improve habitat for fishes with variable salinity and turbidity to mimic historic estuarine conditions (Metropolitan Water District of Southern California 2007). A separate water supply corridor would convey water from the Delta Cross Channel through the lower Mokelumne River system to a siphon under the San Joaquin River for continued conveyance in an isolated Middle River corridor. The Middle River corridor would be isolated from the Old and San Joaquin Rivers by barriers along Middle River at Connection Slough, Railroad Cut, and Woodward Canal.

The separated Delta corridors were similar to those recommended in Preliminary Edition of Bulletin 76 Comprehensive Delta Water Project (California Department of Water Resources 1960).

During the BDCP alternatives screening process, this concept was eventually folded in with other similar concepts.

3A.3.4.5 Separated Delta Corridors Plan for Water Supply Conveyance and Fish Passage

The *Delta Corridors Plan*, proposed in 2007 and revised in 2009, provided an estuarine fish passage corridor along Old River from the Head of Old River into the Delta and a water supply corridor that extended from the Delta Cross Channel and Georgiana Slough confluences along the Sacramento River through the lower Mokelumne River and along Middle River and Victoria Canal to the SWP and CVP south Delta diversions (South Delta Water Agency 2007). Fish screens would be installed at Delta Cross Channel and Georgiana Slough, along the Sacramento River. Fish-handling facilities would be improved at the SWP and CVP intakes. Portions of the Middle River would be dredged to improve capacity. Portions of the Old River near the Delta–Mendota Canal intake and along Victoria Canal would be divided to separate the fish passage and water supply corridors. Barriers would be constructed at the Head of Old River, near the San Joaquin River, Old River near the Delta–Mendota Canal approach channel, Old River at Grant Line Canal, Old River at Victoria Canal, Old River at West Canal, Woodward Canal at Middle River, Railroad Cut at Middle River, Connection Slough at Middle River, Middle River at Victoria Canal, and Franks Tract at San Joaquin River. Water would be siphoned from Victoria Canal under Old River and Coney Island into West Canal. Water would be pumped from north to south at the Head of Old River Barrier and the barrier on Middle River at Victoria Canal.

The *Delta Corridors Plan* was revised in 2009 to provide fisheries with protection in the Mokelumne River system upstream of Delta Cross Channel (South Delta Water Agency 2009). Meadows Slough would be connected through a new channel to the Sacramento River, and operable barriers would be constructed to provide a fish passage corridor from the upper Mokelumne River into the Sacramento River via Lost and Meadows to improve fish passage.

3A.3.4.6 New Fish Handling Facilities at Clifton Court Forebay

This alternative for the Through-Delta conveyance would include modification of the SWP fish-handling facilities at Clifton Court Forebay, with some differences in the locations of those fish screens. Among the suggestions of this alternative are the following.

- Construction of fish screens along Old River at the existing Clifton Court Forebay and at the entrance of the approach channel to the Jones Pumping Plant. Water would continue to flow through existing channels to existing SWP and CVP south Delta intakes.
- Modification of fish-handling facilities at Clifton Court Forebay. Replace the Clifton Court Forebay gated control structure with a new fish screen (inflatable gate/barrier) to allow for normal flow into Clifton Court Forebay during the day; however, no flow would enter the forebay at night, while fish are generally at rest. The pumps would operate during the day and night.
- Replace Clifton Court Forebay's 1.5-mile levee with a new fish screen (inflatable gate/barrier) to keep all fish in the Delta and out of Clifton Court Forebay. The barrier would allow for normal flow during the day and filling of Clifton Court Forebay at night, while fish are generally sleeping.

The pumps would then be able to operate constantly with Clifton Court Forebay, holding 1 to 3 days' supply.

Early in the CEQA analysis of the BDCP, DWR considered, but screened out, an alternative to the conveyance component called the Initial Screening Conveyance Alternative C4, *Through Delta Conveyance with Fish Screens at Clifton Court Forebay*. At the time, this alternative was eliminated from further evaluation because initial results of recent studies, including information included in the recent National Marine Fisheries Service (NMFS) biological opinions (BiOps), supported a phased approach that would emphasize improvements to operations of fish-handling facilities and reduced predator potential within Clifton Court Forebay prior to further analysis of installation of fish screens. DWR completed more than 60 studies in the past 20 years to evaluate the feasibility of providing fish screens along the intakes to Clifton Court Forebay. These studies have indicated that it is difficult to find a location at the Clifton Court Forebay site for a single location that would provide appropriate sweeping velocities to reduce the entrainment of fish in accordance with U.S. Fish and Wildlife Service (USFWS) and NMFS fish screen operations criteria or guidance. The screen would have to be more than a mile long, which could expose fish to excessive times in front of the screen. Because the screens are located in short sloughs with limited cross-waterways, the fish could accumulate in front of the screens and be subject to predation, poor habitat quality, or increased potential of entrainment at the Clifton Court Forebay screens and other intakes in the adjacent portions of the south Delta.

3A.3.4.7 Portfolio Approach without Water Conveyance Facilities

This concept generally focuses on no new intake/conveyance facilities, but instead would utilize a "portfolio" approach of demand-reduction measures (e.g., water-use efficiency actions, limiting agricultural growers' allocations or ability to grow certain crops, limiting growth/development in Southern California) combined with regional/local water supply reliability projects, such as new storage and recycling, and infrastructure improvements to reduce water evaporation and leaks in the SWP system used to deliver water south of the Delta.

Multiple commenters presented different versions of this alternative during NOP scoping, which could also include the following actions.

- Improve through-Delta conveyance, rather than construct a new isolated facility. Delta levees would be strengthened and key Delta channels dredged, similar to concepts being considered by DWR and local agencies related to flood management objectives. Prevent levee failures through frequent monitoring and maintenance to allow for proactive measures, using annual light detection and ranging and thermal remote sensing surveys of the Delta levees, side-scan sonar surveys of the underwater parts of the levee, and ground-penetrating radar to inventory and assess levee construction integrity. Expand the use of strategically placed rock stockpiles in the Delta for rapid response to potential levee failures identified through the expanded monitoring program.
- Maintain flood management levels; the levees would need to be raised as sea level rise and climate change flood flows increase in the future.
- A "Natural Systems" approach to improving Delta levees with setback levees and channel margin habitat at critical and feasible locations, levee improvements where setback levees would not be practical, and identification of some Delta islands to intentionally flood with levee breaches to create freshwater storage and habitat and avoid unplanned levee failures.

- Reduce other regions' reliance on water from the Delta by investing in water-use efficiency, water recycling, dry or hydroponic farming methods, and other advanced technologies. Some comments suggested reductions in existing SWP and/or CVP water deliveries to south-of-Delta.
- Improvements to Clifton Court Forebay and California Aqueduct system to improve water delivery efficiency, including reducing water losses, such as leaks. Portions of the California Aqueduct could be covered with solar panels to generate energy and reduce evaporation.

3A.3.5 Integration of Water Conveyance with Other Projects

Multiple suggestions were provided as conveyance alternatives or portions of conveyance alternatives that would require a more extensive consideration of integration with other SWP projects and other infrastructure projects in California.

- Along the California Aqueduct, install a microhydropower system to generate energy.
- Install microhydropower system in the Delta Conveyance Project tunnels or use tunnel structure to support aboveground solar panels.
- Install a low-profile, aboveground "tube" to convey water from the north Delta to the south Delta to reduce construction activities.
- Place natural draft barges with desalination skids in Monterey Bay. Desalinated water would be brought down to San Luis Reservoir, 50 miles away.
- Install desalination plants on abandoned offshore oil drilling platforms in Los Angeles.
- Modify SWP and CVP operations by closing the Delta Cross Channel and build dams.
- Install shipping locks and tidally controlled louvers in San Pablo Bay at Benicia Bridge to reduce salt water intrusion into the Delta.
- Place swales on contours throughout watersheds in order to raise water tables, reduce runoff, encourage healthy and hydrated forests, and, over time, increase available water resources to the southern portion of California. Reconnect Delta Distributary Channels (i.e., Fremont Weir to Tule Ditch in the Yolo Bypass, Sacramento Deep Water Channel, Railroad Cut, Snodgrass Slough, Elk Slough, Delta Cross Channel, and Georgiana Slough) to allow better water quality from the Sacramento River to push and be drawn across the western, central, and eastern parts of the Delta to the south to improve water quality by moving water from the Sacramento River across the Delta. The flows in these distributaries would function for habitat, water quality, and carriage water and as water supply deliveries for the south Delta SWP pumps. The reconnected head ends of these tributaries would need to be fish-screened and have operable gates (like the Delta Cross Channel). Operable gates would be required to avoid redirected flood flows. The fish screen would keep the Sacramento system fish in the main channel for reduced straying and increased juvenile emigration survival.
- Provide connections between SWP and non-SWP water suppliers north of the Delta to integrate water supplies and water supply reliability.
- Install locations for diversion facilities in the North Delta. This alternative would include different diversion locations that avoid or reduce damage to Delta communities and recreational boating and protect fish. This suggestion was based on the theory that impacts on Delta communities should be equally weighted with impacts on fish and wildlife.

- Other commenters have advanced ideas for alternatives that have more specifically suggested alternative locations for new points of diversion (see discussions for the SolAgra Water Solution alternative in Section 3A.3.3.3, *SolAgra Water Solution Alternative,* and the Western Delta Intake Concept in Section 3A.3.4.1, *Western Delta Salinity Control Barrier*).
- Several commentors suggested construction of multiple SWP intakes in the south and west Delta to add capacity and flexibility during high flow periods or when regulatory criterial restrict use of some intakes to protect fish or water quality, such as along southern Victoria Canal.

3A.4 EIR Alternatives Screening Criteria

CEQA Guidelines Section 15126.6(a) states that "an 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." The EIR is to consider a "reasonable range" of alternatives to foster informed decision-making and public participation.

The screening process for the Delta Conveyance Project Draft EIR only focused on identifying alternatives to the proposed project; it is not a project objective development exercise. Therefore, the screening starts with the provision that the proposed project objectives are in place, and the alternatives, as discussed below, are screened with this specific objective in mind. The proposed project presented in the NOP (Dual Conveyance Central Tunnel Alignment or Dual Conveyance Eastern Tunnel Alignment, operating at 6,000 cfs) is not included specifically in the screening exercise; it is the project against which the alternatives are compared in the screening. The project proposed in the NOP was developed to meet project objectives, while minimizing environmental impacts, 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. The screening criteria were developed based specifically on the proposed project presented in the NOP and are consistent with the legal requirements of CEQA and the project objectives described in the NOP.

The following sections explain the criteria and how they were applied, which is followed by the results. Table 3A-4 in Section 3A.4, *EIR Alternatives Screening Criteria*, illustrates how all the alternatives met the two levels of screening described in the following sections.

3A.4.1 First-Level Screening – Alternative Meets Most of the Project Purpose and Objectives

Under CEQA, a potentially feasible alternative would "feasibly attain *most* of the basic objectives of the project" (emphasis added). The Delta Conveyance Project alternatives described in Section 3A.3, *Identification of Alternatives under CEQA,* were combined into similar groups for screening and screened against the project objectives (yes or no) to determine whether they would be carried forward to the next level of screening. Because there are four criteria under the first filter, those alternatives that met even two of the four criteria were allowed to move to the second filter. Those alternatives were then assessed for whether they met Filter 2 (yes or no). Alternatives that passed both filters were carried forward for analysis in the Draft EIR. Table 3A-1 shows the project objectives associated with the criteria for two screening filters.

Table 3A-1. Screening Filter Criteria and Project Objectives

Criteria	Project Objective
Filter 1	
Climate resiliency. Addresses anticipated sea level rise and other reasonably foreseeable consequences of climate change and extreme weather events.	Address anticipated rising sea levels and other reasonably foreseeable consequences of climate change and extreme weather events.
Seismic resiliency. Minimizes health/safety risk to public from earthquake-caused reductions in water delivery quality and quantity from the SWP.	Minimize the potential for public health and safety impacts from reduced quantity and quality of SWP water deliveries south of the Delta resulting from a major earthquake that causes breaching of Delta levees and the inundation of brackish water into areas in which the existing SWP pumping plant operates in the southern Delta.
Water supply reliability. Restores and protects ability of the SWP to deliver water in compliance with regulatory and contractual constraints.	Protect the ability of the SWP to deliver water when hydrologic conditions result in the availability of sufficient amounts, consistent with the requirements of state and federal law, including the ESA, CESA, and Delta Reform Act, as well as the terms and conditions of water delivery contracts and other existing applicable agreements.
Operational resiliency. Provides operational flexibility to improve aquatic conditions and manage future regulatory constraints.	Provide operational flexibility to improve aquatic conditions in the Delta and better manage risks of further regulatory constraints on SWP operations.
Filter 2	
Avoids or lessens potentially significant environmental impacts more than the proposed project.	–

CESA = California Endangered Species Act; ESA = federal Endangered Species Act; SWP = State Water Project; CVP = Central Valley Project.

A "yes" or "no" answer to the Filter 1 criteria was based on how well the alternative could meet project objectives compared to the proposed project, as well as regulatory, cost, technological, health and safety, and logistical considerations. An alternative had to meet at least two of the four criteria and also had to be feasible to be carried forward for further analysis.

3A.4.1.1 Criterion 1 – Climate Resiliency

- Could the potential alternative address SWP water reliability challenges anticipated from rising sea levels and other reasonably foreseeable consequences of climate change and extreme weather events?

Climate change is expected to cause rising sea levels and altered patterns of precipitation. Either of these effects, or both combined, would affect salinity in the Delta and potentially affect the distribution, behavior, and lifecycles of aquatic species, which in turn would affect water supply reliability for the SWP. Water conveyance facilities must be prepared to adapt operations to continue to reliably deliver water under changing conditions.

Climate change poses a threat to the existing SWP. Maintaining the ability to continue SWP operations in the face of sea level rise and unpredictable precipitation patterns is why climate resiliency is one of the screening criteria.

Dual conveyance alternatives (i.e., alternatives that added an additional point of diversion to the existing points of diversion for the SWP) were initially rated “yes” on this criterion because they allowed for the SWP to divert water in new locations in addition to the existing SWP southern Delta points of diversion during times of higher salinity conditions that could result from sea level rise or reduced flows. The rating, however, was tied to the location of the new diversion; for example, a new diversion facility in the west Delta area would not be able to satisfy this objective because, farther downstream and more influenced by the ocean, it would have limited ability to adjust to changes in sea level and resulting increases in salinity. Isolated facilities with diversions in the north Delta, instead of existing export facilities, might meet this criterion because, farther upstream, a north Delta diversion would have greater ability to adjust to changes in sea level rise and resulting increases in salinity. Alternatives that exclusively use the existing south Delta facilities (i.e., through-Delta and alternate supplies) and alternatives with new diversions in the west Delta would have limited resiliency against future sea level rise and higher salinity levels and would not provide the climate resiliency necessary to maintain a reliable water supply.

3A.4.1.2 Criterion 2 – Seismic Resiliency

- Could the potential alternative minimize the potential for public health and safety impacts from reduced quantity and quality of SWP water deliveries south of the Delta resulting from a major earthquake that causes breaching of Delta levees and the inundation of brackish water into the areas in which the SWP pumping plant operates in the south Delta?

The current water system utilizes natural channels within the Delta to convey water in an area that is extremely vulnerable to large seismic events. The Delta is a region of moderate seismic hazard, with hazard generally increasing from east to west (e.g., Deverel et al. 2016:13). Contributions to Delta seismic hazard come from faults near or within the Delta (e.g., Midland, Pittsburg Kirby Hills) capable of producing moderate-magnitude earthquakes and, from more distant faults (e.g., San Andreas, Hayward), capable of producing large earthquakes. Delta levees on Bacon Island, Webb Tract, Venice Island, and King Island have been damaged by moderate-magnitude earthquakes close to the Delta (e.g., M5.9 1980 Livermore earthquake; Finch 1985:40–41). However, it has been more than 100 years since the large 1906 San Francisco earthquake. At that time, the Delta levees were relatively modest in size, with little to no land subsidence behind them, and roughly only 50% of the islands had been “reclaimed” (State of California 1991). It was speculated that the 1906 San Francisco earthquake may have weakened Delta levees, even with their relatively low heights, and contributed to the failure of 53 major islands during the wet winter of 1907 (Prokopovitch 1985). In 2014, the U.S. Geological Survey estimated that a large earthquake of magnitude 6.7 or greater has a 72% probability of occurring in the San Francisco Bay Area by 2043 (U.S. Geological Survey 2016:1). No such prediction has been developed for the faults near or within the Delta. Seismic activity is one of the most significant hazards that could cause a levee breach. Levee failure (e.g., a levee breach) could cause catastrophic flooding, potentially causing injury or loss of life, and possibly damaging property, water supply, infrastructure, and environmental resources of importance to the entire state. In the case of a levee failure, water from the surrounding area would rush in to fill the interior of the island, causing a suction effect that would draw saltier water from the Bay into the Delta. These conditions would make water in the west Delta (and areas near the levee failure) saltier, and this water may not be usable as a water supply until the salinity is flushed out.

This screening criterion requires that an alternative be able to protect the continued operation of the SWP against a large seismic event, similar to the proposed project.

In general, alternatives that included new conveyance facilities that were not located in the west Delta and rely on existing facilities were rated "yes." New facilities proposed in the west Delta could be designed to withstand seismic loads as DWR proposes for the central, eastern, or Bethany Reservoir alignments. Alternatives that involved locating facilities in the west Delta were generally rejected because the west Delta is closer to the Bay Area faults, and other faults underlie the area, placing it at higher risk of damage from seismic shaking (Delta Stewardship Council 2017:27). Additionally, these areas are more susceptible to the water quality concerns that would follow levee failures that could be caused by seismic events because salinity intrusion would mean higher salinities in the west Delta than farther inland. Through-Delta alternatives and alternate supplies did not meet this criterion because they would rely only on existing south Delta facilities and provide no alternate means of conveyance if seismic activity damaged or destroyed multiple levees and other conveyance facilities. Alternatives did not meet this criterion if they increased risk of levee failure through use of additional leveed waterways (e.g., the Deep Water Ship Channel).

3A.4.1.3 Criterion 3 – Water Supply Reliability

- Could the potential alternative protect the ability of the SWP to reliably deliver water, when hydrologic conditions result in the availability of sufficient amounts, consistent with the requirements of state and federal law, including the CESA, ESA, and Delta Reform Act, as well as the terms and conditions of water delivery contracts and other existing applicable agreements?

Although drought, flood, climate change, and earthquakes all pose a threat to the water system, more immediate effects on the reliability of SWP supplies conveyed through and diverted from the Delta are current pumping limitations in the south Delta in compliance with water quality and federal and state endangered species requirements. These pumping restrictions could prevent the SWP from reliably capturing water when it is available, especially from storm events. Despite cultivating alternative water sources, the SWP remains an important source of water for two-thirds of Californians and hundreds of thousands of acres of farmland that receive water from the SWP south-of-Delta. For that reason, any alternative to the proposed project must be able to provide water, in accordance with the terms of water delivery contracts, while still complying with all applicable regulatory requirements currently in place.

The following sections explain the criteria and how they were applied, which is followed by information about the results. Generally, dual conveyance alternatives were rated "yes" for this criterion because multiple diversion locations and conveyance systems (e.g., new intakes and conveyance alignment and continued use of south Delta diversion facilities) would maximize opportunities for water conveyance while still complying with applicable regulations.

3A.4.1.4 Criterion 4 – Operational Resiliency

- Could the potential alternative provide operational flexibility for the SWP to improve aquatic conditions and manage future regulatory constraints?

The SWP must operate in compliance with regulatory constraints that protect aquatic species and water quality under dynamic conditions.

Given current and anticipated future environmental conditions, DWR must prepare for events that could further restrict current SWP operations or unexpectedly inhibit continued use of the current SWP water conveyance system. For that reason, this criterion screens for alternatives that offer flexibility in how the system can be operated in real time to address existing and aquatic species and water quality concerns.

Dual conveyance alternatives that provide another location for the SWP to divert water when existing regulations prevented operations at the existing south Delta facilities were generally rated "yes." The flexibility to alter operations in this way allows greater certainty that SWP can deliver its obligations reliably. However, dual conveyance alternatives that included new diversion facilities near sensitive resource areas were considered less likely to provide this flexibility because the new diversion facilities also could not be operated reliably in those cases. Isolated and through-Delta conveyance alternatives, or those that abandon south Delta facilities, did not provide such operational flexibility and generally were rejected.

3A.4.1.5 First-Level Screening Results

The initial screening eliminated the following alternatives because they did not meet two or more of the Filter 1 screening criteria, as shown in Table 3A-2.

Table 3A-2. Alternatives Eliminated at First-Level Screening

Alternative	Reasons for Elimination (criteria not met)
Dual Conveyance with New Intakes at Decker Island	• **Climate resiliency**. ○ During July through November, there is relatively high salinity in the west Delta where Decker Island is located, which would reduce the ability for SWP diversions, especially as sea level rise progresses, which results in even greater salinity intrusion. Therefore, total water deliveries would be less than alternatives without western Delta intakes, in light of anticipated climate change. ○ Sea level rise is anticipated to be greater in the western Delta than further upstream in the north Delta due to river flows and channel geometry; therefore, the facility could be required to be modified structurally as sea level rise progresses. As the sea level rises, less land may be available for the fish screen due to the angle of the levee, and the total length of the fish screen could exceed available land. • **Seismic resiliency.** Intakes in the west Delta at Decker Island would be subject to seismic risk due to the proximity of faults near Suisun Bay. A west Delta intake location is more vulnerable to being shut down by an earthquake due to salinity intrusion than the existing SWP south Delta point of diversion. Additionally, an intake at this location would be at a higher risk of damage from a tsunami resulting from seismic activity. • **Operational resiliency.** Use of the intakes at Decker Island would be less reliable than the existing south Delta intake location due to proximity to high salinity waters and/or presence of Delta smelt in some months; this alternative potentially would increase the reliance on the existing south Delta intakes, which would continue to be limited due to water quality and ESA regulations. • **Water supply reliability.** Limited ability to divert water in the western Delta near Decker Island because of the presence of Delta smelt, resulting in low water supply reliability. A pilot study completed by the Bay Area Regional Desalination Project in March

Alternative	Reasons for Elimination (criteria not met)
	2010 for a desalination facility with a diversion in Mallard Slough, which is located 10 miles further west of Decker Island in the west Delta, indicated that, during operations of a 25-million-gallons-per-day intake (approximately 40 cfs) from November 2008 through October 2009, prickly sculpin (*C. asper*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), longfin smelt, and delta smelt were entrained. Longfin smelt and delta smelt were entrained during January through June. Presence of these species in the western Delta during the period when high flows would occur in the Sacramento River could reduce the effectiveness of a western Delta intake. During July through November, salinity could be too high for diversions from the western Delta, especially as sea level rise progresses. • **Other considerations**: ○ Delta smelt are much more likely to occur near Decker Island than in the Sacramento River near Hood (proposed project intake locations). Decker Island is in the main distribution of delta smelt, so that small life stages (e.g., larvae) would be vulnerable to entrainment at this location (Murphy and Hamilton 2013). Even though screens at any location would exclude delta smelt greater than ~21 millimeters in size, potential negative effects. including entrainment and impingement. would be more likely to occur at intakes near Decker Island. creating a significant impact to aquatic special-status species.
Dual Conveyance Tunnel with New Intakes at Fremont Weir and Decker Island	• Due to involvement of a Decker Island intake, this alternative does not meet the Filter 1 criteria of **climate resiliency**, **seismic resiliency**, **operational resiliency**, or **water supply reliability** for the same reasons as Dual Conveyance with new intakes at Decker Island, above. • **Water supply reliability**. Alternatives with a Fremont Weir intake were evaluated in 2010 during development of the BDCP. Results of a preliminary evaluation during that time indicated that diversions upstream of American River probably would not occur until the flows were greater than 5,000 cfs, due to the need to provide water to diversions located between the Feather and American Rivers (including over 200,000 acre-feet/year of water rights or CVP water rights settlement contracts with Natomas Central Mutual Water Company, the cities of West Sacramento, Davis, Woodland, and Sacramento, and several reclamation districts). The preliminary evaluation indicated that these types of restrictions and the inability to divert water from the American River could reduce the amount of diversions from the Sacramento River by 30% as compared to intakes located downstream of the American River, including at the existing south Delta diversions, resulting in lack of water supply reliability. • **Other considerations**: ○ North Delta diversions upstream of Freeport (including at the Fremont Weir) would reduce the operational flexibility of the wastewater treatment plant and the Freeport Regional Water Authority intake.

Alternative	Reasons for Elimination (criteria not met)
Isolated Conveyance Tunnel with New Intakes at Fremont Weir and Decker Island	• Due to involvement of Decker Island and Fremont Weir intakes, it does not meet the Filter 1 criteria of **climate resiliency**, **seismic resiliency**, **operational resiliency**, or **water supply reliability** for the same reasons as Dual Conveyance with new intakes at Fremont Weir and Decker Island, above. • **Water supply reliability.** An isolated conveyance tunnel alternative would provide less water supply reliability than existing SWP south Delta diversions, due to the need to rely solely on intakes at Fremont Weir and Decker Island. This alternative likely would experience more limited operations than the existing south Delta point of diversion due to the need to maintain Sacramento River flow at Freeport and water quality and the need to protect Delta smelt near Decker Island, described above. • **Operational resiliency.** Isolated conveyance options would not allow for operational resiliency due to abandonment of south Delta intakes.
Isolated Conveyance with San Joaquin River Intake (and desalination facilities)	• **Climate resiliency.** Sea level rise is anticipated to be greater in the west Delta than farther upstream in the north Delta or at the existing south Delta diversions. Therefore, the facility could be required to be modified structurally as sea level rise progresses. • **Seismic resiliency.** Intakes in the west Delta near Antioch would be subject to seismic risk due to the proximity of faults near Suisun Bay. A west Delta intake location is more vulnerable to being shut down by an earthquake due to salinity intrusion than the existing SWP south Delta point of diversion. Additionally, an intake at this location would be at a higher risk of damage from a tsunami resulting from seismic activity. • **Operational resiliency.** Isolated conveyance options would not allow for operational resiliency, due to abandonment of south Delta intakes. • **Other considerations**: ○ Climate resiliency could be affected for Central California due to increased GHG emissions related to energy requirements needed for desalination facilities near the Antioch or Pittsburg intakes. With sea level rise in the future, salinity would increase in the lower San Joaquin River and would require increased use of the desalination facilities.
Western Delta Intake Concept	• **Climate resiliency.** The alternative proposed use of Sherman Island as an intake forebay; however, because the sea level rise is anticipated to be greater in the west Delta than farther upstream in the north Delta (due to river flows and channel geometry), the facility could be required to be modified structurally as sea level rise progresses. • **Seismic resiliency.** Intakes in the west Delta at Sherman Island would be subject to seismic risk due to the proximity of faults near Suisun Bay. A west Delta intake location is more vulnerable to being rendered unusable by an earthquake due to salinity intrusion than the existing SWP south Delta point of diversion. Additionally, a new intake forebay at this location would be at a higher risk of severe damage from seismic activity or a tsunami resulting from seismic activity.

Alternative	Reasons for Elimination (criteria not met)
	• **Water supply reliability**. The alternative would likely result in limited use of the west Delta intake due to the presence of high-salinity waters near Sherman Island. This issue would become exacerbated over time with sea level rise and climate change because salinity moves further into the Delta in dry conditions. Additionally, Delta water quality may limit the use of the Sherman Island reservoir. Sherman Island is located at approximately 57 miles from the Golden Gate. This alternative indicates that diversions would not occur unless X2 is located “well west of Sherman Island.” Generally, X2 is located near Chipps Island (46 miles from the Golden Gate) to provide freshwater to the west Delta intakes. Under existing conditions, X2 would be located at or to the west of Chipps Island all or most of the time in January through June of wet and above-normal water years, the majority of the time in January through May in below-normal water years, and February through April of dry years. In other periods and water year types during January–June, X2 would only occasionally be at or west of Chipps Island. Also, because water would be diverted at Sherman Island, the X2 location would move eastward unless additional water is released from upstream reservoirs. Therefore, diversions would be limited near Sherman Island. Even though the existing south Delta intakes would continue to be in use, ongoing regulatory restrictions would still be in place. Due to the limitations of diversions near Sherman Island and diversions at the south Delta intakes, the goal of water supply reliability would not be achieved. • **Other considerations**: ○ The alternative proposes installation of fish screens along Old River at the entrance to Clifton Court Forebay. More than 60 studies have been completed by DWR in the past 30 years to evaluate the feasibility of providing fish screens along the intakes to Clifton Court Forebay. These studies have indicated that it is difficult to find a location at the Clifton Court Forebay site for a single location that would provide appropriate sweeping velocities to reduce the entrainment of fish in accordance with USFWS and NMFS fish screen operations criteria or guidance. The screen would have to be more than a mile in length, which could expose fish to excessive times in front of the screen. Because the screens are located in short sloughs with limited cross-waterways, the fish could accumulate in front of the screens and be subject to predation, poor habitat quality, or increased potential of entrainment at the Clifton Court Forebay screens and other intakes in the adjacent portions of the south Delta. ○ Water quality could be difficult to maintain in the Sherman Island Forebay in the summer. During the summer and fall months, west Delta salinity near Sherman Island could range from 500 to over 2,000 micromhos per centimeter. The saline water could migrate through the groundwater into the Sherman Island Forebay. This would be more likely if the volume of stored water is low. The potential for migration from the Delta into Sherman Island also would be more likely under this potential alternative as compared to the existing conditions because of the removal of up to 45 feet of peat soils.

Alternative	Reasons for Elimination (criteria not met)
	○ The alternative calls for permeable levees to allow water to enter Sherman Island, while avoiding or reducing fish entrainment. Although, in concept, the reduction in entrainment is an excellent feature, the construction of the proposed levees likely would be impractical. Levee designs that include rock and sand to reduce fish entrainment in the facilities are of limited use and success in a project this size. A permeable embankment capable of passing 15,000 cfs at a velocity of 0.002 feet per second (100 times less than existing approach velocity criteria) would have to be about 95 miles long (assuming 15 feet of wetted area). Sherman Island only has about 19.5 miles of existing levees. ○ Inundation of Sherman Island would create its own problems. Constructing a reservoir in the west Delta on peaty soils combined with more saline water would increase the potential formation of trihalomethanes for downstream municipal water users. Alternatively, should the peat soils be removed during construction, very substantial amounts of excavation, with attendant environmental impacts, would be necessary. Although the actual size of the Sherman Island Forebay has not been described, it would need to be at least several hundred acres to provide an operational buffer and take advantage of off-peak pumping. At some locations on Sherman Island, the peat can be up to 40 feet deep. Assuming the forebay size to be 750 acres and the average depth of peat to be 20 feet, removal of over 653 million cubic yards would be required.
SolAgra Water Solution Alternative	• This alternative would not meet the criteria of **climate resiliency** and **seismic resiliency** for the same reasons as the Western Delta Intake Concept because it would also rely on Sherman Island in the western Delta. • **Operational resiliency.** This alternative would end the use of Banks Pumping Plant. Isolated conveyance options would not allow for operational resiliency due to abandonment of south Delta intakes.
Portfolio-Based Proposal including Water Conveyance Facilities	• **Water supply reliability.** This alternative has the specific goal of reducing SWP exports, which is antithetical to the water supply reliability criteria (i.e., restoring and protecting the ability of the SWP to deliver water). The proposal specifically limits the north Delta diversion project design capacity to 3,000 cfs and assumes reduced south Delta diversions during the summer months. This alternative estimates that total south-of-Delta diversions from the SWP and CVP would be 4.0 to 4.3 million acre-feet/year (approximately half of existing SWP and CVP contractual agreements and water rights). The 4.0 to 4.3 million acre-feet/year includes approximately 1.3 million acre-feet/year to be delivered under existing water rights exchange agreements and federal criteria for refuge water supplies. • **Seismic resiliency.** Although this alternative proposes to improve Delta levees to reduce vulnerability of Delta water supplies to earthquakes, these actions would require extensive construction and result in substantial environmental impacts. It would be difficult and expensive to reconstruct all levees to meet water supply reliability goals. Additionally, the alternative provides

Alternative	Reasons for Elimination (criteria not met)
	limited seismic resiliency due to limited capacity at the north Delta diversion and associated water conveyance. If the existing SWP and CVP water supply conveyance through existing Delta channels were disrupted following levee failures after a seismic event, the available water supply from the north Delta diversion would be limited. • **Operational resiliency.** Due to the fact that the alternative involves only one 3,000-cfs intake, there would be limited ability to divert water in the north Delta and primary dependence on south Delta intakes would remain in place. • **Other considerations**: ○ This alterative does address alternative water supplies for all of the existing SWP and CVP south of the Delta users; however, due to a wide variety of geographical and hydrological conditions throughout the south-of-Delta area, not all local water demands and supplies could be modified to continue to support existing and future land uses with warmer temperatures (which would increase water demand of crops) and less rainfall (which would decrease local water supplies). ○ The scope of the Portfolio Approach is greater than can be encompassed in the proposed project objectives and includes efforts that are outside the control of DWR. The scope of this alternative is akin to a statewide water plan. DWR has no control over local water recycling and conservation, even with respect to the water agencies and water districts in California that receive SWP water from DWR, many of which are water wholesalers, and cannot control the actions of water retailers.
Through-Delta Conveyance with No Diversion Facility • Western Delta Salinity Control Barrier • 1957 DWR Evaluation of Salinity Control Barriers • Eco-Crescent/Middle River Corridor Conveyance • Separated Delta Corridors for Water Supply Conveyance and Fish Passage	• **Water supply reliability.** Due to sole reliance on existing south Delta diversions that could be further limited in the future, as species decline continues to be a concern, the fish agencies are likely to impose more constraints on south Delta operations on the theory that doing so is needed to meet no-jeopardy and fully mitigate standards under the ESA and CESA, respectively. • **Climate resiliency.** The south Delta diversions are likely to become more limited in use as water quality at the diversions becomes more degraded as sea levels rise. • **Seismic resiliency.** Potentially limited seismic resiliency of the salinity barriers due to the location of the barriers near several fault zones that extend north from the San Francisco Bay Area. Although water quality could be maintained in the central and south Delta if levees failed due to a seismic event, seismic resiliency of the south Delta diversion facilities would not necessarily be increased, and the SWP and CVP diversion facilities are located near the West Tracy Fault zone, which could cause damage. • **Operational flexibility.** Potential effects on operational flexibility would be unknown for alternatives with in-Delta corridor barriers, due to the unknown minimum flows to be included in the fish corridors to maintain adequate flows and avoid conditions that support predators, and in the water corridors to avoid flows that could cause operational issues with non-SWP/CVP diverters in the Delta.

Alternative	Reasons for Elimination (criteria not met)
Through-Delta Conveyance with New Fish Handling Facilities at Clifton Court Forebay	• **Climate resiliency.** The incremental sea level rise would be higher at Clifton Court Forebay than at the upstream north Delta diversion locations due to river flows and channel geometry. At existing conditions, the fish screen could be more than 1 mile long. At higher water elevations, channel hydraulics and site conditions will change, and fish-protective facilities may not function well in this area. Such a fish screen or other potential fish screening strategies (e.g., screw traps, fish funnels) would ultimately be susceptible to all existing issues present for the current south Delta facilities. Additionally, the south Delta diversions are likely to become more limited in use as water quality at the diversions becomes more degraded as sea levels rise. • **Operational flexibility.** This alternative would not provide operational flexibility due to sole reliance on existing south Delta diversions. The ability to use the south Delta diversions would become even more limited with time as the species decline and the fish agencies are likely to impose more constraints on south Delta operations. • **Water supply reliability.** Due to sole reliance on existing south Delta diversions that could be further limited in the future, as the species decline, the fish agencies are likely to impose more constraints on south Delta operations on the theory that doing so is needed to meet no-jeopardy and fully mitigated standards under the ESA and CESA, respectively. • No improvement in **seismic resiliency** due to the continuous need for improvement of levees, including increased height to maintain flood management with sea level rise and climate change conditions. In addition, the SWP and CVP diversion facilities are located near the West Tracy Fault zone, which could cause damage. With no alternate means of conveyance in the event of a seismic disruption, this alternative would not meet seismic resiliency criteria.
Portfolio Approach without New Water Conveyance Facilities	• **Climate resiliency**. The south Delta diversions are likely to become more limited in use as water quality at the diversions becomes more degraded as sea levels rise. • **Water supply reliability**. This alterative proposes that demands in the SWP service area be addressed through conservation and alternative water supplies. However, this does not address the fundamental project objective of restoring and protecting the ability of the SWP, and potentially the CVP, to deliver water. • **Seismic resiliency.** Although this alternative proposes to improve Delta levees to reduce vulnerability of Delta water supplies to earthquakes, these actions would require extensive construction and result in substantial environmental impacts. It would be difficult and expensive to reconstruct all levees to meet water supply reliability goals. The existing south Delta diversion facilities are located near the West Tracy Fault zone, which could cause damage. Without north Delta diversions included in this alternative, disruption of the south Delta diversions would reduce SWP and/or CVP water deliveries south of the Delta.

Alternative	Reasons for Elimination (criteria not met)
	• No **operational resiliency** for the SWP to improve aquatic conditions and manage future regulatory constraints because this alternative would retain sole dependence on south Delta intakes. • **Other considerations**: ○ The scope of the Portfolio Approach is greater than can be encompassed in the proposed project objectives and includes efforts that are outside the control of DWR. The Portfolio Approach is more akin to a statewide water plan that would treat areas receiving water from the Delta as a single water-planning unit and include an approach to increase water-use efficiency and water supplies. ○ Improvement of the SWP and CVP conveyance facilities to reduce water leaks, provide for electricity generation, and improve water delivery efficiencies are being addressed in ongoing and future operations and maintenance projects that include not only the water entities involved in the Delta Conveyance Project, but also other SWP or CVP water users.
Integration of Water Conveyance with Other Projects	• **Operational resiliency**. These proposals would continue to rely solely on use of the existing south Delta diversions to deliver SWP supplies. • **Climate resiliency**. The south Delta diversions are likely to become more limited in use as water quality at the diversions becomes more degraded as sea levels rise. • **Seismic resiliency.** Although this alternative proposes to improve Delta levees to reduce vulnerability of Delta water supplies to earthquakes, these actions would require extensive construction and result in substantial environmental impacts. It would be difficult and expensive to reconstruct all levees to meet water supply reliability goals. The existing south Delta diversion facilities are located near the West Tracy Fault zone, which could cause damage. Without north Delta diversions included in this alternative, disruption of the south Delta diversions would reduce SWP and/or CVP water deliveries south of the Delta. • These options would not provide any **water supply reliability** in that they do not protect the ability of the SWP to deliver water. • Other considerations: ○ This set of concepts includes some items that would require extensive integration and coordination with other agencies or entities, including barges with desalination treatment facilities in the Pacific Ocean or bays near Monterey or Los Angeles and conveyance to water users or interconnection between water supply entities that use and do not use SWP or CVP water supplies. At this time, it is unknown whether these concepts could be permittable for construction or operations, and, even if permittable, they likely would result in lengthy approval processes. Thus, in addition to the issues identified above, they are speculative. Other proposals would need to be coordinated with other water project alternatives, such as inclusions of microhydropower equipment in the tunnels, reconnection of Delta channels, closure of Delta Cross Channel gates, and increased upstream storage. Therefore, the ability to increase climate resiliency, seismic

Alternative	Reasons for Elimination (criteria not met)
	resiliency, water supply reliability, and operational resiliency would be dependent upon those conveyance alternatives.

BDCP = *Bay Delta Conservation Plan*; CESA = California Endangered Species Act; cfs = cubic square feet; CVP = Central Valley Project; DWR = California Department of Water Resources; ESA = Federal Endangered Species Act; GHG = greenhouse gas; NMFS = National Marine Fisheries Service; SWP = State Water Project; USFWS = U.S. Fish and Wildlife Service.

[1] Permeable levees can be constructed based on various designs. Those that include rock and sand as to reduce fish entrainment in the facilities are of limited use and success in a project this size.

The remaining alternatives to the proposed project presented in the NOP passed Filter 1 and were further screened at Filter 2, as shown in Section 3A.4.2.1, *Second-Level Screening Results*. The remaining alternatives are:

- Dual Conveyance East Canal
- Dual Conveyance West Canal
- Dual Conveyance with New Intakes at Sacramento Weir
- Dual Conveyance Bethany Alignment
- Isolated Conveyance Tunnel with Sacramento River Intakes
    - Isolated Conveyance West Canal with Sacramento River Intakes
    - Isolated Conveyance East Canal with Sacramento River Intakes
    - Isolated Conveyance East Canal with Feather River Intakes
- Alternative Locations for Diversion Facilities Along the Sacramento River in North Delta

3A.4.2 Second-Level Screening – Alternative Avoids or Substantially Lessens Impacts Compared to the Proposed Project

The second-level screening criterion focuses on the potential to avoid or reduce potential adverse environmental effects of the proposed project. Alternatives were considered for their ability to avoid or reduce land based impacts, impacts related to fill activities, or reduce impacts on waters of the United States.

3A.4.2.1 Second-Level Screening Results

Table 3A-3 shows the alternatives that were eliminated because they failed to avoid or substantially lessen environmental impacts. For details about how the intake sites were considered and screened out, see Attachment A to the Engineering Project Reports (Delta Conveyance Design and Construction Authority 2022a, 2022b). Only the dual conveyance Bethany Reservoir alignment passed the Filter 2 screening for its potential to avoid or reduce impacts compared to the proposed project in the NOP and is evaluated in the Draft EIR as Alternative 5.

Table 3A-3. Results of Second-Level Screening

Alternative	Reasons for Elimination
Dual Conveyance East Canal	• A canal would have greater impacts on land use, agricultural operations, and multiple other resources than the proposed project, which would include a tunnel that would be constructed underground with tunnel shafts every 4 to 6 miles. The canal width would be approximately 1,400 feet between the outside levee toes. The canal would be constructed with levees that would extend above the ground surface, so that the bottom of the canal could be constructed above the normal groundwater elevations. • Additionally, as analyzed in the BDCP/California WaterFix EIR/EIS (California Department of Water Resources 2016b:12-7, 12-1402, 12-2037, 12-2762), because a canal is a surface impact, it negatively would affect more wetlands and waters of the United States than the proposed project, which would only affect land surfaces at the tunnel shafts (every 4 to 6 miles) and would not require culverts constructed under water bodies as compared to a canal.
Dual Conveyance West Canal	• Same as Dual Conveyance East Canal alternative.
Dual Conveyance with New Intakes at Sacramento Weir	• The tunnel would require tunnel shafts near residential and commercial areas close to the communities of West Sacramento, Freeport, Clarksburg, and Hood. • The Sacramento Weir is an important flood control feature. Its primary purpose is to protect the City of Sacramento from excessive flood stages in the Sacramento River by diverting river flows west into the 2-mile-long Sacramento Bypass. Intakes at this location would affect the ability of the Sacramento Weir and Bypass to provide flood control support by reducing the amount of water passing over the weir and into the bypass. Additionally, intakes constructed near the Sacramento Weir would have the potential to affect the Sacramento Bypass, which is predominantly riparian and grasslands.
Isolated Conveyance Tunnel with Sacramento River Intakes	• Elimination of use of the south Delta diversions would reduce the amount of freshwater flows from the Sacramento River through Delta Cross Channel gates and Mokelumne River systems and convey across the San Joaquin River to the south Delta channels and freshwater reverse flows from the lower Sacramento and San Joaquin Rivers into the south Delta channels. • This alternative is more impactful than dual conveyance options, where fresh water would still be conveyed north to south through the Delta, which keeps the water fresher than it otherwise would be.
Isolated Conveyance West Canal with Sacramento River Intakes	• A canal would have greater land use conflicts, as well as impacts on agricultural operations and multiple other resources, than the proposed project, which would include a tunnel that would be constructed underground with tunnel shafts every 4 to 6 miles. The canal width would be approximately 1,400 feet between the outside levee toes. The canal would be constructed with levees that would extend above the ground surface so that the bottom of

Alternative	Reasons for Elimination
	the canal could be constructed above the normal groundwater elevations. • Additionally, as analyzed in the BDCP/WaterFix EIR/EIS (California Department of Water Resources 2016b), because a canal is a surface impact, it would affect more wetlands and waters of the United States than the proposed project which would only affect land surfaces at the tunnel shafts (every 4 to 6 miles) and would not require culverts constructed under water bodies as compared to a canal. • This alternative is more impactful than dual conveyance options, where fresh water would still be conveyed north to south through the Delta, which keeps the water fresher than it otherwise would be.
Isolated Conveyance East Canal with Sacramento River Intakes	• Same as Isolated Conveyance West Canal with Sacramento River Intakes.
Isolated Conveyance East Canal with Feather River Intakes	• This alternative would include an additional 150-mile-long canal from the lower Feather River that would extend to the Lower American River and Lower Stanislaus River. This canal would extend through primarily agricultural lands, except near Sacramento and Stockton. Thus, it would have even greater impacts on natural and cultural resources at or near the surface of the land than would the canal alternatives, discussed above. • Water from the Feather River (diverted above the confluence with the Sacramento River) would be discharged into the lower American River and Stanislaus River and could affect the ability of fish to determine appropriate attraction flow with chemical constituents to improve fish migration to native streams. • An isolated conveyance alternative is more impactful than dual conveyance options, where fresh water would still be conveyed north to south through the Delta, which keeps the water fresher than it otherwise would be.
A Water Plan for All of California	• Construction vehicle traffic to access the site and construction-related noise and air emissions would be concentrated in a populated urban area with six schools and other sensitive receptors along routes and near construction sites. • The southern end of the Deep Water Ship Channel has a substantial amount of riparian area that would be disturbed by construction of the intakes and ship lock. • Proposed fish screen and low head-pump station at the existing opening to the Deep Water Ship Channel on the Sacramento River (i.e., Port of West Sacramento intake) would not reduce environmental and other impacts compared to the proposed project. The location is subject to high sediment deposition and would require more dredging during operations as compared to the intakes within the proposed project. • Based upon previous studies by the USACE, some of the sediment in the Deep Water Ship Channel would include hazardous materials and could require sealing within the channel. • An on-bank vertical plate screen structure would require the screen to be in the main channel of the river, where it would be across from the Miller Park boat entrance and in a fairly narrow

Alternative	Reasons for Elimination
	section of the river, which presents a potential navigation hazard compared to construction of an "in bank" design (as is proposed for the proposed project). • An in-channel (i.e., chevron configuration) vertical plate screen would require fish capture and handling, which is not a preferred protection measure for endangered aquatic species. Regulatory approval is typically limited to locations with no other alternatives, which is not the case here. • This alternative would conflict with the adopted *West Sacramento General Plan* for development adjacent to the Deep Water Ship Channel near the confluence with the Sacramento River. • The western levee of the Deep Water Ship Channel would be modified to provide flood management protection and seismic protection for the facilities. This would require construction activities within the Yolo Bypass Wildlife Area that would adversely affect biological resources.

BDCP = *Bay Delta Conservation Plan*; EIR = environmental impact report; EIS = environmental impact statement; USACE = U.S. Army Corps of Engineers.

3A.4.3 Alternatives Selected for Analysis in the Draft EIR

Based on the Filter 1 and Filter 2 screenings described above, nine alternatives (including the proposed project) were selected for analysis in this Draft EIR because they meet project objectives for climate resiliency, seismic resiliency, water supply reliability, and operational resiliency and would avoid or substantially lessen environmental impacts compared to the other projects screened, as presented in Tables 3A-2 and 3A-3. The Bethany Reservoir alignment is the only alternative to the project proposed in the NOP that would meet criteria in both Filter 1 and Filter 2 (Table 3A-4). The central and eastern alignments, as originally proposed with a range of conveyance capacities, are evaluated as Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c in this Draft EIR. The Bethany Reservoir alignment is evaluated as Alternative 5.

The basis of the Bethany Reservoir alignment was described above in Section 3A.3.1.8, *Dual Conveyance Bethany Reservoir Alignment*. Compared to the proposed project described in the NOP, the dual conveyance Bethany Reservoir alignment would eliminate the need for the Southern Forebay and the Southern Complex entirely, including any need for realignment of Byron Highway and Franklin Boulevard, and modifications of railroad tracks at Twin Cities Complex and Southern Complex. This alternative would avoid the impacts of constructing the Southern Complex, which would have the potential for agricultural, aesthetic, noise, and air quality effects from increased traffic that could affect sensitive receptors at the town of Discovery Bay.

The dual conveyance Bethany Reservoir alignment would provide the same climate resiliency, seismic resiliency, and water supply reliability as the central and eastern alignment alternatives evaluated in the Draft EIR and potentially would have fewer or substantially reduced environmental impacts. Additionally, this alternative could have better operational resiliency than the proposed project because it is independent of Banks Pumping Plant. The new facilities from intakes to the southern end of this alternative would be built to meet current seismic design standards.

1 **Table 3A-4. Alternatives Screening Matrix**

	Filter One – Project Objectives					Filter Two	
	Climate Resiliency	Seismic Resiliency	Water Supply Reliability	Operational Resiliency	Yes/No	Avoids or Substantially Lessens Impacts	Yes/No
	Addresses anticipated sea level rise and other reasonably foreseeable consequences of climate change and extreme weather events	Minimizes health/ safety risk to public from earthquake-caused reductions in water delivery quality and quantity from the SWP	Restores and protects ability of the SWP to deliver water in compliance with regulatory and contractual constraints	Could provide operational flexibility for the SWP to improve aquatic conditions and manage future regulatory constraints	Meets at least two objectives	Will the alternative result in fewer or lesser environmental impacts than the proposed project or other alternatives?	
Dual Conveyance Central Tunnel (NOP proposed project)	Y	Y	Y	Y	Y	Y	Y
Dual Conveyance Eastern Tunnel (NOP proposed project)	Y	Y	Y	Y	Y	Y	Y
Dual Conveyance East Canal	Y	N	Y	Y	Y	N	N
Dual Conveyance West Canal	Y	N	Y	Y	Y	N	N
Dual Conveyance with New Intakes at Sacramento Weir	Y	Y	Y	Y	Y	N	N
Dual Conveyance Tunnel with New Intakes at Fremont and Decker Island	N	N	N	N	N	–	–
Dual Conveyance with New Intakes at Decker Island	N	N	N	N	N	–	–

	Filter One – Project Objectives					Filter Two	
	Climate Resiliency	Seismic Resiliency	Water Supply Reliability	Operational Resiliency	Yes/No	Avoids or Substantially Lessens Impacts	Yes/No
	Addresses anticipated sea level rise and other reasonably foreseeable consequences of climate change and extreme weather events	Minimizes health/ safety risk to public from earthquake-caused reductions in water delivery quality and quantity from the SWP	Restores and protects ability of the SWP to deliver water in compliance with regulatory and contractual constraints	Could provide operational flexibility for the SWP to improve aquatic conditions and manage future regulatory constraints	Meets at least two objectives	Will the alternative result in fewer or lesser environmental impacts than the proposed project or other alternatives?	
Dual Conveyance Bethany Reservoir Alignment	Y	Y	Y	Y	Y	Y	Y
Isolated Conveyance New Intakes at Fremont Weir and Decker Island	N	N	N	N	N	–	–
Isolated Conveyance Tunnel with Sacramento River intakes	Y	N	Y	N	Y	N	N
Isolated Conveyance West Canal with Sacramento River Intakes	Y	Y	Y	N	Y	N	N
Isolated Conveyance East Canal with Sacramento River Intakes	Y	Y	Y	N	Y	N	N
Isolated Conveyance East Canal with Feather River Intakes	Y	Y	Y	N	Y	N	N

	Filter One – Project Objectives					Filter Two	
	Climate Resiliency	Seismic Resiliency	Water Supply Reliability	Operational Resiliency	Yes/No	Avoids or Substantially Lessens Impacts	Yes/No
	Addresses anticipated sea level rise and other reasonably foreseeable consequences of climate change and extreme weather events	Minimizes health/ safety risk to public from earthquake-caused reductions in water delivery quality and quantity from the SWP	Restores and protects ability of the SWP to deliver water in compliance with regulatory and contractual constraints	Could provide operational flexibility for the SWP to improve aquatic conditions and manage future regulatory constraints	Meets at least two objectives	Will the alternative result in fewer or lesser environmental impacts than the proposed project or other alternatives?	
Isolated Conveyance with San Joaquin River intake	N	N	Y	N	N	–	–
A Water Plan for All of California	Y	Y	N	N	Y	N	N
Western Delta Intake Concept	N	N	N	Y	N	–	–
SolAgra Water Solution	N	N	Y	N	N	–	–
Portfolio-Based Proposed including Water Conveyance Facilities	Y	N	N	N	N	–	–
Through-Delta Conveyance No New Diversion Facility (with Barriers)	N	N	N	N	N	–	–
Through-Delta Conveyance with No New Diversion Facility – New Fish Handling Facilities at Clifton Court Forebay	N	N	N	N	N	–	–

	Filter One – Project Objectives					Filter Two	
	Climate Resiliency	Seismic Resiliency	Water Supply Reliability	Operational Resiliency	Yes/No	Avoids or Substantially Lessens Impacts	Yes/No
	Addresses anticipated sea level rise and other reasonably foreseeable consequences of climate change and extreme weather events	Minimizes health/ safety risk to public from earthquake-caused reductions in water delivery quality and quantity from the SWP	Restores and protects ability of the SWP to deliver water in compliance with regulatory and contractual constraints	Could provide operational flexibility for the SWP to improve aquatic conditions and manage future regulatory constraints	Meets at least two objectives	Will the alternative result in fewer or lesser environmental impacts than the proposed project or other alternatives?	
Portfolio Approach without Water Conveyance Facilities	N	N	N	N	N	–	–
Integration of Water Conveyance with Other Projects (as described above)	N	N	N	N	N	–	–
Alternative locations for Diversion Facilities along the Sacramento River in the North Delta	Y	Y	Y	Y	Y	N	N

NOP = Notice of Preparation; SWP = State Water Project

3A.5 Identification of Capacities

As indicated in DWR's January 15, 2020, NOP, DWR is considering alternatives to the proposed project with capacities that range from 3,000 to 7,500 cfs, with an option for CVP involvement with the 7,500 cfs alternatives. For that reason, the central and eastern alignments are being analyzed at various conveyance capacities within this range. The Bethany Reservoir alignment is being analyzed at a 6,000-cfs capacity. Although the Bethany Reservoir alignment is analyzed only at a 6,000-cfs capacity, that does not preclude DWR from approving it with another operational capacity, should DWR choose to do so.

3A.6 Identification of Operations

The identification of the proposed operations considered an appropriate balance between exports and ecological issues in the Delta. A new set of operational criteria was developed for the proposed north Delta intakes using the operational criteria from California WaterFix as an initial starting point. California WaterFix operations criteria for the north Delta intakes were developed in collaboration with federal and state fishery agencies for the BDCP in 2010, continuing through development of the California WaterFix BiOps. These criteria are intended to meet the ESA requirement to minimize and mitigate incidental take to the maximum extent practicable, as well as to minimize other potential environmental impacts.

The proposed north Delta diversion intakes would operate in conjunction with the existing SWP/CVP intakes in the south Delta. Operations of the existing SWP facilities would be governed by the applicable regulatory requirements specified under the State Water Board's *Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary* (Bay-Delta Plan), federal BiOps, CESA Incidental Take Permit for SWP, and USACE Clifton Court diversion limits. The operations of the proposed north Delta diversion intakes would remain consistent with these existing regulatory requirements and any additional requirements resulting from Delta Conveyance Project permitting. 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 and sweeping velocity requirements, bypass flow requirements, and pulse protection.

The 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 on sensitive fish species.[5] The following criteria 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/minimum allowable diversions

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

As noted above, the starting point for these criteria is the California WaterFix and BDCP. These criteria were validated and discussed with the fishery agencies in the context of the latest and the best available scientific information. Operations are described in more detail in Chapter 3, *Description of the Proposed Project and Alternatives,* and Appendix 5A, *Modeling Technical Appendix*.

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Appendix E
No Action Alternative and Cumulative Projects

The definition of existing conditions, No Action Alternative, and cumulative impact conditions in this appendix are presented as provided by the California Department of Water Resources (the applicant) in the Delta Conveyance Project Draft Environmental Impact Report Appendix 3C, *Defining Existing Conditions, No Action Alternative, and Cumulative Impact Conditions* (California Department of Water Resources 2022) and therefore is presented from the California Environmental Quality Act perspective. However, the U.S. Army Corps of Engineers relied on this information when preparing its Draft Environmental Impact Statement. All chapter references in this appendix are to those in the Draft EIR. Please refer to the Draft EIR for any information cross referenced.

E.1 No Action Alternative Conditions

The No Action Alternative assumptions include the basic description of No Action Alternative (Section E.1.2), assumptions related to the SWP and CVP, ongoing programs and policies by governmental and nonprofit entities, projections related to climate change, and assumptions related to annual actions that vary every year.

As described in Delta Conveyance Project Draft EIR Chapter 3, the No Action Alternative is considered at two timeframes, 2020 and 2040 (California Department of Water Resources 2022). The 2040 No Action Alternative is described below. Unless stated specifically, the phrase No Action Alternative refers to No Action at the 2040 timeframe.

The approach for how the No Action Alternative is analyzed in this EIS is described in Chapter 2.

E.1.1 Basic Description of No Action Alternative for the EIR

The No Action Alternative analyzed in the EIS resource sections includes descriptions of conditions at approximately Year 2040.[1]

The No Action Alternative includes programs, projects, and policies included in existing conditions assumptions and those with clearly defined management and/or operational plans, including facilities under construction as of January 15, 2020. The No Action Alternative assumptions also includes facilities and programs that have completed environmental review, received approvals and permits, or foreseeably will be approved and permitted by 2040.

Because the effects of climate change and sea level rise will foreseeably have a sizeable effect on the Delta environment by 2040, those effects will be represented in the No Action Alternative analysis. A comprehensive table is included at the end of this appendix (Table E-1).

[1] A No Action Alternative for 2070 is described and analyzed in Delta Conveyance Project Draft EIR Appendix 3D, *Alternatives at 2070* (California Department of Water Resources 2022). Though not required under CEQA, this additional comparison is provided for disclosure purposes because the life of the proposed project would extend beyond the next 50 years.

E.1.2 No Action Alternative Assumptions for State Water Project and Central Valley Project

The No Action Alternative for this draft EIS includes continuation of operations of the SWP and CVP as governed by D-1641, the 2019 NMFS BiOp, 2019 USFWS BiOp, and 2020 CDFW ITP.

Detailed assumptions for the CVP and SWP operations are represented in hydrological and water quality analytical models, as described in Delta Conveyance Project Draft EIR Appendix 5A, *Modeling Technical Appendix* (California Department of Water Resources 2022).

E.1.3 No Action Alternative Assumptions for Ongoing Programs and Policies

The No Action Alternative assumes continued implementation of operations, maintenance, enforcement, and protection programs by federal, state, and local agencies that affect or could be affected by the Delta Conveyance Project and alternatives. As described above for the existing conditions assumptions, many of the ongoing programs include development of future projects that would require separate environmental documentation. The following sections describe the criteria used to determine the actions falling under and considered as part of the No Action Alternative assessment.

While projects already constructed or in construction that are part of EcoRestore are part of existing conditions, for purposes of No Action Alternative, planned EcoRestore projects still in development are also included.

In addition to the ongoing programs, the No Action Alternative considers water rights, flood management, and compliance with the endangered species acts.

E.1.3.1 No Action Alternative Assumptions for Water Rights

The No Action Alternative assumes there would be no changes to senior water rights in the Sacramento and San Joaquin River watersheds by 2025 through use of facilities currently available or under construction.

E.1.3.2 No Action Alternative Assumptions for Flood Management

The No Action Alternative assumes continued operations of flood management facilities by the federal, state, and local agencies. In addition, the No Action Alternative assumes that levee failures due to flooding, erosion, subsidence, wave action, seismic events, burrowing animals, physical encroachment (such as barge collisions), increased hydraulic pressure from sea level rise, or other causes would be repaired and augmented to meet comparable flood management objectives under ongoing programs in the future. The No Action Alternative assumes that these repairs also would occur on privately-owned levees that are integral to the main waterways in the Delta, such as repairs that occurred to privately-owned levees following the floods in 1996 and 1997.

E.1.3.3 No Action Alternative Assumptions for Compliance with Endangered Species Acts

The No Action Alternative assumptions include continued compliance by nonfederal agencies with the CESA and ESA on a case-by-case basis for future programs and projects that have a potential to take listed species under each act. The No Action Alternative does not include additional comprehensive strategies to avoid, minimize, or mitigate effects of programs or projects that are not currently implemented under existing conditions. Under ESA, federal agencies have the responsibility to utilize their authorities to carry out programs for the conservation of endangered species and threatened species. However, many of these programs are too conceptual at this time to analyze in an informative manner, therefore they are not included in the No Action Alternative assumptions.

E.1.4 No Action Alternative Assumptions Related to Climate Change

The No Action Alternative also includes assumptions for climate change related to sea level rise and changes in precipitation patterns, including changes in ratios between snow and rainfall. While no current guidance exists for use of specific climate scenarios under CEQA, per the California Ocean Protection Council, the H++ scenario, or extreme risk aversion scenario, is recommended and relevant for high-stakes, long-term decisions and for projects with a lifespan beyond 2050 that have a low risk tolerance (Chapter 30, *Climate Change*). Based on this scenario, an extreme assumption for sea level rise of 1.8 feet was modeled for the No Action Alternative 2040 operations. Detailed assumptions for climate change as it relates to SWP and CVP operations are represented in hydrological and water quality analytical models, as described in Appendix 5A, *Modeling Technical Appendix*, Section F, *Climate Change Modeling*.

E.1.5 No Action Alternative Assumptions for Annual Actions

The No Action Alternative assumptions focus on longer-term operations and do not include specific annual operations, such as 1-year water transfers. It is recognized that annual operational water transfers will continue to occur, although specific information cannot be reasonably forecasted.

E.1.6 No Action Alternative Assumptions for Water Agency Actions

As stated above, the No Action Alternative takes into account projects, plans, and programs 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.” The Delta Conveyance Project is a water reliability project, and therefore, it can be assumed that in the absence of the proposed project, participating water agencies would seek to bolster water reliability through other projects. These projects would likely be in the same vein of other water reliability projects that are already being developed by the participating water agencies. These types of actions have not been considered as a project alternative on their own because, among other reasons, they fail to meet the fundamental project objective to restore and protect reliable SWP supplies from the Delta, as explained further in Appendix D, *Alternatives Screening Analysis*.

These actions would include:

- Water conservation programs by public agencies aimed at water use reduction/efficiency targeting landscaping, and the commercial and multi-family housing sectors, as well as changing individual habits. This could include programs like rebates or other incentives for water saving devices, water use restrictions, and outreach campaigns.
- Water recycling projects involving further treatment of treated wastewater that is currently discharged to the ocean, bays, streams, or lands, and using it for non-potable uses such as landscape and agricultural irrigation, commercial and industrial purposes. There is potential that in the future, recycled water could eventually be used as a supply of potable water.
- Groundwater recovery projects involve treatment of high salinity or contaminated groundwater for potable uses.
- Groundwater management consists of use of existing groundwater supplies, but also conjunctive use of water—which refers to the coordinated management of surface water and groundwater supplies such as use and storage of surface water supplies in groundwater basins and reservoirs during periods of abundance. This stored water is available for use during periods of low surface water supplies as a way of augmenting seasonal and multiyear shortages.
- Water transfers and exchanges or water purchases on the open market.

Projects pursued would be dependent primarily on the geographic location of the water agency. For purposes of this analysis, water agencies that have signed on to the Agreement in Principle as of the date of the release of this Draft EIR have been divided into four geographic areas: northern coastal, northern inland, southern coastal, southern inland. Projects most likely pursued by the various geographies are as follows:

- **Northern coastal** (Alameda County Water District; Santa Clara Valley Water District)
    - Desalination
    - Recycling
    - Water conservation/water use efficiency
    - Groundwater recovery
    - Groundwater management
- **Northern inland** (Alameda County Flood Control and Water Conservation District, Zone 7)
    - Desalination
    - Recycling
- **Southern coastal** (Metropolitan Water District; San Luis Obispo County Flood Control and Water Conservation District; Ventura County Water Protection District; Santa Clarita Valley Water Agency)
    - Desalination
    - Recycling
    - Water conservation/water use efficiency
    - Groundwater recovery

- Groundwater management

- **Southern inland** (Antelope Valley – East Kern Water Agency; Coachella Valley Water District; Crestline–Lake Arrowhead Water Agency; Desert Water Agency; Dudley Ridge Water District; Kern County Water Agency; Mojave Water Agency; Palmdale Water District; San Bernardino Valley Municipal Water District; San Gabriel Valley Municipal Water District; San Gorgonio Pass Water Agency)
    - Groundwater recovery
    - Recycling
    - Groundwater management
    - Water conservation/water use efficiency

Projects currently in development or in exploratory phases are outlined in the most current Urban or Agricultural Water Management Plan for each of these water agencies. But because it is not possible to know precisely what projects or blends of projects water suppliers would take, the impact analyses are necessarily general in nature and do not contain detailed project-specific analysis.

E.2 Cumulative Impact Assumptions

For the most part, cumulative impact assumptions for the Draft EIR include programs, projects, and policies included in existing conditions and No Action Alternative assumptions and reasonably foreseeable probable future programs and projects. For the Draft EIR, programs with specific plans identified in draft environmental and engineering documents without subsequent approvals were included in the cumulative impact assumptions as reasonably foreseeable. A comprehensive table of programs, projects, and policies considered for cumulative impact analysis is included at the end of this appendix (Table E-1).

Most of the programs, projects, and policies included in the cumulative impact assumptions are defined in adequate detail to estimate potential adverse and beneficial impacts, including projects with draft environmental documentation but without selection of a proposed project. The cumulative impact analysis considers the preliminary determinations of beneficial and adverse impacts for these actions in conjunction with the Delta Conveyance Project and alternatives.

Table E-1. Descriptions of Programs, Projects, and Policies Considered for Existing Conditions, No Action Alternative, and Cumulative Impact Analysis

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
East Alameda County Conservation Strategy (EACCS)	Alameda County	The EACCS is intending to preserve endangered species with a plan for long term habitat protection. The EACCS will assess the conservation value of East Alameda County to establish biological principles for conservation in that area. The EACCS will provide a framework for regional conservation of biological species, streamline the environmental permitting process, provide guidance to project proponents, and facilitate ongoing conservation programs. The EACCS will identify land suitable for voluntary mitigation or conservation, mitigation ratios, standards for habitat restorations, best management and maintenance practices for conservation sites, monitoring standards, and guidelines for adaptive management.	No	No	Yes	East Alameda County website. Site accessed October 28, 2020. URL = http://www.eastalco-conservation.org/about.html.
Alameda East County General Plan	Alameda County	The Alameda County Eden Area General Plan provides "a comprehensive guide for making decisions about land use, community character, economic development, circulation, open space, the environment, and public health and safety" as well as coordination for future development and conservation in the Eden Area through 2025. Developed by County staff with input from the public starting in 2002, the plan was finalized in 2010.	Yes	Yes	Yes	Alameda County, Community Development Agency, General Plan, Specific Plans & Ordinances website. Accessed February 24, 2022. URL = https://www.acgov.org/cda/planning/generalplans/index.htm.
CALFED Levee System Integrity Program	California Department of Water Resources (DWR), California Department of Fish and Wildlife (CDFW), U.S. Army Corps of Engineers (USACE)	The CALFED Record of Decision requires that the Levee System Integrity Program be managed to provide for long-term protection for Sacramento–San Joaquin River Delta (Delta) resources through maintenance and improvement of the Delta levee system. Goals are to protect life, infrastructure, and properties and reduce the risk to land use and associated economic activities, water supply, infrastructure, and ecosystem from catastrophic breaching of Delta levees. The primary focus is on the legal Delta as defined in Section 12220 of the California Water Code. Protection and maintenance of 1,300 miles of project and nonproject levees have taken place since the inception of the CALFED Levee System Integrity Program in 2000.	Yes	Yes	Yes	CALFED Bay-Delta Program. 2000. *Levee System Integrity Program Plan*. Available: http://s3-us-west-2.amazonaws.com/ucldc-nuxeo-ref-media/677f7439-2b07-4494-a627-4a96260226fa. Site accessed October 12, 2020.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		Other major undertakings include restoration of native vegetation and reuse of dredge material to bolster levee stability. Major activities include levee maintenance, levee improvement, environmental mitigation, emergency response functions, and other components carried out using local funds, with additional funds provided by the state and federal governments. However, uncertainty in program funding has required that some goals be revised and schedules be extended. Proposition 50 provided $70 million for Delta levees.				
Lower Cache Creek/Woodland Flood Risk Management Project	City of Woodland, USACE, DWR, Central Valley Flood Protection Board (CVFPB)	The Final Environmental Impact Report (EIR) and Final Environmental Impact Statement (EIS) evaluate impacts associated with a proposed flood risk reduction project on Lower Cache Creek. As part of the overall effort, USACE is also preparing a project feasibility study. Similarly, the City of Woodland is partnering with DWR through its Urban Flood Risk Reduction Program to identify and implement the flood risk reduction project to meet the State's urban level of protection requirements in a cost-effective manner that would be compatible with and supportive of elements of the Integrated Watershed Monitoring Program. Project components include secondary earthen levees and a diversion channel to redirect overland flood flows into the Yolo Bypass, modification of the Cache Creek Settling Basin to allow conveyance of flood flows into the Yolo Bypass, and various bridge and/or culvert improvements to facilitate conveyance of flood flows in the diversion channel.	No	Yes	Yes	City of Woodland. 2021a. *Lower Cache Creek Feasibility Study (LCCFS)*. Available: https://www.cityofwoodland.org/1196/Lower-Cache-Creek-Feasibility-Study-LCCF. Site accessed April 2, 2021.
Alameda Watershed Habitat Conservation Plan (HCP)	San Francisco Public Utilities Commission (SFPUC), U.S. Fish and Wildlife Service (USFWS), and National Marine Fisheries Service (NMFS)	Activities covered by the HCP include those in the Alameda Watershed Management Plan adopted in 2000 to maintain and improve source water quality and supply while preserving and enhancing the watershed's ecological resources. The SFPUC-owned Alameda Watershed consists of 36,000 acres of rolling grasslands, native woodlands, scrub and freshwater marshes within the Southern Alameda Creek Watershed. The conservation measures are expected to consist of a combination of avoidance and minimization measures, water and land management, river and stream restoration, barrier modification, and threat abatement.	Yes	Yes	Yes	Alameda Creek Alliance. 2021. *San Francisco's Habitat Conservation Plan.* Site accessed May 5, 2021. URL= http://www.alamedacreek.org/take-action/sf-habitat-conservation-plan.php.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
Phase 1: Greenhouse Gas Emissions Reduction Plan	DWR	In 2012, DWR developed the Greenhouse Gas Emissions Reduction Plan as the first phase of its Climate Action Plan to guide decision-making related to energy use and GHG emissions. As it committed to in 2012, DWR has developed this Greenhouse Gas Emissions Reduction Plan Update 2020 to review its greenhouse gas (GHG) reductions since the 2012 Plan and to update strategies for further reduction consistent with legislative changes, including the GHG emissions reduction targets established in Senate Bill (SB) 32 (2016), SB 100 (2018), Executive Order (EO) B-18-12 (2012), EO B-30-15 (2015), and EO B-55-18 (2018). DWR will monitor the implementation of the GHG-reduction measures and commits to another update of the Greenhouse Gas Emissions Reduction Plan in 2030.	Yes	Yes	Yes	DWR. 2020. *Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan*. July. Available: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Climate-Change-Program/Climate-Action-Plan/Files/CAP-I-GGERP-Update-2020.pdf?la=en&hash=0BA702D428A58FCA286EBA4A6C0BF1D2CA532F52.
South Fork Feather Project	Federal Energy Regulation Commission (FERC), South Feather Water and Power Agency	The South Fork Feather Project (FERC Project No. 2088) is a water supply/power project composed of four hydroelectric developments: Sly Creek, Woodleaf, Forbestown, and Kelly Ridge. Final Water Quality Certification was issued on November 30, 2018.	Yes	Yes	Yes	State Water Resources Control Board. 2021. *South Feather Power Project*. Federal Energy Regulatory Commission (FERC) Project No. 2088. Site accessed March 22, 2021. URL= https://www.waterboards.ca.gov/waterrights/water_issues/programs/water_quality_cert/southfeather_ferc2088.html.
Bucks Creek Hydroelectric Project	FERC, Pacific Gas and Electric Company, Inc. (PG&E), and the City of Santa Clara	The Bucks Creek Hydroelectric Project (FERC Project No. 619) is an 84.8-MW project located in Plumas County, California. The Project consists of the Bucks Creek Powerhouse, Grizzly Powerhouse, Bucks Lake, Lower Bucks Lake, Grizzly Forebay, and Three Lakes along with associated conveyances and other facilities. Final Water Quality Certification was issued on October 22, 2010.	Yes	Yes	Yes	State Water Resources Control Board. 2021. *Bucks Creek Hydroelectric Project*. Federal Energy Regulatory Commission (FERC) Project No. 619. Site accessed March 22, 2021. URL=

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
						https://www.waterboards.ca.gov/waterrights/water_issues/programs/water_quality_cert/buckscreek/.
Yuba River Watershed Hydroelectric Projects	FERC, Nevada Irrigation District, PG&E	The Nevada Irrigation District is applying for a new license for the Yuba-Bear Project (FERC Project No. 2266), and PG&E is applying for the Drum-Spaulding Project (FERC Project No. 2310). The Yuba-Bear Project is on the Middle and South Yuba Rivers, Bear River, and Jackson and Canyon creeks. Concurrently, PG&E is applying for a license renewal for the Drum-Spaulding Project on the Bear and Yuba Rivers. PG&E closely coordinates the operations of the Drum-Spaulding Project with Nevada Irrigation District's Yuba-Bear Hydroelectric Project. Final Water Quality Certification was issued on February 3, 2021.	Yes	Yes	Yes	California Department of Water Resources. 2020. *Final Environmental Impact Report for Long-Term Operation of the California State Water Project.* State Clearinghouse No. 2019049121. March.
Yuba River Development Project Relicensing	FERC, Yuba County Water Agency	The Yuba County Water Agency is seeking to renew its 50-year FERC license for the Yuba River Development Project (FERC Project No. 2246). The Yuba River Development Project is on the Yuba River, the Middle Yuba River, and Oregon Creek in Yuba County, and consists of one reservoir (New Bullards Bar on the North Yuba River), two diversion dams (Our House Diversion Dam on the Middle Yuba River and Log Cabin Diversion Dam on Oregon Creek), three powerhouses (New Colgate, Fish Release, and Narrows No. 2), and various recreational facilities and appurtenant facilities. FERC issued the Final EIS in January 2019.	Yes	Yes	Yes	California Department of Water Resources. 2020. *Final Environmental Impact Report for Long-Term Operation of the California State Water Project.* State Clearinghouse No. 2019049121. March.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
Upper North Fork Feather River Hydroelectric Project	FERC, PG&E	The Upper North Fork Feather River Hydroelectric Project (FERC Project No. 2105) is located on the North Fork Feather River in Plumas County. It consists of three reservoirs with dams: Lake Almanor, Butt Valley reservoir and Belden forebay; five powerhouses; tunnels and penstocks connecting the reservoirs to the powerhouses; and transmission, operation and maintenance, and access facilities. The five powerhouses include eight hydroelectric generating units with a total nameplate capacity of 362.3 MW.	Yes	Yes	Yes	State Water Resources Control Board. 2021. *Upper North Fork Feather River Hydroelectric Project.* Federal Energy Regulatory Commission (FERC) Project No. 2105. Site accessed March 22, 2021. URL= https://www.waterboards.ca.gov/waterrights/water_issues/programs/water_quality_cert/unffr_ferc2105.html.
DeSabla-Centerville Hydroelectric Project	FERC, PG&E	The DeSabla-Centerville Hydroelectric Project (FERC Project No. 803) is located on Butte Creek and the West Branch Feather River. The Project consists of three developments (Toadtown, DeSabla, and Centerville), which collectively include three reservoirs, three powerhouses, 14 diversion and feeder dams, five canals, and associated equipment and transmission facilities. Final Water Quality Certification was issued on April 8, 2015.	Yes	Yes	Yes	State Water Resources Control Board. 2021. *DeSabla-Centerville Hydroelectric Project.* Federal Energy Regulatory Commission (FERC) Project No. 803. Site accessed March 22, 2021. URL= https://www.waterboards.ca.gov/waterrights/water_issues/programs/water_quality_cert/desabla_ferc803.html.
Don Pedro Hydroelectric Project	Turlock Irrigation District, Modesto Irrigation District, FERC	Turlock Irrigation District and Modesto Irrigation District are the co-licensees of the 168-MW Don Pedro Hydroelectric Project (FERC Project No. 2299) located on the Tuolumne River in western Tuolumne County. The Tuolumne River is tributary to the San Joaquin River, which eventually flows into the Delta, and then the San Francisco Bay. Final Water Quality Certification was issued on January 15, 2021.	Yes	Yes	Yes	State Water Resources Control Board. 2021. *Don Pedro Hydroelectric Project*. Site accessed March 22, 2021. URL = https://www.waterboards.ca.gov/waterrights/water_issues/programs/water_quality_cert/donpedro_ferc2299.html.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
Del Puerto Canyon Reservoir	San Joaquin River Exchange Contractors Water Authority, Del Puerto Water District	Del Puerto Water District and the Exchange Contractors are partnering to construct and operate the Del Puerto Canyon Reservoir, an 800-acre reservoir that would store up to 82,000 acre-feet of water. The project will deliver water from the Delta-Mendota Canal into the new reservoir, where it will be stored and released on a carefully managed basis. The reservoir would allow water to be delivered into storage during wetter periods until it is needed in drier periods for irrigation, groundwater recharge, or wildlife beneficial uses (up to 60,000 acre-feet per year [AFY]).	No	No	Yes	Del Puerto Canyon Reservoir website. Site accessed January 7, 2021. URL = https://delpuertocanyonreservoir.com/.
Bay Area Water Quality and Supply Reliability Program	Bay Area Integrated Regional Water Management Plan (IRWMP) participants representing Bay Area agencies	The Bay Area IRWMP will be adopted by the involved agencies and organizations that have taken the lead in funding and preparing the Bay Area IRWMP. The partners envision it to be an evolving plan, recognizing that as projects, information and understanding progress, so too should the Bay Area IRWMP. State agencies such as the State Water Control Board and DWR are also being apprised of the planning process as it proceeds and will receive the plan. The plan will be used to prioritize projects and provide information for projects to be funded by state and federal agencies, such as the Proposition 50 projects.	Yes	Yes	Yes	Bay Area IRWMP website. Site accessed October 28, 2020. URL = http://bayareairwmp.org/.
Bay Area Stormwater Management Programs	Bay Area Stormwater Management Association Member Agencies (BASMAA)	BASMAA was started in response to the National Pollutant Discharge Elimination System (NPDES) permitting program for storm water in an effort to promote regional consistency and to facilitate efficient use of public resources to implement stormwater regulations. The seven member programs of BASMAA have all agreed to the terms of a memorandum of understanding. The focus of the association is implementing stormwater regulations in a way that cuts across typical departmental boundaries, programs, and lines of communication. To do so, these programs have used essentially a watershed approach involving as many interested parties as possible and building consensus. Stormwater management programs within the Bay Area include: • Alameda Countywide Clean Water Program, • Contra Costa Clean Water Program, • Fairfield-Suisun Urban Runoff Management Program, • Marin County Stormwater Pollution Prevention Program,	Yes	Yes	Yes	Bay Area Stormwater Management Association's website. Site accessed October 28, 2020. URL = http://www.basmaa.org/AboutBASMAA/tabid/55/Default.aspx.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		• Napa Countywide Stormwater Pollution Prevention Program • San Mateo Countywide Water Pollution Prevention Program, • Santa Clara Valley Urban Runoff Pollution Prevention Program, and • Programs implemented by Sonoma County Water Agency and Vallejo Sanitation and Flood Control District.				
Submersed Aquatic Vegetation Control Program	California State Parks Division of Boating and Waterways	Previously known as the *Egeria densa* Control Program, the Submersed Aquatic Vegetation Control Program is part of the California State Parks Division of Boating and Waterways Aquatic Invasive Plant Control Program. From 2001 through 2015, DBW operated the original *Egeria densa* Control Program in the Delta and its tributaries. With the addition of curlyleaf pondweed (*Potamogeton crispus* L.) in 2016, the program was renamed as the Submersed Aquatic Vegetation Control Program. The program includes treatment with herbicides and annual environmental monitoring, in pursuant to the Aquatic Invasive Plant Control Program biological opinions (BiOps)issued by USFWS and NMFSs and State Water Resources Control Board (State Water Board) Statewide General NPDES permit.	Yes	Yes	Yes	CSP Division of Boating and Waterways website. Submersed Aquatic Vegetation. Site accessed October 28, 2020. URL = https://dbw.parks.ca.gov/?page_id=28994.
Floating Aquatic Vegetation Control Program	California State Parks Division of Boating and Waterways	The Floating Aquatic Vegetation Control Program is part of the California State Parks Division of Boating and Waterways Aquatic Invasive Plant Control Program. It was created in 2015 when the division combined the Water Hyacinth (and Spongeplant) Control Program with the Water Primrose (*Ludwigia hexapetala*) Control Program. The program includes treatment with herbicides, mechanical harvesting, biological control (in partnership with U.S. Department of Agriculture), hand picking, and annual environmental monitoring, in pursuant to the Aquatic Invasive Plant Control Program BiOps issued by USFWS and NMFSs and the State Water Resources Control Board Statewide General NPDES permit.	Yes	Yes	Yes	CSP Division of Boating and Waterways website. Floating Aquatic Vegetation. Site accessed October 28, 2020. URL = https://dbw.parks.ca.gov/?page_id=28995.
Private Lands Incentive Programs	CDFW	CDFW manages the California Waterfowl Habitat Program (Presley Program), a multi-faceted wetland incentive program designed to improve habitat for waterfowl on private lands. Consistent with its primary waterfowl habitat objectives, the program also endeavors to enhance	Yes	Yes	Yes	CDFW website. Site accessed October 29, 2020. URL= https://wildlife.ca.gov/Lands

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		habitat for shorebirds, wading birds, and other wetland- dependent species. The program pays private landowners $30/acre ($60/acre in the Tulare Basin) annually for a 10-year duration to implement habitat practices in accordance with a detailed management plan. In cooperation with Wildlife Conservation Board's Inland Wetland Conservation Program, CDFW also administers the Permanent Wetland Easement Program that pays willing landowners approximately 50-70% of their property's fair market value to purchase the farming and development rights in perpetuity. Landowner retains many rights including: trespass rights, the right to hunt and/or operate a hunting club, and the ability to pursue other types of undeveloped recreation (fishing, hiking, etc.). Easement landowners are required to follow a cooperatively developed wetland management plan. CDFW also administers the California Winter Rice Habitat Incentive Program to annual incentive payments of $15/acre to landowners for winter-flooding of harvested rice fields for a minimum of 70 continuous days.				/CWHP/Private-Lands-Programs.
Invasive Species Program	CDFW	The Invasive Species Program participates on efforts to reduce the effects of non-native invasive species in California, detect and respond to introductions when they occur, and prevent the spread of non-native invasive species that have become established. Program activities include implementation of the proposed California Aquatic Invasive Species Management Plan (CAISMP), the Marine Invasive Species Monitoring Program, and informational and education activities for quagga/zebra mussels, New Zealand mudsnails, mute swans, and nutria.	Yes	Yes	Yes	CDFW website. Invasive Species Program. Site accessed October 29, 2020. Invasive Species Program, homepage: URL = https://wildlife.ca.gov/Conservation/Invasives.
California Aquatic Invasive Species Management Plan	CDFW	The CAISMP was released in January 2008. The plan's overall goal is to identify the steps that need to be taken to minimize the harmful ecological, economic, and human health impacts of aquatic invasive species in California. This plan provides the state's first comprehensive, coordinated effort to prevent new invasions, minimize impacts from established aquatic invasive species and establish priorities for action statewide. In addition, it proposes a process for annual plan evaluation and improvement so that aquatic invasive species can continue to be managed	Yes	Yes	Yes	CDFG. *California Aquatic Invasive Species Management Plan.* January 2008. Site accessed October 29, 2020. URL = https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=3868&inline=1.

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		in the most efficient manner in the future. Eight major objectives and 163 actions were identified in the CAISMP.				
Aquatic Invasive Species Draft California Rapid Response Plan	CDFW	The California Aquatic Invasive Species Management (described above) proposes an Aquatic Invasive Species Rapid Response Plan for the State of California. The Rapid Response Plan establishes a draft general procedure for rapid response following detection of new aquatic invasive species infestation. It provides a framework for developing and implementing a rapid response plan. It is preliminary in that it describes types of information, resources and decisions necessary to finalize the plan. In order to finalize, fund, and implement the draft Rapid Response Plan, CDFW expects that cooperating agencies will assign staff to participate. CDFW Invasive Species Program staff will provide coordination for the interagency activities called for in the agreement(s).	No	Yes	Yes	CDFG. 2007. *Draft Aquatic Invasive Species Rapid Response Plan*. CAISMP Appendix A. August.
Quagga and Zebra Mussel Management Program	CDFW	On February 10, 2016, the California Office of Administrative Law issued a Notice of Approval of Regulatory Action for CDFW's proposed dreissenid mussel regulations. These new regulations, Title 14, sections 672, 672.1, and 672.2, developed under the authority of Fish and Game Code sections 702, 2301, and 2302, became effective April 1, 2016. To facilitate compliance with the applicable laws and regulations, CDFW has developed guidance for the development and documentation of dreissenid mussel prevention programs, including suggestions for assessing reservoir vulnerability, conducting effective monitoring activities, and preparing the written program document and annual reports.	Yes	Yes	Yes	CDFW website. Invasive Species Program. Site accessed October 21, 2021. URL = https://wildlife.ca.gov/Conservation/Invasives CDFW website. Quagga and Zebra Mussel Management. Site accessed October 21, 2021. URL = https://wildlife.ca.gov/Conservation/Invasives/Quagga-Mussels
Bethany Dams Improvement Project	DWR	To ensure the long-term safety and operations of the State Water Project (SWP), DWR is conducting additional vegetation removal in the drainage ditches at Dams 1 and 2, removing accumulated sediment blocking the culvert in the drainage ditch at Dam 3, repairing existing rodent burrow damage on the dam faces, establishing a long-term, sustainable program of effective rodent control to reduce or eliminate further burrowing within	No	Yes	Yes	DWR website. Bethany Dams Improvement Project. Site accessed October 20, 2021. URL = https://water.ca.gov/About/

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		the dam embankments, and performing annual maintenance to repair new rodent burrow damage at the four Bethany Reservoir Dams. Work for this project began in April of 2021 and is expected to be complete in summer 2022.				Facilities/Bethany-Dams-Improvement-Project CEQAnet website. Site accessed October 20, 2021. URL = https://ceqanet.opr.ca.gov/2014042030/4 CEQAnet website. Site accessed October 20, 2021. URL = https://ceqanet.opr.ca.gov/2014042030/9
Fremont Landing Conservation Bank	CDFW	Approved in October 2006 by NMFS for the restoration, enhancement, and preservation of 100 acres of habitat for the federally and state listed Chinook salmon and Central Valley steelhead. Sponsored by Wildlands Inc. to preserve and enhance 40 acres of existing riparian and wetland habitat and restore/create 60 acres of riparian woodland and wetland sloughs within the floodplain of the Sacramento River, near its confluence with the Feather River. Three borrow pits connected to the Sacramento River reduce or eliminate fish stranding. The project also includes preservation and restoration of shaded riverine aquatic habitat and placement of large woody debris along the Sacramento River.	Yes	Yes	Yes	Wildlands Inc. website. Site accessed October 31, 2020. URL = https://www.wildlandsinc.com/banks/fremont-landing-conservation-bank-salm/.
Fish Screen Project at Sherman and Twitchell Islands	DWR	This project installed four fish screens on currently unscreened agricultural intakes used to irrigate state-owned lands on Sherman and Twitchell Islands in the Delta. These screens are in addition to more than 10 other self-cleaning screened intakes on Sherman and Twitchell Islands. The screens contribute to the protection of delta smelt and other sensitive aquatic species and the restoration of habitat in the Delta.	Yes	Yes	Yes	CEQAnet website. Site accessed October 25, 2021. URL = https://ceqanet.opr.ca.gov/Project/2016032007http://www.water.ca.gov/deltainit/action.cfm.
Lower Sherman Island Wildlife Area	CDFW	The Lower Sherman Island Wildlife Area occupies roughly 3,900 acres, primarily marsh and open water, at the confluence of the Sacramento and San Joaquin Rivers in the western Sacramento–San Joaquin River Delta	Yes	Yes	Yes	CDFG. 2007. *Lower Sherman Island Wildlife Area Land Management Plan.* California

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Land Management Plan		(Delta). This extensive tract of natural vegetation and Delta waters provides diverse and valuable wildlife habitats and related recreational opportunities and is integral to the functioning and human use of the Delta. The mission of the CDFW is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. The land management plan (LMP) is consistent with that mission. The purpose of the LMP is to: (1) guide management of habitats, species, and programs described in the LMP to achieve the CDFW's mission to protect and enhance wildlife values; (2) serve as a guide for appropriate public uses of the Lower Sherman Island Wildlife Area; (3) serve as descriptive inventory of fish, wildlife, and native plant habitats that occur on or use the Lower Sherman Island Wildlife Area; (4) provide an overview of the property's operation and maintenance and of the personnel requirements associated with implementing management goals (this LMP also serves as a budget planning aid for annual regional budget preparation); and (5) present the environmental documentation necessary for compliance with state and federal statutes and regulations, provide a description of potential and actual environmental impacts that may occur during plan management, and identify mitigation measures to avoid or lessen these impacts.				Department of Fish and Game, Rancho Cordova, CA.
Yolo Bypass Wildlife Area Land Management Plan	CDFW	The Yolo Bypass Wildlife Area comprises approximately 16,770 acres of managed wildlife habitat and agricultural land within the Yolo Bypass. The bypass conveys seasonal high flows from the Sacramento River to help control river stage and protect the cities of Sacramento, West Sacramento, and Davis and other local communities, farms, and lands from flooding. Substantial environmental, social, and economic benefits are provided by the Yolo Bypass, benefiting the people of the State of California. The stated purposes of the Yolo Bypass Wildlife Area Land Management Plan are to: (1) guide the management of habitats, species, appropriate public use, and programs to achieve CDFW's mission; (2) direct an ecosystem approach to managing the Yolo Bypass Wildlife Area in	Yes	Yes	Yes	CDFG. 2008. *Yolo Bypass Wildlife Area Land Management Plan.* California Department of Fish and Game, Rancho Cordova, CA.

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		coordination with the objectives of the CALFED Ecosystem Restoration Program; (3) identify and guide appropriate, compatible public-use opportunities within the Yolo Bypass Wildlife Area; (4) direct the management of the Yolo Bypass Wildlife Area in a manner that promotes cooperative relationships with adjoining private-property owners; (5) establish a descriptive inventory of the sites and the wildlife and plant resources that occur in the Yolo Bypass Wildlife Area; (6) provide an overview of the Yolo Bypass Wildlife Area's operation, maintenance, and personnel requirements to implement management goals, and serve as a planning aid for preparation of the annual budget for the Bay-Delta Region (Region 3); and (7) present the environmental documentation necessary for compliance with state and federal statutes and regulations, provide a description of potential and actual environmental impacts that may occur during plan management, and identify mitigation measures to avoid or lessen these impacts.				
Staten Island Wildlife-Friendly Farming Demonstration	CDFW	Acquisition and restoration of Staten Island (9,269 acres) by The Nature Conservancy to protect critical agricultural wetlands used by waterfowl and Sandhill cranes. Phase II of this project improved wildlife-friendly agriculture to foster recovery of at-risk species and to investigate effects of agriculture on water quality. This demonstration project for wildlife friendly agriculture practices increased habitat availability by flooding 2,500-5,000 acres of corn for a longer duration than previously possible. The demonstration project also determined the effect of winter flooding strategies on target bird species, namely greater sandhill crane and northern pintail in the Delta Ecological Management Zone.	Yes	Yes	Yes	Staten Island Wildlife-Friendly Farming Demonstration www.nrm.dfg.ca.gov/FileHandler.ashx?DocumentVersionID=10220 The Nature Conservancy website. Staten Island. Site accessed: October 31, 2020. URL= https://www.nature.org/en-us/get-involved/how-to-help/places-we-protect/staten-island/.
Restoring Ecosystem Integrity in the Northwest Delta	CDFW	Completed in 2015, this project acquired conservation easements within the Cache Slough complex, along the Barker, Lindsey and Calhoun Sloughs, north Delta tidal channels located west of the Yolo Bypass. Acquisition of	Yes	Yes	Yes	Restoring Ecosystem Integrity in the Northwest Delta www.nrm.dfg.ca.gov/FileHan

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		conservation easements are on 978 acres of existing riparian, wetland and/or agricultural lands.				dler.ashx?DocumentVersionID=10429. EcoAtlas website. Site accessed November 16, 2021. URL = https://www.ecoatlas.org/regions/adminregion/delta/projects/5876
Incidental Take Permit for Long-Term Operation of the State Water Project in the Sacramento-San Joaquin Delta 2020	CDFW	The CDFW issued an Incidental Take Permit (ITP) in 2020 to DWR for long-term operations of the SWP. The permit covers four species protected under the California Endangered Species Act: Delta smelt, longfin smelt, winter-run Chinook salmon and spring-run Chinook salmon.	Yes	Yes	Yes	CDFW website. Site accessed January 7, 2021. URL = https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Files/ITP-for-Long-Term-SWP-Operations.pdf?la=en&hash=AE5FF28E0CB9FA5DC67EF1D6367C66C5FF1B8B55.
Fish Production and Aquatic Pathology	CDFW	CDFW operates a statewide system of fish hatchery facilities that rear and subsequently release millions of trout, salmon, and steelhead of various age and size classes into state waters. These fish are reared and released for recreational and commercial fishing, for conservation and restoration of fish species that are native to California waters, for mitigation of habitat losses caused by construction of dams on the state's major rivers, and for mitigation of fish lost at state-operated pumping facilities in the Delta. CDFW's Hatchery Program includes: • Operation of 14 trout hatchery facilities owned by CDFW and the related stocking of fish, • Operation of eight salmon and steelhead hatchery facilities owned by others and the related stocking of fish, • Operation of two salmon and steelhead hatchery facilities owned by CDFW and the related stocking of fish,	Yes	Yes	Yes	CDFW website. Site accessed November 4, 2020. URL = https://nrm.dfg.ca.gov/FishPlants/.

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		• Providing education staff and fish for stocking under the Fishing in the City program, • Issuing authorizations and providing fish eggs for the Classroom Aquarium Education Project • Issuing permits for stocking public and private waters with fish reared at private aquaculture facilities • Implementing the fish production and native trout conservation requirements contained in California Fish and Game Code Section 13007 The fundamental objectives of CDFW's Hatchery Program are to continue the rearing and stocking of fish from its existing hatchery facilities for the recreational use of anglers, for mitigation of habitat loss due to dam construction and blocked access to upstream spawning areas, for mitigation of fish losses caused by operation of the state-operated Sacramento-San Joaquin Delta pumps, and for conservation and species restoration.				
Hatchery and Stocking Program Proposed Changes	CDFW (previously CDFG) and USFWS	The CDFW has been rearing and stocking fish in the inland waters of California since the late 1800s. CDFW currently stocks trout in high mountain lakes, low elevation reservoirs, and various streams and creeks throughout California. Salmon have been planted mostly in rivers and direct tributaries to the Pacific Ocean, except for inland kokanee, Coho, and Chinook salmon populations that have been planted in reservoirs for recreational fishing. In 2006, a lawsuit was filed against CDFG claiming that CDFG's fish stocking operation did not comply with the California Environmental Quality Act (CEQA). In July 2007, CDFG was ordered by the Sacramento Superior Court to comply with CEQA regarding its fish stocking operations. In 2010, CDFG and USFWS released the final joint EIR/EIS to comply with the court order.	Yes	Yes	Yes	CDFG and USFWS. September 2010. *Final Hatchery and Stocking Program Environmental Impact Report/Environmental Impact Statement.*
Watercraft Inspection Programs	CDFW, California Department of Food and Agriculture,	Several local boat and watercraft inspection programs have been initiated to prevent the spread of invasive species such as quagga mussels. Since early 2007, watercrafts have been inspected at the California Department of Food and Agriculture (CDFA) Border Protection Stations for pests. After	Yes	Yes	Yes	California Department of Food and Agriculture. California Border Protection Stations website. Site

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	California State Parks	quagga mussels were detected in 2007 in the Colorado River, funding was granted to enable CDFA to inspect watercraft at six border stations along the Nevada and Arizona borders: Truckee, Needles, Winterhaven, Blythe, Yermo and Vidal. When exotic mussels are detected by CDFA inspectors, the watercraft are cleaned and the owners issued a quarantine notice prohibiting the craft from entering California waters until a final inspection is conducted by CDFW. CDFW conducts boat inspection training and activities around the state and has initiated inspections at several water bodies.				accessed November 4, 2020. URL = https://www.cdfa.ca.gov/plant/pe/ExteriorExclusion/borders.html. California Department of Food and Agriculture. Public Affairs. *News Release #08-055. "CDFA Border Protection Stations to Continue Fight Against."* August 26, 2008. Site accessed November 4, 2020. URL = http://www.cdfa.ca.gov/egov/Press_Releases/Press_Release.asp?PRnum=08-055.
Suisun Marsh Habitat Management, Preservation, and Restoration Plan	CDFW, USFWS, U.S. Bureau of Reclamation (Reclamation), and Suisun Marsh Charter Group	The Suisun Marsh Charter Group, a collaboration of federal, state, and local agencies with primary responsibility in Suisun Marsh, prepared the Suisun Marsh Habitat Management, Preservation, and Restoration Plan. The plan balances implementation of the CALFED Program, the Suisun Marsh Preservation Agreement, and other management and restoration programs within the Suisun Marsh in a manner that is based upon voluntary participation by private landowners and that responds to the concerns of interested parties. Charter agencies include Reclamation, DWR, USFWS, Delta Stewardship Council (DSC), Suisun Resource Conservation District, and NMFS. The Charter Group is charged with developing a regional plan that would outline the actions needed in Suisun Marsh to preserve and enhance managed seasonal wetlands, restore tidal marsh habitat, implement a comprehensive levee protection/improvement program, and protect ecosystem and drinking water quality. The plan would be consistent with the goals and objectives of the Bay-Delta Program and would balance those goals and objectives with the Suisun Marsh Preservation Agreement	Yes	Yes	Yes	Suisun Marsh Charter Group Principal Agencies. 2004. *Scoping Report for the Management, Preservation, and Restoration Plan for the Suisun Marsh Programmatic EIS/EIR*. May. U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, and California Department of Fish and Game. 2011. *Suisun Marsh Habitat Management, Preservation, and Restoration Plan. Final EIR/EIS.* November. U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service,

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		and federal and state endangered species programs within the Suisun Marsh. The Suisun Marsh Habitat Management, Preservation, and Restoration Plan also provides for simultaneous protections and enhancement of: (1) existing wildlife values in managed wetlands, (2) endangered species, (3) tidal marshes and other ecosystems, and (4) water quality, including, but not limited to, the maintenance and improvement of levees. Restoration projects that are expected to partially fulfill requirements of the Suisun Marsh Habitat Management, Preservation, and Restoration Plan include the Chipps Tidal Habitat Restoration Project, Arnold Slough Restoration Project, Bradmoor Island Restoration Project, Tule Red Tidal Restoration Project, and Wings Landing Tidal Habitat Restoration Project.				and California Department of Fish and Game. 2013. *Suisun Marsh Habitat Management, Preservation, and Restoration Plan.* May.
Central Valley Vision	California State Parks	In 2003, California State Parks began work on a long-term Central Valley Vision to develop a strategic plan for State Parks expansion in the Central Valley. The plan will provide a 20-year road map for State Park actions to focus on increasing service to Valley residents and visitors. Within the Great Central Valley (San Joaquin Valley, Sacramento Valley, and the Delta region), California State Parks operates and maintains 32 state park units representing 7% of the total state park system acreage. Plans include Delta Meadows River Park, Brannan Island SRA, Franks Tract SRA, Locke Boarding House, and San Joaquin and Sacramento Rivers. In 2008, California State Parks published a Draft Central Valley Vision Implementation Plan that focuses on meeting the public's recreation needs in the Central Valley 20 years into the future. It outlines planning options to develop new and improved recreation opportunities, acquire new park lands, and build economic and volunteer partnerships.	Yes	Yes	Yes	California State Parks. 2009. *Central Valley Vision Implementation Plan.* California State Parks. 2007. *Central Valley Vision Summary Report, Findings and Recommendations.* January 1.
California Water Plan Update 2018	DWR	The California Water Plan is the state's strategic plan for sustainable management of water resources in the present and for future generations. It provides a framework for water managers, legislators, and the public to consider options and make decisions regarding California's water future. The California Water Plan, which is updated every five years, presents basic data and information on California's water resources (including water supply evaluations and assessments of agricultural, urban, and	Yes	Yes	Yes	DWR. *California Water Plan Update 2018: Managing Water Resources for Sustainability.* July 2019. Site accessed November 4, 2020. URL= https://water.ca.gov/Progra

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		environmental water uses) to quantify the gap between water supplies and uses. The California Water Plan also identifies and evaluates existing and proposed statewide demand management and water supply augmentation programs and projects to address the state's water needs.				ms/California-Water-Plan/Update-2018.
Central Valley Flood Protection Plan	DWR	Central Valley Flood Protection Plan is a sustainable, integrated flood management plan that reflects a system-wide approach for protecting areas of the Central Valley currently receiving protection from flooding by existing facilities of the State Plan of Flood Control. The plan incorporates the State Plan of Flood Control and Flood Control System Status Update. The first plan was adopted in 2012 and is updated every 5 years. The CVFPP recommends actions to reduce the probability and consequences of flooding. Produced in partnership with federal, Tribal, local, and regional partners and other interested parties, the CVFPP also identifies the mutual goals, objectives, and constraints important in the planning process; distinguish plan elements that address mutual flood risks; and, finally, recommend improvements to the state-federal flood protection system.	Yes	Yes	Yes	DWR website. *Central Valley Flood Protection Plan*. Site accessed November 4, 2020. URL = https://water.ca.gov/Programs/Flood-Management/Flood-Planning-and-Studies/Central-Valley-Flood-Protection-Plan.
Delta Flood Protection Fund	DWR	DWR administers the Delta Flood Protection Fund as authorized by the California Water Code, Sections 12300 through 12307, 12310 through 12318, and 12980 through 12995. This is a grants program that works to maintain and improve the flood control system and provide protection to public and private investments in the Delta including water supply, habitat, and wildlife. The program funds two major programs: the Delta Levees Maintenance Subventions Program and Delta Levees Special Flood Control Projects. The Delta Levees Maintenance Subventions Program provides financial assistance to local levee maintaining agencies for the maintenance and rehabilitation of non-project levees in the Delta. It has been in effect since passage of the Way Bill in 1973, which has been modified periodically by legislation. The program is under the authority of CVFPB and is managed by DWR. Water Code Section 12987 calls on DWR to prioritize the islands for receipt of grant funds through the program and recommend the prioritization to the CVPFB. The CVPFB reviews and approves the	Yes	Yes	Yes	DWR website. *Delta Levees Maintenance Subventions*. Site accessed November 4, 2020. URL = https://water.ca.gov/Work-With-Us/Grants-And-Loans/Delta-Levees-Maintenance-Subventions. DWR website. *Special Flood Control Projects*. Site accessed July 27, 2021. URL = https://water.ca.gov/Work-With-Us/Grants-And-Loans/Delta-Levees-Special-Flood-Control-Projects.

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		Department's recommendation and enters into an agreement with reclamation districts to reimburse eligible costs. Since the passage of Propositions 1E and 84, the state has funded roughly $200 million for flood control and habitat projects as administered by local agencies. The Delta Levees Special Flood Control Projects provides financial assistance to local levee maintaining agencies for rehabilitation of levees in the Delta. The program was established by the California Legislature under SB 34 (1998), SB 1065 (1991), and AB 360 (1996). Since the inception of the program, more than $300 million have been provided to local agencies in the Delta for flood control and related habitat projects. The program originally focused on flood control projects and related habitat projects for eight western Delta Islands (Bethel, Bradford, Holland, Hotchkiss, Jersey, Sherman, Twitchell and Webb Islands) and for the towns of Thornton, New Hope, and Walnut Grove. It has since expanded to include the entire Delta, as well as portions of Suisun Marsh as outlined in Section 12311 of Water Code.				
Delta Flood Emergency Preparedness, Response, and Recovery Program	DWR	Pursuant to the Disaster Preparedness and Flood Prevention Bond Act of 2006, DWR developed the Delta Flood Emergency Preparedness, Response, and Recovery Program to prepare for, respond to, and recover from large-scale catastrophic flooding emergencies in the Delta region. The objectives of this program include: (1) protect the lives, property, and infrastructure critical to the functioning of both the Delta and California; (2) protect water quality and restore water supply for both Delta and export water users; (3) reduce the recovery time of California's water supply to less than 6 months; and (4) minimize impacts on environmental resources. Under this program, DWR finalized the Delta Flood Emergency Management Plan in 2018 to help manage risk of levee failures in the Delta and guide DWR Delta flood emergency management.	Yes	Yes	Yes	California Natural Resources Agency website. Bond Accountability: Flood Emergency Response Program. Site accessed November 8, 2021. URL = http://bondaccountability.resources.ca.gov/Program.aspx?ProgramPK=100&Program=Flood%20Emergency%20Response%20Program&PropositionPK=5#:~:text=The%20Delta%20Flood%20Preparedness%2C%20Response%2C%20and%20Recovery%20project,Agency%2C%20and%20th

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
						e%20U.S.%20Army%20Corps%20of%20Engineers.
Levee Repairs Program	DWR	On February 24, 2006, Governor Arnold Schwarzenegger declared a State of Emergency for California's levee system, commissioning up to $500 million of state funds to repair and evaluate state/federal project levees. Following the emergency declaration, the Governor directed DWR to secure the necessary means to fast-track repairs of critical erosion sites. Hundreds of levee sites were identified for immediate repair throughout the Central Valley. These repairs were necessary to maintain the functionality of flood control systems that have deteriorated over time and/or do not meet current design standards. While many of the most urgent repairs have been completed or are near completion, other sites of lower priority are still in progress, and still more are in the process of being identified, planned, and prioritized. In general, repairs to state/federal project levees are being conducted under three main programs: The Flood System Repair Project, the Sacramento River Bank Protection Project, and the Public Law 84-99 (PL84-99) Rehabilitation Program. DWR has completed geotechnical exploration, testing, and analysis of state and federal levees that protect several highly populated urban areas of greater Sacramento, Stockton/Lathrop, and Marysville/Yuba City. This program is being implemented simultaneously with the various urgent levee repairs.	Yes	Yes	Yes	DWR website. *Levee Repairs.* Site accessed November 4, 2020. URL = https://water.ca.gov/Programs/Flood-Management/Maintenance/Levee-Repairs DWR website. *Levee Evaluation Program.* Site accessed July 27, 2021. URL = http://bondaccountability.resources.ca.gov/Program.aspx?ProgramPK=86&Program=Levee%20Evaluations%20Program&PropositionPK=5. DWR website. *Proposition 1E fact sheet.* Site accessed November 23, 2021. URL = http://bondaccountability.resources.ca.gov/PDF/Prop1E/PROPOSITION_1E_fact.pdf.
Old Banks Landfill Cap Project	DWR	DWR constructed the Old Banks Landfill Cap Project to cap the Old Banks Landfill (also known as the Harvey O. Banks Pumping Plant Landfill) to address concerns related to landfill debris exposure raised by the Contra Costa County Health Department. This project is located approximately 9 miles northwest of the city of Tracy and 12 miles northeast of the city of Livermore in Contra Costa County. Landfill debris concerns were addressed by DWR by confining the landfill materials and preventing the landfill contents from being exposed by rodent activities, as well as improving surface drainage and minimizing	No	Yes	Yes	Department of Water Resources Addendum to the IS/MND for Soil Investigations for Data Collection in the Delta Site accessed October 21, 2021. URL = https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Delta-

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		future maintenance. Project activities included clearing existing vegetation, removing the upper 2 to 4 inches of topsoil of the landfill crown, grading the existing landfill crown by adding fill soil materials in localized areas to bring the site to grade, placing a commercially available rodent control barrier material, placing a 1-foot thick surface layer on top of the rodent control fill fabric to protect it, and returning the project site to near pre-project conditions by hydroseeding. A Notice of Completion for an Initial Study/Mitigated Negative Declaration was filed on October 25, 2019. This project was completed December 10, 2021.				Conveyance/Environmental-Planning/Soil_ISMND_Addendum_FINAL_with_Attachments_signed_508.pdf CEQAnet website. Site accessed on October 21, 2021. URL = https://files.ceqanet.opr.ca.gov/256628-2/attachment/Qp9goXmM18AjfbMJON5KlFTq1xLX-r72fEtce62lmLsNFkefIK-pcJXk57k-Wkld05yMF46t2EfgaSQu0
Lower Yolo Ranch Restoration Project	State and Federal Contractors Water Agency, DWR and MOA Partners	The project is located in the lower Yolo Bypass and is a tidal and seasonal salmon habitat project restoring tidal flux to about 1,670 acres of existing pastureland. The project site includes the Yolo Ranch, also known as McCormack Ranch, which was purchased in 2007 by the Westlands Water District. The goal of this project is to provide important new sources of food and shelter for a variety of native fish species at the appropriate scale in strategic locations in addition to ensuring continued or enhanced flood protection. The Lower Yolo wetlands restoration project is part of an adaptive management approach in the Delta to learn the relative benefits of different fish habitats, quantify the production and transport of food and understand how fish species take advantage of new habitat.	Yes	Yes	Yes	California EcoRestore website. Site accessed November 4, 2020. URL = https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Lower_Yolo_Restoration.pdf.
Meins Landing Restoration	DWR, Suisun Marsh Preservation Agreement agencies, and State Coastal Conservancy	Meins Landing is a 668-acre property in the eastern Suisun Marsh along Montezuma Slough that was purchased in 2005 as part of a multi-agency tidal restoration project. Previously a duck club, the property was purchased to restore it to tidal influence by breaching the levee. Due to the presence of three underground gas and oil pipelines with restrictive easements, the original restoration concept for the site was not able to be implemented. While DWR explored other restoration options, the property	Yes	Yes	Yes	California State Coastal Conservancy website. 2004. Site accessed November 4, 2020. URL = https://www.scc.ca.gov/webmaster/ftp/pdf/sccbb/2004/0405/0405Board15_Meins_Landing_Acq.pdf.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		was leased to the previous owners for 10 years and was operated as a duck club until the lease ended in 2016. The property is currently being operated as a managed marsh and maintained by DWR and Suisun Resource Conservation District, with no hunting leases on the property and restricted public access. As a managed marsh, the current operation goals are: (1) Operate Meins as a managed marsh to provide productive habitat for a diverse population of waterfowl, salt marsh harvest mouse, and other wildlife. (2) Formulate and test management practices to maximize nutrient production and export into adjacent sloughs to meet objectives of the Delta Smelt Resiliency Strategy. (3) Provide research opportunities for study of primary and secondary production, waterfowl feed utilization, nutrient export, and other topics to meet objectives of the Delta Smelt Recovery Plan. (4) Explore providing public access and hunting opportunities to meet demands by the SF Bay Conservation and Development Commission (BCDC) for habitat restoration projects in Suisun Marsh to include public access. Managed wetlands, like Meins Landing, are potentially more effective (and cheaper) at augmenting local food production than creating intertidal wetlands while providing more diverse habitats for multiple species. Research on managed wetlands is critical to understand the management techniques best suited to boost food/nutrient production while minimizing impacts to other species (e.g., waterfowl, western pond turtle, salt marsh harvest mouse). Once best management practices are identified, they could be evaluated on other sites throughout Suisun Marsh with cooperating landowners. Research by UC Davis and California Trout is currently underway on Meins Landing to evaluate primary and secondary production and determine optimal conditions to increase the production.				

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
Interagency Ecological Program	DWR, CDFW, State Water Board, USFWS, Reclamation, Geological Survey, USACE, NMFS, and Environmental Protection Agency	Since the 1970s the Interagency Ecological Program (IEP) mission has been to support management of the Bay-Delta ecosystem by integrating relevant ecological data in a timely manner. The mission of the Interagency Ecological Program is to provide information on the factors that affect ecological resources in the Sacramento–San Joaquin Estuary to support more efficient management of the estuary. The program consists of 10 member agencies, three state (DWR, CDFW, and State Water Board), six federal (USFWS, Reclamation, Geological Survey, USACE, NMFS, and Environmental Protection Agency), and one nongovernment organization (the San Francisco Estuarine Institute). Program partners work together to develop a better understanding of the estuary's ecology and the effects of the SWP and federal Central Valley Project (CVP) operations on the physical, chemical, and biological conditions of the San Francisco Bay-Delta estuary. The IEP relies on a wide range multidisciplinary teams to address high priority management and policy needs and responsibilities as directed under federal, state, and local regulatory requirements. The 2022 Annual Work Plan includes annually planned work—such as compliance monitoring, baseline status and trends, modeling, directed studies, workshops, and project management—by IEP agencies to be conducted as part of the consortium within the Bay-Delta ecosystem during the calendar year. Activities include data collection and analysis, evaluation of the impacts of human activities on fish and wildlife, interpretation of information and development of measures to avoid or offset impacts of water project operation and other human activities on the estuary, and assistance with planning, coordination and integration of estuarine studies by other agencies. The Interagency Ecological Program Science Advisory Group also conducts independent scientific reviews of modeling activities and study programs in the Delta when requested. Current efforts focus on evaluation of the decline of pelagic species in the upper San Francisco Estuary. These efforts emphasize modeling and integration of results, and respond to management interests by including temperature modeling, wastewater impacts, contaminants, salvage efficiency, 3-dimensional particle tracking and individual based modeling for striped bass and longfin smelt. The ammonia work includes source,	Yes	Yes	Yes	Interagency Ecological Program. 2021. *2022 Annual Work Plan*. Site accessed April 5, 2022. URL = https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=196010&inline.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		fate, and transport modeling, field studies, and a review and syntheses of data and studies on the effects of ammonia on aquatic species. The temperature work is closely coordinated with the CALFED-funded Computational Assessments of Scenarios of Change for the Delta Ecosystem (CASCaDE) project and will analyze the trends of water temperature stress zones and refugia in the Delta. As part of the IEP monitoring program, two monitoring stations on 18-inch diameter pipe pilings are expected to be installed in the Sacramento River near the proposed intakes.				
Mayberry Farms Subsidence Reversal and Carbon Sequestration Project	DWR	The Mayberry Farms Subsidence Reversal and Carbon Sequestration Project created permanently flooded wetlands on a 307-acre parcel on Sherman Island that is owned by DWR. The project has restored approximately 192 acres of emergent wetlands and enhanced approximately 115 acres of seasonally flooded wetlands. Construction occurred in summer 2010. Ongoing operations and maintenance is routinely performed by DWR. The Mayberry Farms project was conceived as a demonstration project that would provide subsidence reversal benefits and develop knowledge that could be used by operators of private wetlands (including duck clubs) that manage lands for waterfowl-based recreation. By maintaining permanent water, the growth and subsequent decomposition of emergent vegetation is expected to control and reverse subsidence. The project is also anticipated to provide climate benefits by sequestering atmospheric carbon dioxide. The project is expected to provide year-round wetland habitat for waterfowl and other wildlife.	Yes	Yes	Yes	California EcoRestore website. Site accessed November 5, 2020. URL= https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Sherman_Island_-_Mayberry_Farms_Wetlands.pdf. DWR website. *State of California Interim Delta Actions*. 2014. Site accessed November 5, 2020. URL= https://www.watereducation.org/sites/main/files/file-attachments/brock--combined_4-30-14.pdf.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
Sherman Island Setback Levee-Mayberry Slough	DWR	Reclamation District 341, with funding from DWR, constructed four sections of setback levee to increase levee stability along Mayberry Slough on Sherman Island in 2004 and 2005. The Sherman Island setback levee represents an opportunity to reverse some of the ecological damage resulting from levee construction and maintenance by implementing a habitat development project that will augment the existing riparian vegetation and provide habitat for native species. Project implementation restored tidal wetland and riparian habitat. Construction of the waterside portion of the setback levee was divided into two phases (Phase IIA, Phase IIB) that were completed in fall 2008 and fall 2009, respectively. Vegetation monitoring and maintenance was conducted until 2013.	Yes	Yes	Yes	California EcoRestore fact sheet. Sherman Island Setback Levee – Mayberry Slough. Site accessed October 25, 2021. URL = https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Sherman_Island_Setback_Levee-Mayberry_Slough.pdf
Sherman Island Whale's Mouth Wetlands	DWR	The Sherman Island Whale's Mouth Wetland Restoration Project restored approximately 600 acres of palustrine emergent wetlands within an 877-acre project boundary on a nearly 975-acre parcel on Sherman Island that is owned by DWR. The property is currently managed for flood irrigated pasture land, which includes a regular and extensive disturbance regime associated with field prepping, disking, and grazing. The ultimate outcome of the restoration project was hundreds of additional acres of freshwater emergent wetlands. Other native plant restoration components included installation of native trees and shrubs compatible with their respective hydrologic regime as well as a substantial amount of upland transitional area, all of which provide a diversity of habitat structure and function. The project was completed in 2015.	Yes	Yes	Yes	California EcoRestore fact sheet. Sherman Island Whale's Mouth Habitat Restoration Project. Site accessed October 25, 2021. URL = https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Sherman_Island-_Whale's_Mouth_Wetland.pdf
Sherman Island – Whale's Belly Wetlands	DWR	Whale's Belly is part of the California EcoRestore Initiative to restore and protect at least 30,000 acres of habitat across the S Delta. The project objectives are to reduce the effects of climate change and Delta subsidence, as well as improve habitat for millions of migrating birds along the Pacific Flyway that rely on the Delta as a crucial rest stop and safe haven. Whale's Belly is one of four projects on Sherman Island that creates managed wetlands, tidal wetlands, and setback levees to contribute toward EcoRestore's restoration targets.	No	Yes	Yes	DWR website. DWR Enters 'Whale's Belly' to Combat Climate Change, Protect Water Deliveries. Site accessed on October 25, 2021. URL = https://water.ca.gov/News/

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		The Whale's Belly Wetland Restoration Project includes adding soils and materials to support protective levees and riverbanks, enabling these structures to effectively hold back high floodwaters. Construction will also involve relocation of drainage ditches, pipelines, and water pumps. Upon completion of construction activities, the island will be inundated to an approximate depth of 1–3 feet, allowing marshland growth to eliminate subsidence on this southeast section of Sherman Island. The project began in May 2020 and is scheduled for completion by summer 2022.				Blog/2020/May/Whales-Belly
Twitchell Island - East End Wetland Restoration	DWR	The Twitchell Island East End Wetland Restoration Project restored approximately 740 acres of palustrine emergent wetlands and approximately 50 acres of upland and riparian forest habitat on Twitchell Island. This property is owned by the DWR and previously managed as flood irrigated corn and alfalfa. This project was completed in 2013.	Yes	Yes	Yes	California EcoRestore fact sheet. Twitchell Island – East End Wetland Restoration. Site accessed on October 25, 2021. URL = https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Twitchell_Island-_East_End_Wetland.pdf
Twitchell Island - San Joaquin River Setback Levee	DWR	This project will stabilize a threatened section of levee along the San Joaquin River and allow for several different types of waterside habitat features to be constructed. Expected habitat types include riparian shaded riverine aquatic, intertidal habitats, and upland vegetation created by waterside beaches, benches, and undulations. An original 2,200-foot section was completed in 2000, and is currently serving as a model for an approximately 23,000-foot setback spanning the entire San Joaquin River levee plus a proposed 80-acre tidal marsh restoration site on Chevron Point. There are eight reaches to the setback project. Reach #6, a 2,680-feet setback levee reach is the top priority. Funding has not yet been secured but all permits have been obtained. Reach #10 is the Chevron Point Dryland Levee that separates the 80-acre tidal marsh restoration site from the rest of the island.	No	Yes	Yes	California EcoRestore fact sheet. Twitchell Island – San Joaquin River Setback Levee. Site accessed on October 25, 2021. URL = https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Twitchell_Island-_SJ_River_Setback_Levee.pdf

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
North Delta Flood Control and Ecosystem Restoration Project	DWR	Consistent with objectives contained in the CALFED Record of Decision, the North Delta Flood Control and Ecosystem Restoration Project is intended to improve flood management and provide ecosystem benefits in the North Delta area through actions such as construction of setback levees and configuration of flood bypass areas to create quality habitat for species of concern. These actions are focused on McCormack-Williamson Tract and Staten Island. The purpose of the project is to implement flood control improvements in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes. Flood control improvements are needed to reduce damage to land uses, infrastructure, and the Bay-Delta ecosystem resulting from overflows caused by insufficient channel capacities and catastrophic levee failures near where the Mokelumne River, Cosumnes River, Dry Creek, and Morrison Creek converge.	No	Yes	Yes	DWR. November 2007. *North Delta Flood Control and Ecosystem Restoration Project Draft EIR.* DWR. October 2010. *North Delta Flood Control and Ecosystem Restoration Project Draft EIR.* DWR website. *North Delta Program*. Site accessed November 5, 2020. URL= https://water.ca.gov/Programs/Flood-Management/Delta-Conveyance-And-Flood-Protection/North-Delta-Program.
North Delta Flow Action	DWR	As part of the Delta Smelt Resilience Strategy, this study investigates the role of augmented summer and fall flows in the Yolo Bypass and North Delta areas on lower trophic food web dynamics, such as phytoplankton blooms, and the potential benefits to listed fish species, specifically delta smelt. Managed pulse flows were conducted in 2016, 2018, and 2019 and appeared to result in increases in zooplankton or phytoplankton downstream. The study is being conducted in partnership with Reclamation, CDFW, U.S. Geological Survey, San Francisco State University, and UC Davis.	Yes	Yes	Yes	*North Delta Flow Action, 2019 Food Web Study Fact Sheet.* Site accessed November 30, 2021. URL = https://www.baydeltalive.com/assets/5c92b61032e1bfd2c6a30d4ee74773aa/application/pdf/North_Delta_Food_Web_Study_Fact_Sheet_06272019.pdf *Interagency Ecological Program 2020 Work Plan Element: North Delta Flow Action: Role of improved Yolo*

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
						Bypass Flows on Delta Food Web Dynamics. Site accessed November 30, 2021. URL = file:///C:/Users/53124/Downloads/2020_281_Factsheet_NDeltaFlowAction_DWR_remediated_12212020.pdf
South Delta Temporary Barriers Project	DWR	The 2017–2022 South Delta Temporary Barriers Project, consists of annual construction, operation, and removal of the Middle River, Old River near Tracy, Grant Line Canal, and Heald of Old River (HOR) spring and fall rock barriers. The project reduces adverse water level impacts (i.e., minimum tide elevations) caused by the SWP and CVP export pumping on local agricultural diverters within the South Delta Water Agency. The South Delta Temporary Barriers Project consists of four rock barriers across South Delta channels. The objectives of the project are to increase water levels, improve water circulation patterns and water quality in the southern Delta for local agricultural diversions, and improve operational flexibility of the SWP to help reduce fishery impacts and improve fishery conditions. Of the four rock barriers, the barrier at the head of Old River serves as a fish barrier (intended to primarily benefit migrating San Joaquin River Chinook salmon) and is installed and operated in April-May and again in September-November. The remaining three barriers (Old River at Tracy, Grant Line Canal, Middle River) serve as agricultural barriers (intended to primarily benefit agricultural water users in the south Delta) and are installed and operated between April 15 and November 30 of each season.	Yes	Yes	Yes	DWR website. *South Delta Temporary Barriers Project.* Site accessed November 5, 2020. URL = https://water.ca.gov/Programs/Bay-Delta/Water-Quality-And-Supply/South-Delta-Temporary-Barriers-Project. DWR. 2019. *Comprehensive Operations Plan and Monitoring Special Study.* Site accessed November 5, 2020. URL= https://mavensnotebook.com/wp-content/uploads/2020/04/draft-Comprehensive-Operations-Plan.pdf.
Water Supply Contract Extension Program	DWR	The State of California entered into long-term water supply contracts with water agencies in the 1960s. Under terms of the contracts, the DWR provides a water service to these agencies, known as SWP Contractors, from the SWP in exchange for payments that will recoup all costs associated with providing this water service over the life of the SWP. Many of the capital costs associated with the development and maintenance of the SWP is financed using revenue bonds. These bonds have historically	Yes	Yes	Yes	California Department of Water Resources website. Site accessed November 5, 2020. URL = https://water.ca.gov/Programs/State-Water-

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		been sold with 30-year terms that extend to the year 2035, the year in which most of the contracts expire. The program mission is to extend the term and amend the SWP contracts by conducting negotiations between DWR and the SWP Contractors which will occur in a public forum to ensure continued water supply affordability while complying with obligations under CEQA, and the Monterey Settlement Agreement.				Project/Management/Water-Supply-Contract-Extension.
Port of Stockton Dock 13 and 20 Aeration Facility	DWR	The Port of Stockton Dock 20 Aeration Facility was constructed in 2007 after the DWR Stockton Deep Water Ship Channel Demonstration Dissolved Oxygen Project showed the effectiveness of elevating dissolved oxygen concentrations in the channel through use of an in-channel aerator in order to mitigate adverse effects on aquatic life from oxygen depletion (including the health and migration behavior of anadromous fish such as salmon). The Aeration Facility, per the 2017 amended agreement for funding and operation, is financed voluntarily among participating San Joaquin River Dissolved Oxygen total maximum daily load (TMDL) interested parties. The facility is designed to inject dissolved oxygen into the San Joaquin River when dissolved oxygen concentrations are below the Central Valley Water Board's Basin Plan quality objectives. Dock 13 is located at the of the Deep Water Ship Channel and the San Joaquin River. Dock 13 consists of two jet aerators which run throughout the year to maintain dissolved oxygen levels above specific concentrations. From August to November this threshold is raised to benefit winter-run Chinook. DO levels are collected every 15 minutes with monitoring updates posted ever hour.	Yes	Yes	Yes	Port of Stockton website. *Aeration Facilities.* Site accessed November 23, 2021. URL = https://www.portofstockton.com/aeration-facility/. DWR website. *Port of Stockton Dock 20 Aeration Facility*. Site accessed November 23, 2021. URL = https://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/san_joaquin_oxygen/implementation_activities/ San Joaquin River Dissolved Oxygen TMDL Technical Working Group website. Site accessed November 5, 2020. URL = http://www.sjrdotmdl.org/.
Little Egbert Tract	Westervelt Ecological Services	Restoration plans for 180 acres of habitat restoration at the terminus of the Yolo Bypass which will include the construction of habitat berms, subtidal flats, swales, and vegetated shoals. This restored aquatic land will provide habitat to a multitude of species including Swainson's hawk, giant	No	No	Yes	Westervelt Ecological Services website. *Little Egbert Tract.* Site accessed June 21, 2021. URL =

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		garter snake, green sturgeon, longfin smelt, Chinook salmon, and California black rail.				https://wesmitigation.com/egbert/.
Delta Fish Agreement (Four Pumps Project)	DWR and CDFW	The 1986 Delta Pumping Plant Fish Protection Agreement between the DWR and the CDFW provides a mechanism for offsetting adverse fishery impacts caused by the diversion of water at the Harvey O. Banks Delta Pumping Plant, a part of the SWP located at the head of the California Aqueduct. Direct losses of Chinook salmon, steelhead, and striped bass are offset or mitigated through the funding and implementation of fish mitigation projects. DWR and CDFW work closely with the Fish Advisory Committee to implement the agreement and projects funded under the agreement. The Fish Advisory Committee is made up of representatives of the SWP Contractors, sport and commercial fishing groups, and environmental groups. The agreement was signed by the directors of DWR and CDFW on December 30, 1986 and has been amended twice since that time. The Delta Fish Agreement is also commonly known as the Four Pumps Agreement because it was subsequently identified as mitigation for the enlargement of the Banks Pumping Plant, including four additional pumps.	Yes	Yes	Yes	CDFW website. Delta Fish Agreement. Site accessed November 5, 2020. URL = https://wildlife.ca.gov/Conservation/Watersheds/1986-Delta-Fish-Agreement.
North Bay Aqueduct Alternative Intake Project	DWR and Solano County Water Agency	The California Department of Water Resources issued a Notice of Preparation (NOP) on December 2, 2009, to construct and operate an alternative intake on the Sacramento River, generally upstream of the Sacramento Regional Wastewater Treatment Plant, and connect it to the existing North Bay Aqueduct system by a new segment of pipe. The proposed alternative intake would be operated in conjunction with the existing North Bay Aqueduct intake at Barker Slough. The proposed project would be designed to improve water quality and to provide reliable deliveries of SWP supplies to its contractors, the Solano County Water Agency and the Napa County Flood Control and Water Conservation District. However, this project is currently on hold with no construction proceeding in the near term.	No	Yes	Yes	Solano County Water Agency website. Site accessed November 5, 2020. URL = http://www.scwa2.com/water-supply/north-bay-aqueduct. Delta Stewardship Council website. *North Bay Aqueduct*. Site accessed July 28, 2021. URL = https://viewperformance.deltacouncil.ca.gov/pm/north-bay-aqueduct

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Dutch Slough Tidal Marsh Restoration Project	DWR and California State Coastal Conservancy	The Dutch Slough Tidal Marsh Restoration Project, located near Oakley in Eastern Contra Costa County, would restore wetland and uplands, and provide public access to the 1,187-acre Dutch Slough property owned by DWR. The property is composed of three parcels separated by narrow engineered sloughs. The project would provide ecosystem benefits, including habitat for sensitive aquatic species. It also would be designed and implemented to maximize opportunities to assess the development of those habitats and measure ecosystem responses so that future Delta restoration projects will be more successful. Two neighboring projects proposed by other agencies that are related to the Dutch Slough Restoration Project collectively contribute to meeting project objectives. These include the City of Oakley's proposed Community Park and Public Access Conceptual Master Plan for 55 acres adjacent to the wetland restoration project and four miles of levee trails on the perimeter of the DWR lands. The City Community Park will provide parking and trailheads for the public access components of the Dutch Slough Restoration Project. Construction on two of the parcels, Emerson and Gilbert, started in May 2018 and site grading was completed in 2019, followed by revegetation planting. Breaching of these two parcels will be completed in 2021. Restoration planning of the third parcel, Burroughs, would begin in 2022.	No	Yes	Yes	DWR and CSCC. 2014. *Final Supplemental Environmental Impact Report Dutch Slough Tidal Marsh Restoration Project.* September. DWR and CSCC. 2010. *Dutch Slough Tidal Marsh Restoration Project Final Environmental Impact Report.* March. California EcoRestore website. *Dutch Slough Tidal Restoration Project.* Site accessed November 5, 2020. URL = https://water.ca.gov/Programs/Integrated-Regional-Water-Management/Delta-Ecosystem-Enhancement-Program/Dutch-Slough-Tidal-Restoration-Project.
Franks Tract Futures	CDFW, Department of Parks and Recreation, and DWR	Franks Tract Futures builds off the previous Franks Tract Feasibility Study, which was prepared by CDFW as an element of the Delta Smelt Resiliency Strategy. The restoration feasibility study was conducted in 2017-2018 to inform a feasible and locally accepted restoration design. are conducting studies to evaluate the feasibility of modifying the hydrodynamic conditions near Franks Tract to improve Delta water quality and enhance the aquatic ecosystem. The results of these studies have indicated that modifying the hydrodynamic conditions near Franks Tract may substantially reduce salinity in the Delta and protect fishery resources, including populations of delta smelt, a federally listed and state-listed species that is endemic to the Delta. Although the preliminary modeling indicated that the original plan met water quality and ecological	No	No	Yes	CDFW website. *Franks Tract Restoration ("Franks Tract Futures").* Site accessed November 6, 2020. URL = https://wildlife.ca.gov/Conservation/Watersheds/Franks-Tract. CDFW. 2020. *Franks Tract Futures. Final Report.* September. Site accessed November 6, 2020. URL=

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		objectives, it did not meet other objectives developed during the feasibility study, such as those for navigability, recreation and sustaining the local economy. The initial design concept will not be retained going forward in this next stage of planning and design. New alternatives are actively being developed that seek to address this broader range of interested party project objectives. Franks Tract Futures is consistent with ongoing planning efforts for the Delta to help balance competing uses and create a more sustainable system for the future.				https://franks-tract-futures-ucdavis.hub.arcgis.com/.
Fremont Weir Adult Fish Passage Modification Project	DWR and Reclamation	One of six separate projects identified and implemented to carry out the Reasonable and Prudent Alternative (RPA) Actions in the 2009 NMFS BiOp specific to the Yolo Bypass. DWR and Reclamation prepared the Initial Study/Environmental Assessment for the proposed Fremont Weir Adult Fish Passage Modification Project in 2017. Reclamation signed a Finding of No Significant Impact (FONSI) on July 14, 2017. The project was part of the original Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project and was identified to be included in California EcoRestore in 2015. In 2018, Reclamation and DWR began construction on the Fremont Weir Adult Fish Passage Modification Project to improve adult fish passage at the Fremont Weir and along the Tule Canal in the Yolo Bypass. The project constructed a new fish passage structure at Fremont Weir to widen and deepen the fish ladder and removed barriers in the Tule Canal. The maximum target flow through the fish passage structure would be limited to approximately 1,100 cubic feet per second (cfs).	Yes	Yes	Yes	Reclamation, Bay Delta Office website. 2020. *Fremont Weir Adult Fish Passage Modification Project.* Site accessed January 7, 2021. URL = https://www.usbr.gov/mp/bdo/fremont-weir.html.
Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project	DWR and Reclamation	One of six separate projects identified and implemented to carry out the RPA Actions in the 2009 NMFS BiOp specific to the Yolo Bypass. The project will construct a two-way fish passage gateway at the head of the Fremont Weir, a 1.8-mile concrete wall that provides flood protection to Sacramento and surrounding communities. The 100-foot-wide gateway, or “big notch,” will open each winter, allowing juvenile salmon to move from the Sacramento River onto the floodplain and then back into the Sacramento River at Cache Slough. Providing fish	Yes	No	Yes	DWR and Reclamation. May 2019. *Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project Final Environmental Impact Statement/Environmental Impact Report (EIS/EIR).*

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		access to the food-rich floodplain will expand survival rates for native fish on their migratory journey to the Pacific Ocean. The project will also allow adult salmon, steelhead, and sturgeon to more easily access the Sacramento River from the bypass.				
Lower Yuba River Accord	DWR and Yuba County Water Agency	The Lower Yuba River Accord is a collaborative effort among environmental interests, fisheries agencies, and water agencies intended to resolve instream flow issues associated with operation of the Yuba Project in a way that would protect and enhance lower Yuba River fisheries and local water supply reliability. It also provides revenues for local flood control and water supply projects, improves statewide water supply reliability, and provides water for protection and restoration purposes in the Delta. Local water supply reliability is achieved through implementation of a conjunctive use program. The Lower Yuba River Accord includes three separate, but interrelated, agreements intended to meet program objectives. The Fisheries Agreement modifies the instream flow requirements contained in the State Water Board Revised Decision 1644 to provide increased flows in most months of most water years. These changes would primarily serve to improve habitat conditions for salmonids by reducing water temperatures during sensitive life stage periods. Implementation of the Yuba Accord requires appropriate the State Water Board amendments of Yuba County Water Agency's (YCWA) water-right permits and RD-1644. To assure that local water supply reliability would not be reduced by the higher minimum instream flows, YCWA and its participating local water districts implemented agreements that would establish a comprehensive conjunctive use program that would integrate the surface water and groundwater supplies of the local irrigation districts and mutual water companies that YCWA serves in Yuba County. Integration of surface water and groundwater would allow YCWA to increase the efficiency of its water management. Under the Water Purchase Agreement, DWR entered into an agreement with YCWA to purchase water from YCWA for use in the Environmental Water Account Program or an equivalent program as long as operational	Yes	Yes	Yes	Reclamation and YCWA. October 2007. *Final Environmental Impact Report/ Environmental Impact Statement for the Proposed Lower Yuba River Accord.* Yuba Water Agency website. Site accessed November 6, 2020. URL= https://www.yubawater.org/157/Lower-Yuba-River-Accord.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		and hydrological conditions allow. Additional water purchased by DWR would be available for the SWP in drier years. The Environmental Water Account Program would take delivery of water in every year; the SWP would receive additional water in the drier years.				
Los Vaqueros Reservoir Expansion	Reclamation, DWR, and Contra Costa Water District (CCWD)	The Los Vaqueros Reservoir Expansion Project consists of enlarging the existing Los Vaqueros Reservoir and constructing related reservoir system facilities to develop water supplies for environmental water management that supports fish protection, habitat management, and other environmental needs in the Delta and tributary river systems, and to improve water supply reliability and water quality for urban users in the San Francisco Bay Area. Los Vaqueros Reservoir is a 100,000 acre-foot off-stream storage reservoir owned and operated by CCWD that is used to store water pumped from the Delta. This storage capacity allows CCWD to improve the water quality delivered to its customers and to adjust the timing of its Delta water diversions to accommodate the life cycles of Delta aquatic species, thus reducing species impact and providing a net benefit to the Delta environment. The proposed expansion project would increase the reservoir capacity to 275,000 acre-feet and add a new 470 cfs connection that would allow the Los Vaqueros system to provide water to South Bay water agencies—Alameda County Flood Control and Water Conservation District, Zone 7, Alameda County Water District, and Santa Clara Valley Water District—that otherwise would receive all of their Delta supplies through the existing SWP and CVP export pumps. It also would include construction of a new diversion on Old River with a capacity of 170 cfs. The new and expanded facilities would be operated in coordination with Reclamation and DWR to shift Delta pumping for the three South Bay water agencies from the CVP and SWP Delta export pumps to the expanded Los Vaqueros reservoir system. In August 2020, Reclamation released its Final Feasibility Report, which documents potential costs and benefits of the expansion of Los Vaqueros Reservoir. The recommended plan described in the report provides for	No	No	Yes	Reclamation et al. 2010. *Final Environmental Impact Statement/Environmental Impact Report for the Los Vaqueros Reservoir Expansion Project.* March 2010 U.S. Bureau of Reclamation. 2020. *Los Vaqueros Reservoir Expansion Investigation, Final Feasibility Report.* February. Contra Costa Water District website. *Los Vaqueros Reservoir Expansion Project.* Site accessed November 6, 2020. URL= https://www.ccwater.com/lvstudies. Contra Costa Water District website. *Los Vaqueros Reservoir Expansion Updates*. Site accessed July 28, 2021. URL = https://www.ccwater.com/CivicAlerts.aspx?AID=768. Congressman Mike Thompson's letter of support. Site accessed July 28, 2021. URL = https://www.ccwater.com/D

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		federal cost sharing of up to 25% of project construction costs. A similar 25% federal share for Phase 2 construction was requested by members of Congress in a letter dated April 2, 2021, to the Department of the Interior. On January 20, 2021, the California Water Commission increased its Water Storage Investment Program funding for the project based on inflation.				ocumentCenter/View/9752/Congressman-Thompson-LVE-Support-Letter-April-2021-PDF
Transfer-Bethany Pipeline with the Los Vaqueros Reservoir Expansion	Reclamation, DWR, and CCWD	The Los Vaqueros Reservoir Expansion Project includes expansion of the Los Vaqueros Reservoir from its current capacity of 160 thousand acre-feet (TAF) to 275 TAF, construction of a pipeline between CCWD's Transfer Pump Station and the SWP's California Aqueduct at Bethany Reservoir (the "Transfer-Bethany Pipeline"), upgrades to the existing Transfer Pump Station Facilities, and construction of the Neroly High Lift Station. Expansion of Los Vaqueros Reservoir improves Bay Area water supply reliability and water quality while protecting Delta fisheries and providing additional Delta ecosystem benefits. The proposed project will include a regional intertie (the Transfer-Bethany Pipeline) and improved pump stations and pipelines. The Transfer-Bethany Pipeline is composed of a new 300-cfs (84-inch-diameter) pipeline would deliver water from the Transfer Facility to the vicinity of Bethany Reservoir for South-of-Delta partners. The new Transfer-Bethany Pipeline would tie into the California Aqueduct just north of Bethany Reservoir in the Bethany Recreation Area.	No	No	Yes	Supplement to the Final Environmental Impact Statement Final Environmental Impact Report (Feb. 2020). Site accessed October 20, 2021. URL = https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=903 Los Vaqueros Expansion Project Homepage (2021) Site accessed October 20, 2021. URL = https://www.ccwater.com/706/Los-Vaqueros-Studies Resolution Authorizing Execution of the First Amended and Restated Los Vaqueros Reservoir Expansion Project Activity Agreement and Los Vaqueros Reservoir Joint Exercise of Powers Agreement, and Authorizing Actions Related Thereto (Aug. 2021). Site accessed October 20, 2021. URL =

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						https://www.sldmwa.org/OHTDocs/pdf_documents/Meetings/Board/Prepacket/AgendaItem8_LVEMaterials_2021_0805_BOD.pdf
The Riparian Bird Conservation Plan	California Partners in Flight and Riparian Habitat Joint Venture	The Riparian Habitat Joint Venture (RHJV) was initiated by California Partners in Flight in 1994. To date, 18 federal, state, and private organizations have signed the Cooperative Agreement to protect and enhance habitats for native landbirds throughout California. These organizations include CDFW, DWR, California State Lands Commission, Ducks Unlimited, National Audubon Society, National Fish and Wildlife Foundation, The Nature Conservancy, The Trust for Public Land, The Resources Agency State of California, Reclamation, USFWS, U.S. Geological Survey, and Wildlife Conservation Board. The RHJV, modeled after the successful Joint Venture projects of the North American Waterfowl Management Plan, reinforces other collaborative efforts currently underway that protect biodiversity and enhance natural resources as well as the human element they support. The vision of the RHJV is to restore, enhance, and protect a network of functioning riparian habitat across California to support the long-term viability of landbirds and other species. A wide variety of other species of plants and animals will benefit through the protection of forests along rivers, streams, and lakes. The RHJV mission is to provide leadership and guidance to promote the effective conservation and restoration of riparian habitats in California through the following goals: (1) Identify and develop technical information based on sound science for a strategic approach to conserving and restoring riparian areas in California; (2) Promote and support riparian conservation on the ground by providing guidance, technical assistance and a forum for collaboration; and (3) Develop and influence riparian policies through outreach and education. In 2004, Partners in Flight and the RHJV prepared the Riparian Bird Conservation Plan, a guidance document that outline a strategy for conserving riparian birds, including birds using the Delta.	Yes	Yes	Yes	Riparian Habitat Joint Venture and California Partner in Flight. 2004. Version 2.0. *The Riparian Bird Conservation Plan: A Strategy for Reversing the Decline of Riparian Associated Birds in California.* http://www.prbo.org/calpif/pdfs/riparian_v-2.pdf.

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Marine Invasive Species Program	California State Lands Commission	The California Marine Invasive Species Program is charged with preventing or minimizing the introduction of nonindigenous species to California Waters from commercial vessels. The program began in 1999 with the passage of California's Ballast Water Management for Control of Nonindigenous Species Act, which addressed the threat of species introductions through ships' ballast water during a time when federal regulations were not mandatory. In 2003, the Marine Invasive Species Act was passed, reauthorizing and expanding the 1999 Act. Subsequent amendments to the act and additional legislation have further expanded the scope of the program. The law charged the California State Lands Commission with oversight of the state's program to prevent or minimize the introduction of nonindigenous species from commercial vessels. To advance this goal, the commission uses a comprehensive approach that includes ballast water and vessel fouling management tracking, compliance, and enforcement; sound policy development in consultation with a wide array of experts and interested parties; applied research that advances the strategies for nonindigenous species prevention; and outreach and education to coordinate information exchange among scientists, legislators, and interested parties. The Coastal Ecosystems Protection Act of 2006 directed the commission to adopt performance standards for the discharge of ballast water by January 1, 2008, and prepare a report assessing the availability of treatment technologies to meet those standards. The Commission completed the rulemaking process and adopted the standards in October 2007; the technology assessment report was completed in December 2007.	Yes	Yes	Yes	California State Lands Commission website. *Marine Invasive Species Program homepage.* Site accessed November 6, 2020. URL = https://www.slc.ca.gov/misp/. California State Lands Commission. 2009. *Biennial Report on the California Marine Invasive Species Program.* State Lands Commission. 2006. *Commercial Vessel Fouling in California: Analysis, Evaluation, and Recommendations to Reduce Nonindigenous Species Release from the Non-Ballast Water Vector.* April.
Central Valley Joint Venture Program	Central Valley Joint Venture (CVJV)	The CVJV is a self-directed coalition consisting of 22 state and federal agencies and private conservation organizations. The partnership directs their efforts toward the common goal of providing for the habitat needs of migrating and resident birds in the Central Valley of California. The CVJV was established in 1988 as a regional partnership focused on the conservation of waterfowl and wetlands under the North American Waterfowl Management Plan. It has since broadened its focus to the conservation of habitats for other birds, consistent with major national	Yes	Yes	Yes	Central Valley Joint Venture website. Site accessed November 6, 2020. URL = https://www.centralvalleyjointventure.org/. Central Valley Joint Venture, 2006. *Central Valley Joint Venture Implementation*

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		and international bird conservation plans and the North American Bird Conservation Initiative. The CVJV provides guidance and facilitates grant funding to accomplish its habitat goals and objectives. Integrated bird conservation objectives for wetland habitats in the Central Valley identified in the 2006 Implementation Plan include restoration of 19,170 acres of seasonal wetland, enhancement of 2,118 acres of seasonal wetland annually, restoration of 1,208 acres of semi-permanent wetland, and restoration of 1,500 acres of riparian habitat.				*Plan—Conserving Bird Habitat.* U.S. Fish and Wildlife Service, Sacramento, CA.
Cache Creek, Bear Creek, Sulfur Creek, Harley Gulch Mercury TMDL	Central Valley Regional Water Quality Control Board	Historic mining activities in the Cache Creek watershed have discharged and continue to discharge large volumes of inorganic mercury to creeks in the watershed. Much of the mercury discharged from the mines is now distributed in the creek channels and floodplain downstream from the mines. Natural erosion processes are expected to slowly move the mercury downstream out of the watershed over the next several hundred years. However, current and proposed activities in and around the creek channel can enhance mobilization of this mercury. To reduce mercury loads in these streams, which ultimately connect to the northern Delta, the Central Valley Regional Water Quality Control Board is implementing mercury TMDLs for Cache Creek and its tributaries, as well as Sulfur Creek. The implementation plans require a reduction in mercury loads through a combination of actions to clean up mines, sediments, and wetlands; identify engineering options; control erosion reduction actions and perform studies and monitoring.	Yes	Yes	Yes	CVRWQCB. October 2005. Cache Creek, Bear Creek, Sulfur Creek, Harley Gulch TMDL for Mercury, Staff Report. CVRWQCB. October 2007. *The Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board, Central Valley*, Fourth Edition. Revised October 2007 (with Approved Amendments).
Irrigated Lands Regulatory Program	Central Valley Regional Water Quality Control Board	The Irrigated Lands Regulatory Program regulates discharges from irrigated agricultural lands. Its purpose is to prevent agricultural discharges from impairing the waters that receive the discharges. The California Water Code authorizes state and regional water boards to conditionally waive waste discharge requirements if this is in the public interest. On this basis, the Los Angeles, Central Coast, Central Valley, and San Diego regional water quality control boards have issued conditional waivers of waste discharge requirements to growers that contain conditions requiring water quality monitoring of receiving waters.	Yes	Yes	Yes	CVRWQCB website. *Irrigated Lands Regulatory Program (ILRP)*. Site accessed November 6, 2020. URL= https://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/.

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		Participation in the waiver program is voluntary; dischargers must file a permit application as an individual discharger, stop discharging, or apply for coverage by joining an established coalition group. The waivers must include corrective actions when impairments are found.				
Sacramento-San Joaquin Delta Estuary TMDL for Methylmercury	Central Valley Regional Water Quality Control Board	The Central Valley Regional Water Quality Control Board identified the Delta as impaired because of elevated levels of methylmercury in Delta fish that pose a risk for human and wildlife consumers. As a result, it initiated the development of a water quality attainment strategy to resolve the mercury impairment. The strategy has two components: the methylmercury TMDL for the Delta and the amendment of the Water Quality Control Plan (WQCP) for the Sacramento River and San Joaquin River Basins (the Basin Plan) to implement the TMDL program. The Basin Plan amendment requires methylmercury load and waste load allocations for dischargers in the Delta and Yolo Bypass to be met as soon as possible, but no later than 2030. The regulatory mechanism to implement the Delta Mercury Control Program for point sources would be through NPDES permits. Nonpoint sources would be regulated in conformance with the State Water Board's Nonpoint Source Implementation and Enforcement Policy. Both point and nonpoint source dischargers would be required to conduct mercury and methylmercury control studies to develop and evaluate management practices to control mercury and methylmercury discharges. The Regional Water Board will use the study results and other information to amend relevant portions of the Delta Mercury Control Program during the Delta Mercury Control Program Review. The Basin Plan amendment also requires proponents of new wetland and wetland restoration projects scheduled for construction after 2011 to either participate in a comprehensive study plan or implement a site-specific study plan, evaluate practices to minimize methylmercury discharges, and implement newly developed management practices as feasible. Projects would be required to include monitoring to demonstrate effectiveness of management practices. Activities, including changes to water management and storage in and upstream of the Delta, changes to salinity objectives, dredging and dredge	Yes	Yes	Yes	CVRWQCB. 2011. *Final Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methylmercury and Total Mercury in the Sacramento-San Joaquin River Delta Estuary.* (Attachment 1 to Resolution No. R5-2010-0043) CVRWQCB. 2010. *Sacramento-San Joaquin Delta Estuary TMDL for Methylmercury. Staff Report.* April.

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		materials disposal and reuse, and changes to flood conveyance flows, would be subject to the open water methylmercury allocations. Agencies would be required to include requirements for projects under their authority to conduct control studies and implement methylmercury reductions as necessary to comply with the allocations by 2030.				
Contra Costa County General Plan 2005-2020	Contra Costa	The Contra Costa County General Plan sets policies, goals, and specific measures to help guide future growth and conservation of resources through 2020. Efforts are ongoing to update the general plan, with a planning horizon of 2040.	Yes	Yes	Yes	Contra Costa County website. General Plan Overview, Site accessed April 2022. https://www.contracosta.ca.gov/4732/General-Plan. Contra Costa County General Plan 2005-2020, as amended.
East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan	Contra Costa County and East Contra Costa County Habitat Conservancy	The East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan was adopted in 2006 and provides regional conservation and development guidelines to protect natural resources while improving and streamlining the permit process for endangered species and wetland regulations. The plan was developed by a team of scientists and planners with input from independent panels of science reviewers and interested parties. Within the 174,018-acre inventory area, the plan provides permits for between 8,670 and 11,853 acres of development and will permit impacts on an additional 1,126 acres from rural infrastructure projects. The plan will result in the acquisition of a preserve system that will encompass 23,800 to 30,300 acres of land that will be managed for the benefit of 28 species as well as the natural communities that they depend upon. The East Contra Costa County Habitat Conservancy is a joint exercise of powers authority formed by Contra Costa County and the cities of Brentwood, Clayton, Oakley, and Pittsburg to implement the plan. It allows Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, the East Bay Regional Park District and the cities of Brentwood, Clayton, Oakley, and Pittsburg to control permitting for activities and projects they perform or approve in the region that have the	Yes	Yes	Yes	Contra Costa County website. *East Contra Costa County Habitat Conservancy.* Site accessed November 6, 2020. http://www.co.contra-costa.ca.us/depart/cd/water/HCP/index.html East Contra Costa County Habitat Conservation Plan Association. October 2006. *Final East Contra Costa County Habitat Conservation Plan/ Natural Community Conservation Plan.* URL = http://www.co.contra-costa.ca.us/depart/cd/water/HCP/documents.html.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		potential to adversely affect state- and federally listed species. The plan also provides for comprehensive species, wetlands, and ecosystem conservation and contributes to the recovery of endangered species in northern California. The plan avoids project-by-project permitting that often results in uncoordinated and biologically ineffective mitigation.				
Canal Modernization Project	CCWD	CCDW's Canal Modernization Project will replace the canal with a pipeline along a portion of the 48-mile Contra Costa Canal near Oakley. The first phase was initiated in 2009 and encased a 1,900-foot portion of the Contra Costa Canal to reduce salinity and water quality impacts of groundwater seepage from adjacent agricultural areas, as well as to increase public safety and flood protection. CCWD will be initiating plans for the remaining sections. CCWD is conducting a two-year study for advance planning and technical analysis for canal modernization.	No	Yes	Yes	Contra Costa Water District website. *Main Canal Modernization Studies.* Site accessed November 6, 2020. URL = https://www.ccwater.com/688/Main-Canal-Modernization-Studies.
.website/.Delta Protection Commission Land Use and Resource Management Plan Update	Delta Protection Commission	The Delta Protection Commission, created with passage of the Delta Protection Act, was formed to adaptively protect, maintain, and where possible, enhance and restore the overall quality of the Delta environment consistent with the Delta Protection Act and the Land Use and Resource Management Plan for the Primary Zone. The commission is currently updating its Land Use and Resource Management Plan, which was last adopted in 2010. The Management Plan outlines the long-term land use requirements for the Delta and sets out findings, policies, and recommendations in the areas of environment, utilities and infrastructure, land use, agriculture, water, recreation and access, levees, and marine patrol/boater education/safety programs. The updated plan will place increased emphasis on the requirement for local government general plans to provide for consistency with the provisions of the Land Use and Resources Management Plan. The Delta Protection Commission develops priorities and timelines for tasks to be implemented each year and provides annual progress reports to the Legislature. One of the tasks identified by the commission is to monitor the Delta Vision, Bay Delta Conservation Plan, and Delta Risk Management Strategy processes and provide input as deemed appropriate.	No	Yes	Yes	Delta Protection Commission website. *Land Use and Resource Management Plan.* Site accessed November 7, 2020. URL = http://delta.ca.gov/land-use/management-plan/. Delta Protection Commission. 2009. *Draft Land Use and Resource Management Plan for the Primary Zone of the Delta.* Compiled Draft Management Plan 11-12-2009.

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Great California Delta Trail System	Delta Protection Commission	The Delta Protection Commission is leading the planning process for the Great California Delta Trail System. The system will link the San Francisco Bay Trail and trails planned along the Sacramento River in Yolo and Sacramento Counties to present and future trails in and around the Delta and along shorelines in several counties.	Yes	Yes	Yes	Delta Protection Commission website. *Recreation and Tourism*. Site accessed March 4, 2022. URL = https://delta.ca.gov/recreation-and-tourism/.
Delta Plan	DSC	The Delta Reform Act, created by SB X7-1, established the co-equal goals for the Delta of "providing a more reliable water supply for California and protecting, restoring, and enhancing the delta ecosystem." (Public Resources Code § 29702; Water Code § 85054). These coequal goals are to be achieved "in a manner that protects and enhances the unique cultural, recreational, natural resources, and agricultural values of the Delta as an evolving place." (Water Code § 85054). The Delta Reform Act also established the DSC. The DSC is tasked with furthering the state's coequal goals for the Delta through development of the Delta Plan, a comprehensive, long-term, resource management plan for the Delta, containing both regulatory policies and recommendations aimed at furthering the coequal goals and promoting a healthy Delta ecosystem. The Delta Plan provides for a distinct regulatory process for activities that qualify as covered actions under Water Code Section 85057.5. State and local agencies proposing Covered Actions, prior to initiating implementation of that action, must prepare a written certification of consistency with detailed findings regarding consistency with applicable Delta Plan policies and submit that certification to the DSC.	Yes	Yes	Yes	Delta Stewardship Council website. *The Delta Plan.* Site accessed November 5, 2021. URL= https://www.deltacouncil.ca.gov/delta-plan//.
Delta Adapts	DSC	The DSC decided to take action in the Delta and Suisun Marsh in response to climate change at its May 2018 meeting, directing staff to begin a two-phase effort preparing: (1) a *vulnerability assessment* to improve understanding of regional vulnerabilities in order to protect the vital resources the Delta provides to California and beyond with state interests and investments top of mind; and (2) an *adaptation plan* detailing strategies and tools that state,	Yes	Yes	Yes	Delta Stewardship Council website. Delta Adapts: Creating a Climate Resilient Future. Site accessed October 28, 2021. URL = https://deltacouncil.ca.gov/delta-plan/climate-change

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		regional, and local governments can use to help communities, infrastructure, and ecosystems thrive in the face of climate change. Together, these two phases form the *Delta Adapts: Creating a Climate Resilient Future* initiative, a comprehensive, regional approach to climate resiliency that cuts across regional boundaries and commits to collaboration across state, local, and regional levels. Delta Adapts supports the Delta Reform Act, EO B-30-15, and the Delta Plan. The goals of Delta Adapts are to: (1) inform future work at the Council; Provide local governments with a toolkit of information to incorporate into their regulatory and planning documents; (2) integrate climate change into the state's prioritization of future Delta actions and investments; and (3) serve as a framework to be built upon by the Council and others in years to come. DSC staff are pursuing these goals across the two phases, while following the statutory requirements outlined in the Delta Reform Act of 2009. Delta Adapts will consider climate change impacts that are expected to occur and amend the Delta Plan, where applicable.				Delta Stewardship Council website. Delta Adapts: Creating a Climate Resilient Future. Frequently Asked Questions. Site accessed October 28, 2021. URL = https://deltacouncil.ca.gov/delta-plan/delta-adapts-faq#:~:text=Delta%20Adapts%20consists%20of%20a%20vulnerability%20assessment%20to,ecosystems%20thrive%20in%20the%20face%20of%20climate%20change.
Recreation Proposal for the Sacramento- San Joaquin Delta and Suisun Marsh	Department of Parks and Recreation	In 2011, California State Parks developed a Recreation Proposal for the Delta and Suisun Marsh in response to the requirements in SBX7 1. The proposal recommends that communities on the edge of the Delta or Suisun Marsh with access to major transportation routes be developed as "gateways" to provide supplies and information to visitors about recreation opportunities available in an area. Recommendations also include collaboration with other agencies and other partners to expand wildlife viewing, angling, and hunting opportunities; and expansion of the State Park system in the Delta.	Yes	Yes	Yes	California State Parks, Planning Division. *Recreation Proposal for the Sacramento-San Joaquin Delta and Suisun Marsh, 2011.*
East Bay Municipal Utility District Camanche Permit Extension	East Bay Municipal Utility District (EBMUD)	The proposed project would extend the term of the existing Camanche water right Permit 10478 through the year 2040. Extending the Camanche Permit would allow EBMUD additional time to apply the water provided under Permit 10478 to municipal and industrial use within EBMUD's designated service area. Additionally, EBMUD contends that the full	No	Yes	Yes	East Bay Municipal Utility District website. Site accessed November 7, 2020. URL= https://www.ebmud.com/water/about-your-water/water-

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		entitlement of Permit 10478 through 2040 is needed to maintain operational flexibility to meet future projected water demand and address system vulnerabilities associated with several factors, including emergencies and potential effects of climate change. On Sept. 23, 2014, EBMUD approved a FEIR for the petition for time extension. Permit 10478 allows EBMUD to directly divert up to 194-cfs and divert to storage up to 353,000 acre-feet of water from the Mokelumne River at Pardee and Camanche Reservoirs in Amador and San Joaquin Counties between December 1 and July 1, mainly for municipal use in EBMUD's service area in Alameda and Contra Costa Counties.				supply/water-right-permit-10478-time-extension-project/. CEQAnet website. Site accessed November 7, 2020. URL = https://ceqanet.opr.ca.gov/2008112043/4.
Lower Mokelumne River Spawning Habitat Improvement Project	EBMUD	The Mokelumne River is tributary to the Delta and supports five species of anadromous fish. The proposed project would initially place 4,000 to 5,000 cubic yards of suitably sized salmonid spawning gravel annually for a 3-year period at two specific sites, and then provide annual supplementation of 600 to 1,000 cubic yards thereafter. Fall-run Chinook salmon and steelhead are the primary management focus in the river. Availability of spawning gravel in this section of the Mokelumne River has been determined to be deficient because historic gold and aggregate mining operations removed gravel annually and upstream dams have reduced gravel transport to the area. This area was chosen because it is known to have supported fall-run Chinook salmon and steelhead spawning in the past and because the substrate is suitable for habitat improvement.	Yes	Yes	Yes	East Bay Municipal Utility District website. *Lower Mokelumne River Spawning and Rearing Habitat Improvement Project.* Site accessed November 7, 2020. URL= https://www.ebmud.com/recreation/protecting-natural-habitat/lower-mokelumne-river-spawning-and-rearing-habitat-improvement-project/#:~:text=The%20project%20is%20a%20long,and%20steelhead%20spawning%20and%20rearing.
Water Supply Management Program 2040	EBMUD	East Bay Municipal Utility District's current Water Supply Management Program (WSMP 2020), adopted in 1993, serves as the basis for water conservation and recycling programs and for development of supplemental supply initiatives such as the Freeport Regional Water Project. The WSMP 2040 updates the current plan and extends the planning horizon another 20 years. It identifies and recommends a	Yes	Yes	Yes	EBMUD website. *Water Supply Management Plan 2040*. Site accessed November 7, 2020. URL = https://www.ebmud.com/water/about-your-water/water-supply/water-supply-

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		Preferred Portfolio of solutions to meet dry-year water needs through 2040, including desalination, enlargement of Mokelumne River reservoirs. The primary objectives of the WSMP 2040 are to maintain and improve EBMUD's water supply reliability to its customers and help meet the need for water in the future. WSMP 2040 will also adapt the EBMUD's water planning approach to circumstances that have changed since WSMP 2020 was adopted, such as competing and changing demands for water, the availability of Freeport water after 2009, and long-term climate change.				management-program-2040/. EBMUD. September 2009. Water Supply Management Program 2040. Final Draft.
Bay Area Regional Desalination Project	EBMUD,CCWD, Santa Clara Valley Water District, and San Francisco Public Utility Commission	The Bay Area's four largest water agencies are jointly exploring the development of regional desalination facilities that would benefit Bay Area residents and businesses served by these agencies. The Bay Area Regional Desalination Project could consist of one or more desalination facilities, with an ultimate total capacity of up to 71 million gallons per day (mgd). The project would provide an additional source of water during emergencies, such as earthquakes or levee failures, increase supply reliability, and provide water during droughts or maintenance of other facilities. A pilot plant was constructed near the southern end of Antioch Bridge. Following the pilot study, environmental documentation and designs will be completed for a full-scale plant. In early 2014, a site analysis was completed to study potential impacts on the Delta environment and confirm that the potable water produced at the East Contra Costa location could be delivered to other Bay Area regions. The partners continued public and interested party outreach to share the findings and seek input.	No	No	Yes	East Bay Municipal Utility District website. *Desalination for Bay Area Regional Reliability.* Site accessed November 7, 2020. URL= https://www.ebmud.com/about-us/construction-and-maintenance/construction-my-neighborhood/desalination-bay-area-regional-reliability/. URS. July 2007. *Bay Area Regional Desalination Project Feasibility Study*.
Folsom Lake Temperature Control Device	El Dorado Irrigation District and Reclamation	El Dorado Irrigation District, in collaboration with the Reclamation, proposes to construct facilities on the bank of Folsom Lake to withdraw water from the warm upper reaches of the lake while preserving the coldwater pool at the bottom of the lake to protect downstream aquatic species. The facilities will include a large diameter concrete lined vertical shaft and five lined horizontal adits extending from the shaft. This structure, known as a Temperature Control Device will replace the district's five existing raw pump casings that currently extract water from Folsom Lake at a rate of 19.5 mgd. The new facility will be sized to	No	Yes	Yes	EID website. *Folsom Lake Intake Project.* Site accessed November 7, 2020. URL= https://www.eid.org/about-us/project-updates/folsom-lake-intake-project. Reclamation website. *Project Details.* Site accessed

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		accommodate a maximum extraction rate of 74 mgd over an 18-hour period, which is equivalent to 52 mgd. Construction was planned to begin in June 2020.				November 7, 2020. URL = http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=797.
El Dorado Water Reliability Project (formerly known as the Supplemental Water Rights Project)	El Dorado Water and Power Authority	The proposed project is to establish permitted water rights allowing diversion of water from the American River basin to meet planned future water demands in the El Dorado Irrigation District and Georgetown Divide Public Utility District service areas and other areas located within El Dorado County that are outside of these service areas. El Dorado Water and Power Authority will be filing with the State Water Board, Division of Water Rights, petitions for partial assignment of each of State Filed Applications 5644 and 5645, and accompanying applications allowing for the total withdrawal for use of 40,000 AFY, consistent with the diversion and storage locations allowed it under the El Dorado-Sacramento Municipal Utility District Cooperation Agreement.	No	Yes	Yes	El Dorado County Water Agency website. *Projects*. Site accessed November 7, 2020. URL= https://www.edcgov.us/Water/pages/projects.aspx#:~:text=The%20El%20Dorado%20Water%20Reliability,Slope%20of%20El%20Dorado%20County.
Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon and Central Valley Steelhead	NMFS	The Final Recovery Plan provides a roadmap that describes the steps, strategy, and actions that should be taken to return winter-run Chinook salmon, spring-run Chinook salmon, and steelhead to viable status in the Central Valley, California thereby ensuring their long-term persistence and evolutionary potential. The general near- term strategic approach to recovery includes methods to: secure all extant populations, monitor for *O. mykiss* in habitats accessible to anadromous fish, and minimize straying from hatcheries to natural spawning areas. Conduct critical research on fish passage and reintroductions with climate change and develop recovery plan for sustainable populations that have minimal susceptibility to catastrophic events. Recovery plan for Sacramento River Winter-Run Chinook salmon, Central Valley Spring-Run Chinook salmon, and Central Valley Steelhead was released in July 2014.	Yes	Yes	Yes	U.S. Department of Commerce, National Oceanic and Atmospheric Administration, West Coast Region. *Recovery Plan for Sacramento River Winter-Run Chinook Salmon, Central Valley Spring-Run Chinook Salmon, and Central Valley Steelhead, July 2014.*
Eastern San Joaquin Integrated Conjunctive Use Program	Northeastern San Joaquin County Groundwater Banking Authority	The Eastern San Joaquin Integrated Regional Water Management Plan (Eastern San Joaquin IRWMP) is a collaborative regional planning document that was published in June 2014. The IRWMP defines and integrates key water management strategies to establish protocols and	Yes	Yes	Yes	NSJCGBA. September 2009. *Eastern San Joaquin Basin Integrated Conjunctive Use*

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		courses of action to implement the Eastern San Joaquin Integrated Conjunctive Use Program (ICU Program). The program was designed to implement a comprehensive, prioritized set of projects and management actions to meet adopted Best Management Objectives, moving the Eastern San Joaquin County Region toward the goal of sustainable and reliable water supplies. The Integrated Conjunctive Use Program is to develop approximately 140,000 to 160,000 AFY of new surface water supply for the basin that will be used to directly and indirectly to support conjunctive use by the Northeastern San Joaquin County Groundwater Banking Authority (GBA) member agencies. This amount of water would support groundwater recharge at a level consistent with the GBA's objectives for conjunctive use and the underlying groundwater basin. Within this framework, the program would implement the following categories of conjunctive use projects and actions: • Water conservation measures • Water recycling • Groundwater banking • Water transfers • Development of surface storage facilities • Groundwater recharge • River withdrawals • Construction of pipelines and other facilities To enable and facilitate sustainable and reliable management of San Joaquin County's water resources, the GBA developed a series of Basin Management Objectives to support conjunctive use and address a variety of water resources issues, including groundwater overdraft, saline groundwater intrusion, degradation of groundwater quality, environmental quality, land subsidence, supply reliability, water demand, urban growth, recreation, agriculture, flood protection, and other issues.				*Program Programmatic Environmental Impact Report.* NSJCGBA. February 2011. *Eastern San Joaquin Basin Integrated Conjunctive Use Program Final Programmatic Environmental Impact Report.* Greater San Joaquin County Regional Coordinating Committee website. *Eastern San Joaquin ICU Program.* Site accessed November 7, 2020. URL= http://www.esjirwm.org/IRWMP/Eastern-San-Joaquin-ICU-Program.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		The purpose of the Basin Management Objectives is to ensure the long-term sustainability of water resources in the San Joaquin Region.				
Sacramento River Water Reliability Study	Placer County Water Agency and Reclamation	The Reclamation and Placer County Water Agency, on behalf of Placer County Water Agency, Sacramento Suburban Water District, and the cities of Roseville and Sacramento, are investigating the viability of a joint water supply diversion from the Sacramento River to meet the needs of the cost-sharing partners. The Sacramento River Water Reliability Study will be consistent with the Water Forum Agreement in pursuing a Sacramento River diversion to accomplish the following objectives envisioned in the agreement: (1) meeting the needs of planned future growth within the Placer-Sacramento region, (2) maintaining a reliable water supply while reducing diversions of surface water from the American River in future dry years to preserve the river ecosystem, and (3) enhancing ground water conjunctive management to help sustain the quality and availability of ground water for the future. To meet the water supply needs of the cost-sharing partners, the Sacramento River Water Reliability Study is identifying a package of water supply infrastructure components, including new or expanded diversions from the Sacramento, Feather, or American Rivers, and new or expanded water treatment and pumping facilities, storage tanks, and major transmission and distribution pipelines. The study includes a feasibility study and an EIS/EIR for identified water supply alternatives as the basis for seeking necessary BiOps and permits from the responsible resource agencies to allow execution of necessary agreements and construction of the recommended water supply infrastructure.	No	No	Yes	Reclamation website. Site accessed November 7, 2020. URL = http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=907.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
Liberty Island Conservation Bank	Reclamation District 2093	This project received permits and approvals in 2009 to create a conservation bank on the northern tip of Liberty Island that would preserve, create, restore, and enhance habitat for native Delta fish species, including Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, California Central Valley steelhead, delta smelt, and Central Valley fall- and late fall-run Chinook salmon. The project consists of creating tidal channels, perennial marsh, riparian habitat, and occasionally flooded uplands on the site. The project also includes the breaching of the northernmost east-west levee, and preservation and restoration of shaded riverine aquatic habitat along the levee shorelines of the tidal sloughs. The island's private levees failed in the 1997 flood and were not recovered, leaving all but the upper 1,000 acres and the adjacent levees permanently flooded. These upper acres encompass the proposed bank. The lower nearly 4,000 acres will remain, at least for the near future, predominantly open water and subtidal because tidal elevations are too great for marsh or riparian habitat.	Yes	Yes	Yes	Wildlands Inc. website. *Mitigation Projects. Liberty Island Conservation Bank.* Site accessed November 7, 2020. URL= https://www.wildlandsinc.com/banks/liberty-island-conservation-bank-salm/.
Flood Management Program	Sacramento Area Flood Control Agency (SAFCA), CVFPB, and USACE	The SAFCA Flood Management Program includes studies, designs, and construction of flood control improvements. In the South Sacramento area, SAFCA projects include the South Sacramento Streams Project and the Sacramento River Bank Protection Project. The South Sacramento Streams Project consists of levee, floodwall, and channel improvements starting south of the town of Freeport along the Sacramento River to protect the City of Sacramento from flooding associated with Morrison, Florin, Elder, and Union House creeks. The Sacramento River Bank Protection Project, which is implemented and funded primarily through the USACE, addresses long-term erosion protection along the Sacramento River and its tributaries. Bank protection measures typically consist of large angular rock placed to protect the bank, with a layer of soil/rock material to allow bank re-vegetation. SAFCA contributes to funding the local share for bank protection activities within its jurisdiction.	Yes	Yes	Yes	SAFCA website. *South Sacramento Streams Project information.* Site accessed November 7, 2020. URL = http://www.safca.org/Programs_SoSacStreams.html. SAFCA website. *Sacramento River Bank Protection Program information.* Site accessed November 7, 2020. URL = http://www.safca.org/Programs_SacBankProtection.html.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
Sacramento County General Plan of 2005-2030	Sacramento County	The Sacramento County General Plan of 2005–2030 outlines goals, objectives, polices, and measures for new growth, housing needs, and environmental protection. The updated plan adopted on November 9, 2011, focused on revitalizing commercial corridors and strategies to reduce GHG emissions in compliance with state laws.	Yes	Yes	Yes	Sacramento County Planning and Environmental Review, General Plan website. Site accessed February 24, 2022. URL = https://planning.saccounty.net/PlansandProjectsIn-Progress/Pages/GeneralPlan.aspx.
Sacramento International Airport Master Plan	Sacramento County	The Master Plan for Sacramento International Airport was completed in 2004 and establishes a program for the improvement of existing facilities and the development of facilities at the airport over the next 20 years. The plan identifies the type and extent of facilities that are required to meet projections of aviation demand and the airport functions, including the airfield, terminal and related passenger services, cargo, general aviation, airport support, and access. A NOP for the preparation Supplemental EIR was released in September 2020.	Yes	Yes	Yes	Sacramento County website. *Department of Airports.* Site accessed November 7, 2020. URL= https://sacramento.aero/scas/about/planning_design.
South Sacramento Habitat Conservation Plan	South Sacramento Conservation Agency Joint Powers Authority	The South Sacramento Habitat Conservation Plan is a regional plan to address issues related to species conservation, agricultural protection, and urban development in south Sacramento County. Adopted in 2018, the HCP covers 40 different species of plants and wildlife including 10 that are state or federally listed as threatened or endangered and allow landowners to engage in the “incidental take” of listed species (i.e., to destroy or degrade habitat) in return for conservation commitments from local jurisdictions. The conservation measures outlined in the HCP would minimize and mitigate the impact of incidental take and provide for the conservation of covered species that may occur in the plan area. The geographic location of the HCP includes a combined 317,656 acres within south Sacramento County (unincorporated area) and the cities of Rancho Cordova, Elk Grove, and Galt.	Yes	Yes	Yes	South Sacramento Habitat Conservation Plan website. Site accessed November 7, 2020. URL= https://www.southsachcp.com/.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
Sacramento Stormwater Quality Partnership	Sacramento County, Sacramento, Citrus Heights, Elk Grove, Folsom, Galt, and Rancho Cordova	The Sacramento Stormwater Quality Partnership is a collaborative of public agencies that protects and improves water quality in local waterways for the benefit of the community and the environment. The partnership's main charge is to oversee compliance with the Sacramento Area-wide Municipal Stormwater Permit, which is designed to comply with state and federal clean water regulations (NPDES Stormwater Permit No. CAS082597). The goals of the partnership are to: educate and inform the public about urban runoff pollution; encourage public participation in community and clean-up events; work with industries and businesses to encourage pollution prevention; require construction activities to reduce erosion and pollution; and require developing projects to include pollution controls that will continue to operate after construction is complete. Program elements include monitoring, target pollutant reduction, special studies (such as evaluating the effectiveness of best management practices), and public outreach.	Yes	Yes	Yes	Sacramento Stormwater Quality Partnership website. Site accessed November 7, 2020. URL = http://www.beriverfriendly.net/. Sacramento Stormwater Quality Partnership website. *Stormwater Quality Design Manual.* Site accessed November 7, 2020. URL = http://www.beriverfriendly.net/newdevelopment/stormwaterqualitydesignmanual/#SWQ_DesignManual. Sacramento County Stormwater Quality Program website. *Stormwater Quality Improvement Plan.* 2009. Site accessed November 7, 2020. URL = http://www.beriverfriendly.net/documents/.
Sacramento Regional Wastewater Treatment Plant Facility Upgrade Project (EchoWater)	Sacramento Regional County Sanitation District	Upgrade existing secondary treatment facilities to advanced unit processes including improved nitrification/denitrification and filtration. The Sacramento Regional County Sanitation District is upgrading its existing facilities at the Sacramento Regional Wastewater Plant to meet new NPDES permit requirements. Project implementation would not result in an increase in permitted wastewater treatment capacity; however, would result in improved treated effluent water quality. The project will upgrade existing secondary treatment facilities to advanced	No	Yes	Yes	Regional San website. *EchoWater Project.* Site accessed November 7, 2020. URL= https://www.regionalsan.com/echowater-project.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		unit processes including improved nitrification/denitrification and filtration.				
Harvest Water (formerly called the South County Ag Program)	Sacramento Regional County Sanitation District	Harvest Water is being developed by Sacramento Regional County Sanitation District and could deliver up to 50,000 AFY of safe and reliable supply of tertiary-treated water for agricultural uses to more than 16,000 acres of permanent agriculture through irrigation, as well as habitat conservation lands near the Cosumnes River and Stone Lakes Wildlife Refuge. This project has received up to $287.5 million through the Proposition 1 grant funding of the California Water Commission, Water Storage Investment Program. The district is currently working with local farmers and the initial planning stages of preliminary designs for transmission and distribution systems near Elk Grove in southern Sacramento County.	No	Yes	Yes	Regional San website. *Harvest Water*. Site accessed November 30, 2021. URL = https://www.regionalsan.com/harvest-water.
San Francisco Bay Plan Amendment and Special Programs	San Francisco Bay Conservation and Development Commission	The San Francisco Bay BCDC is a 27-member commission created by the California Legislature in 1965 dedicated to the protection and enhancement of San Francisco Bay and to the encouragement of the Bay's responsible use. The commissioners are appointees from local governments and state/federal agencies. The BCDC has jurisdiction over the open water, marshes, and mudflats of greater San Francisco Bay, including Suisun, San Pablo, Honker, Richardson, San Rafael, San Leandro and Grizzly Bays and the Carquinez Strait, and some inland areas. It regulates all filling and dredging in San Francisco Bay (which includes San Pablo and Suisun Bays, sloughs and certain creeks and tributaries that are part of the Bay system, salt ponds and certain other areas that have been diked-off from the Bay), protects Suisun Marsh, regulates new development within the first 100 feet inland from the Bay, pursues an active planning program to study Bay issues, and engages in the region-wide state and federal program to prepare a Long Term Management Strategy for dredging and dredge material disposal in San Francisco Bay. Among its various responsibilities, the BCDC sponsors special programs that address climate change planning; subtidal habitat research, restoration, and management; and a long-term management strategy for the placement of dredged material in the San Francisco Bay region.	No	Yes	Yes	San Francisco Bay Conservation and Development Commission website. Site accessed November 7, 2020. URL = https://www.bcdc.ca.gov/aboutus/.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
San Francisco Bay Mercury TMDL	San Francisco Bay Region Water Quality Control Board	San Francisco Bay is impaired because mercury contamination is adversely affecting existing beneficial uses, including sport fishing, preservation of rare and endangered species, and wildlife habitat. On February 12, 2008, the Environmental Protection Agency approved a Basin Plan amendment incorporating a TMDL for mercury in San Francisco Bay and an implementation plan to achieve the TMDL. The amendment was formerly adopted by the San Francisco Bay Water Board, the State Water Board, and the state Office of Administrative Law. It is now officially incorporated into the WQCP for the San Francisco Bay Basin (Basin Plan). The San Francisco Bay mercury TMDL, which includes the waters of the Delta within the San Francisco Bay region, is intended to: (1) reduce mercury loads to achieve load and wasteload allocations, (2) reduce methylmercury production and consequent risk to humans and wildlife exposed to methylmercury, 3) conduct monitoring and focused studies to track progress and improve the scientific understanding of the system, and 4) encourage actions that address multiple pollutants. The implementation plan establishes requirements for dischargers to reduce or control mercury loads and identifies actions necessary to better understand and control methylmercury production. In addition, it addresses potential mercury sources and describes actions necessary to manage risks to Bay fish consumers. Load reductions are expected via implementation of the Delta Methylmercury TMDL (river source), plus urban runoff management, Guadalupe River mine remediation, municipal and industrial wastewater source controls and pretreatment, and sediment remediation.	Yes	Yes	Yes	SFBRWQCB. 2008. *Basin Plan Amendment.*
San Joaquin County Multi-Species Habitat Conservation and Open Space Plan	San Joaquin Council of Governments	Permitted in 2000, the key purpose of the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (Plan) is to provide a strategy for balancing the need to conserve open space and the need to convert open space to non-open space uses. These goals are intended to be met while protecting the region's agricultural economy; preserving landowner property rights; providing for the long-term management of plant, fish and wildlife species, especially those that are currently listed, or may be listed in the future, under the federal Endangered Species Act or	Yes	Yes	Yes	San Joaquin Council of Governments website. *Habitat*. Site accessed November 7, 2020. URL = https://www.sjcog.org/94/Habitat.

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		the California Endangered Species Act; providing and maintaining multiple-use open spaces that contribute to the quality of life of the residents of San Joaquin County; and accommodating a growing population while minimizing costs to project proponents and society at large. The conservation strategy relies on minimizing, avoiding, and mitigating impacts on the species covered by the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan. Minimization of impacts on covered species takes a species-based approach emphasizing the implementation of measures to minimize incidental take by averting the actual killing or injury of individual covered species and minimizing impacts on habitat for such species on open space lands converted to non-open space uses. Unavoidable impacts on covered species are addressed through a habitat-based approach that emphasizes compensation for habitat losses through the establishment, enhancement and management-in-perpetuity of preserves composed of a specific vegetation types or association of vegetation types (habitats) upon which discrete groups of covered species rely. The purchase of easements from landowners willing to sell urban development rights is the primary method for acquiring preserves. The plan identifies zones distinguished by a discrete association of soil types, water regimes (e.g., Delta lands subject to tidal influence, irrigated lands, lands receiving only natural rainfall), elevation, topography, and vegetation types. In general, impacts within a particular zone are mitigated within the same zone.				
San Joaquin County General Plan Update	San Joaquin County	The San Joaquin County General Plan 2010 was adopted on July 29, 1992. The general plan provides guidance for future growth in a manner that preserves the county's natural and rural assets. Most of the urban growth is directed to existing urban communities. In December 2016, San Joaquin County began the process to update the 2008 general plan. The general plan update will provide the blueprint for growth in the county unincorporated areas through 2035.	Yes	Yes	Yes	San Joaquin County General Plan Update website. Community Development Department. Site accessed November 7, 2020. URL = https://www.sjgov.org/commdev/cgi-

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
						bin/cdyn.exe?grp=neighpresv&htm=generalplandef.
San Joaquin County, Stockton, and Tracy Stormwater Management Programs	San Joaquin County (Department of Public Works), Stockton (Municipal Utilities Department), Tracy (Water Resources Department), and State Water Board	San Joaquin County has developed a Stormwater Management Program committed to protecting local rivers and the Delta by involving and educating residents in stormwater pollution prevention, regulating stormwater runoff from construction sites, investigating non-stormwater discharges, and reducing non-stormwater run-off from municipal operations. Storm drainage is conveyed via County storm drains to the Calaveras, Mokelumne, Old, and San Joaquin Rivers, where it ultimately flows into the Delta. Effective January 2021, San Joaquin County Department of Public Works and City of Stockton released a new Stormwater Quality Control Criteria Plan which outlines new guidelines for construction projects region-wide. In addition to the County program, several municipalities in San Joaquin County have developed stormwater management programs and obtained NPDES permits from the State Water Board. Permits issued for medium (serving between 100,000 and 250,000 people) and large (serving 250,000 people) municipalities are typically issued to a group of co-permittees encompassing an entire metropolitan area. These permits are reissued as the permits expire. For smaller municipalities, the first 5-year term of the NPDES permits were adopted by the State Water Board in 2003 and expired on May 1, 2008. Under the General Permit, Section H.21, Continuation of Expired Permit, the General Permit continues in force and in effect until a new General Permit is issued or the State Water Board rescinds the General Permit. The goals of the City of Stockton's program are to reduce the degradation of the beneficial uses of the San Joaquin River and tributary streams and the regional groundwater aquifer caused by urban runoff in the metropolitan area of Stockton. The City of Tracy's NPDES permit requires the city to develop and implement a Storm Water Management Plan/Program with the goal of reducing the discharge of pollutants to the maximum extent practicable.	Yes	Yes	Yes	County of San Joaquin. September 2003. *Stormwater Management Plan.* City of Stockton. April 2009. *City of Stockton Stormwater Management Plan.* City of Tracy. September 2003. *Stormwater Management Program.* Site accessed November 7, 2020. URL = http://library.municode.com/HTML/16660/level2/TIT11PUUT_CH11.34STMADICO.html#TOPTITLE. San Joaquin County Flood Control & Water Conservation District website. *Stormwater Program.* Site accessed November 23, 2021. URL = http://www.sjwater.org/Stormwater-Management/Stormwater-Program

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Solano Multispecies Habitat Conservation Plan	Solano County Water Agency	The Solano HCP is intended to support the issuance of an ITP under the federal Endangered Species Act for a period of 30 years. This permit is required by the March 19, 1999, Solano Project Contract Renewal Biological Opinion between the USFWS and Reclamation. The scope of the Solano HCP was expanded beyond the requirements of the BiOp to include additional voluntary applicants and additional species for incidental take coverage. Thirty-seven (37) species are proposed to be covered under the Solano HCP. The minimum geographical area to be covered is the Solano County Water Agency's contract service area that is the cities of Fairfield, Vacaville, Vallejo, Suisun City, the Solano Irrigation District, and the Maine Prairie Water District. The area covered by the HCP is all of Solano County and a small portion of Yolo County. The Final Administrative Draft was submitted to the lead agencies in June 2009. The HCP includes a Coastal Marsh Natural Community Conservation Strategy designed to maintain the water and sediment quality standards, hydrology of this natural community; contribute to the restoration of tidally influenced coastal marsh habitat; and promote habitat connectivity. Primary conservation actions include preservation (primarily through avoidance), restoration, invasive species control, and improvement of water quality. The plan area covers 580,000 acres, which includes 12,000 acres of proposed development and 30,000 acres that will be preserved.	No	Yes	Yes	Solano County Water Agency website. *Habitat Conservation Plan Final Administrative Draft.* October 2012. Site accessed November 7, 2020. URL = https://www.scwa2.com/solano-multispecies-habitat-conservation-plan/.
Bay-Delta Water Quality Control Plan Update (San Joaquin River Flows and Southern Delta Salinity)	State Water Board	The State Water Board is updating the 2006 Bay-Delta WQCP in two separate processes (Plan Amendments). On December 12, 2018, through State Water Board Resolution No. 2018-0059, the State Water Board adopted the first Plan amendments and Final Substitute Environmental Document establishing the Lower San Joaquin River flow objectives and revised southern Delta salinity objectives. On February 25, 2019, the Office of Administrative Law approved the Plan amendments, which are now in effect.	Yes	Yes	Yes	State Water Resources Control Board website. Site accessed November 7, 2020. URL = http://www.swrcb.ca.gov/waterrights/water_issues/programs/bay_delta/.

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Bay-Delta Water Quality Control Plan Update (Delta Outflows, Sacramento River and Delta Tributary Inflows, Cold Water Habitat and Interior Delta Flows)	State Water Board	The State Water Board is updating the 2006 Bay-Delta WQCP in two separate processes. The State Water Board is also considering plan amendments focused on the Sacramento River and its tributaries, Delta eastside tributaries (including the Calaveras, Cosumnes, and Mokelumne Rivers), Delta outflows, and interior Delta flows. The second plan amendment, currently in progress, focuses on the Sacramento River and its tributaries, Delta eastside tributaries (including the Calaveras, Cosumnes, and Mokelumne Rivers), Delta outflows, and interior Delta.	No	No	Yes	State Water Resources Control Board website. Site accessed November 7, 2020. URL = http://www.swrcb.ca.gov/waterrights/water_issues/programs/bay_delta/.
California Water Boards' Strategic Plan Update – 2008-2012	State Water Board	The Strategic Plan Update broadly identifies the State Water Board's vision and direction for the future. It identifies goals intended to achieve that vision, which include: implementing strategies to fully support the beneficial uses for all 2006-listed water bodies; improving and protecting groundwater quality in high-use basins; increasing sustainable local water supplies available for meeting existing and future beneficial uses and ensuring adequate flows for fish and wildlife habitat; comprehensively addressing water quality protection and restoration in consideration of the connections between water quality, water quantity, and climate change, throughout California's water planning processes; improving Water Board transparency and accountability; enhancing consistency across the Water Boards; and ensuring that the Water Boards have access to information and expertise. The plan also identifies environmental priorities that focus on strategies for achieving environmental outcomes associated with protecting the State's surface waters and groundwaters and promoting sustainable water supplies. To better address the implementation of coordinated activities in the Bay-Delta, the State Water Board adopted Resolution 2007-0079 in 2007; similar resolutions were adopted by the San Francisco Bay and Central Valley regional water boards. In those resolutions, the Water Boards committed to ensure the protection of beneficial uses of water, and to the equitable administration of water rights in the Bay-Delta and its tributaries. A strategic work plan, completed in July 2008, describes the actions the Water Boards will undertake to protect beneficial uses of water	Yes	Yes	Yes	State Water Resources Control Board website. Site accessed November 7, 2020. URL = http://www.swrcb.ca.gov/water_issues/hot_topics/strategic_plan/.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		in the Bay-Delta and the timelines and resource needs for implementing those actions. Workplan activities are divided into the nine broad elements covering a range of actions that: (1) implement the Water Boards' core water quality responsibilities; (2) continue meeting prior Water Board commitments; (3) are responsive to priorities identified by the Governor and the Delta Vision Blue Ribbon Task Force; and (4) build on existing processes, such as the BDCP. The Water Boards do not have the capacity or responsibility to conduct all the planning and implementation activities needed to protect and restore fisheries, aquatic habitats, and other beneficial uses in the Bay-Delta. Accordingly, the work plan identifies activities that will need to be coordinated with other efforts.				
Financial Assistance Programs for Wastewater and Water Facilities for Small Communities	State Water Board and Department of Public Health	State Water Board Resolution No. 200800048 includes the Small Community Wastewater Strategy to assist small and/or disadvantaged communities with wastewater needs for training and funding. The Small Community Wastewater Grant Program and Clean Water State Revolving Fund Program provide grants, low-interest loans, and bonds for construction of wastewater facilities. The Department of Public Health Drinking Water State Revolving Fund provides grants and low-interest loans for disadvantaged and small communities. On February 19, 2013, the State Water Board approved a streamlined process.	Yes	Yes	Yes	State Water Resources Control Board website. Site accessed November 9, 2020. URL= http://www.waterboards.ca.gov/water_issues/programs/grants_loans/small_community_wastewater_grant/.
Groundwater Ambient Monitoring and Assessment Program	State Water Board, Central Valley Regional Water Quality Control Board, and Department of Public Health	The State Water Board and/or Central Valley Regional Water Quality Control Board have an ongoing program to establish water quality objectives to protect beneficial uses of surface water and groundwater. Existing programs have focused on hazardous substances from landfills, waste disposal sites, fuel storage, and industrial facilities. The Groundwater Ambient Monitoring and Assessment program has been implemented to identify emerging pollutants and other constituents that affect drinking water quality. Currently, there is only one subbasin in the Central Valley that is under study as priority basin (western San Joaquin Valley near Tracy). This program is being coordinated with the Department of Public Health California Drinking Water Source Assessment and Protection program that provides information to water users.	Yes	Yes	Yes	State Water Resources Control Board website. Site accessed November 9, 2020. URL = http://www.waterboards.ca.gov/gama/.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		Information from these programs is used by these agencies to establish cleanup programs to protect groundwater quality.				
Delta Water Supply Project	City of Stockton	The Delta Water Supply Project is a new supplemental water supply for the Stockton Metropolitan Area by diverting water from the Delta and conveying it through a pipeline to a surface water treatment plant, where it would be treated to the highest drinking water standards and distributed. Initially, the project would have the capacity to treat and deliver up to 30 mgd or 33,600 acre-feet of water per year, meeting approximately one third of Stockton's water needs.	Yes	Yes	Yes	CDM Smith website. Stockton Delta Water Project. Site accessed November 9, 2020. URL = https://cdmsmith.com/en/Client-Solutions/Projects/Stockton-Delta-Water-Project.
Battle Creek Salmon and Steelhead Restoration Project	Reclamation and California State Water Board	Construction of the Battle Creek Salmon and Steelhead Restoration Project was initiated in 2009 reestablish approximately 42 miles of prime salmon and steelhead habitat on Battle Creek, plus an additional 6 miles on its tributaries. The species benefited by the project include the Central Valley spring-run Chinook salmon (state- and federally listed as threatened), the Sacramento River winter-run Chinook salmon (state- and federally listed as endangered), and the Central Valley steelhead (federally listed as threatened). Restoration of Battle Creek will be accomplished primarily through the modification of the Battle Creek Hydroelectric Project (FERC Project No. 1121) facilities and operations, including instream flow releases. Facility changes include the removal of five diversion dams and construction of fish ladders and fish screens at three diversion dams. The PG&E is the owner and licensee of the Hydroelectric Project. Any changes to the Hydroelectric Project trigger the need for PG&E to seek a license amendment from FERC. The Restoration Project has been developed in collaboration with various resource agencies, including the USFWS, NMFS, CDFW, and the California Bay Delta Authority, and in conjunction with participation from the public, including the Greater Battle Creek Watershed Working Group and the Battle Creek Watershed Conservancy.	No	Yes	Yes	Reclamation website. Site accessed November 9, 2020. URL = https://www.usbr.gov/mp/battlecreek/. Reclamation and SWRCB. 2005. Battle Creek Salmon and Steelhead Restoration Project final environmental impact statement/environmental impact report. July 2005. URL = http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=99.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
Delta Dredged Sediment Long-Term Management Strategy /Pinole Shoal Management Study	USACE	The Delta Dredged Sediment Long-Term Management Strategy is a cooperative planning effort to coordinate, plan, and implement beneficial reuse of sediments in the Delta. Five agencies USACE, Environmental Protection Agency, DWR, California Bay Delta Authority, and the Central Valley Regional Water Quality Control Board) have begun to examine Delta dredging, reuse, and disposal needs. The strategy development process will examine and coordinate dredging needs and sediment management in the Delta to assist in maintaining and improving channel function (navigation, water conveyance, flood control, and recreation), levee rehabilitation, and ecosystem restoration. Agencies and interested parties will work cooperatively to develop a sediment management plan that is based on sound science and protective of the ecosystem, water supply, and water quality functions of the Delta. As part of this effort, the sediment management plan will consider regulatory process improvements for dredging and dredged material management so that project evaluation is coordinated, efficient, timely, and protective of Delta resources.	Yes	Yes	Yes	USACE website. *Pinole Shoal Management Study/Delta LTMS (O&M).* Site accessed November 9, 2020. https://www.spn.usace.army.mil/Missions/Projects-and-Programs/Projects-A-Z/Pinole-Shoal-Management-Study-Delta-LTMS-O-M-/.
Lower San Joaquin	USACE	The Lower San Joaquin Feasibility Study is intended to determine if there is a federal interest in providing flood risk management and ecosystem restoration improvements along the Lower (northern) San Joaquin River. The Lower San Joaquin River study area includes the San Joaquin River from the Mariposa Bypass downstream to, and including, the city of Stockton. The study area also includes the channels of the San Joaquin River in the southernmost reaches of the Delta: Paradise Cut and Old River as far north as Tracy Boulevard and Middle River as far north as Victoria Canal. The floodplains of the lower San Joaquin River and its tributaries are also included in the study area. Additionally, studies have been funded by grants from the California Delta Conservancy and funds from Reclamation District Number 2062. Currently the effort is being led by the San Joaquin County Resource Conservation District, American Rivers, and the South Delta Water Agency, with the purpose of developing a mitigation strategy to consider and minimize the downstream effects of the future Paradise Cut Flood Bypass Expansion Project.	No	Yes	Yes	San Joaquin Area Flood Control Agency website. Last updated 2009. URL = http://www.sjafca.com/lower_sj_river_feasibility.php. U.S. Army Corps of Engineers Lower San Joaquin River website. URL= https://www.spk.usace.army.mil/lower_sj_river/. CEQAnet. Lower San Joaquin River Feasibility Study. Site accessed November 9, 2020. URL=

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
						https://ceqanet.opr.ca.gov/2010012027/4 South Delta Water Agency website. Site accessed October 20, 2021. URL = https://southdeltawater.org/paradise-cut-expansion Paradise Cut Conservation and Flood Management Project, Phase 2: Bond Accountability website. Site accessed October 20, 2021. URL = https://bondaccountability.resources.ca.gov/Project.aspx?ProjectPK=25976&PropositionPK=48.
Sacramento River Bank Protection Project	USACE	Originally authorized by Section 203 of the Flood Control Act of 1960, the Sacramento River Bank Protection Project is a long-term flood risk management project designed to enhance public safety and help protect property along the Sacramento River and its tributaries. While the original authorization approved the rehabilitation of 430,000 linear feet of levee, the 1974 Water Resources Development Act added 405,000 linear feet to the authorization and a 2007 bill authorized another 80,000 linear feet for a total of 915,000 linear feet of project. USACE is set to release a Post Authorization Change Report, including an EIS, to address the effects of the latest authorization. The USACE Sacramento District is responsible for implementation of the project in conjunction with its nonfederal partner, the California CVFPB. A Final Post Authorization Change Report and Final EIS/EIR were released in April and March 2020, respectively.	No	Yes	Yes	U.S. Army Corps of Engineers website. Site accessed April 2, 2021. URL = https://www.spk.usace.army.mil/Missions/Civil-Works/Sacramento-River-Bank-Protection/.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
Suisun Bay Channel Operations and Maintenance	USACE	The project is located 30 miles northeast of San Francisco and is part of the San Francisco Bay to Stockton Ship Channel. The project provides for annual maintenance dredging of the main channel, 300 feet wide and -35 feet deep at mean lower low water, from the Carquinez Strait at Martinez to Pittsburg (called Suisun Bay Channel), and maintenance dredging of New York Slough Channel farther upstream to Antioch (a distance of 17 miles). The project also provides annual maintenance dredging for a channel 250 feet wide and -20 feet deep south of Seal Islands, from the main channel at Point Edith to the main channel again at Port Chicago at mile 6.	Yes	Yes	Yes	USACE website. *Suisun Bay Channel Operations and Maintenance.* Site accessed November 9, 2020. URL = https://www.spn.usace.army.mil/Missions/Projects-and-Programs/Projects-by-Category/Projects-for-Navigable-Waterways/Suisun-Bay-Channel----/.
Suisun Channel (Slough) Operation and Maintenance	USACE	The Suisun Channel connects the City of Suisun near Fairfield, California to Grizzly Bay and thus to Suisun Bay 30 miles northeast of San Francisco. Project operations and maintenance provides for maintenance dredging of an entrance channel in Suisun Bay 200 feet wide and -8 feet deep, and thence a channel 100 to 125 feet wide and -8 feet deep for 13 miles to the head of navigation at City of Suisun, with a turning basin. This shallow draft channel is maintained on an infrequent basis.	Yes	Yes	Yes	USACE website. *Suisun Channel (Slough) Operations and Maintenance.* Site accessed November 9, 2020. URL = https://www.spn.usace.army.mil/Missions/Projects-and-Programs/Projects-by-Category/Projects-for-Navigable-Waterways/Suisun-Channel-Slough----/#:~:text=Project%20Operations%20and%20Maintenance%20(O%26M,8%20feet%20MLLW%2C%20and%20a.
San Francisco Bay to Stockton Deep Water Ship Channel Project	USACE, Port of Stockton, and Contra Costa County Water Agency	The San Francisco Bay to Stockton Deep Water Ship Channel Project is a congressionally authorized project being implemented by USACE, the Port of Stockton, and Contra Costa County Water Agency. A joint EIS/EIR will evaluate the action of navigational improvements to the Stockton Deep Water Ship Channel. A General Reevaluation Report and EIS, both released in January 2020, determined the feasibility of modifying the current dimensions of the West Richmond, Pinole Shoal, Suisun Bay, and Stockton	No	No	Yes	USACE website. *San Francisco Bay to Stockton (JFB).* Site accessed November 9, 2020. URL = https://www.spn.usace.army.mil/Missions/Projects-and-Programs/Projects-by-

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		Ship Channels, which are currently maintained to 35 feet and provide access to oil terminals, industry in Pittsburg, and the Port of Stockton. The proposed action consists of altering the depth of the deep draft navigation route.				Category/Projects-for-Navigable-Waterways/San-Francisco-Bay-to-Stockton-JFB-/.
Sacramento Deep Water Ship Channel Project	USACE and Port of Sacramento	The Sacramento River Deep Water Ship Channel Project is a Congressionally authorized project being implemented by USACE and the Port of Sacramento. The proposed project would complete the deepening and widening of the navigation channel to its authorized depth of 35 feet. Deepening of the existing ship channel is anticipated to allow for movement of cargo via larger, deeper draft vessels. Widening portions of the channel would increase navigational safety by increasing maneuverability. The 46.5-mile-long ship channel lies within Contra Costa, Solano, Sacramento, and Yolo counties and serves the marine terminal facilities at the Port of Sacramento. The Sacramento Deep Water Ship Channel joins the existing 35-feet-deep channel at New York Slough, thereby affording the Port of Sacramento access to San Francisco Bay Area harbors and the Pacific Ocean. The project has been on hold since 2014.	No	No	Yes	USACE website. *Sacramento River Deep Water Ship Channel.* Site accessed November 9, 2020. URL = https://www.spn.usace.army.mil/Missions/Projects-and-Programs/Projects-A-Z/Sacramento-River-Deep-Water-Ship-Channel-C/#:~:text=PROJECT%20LOCATION%20AND%20DESCRIPTION,harbors%20and%20the%20Pacific%20Ocean.
Shasta Lake Water Resources Investigation	Reclamation	The Shasta Lake Water Resources Investigation is currently being undertaken by Reclamation to determine the type and extent of federal interest in a multiple purpose plan to modify Shasta Dam and Reservoir to increase survival of anadromous fish populations in the upper Sacramento River; increase water supplies and water supply reliability to agricultural, municipal and industrial, and environmental purposes; and, to the extent possible through meeting these objectives, include features to benefit other identified ecosystem, flood damage reduction, and related water resources needs, consistent with the objectives of the CALFED Bay Delta Program. Anticipated alternatives for expansion of Shasta Lake include, among other features, raising the dam from 6.5 to 18.5 feet above current elevation, which would result in additional storage capacity of 256,000 to 634,000 acre-feet, respectively. The increased capacity is expected to improve water supply reliability and increase the coldwater pool, which would provide improved water temperature conditions for anadromous fish in the Sacramento River downstream of the dam.	No	No	No	Reclamation. 2015. *Final Feasibility Report and Appendices.* August. Site accessed November 9, 2020. URL = https://www.usbr.gov/mp/slwri/ Reclamation. 2015. *Final EIS and Appendices.* August. Site accessed November 9, 2020. URL = https://www.usbr.gov/mp/slwri/.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		Reclamation prepared a Draft Supplemental EIS to address new and updated information that has come available since the publication of the Final and Draft EIS. The draft supplemental includes updated information on the potential impacts of the project to waters of the United States, a revision of the wild and scenic river considerations for the McCloud River that refocuses on federal requirements, and updated modeling to reflect the operational changes to Shasta Dam in the 2019 BiOps issued by the USFWS and NMFS. The draft supplement was available for public comment through October 5, 2020.				
San Luis Reservoir Low Point Improvement	Reclamation, Santa Clara Valley Water District, and San Luis and Delta Mendota Water Authority	Reclamation and DWR jointly manage San Luis Reservoir for the purpose of storing and reregulating CVP and SWP water from the Delta. San Luis Reservoir is an off-stream water storage facility that stores water for both projects. In 2000, the CALFED Programmatic Record of Decision identified the need to resolve the low point problem to potentially increase use of water from San Luis Reservoir by up to 200,000 acre-feet. The San Luis Reservoir Low Point Project is designed to address water supply reliability issues in San Luis Reservoir that result when water levels fall below 369 feet above sea level (corresponding to a reservoir capacity of 300,000 acre-feet) and create water quality degradation that has the potential to interrupt a portion of the San Felipe Division's water supply. The term "low point" refers to a range of minimum pool elevations in San Luis Reservoir. During the late summer months if the reservoir elevation drops below 369 feet above sea level, the conditions in San Luis Reservoir promote the growth of algae in the reservoir. The water quality during the algal blooms is not suitable for agricultural water users with drip irrigation systems in San Benito County or municipal and industrial water users relying on existing water treatment facilities in Santa Clara County. The low point issue increases progressively as the reservoir continues to drop below elevation 369 feet. This creates a risk for the San Felipe Division contractors because they rely on San Luis Reservoir for receiving their CVP allocation.	No	No	Yes	Reclamation website. San Luis Reservoir Low Point Improvement Project. Site accessed November 10, 2020. URL = http://www.usbr.gov/mp/sllpp/index.html.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
San Luis Reservoir Expansion Project B.F. Sisk Dam Safety of Dams Modification Project	Reclamation, San Luis & Delta Mendota Water Authority DWR	In 2006 Reclamation initiated a Safety of Dams Corrective Action Study to determine actions to reduce seismic risks at the dam.	No	Yes	Yes	U.S. Bureau of Reclamation, Mid-Pacific Region. 2013. *San Luis Reservoir Expansion, Draft Appraisal Report, Central Valley Project, California*. December.
B.F. Sisk Dam Raise and Reservoir Expansion Project	U.S. Bureau of Reclamation, San Luis & Delta Mendota Water Authority	The project will lower seismic risks and reduce downstream public safety concerns by raising the dam crest by 12 feet, adding shear-keys, and installing downstream stability dams to address bank instability during a seismic event. The Final EIS was released in August 2019, with a Record of Decision posted in December 2019. A supplemental EIS was released in July 2021 with a FONSI and signed in August 2021. Currently, the project is undergoing facility feasibility studies and reviews, final design, and economic, environmental, and geologic assessments. The final project is projected to cost 1.1 billion dollars.	No	No	Yes	Reclamation website. *B.F. Sisk Dam Raise and Reservoir Expansion Project.* Site accessed November 23, 2021. URL= https://www.usbr.gov/mp/sod/projects/sisk/
Delta-Mendota Canal Recirculation Feasibility Study	Reclamation and DWR	Delta Mendota Canal recirculation is a concept under study by Reclamation and DWR to augment San Joaquin River flows with Delta water to reduce salinity and to maintain adequate flows required for beneficial uses. To accomplish this, the study is investigating options for recirculating water pumped from the Jones Pumping Plant, located in the south Delta near Tracy, through the Delta Mendota Canal for release to the San Joaquin River. These releases would reach the San Joaquin River and eventually the south Delta via an existing wasteway or a yet to be identified route. The purpose of the study is to meet certain requirements of PL 108-361 and D-1641. The study has been proposed as a way "to provide flow, reduce salinity concentrations into the San Joaquin River, and reduce the reliance on the New Melones Reservoir for meeting water quality and fishery flow objectives through the use of excess capacity in export pumping and conveyance facilities" consistent with PL 108-361, Title 1, Section 103. A plan formulation report was released in January 2010 and updated in September 2010.	No	No	No	Reclamation website. Site accessed November 9, 2020. URL = http://www.usbr.gov/mp/dmcrecirc/index.html.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
Sacramento Valley Water Management Plan	Reclamation and DWR	In 1997, the State Water Board issued a notice of the water rights hearings to allocate responsibility for meeting the 1995 Delta WQCP objectives. Because the issues were so complex, the State Water Board divided the water rights proceedings into eight phases. Phase 8 was to allocate responsibility for satisfying the flow-related water quality objectives of the 1995 Delta WQCP among water right holders in the watersheds of the Sacramento, Cosumnes, and Calaveras Rivers. To avoid the consequences of delay associated with resolving Phase 8 issues, over 40 water suppliers in the Sacramento Valley, DWR, Reclamation, and the Downstream Water Users developed a cooperative water management partnership to better manage water and provide a mechanism for satisfying Bay-Delta water quality and flow objectives. This partnership led to the development of the Short-Term Settlement Agreement which continues the commitment of Reclamation and DWR to meet the State Water Board D-1641 flow-related standards and provides for a collaborative process among the parties to develop projects to meet water supply, water quality, and environmental needs in the Sacramento Valley, Bay-Delta, and throughout California. As a result of the parties' commitment, on January 31, 2003, the State Water Board dismissed Phase 8 of the Bay-Delta Hearings. The 2010/2011 Regional Water Management Plan Annual Update focused on changes to water management practices, monitoring programs, individual water budgets, and new and proposed projects. It also reviewed baseline conditions and Quantifiable Objectives and Targeted Benefits. As part of the agreement, 185,000 acre-feet of capacity is to be provided within 3 years of implementing the agreement to assist with meeting local and WQCP requirements as well as south of Delta needs. As part of the agreement, the parties agreed to further the objective to meet unmet water demands in the Sacramento Valley by providing at least 92,500 acre-feet, and up to a total of 185,000 acre-feet to support SWP and CVP water supplies during certain water year types. This would be accomplished through increased groundwater use and reservoir reoperation in lieu of river diversions.	No	No	No	Northern California Water Association website. *Sacramento Valley Water Management Agreement.* Site accessed November 9, 2020. URL = https://norcalwater.org/efficient-water-management/efficient-water-management-regional-sustainability/regional-planning/sacramento-valley-water-management-agreement/.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
Upper San Joaquin River Basin Storage Investigation	Reclamation and DWR	The Upper San Joaquin River Basin Storage Investigation is intended to examine how Upper San Joaquin Storage can enhance the San Joaquin River restoration efforts and improve water supply reliability for agricultural, municipal and industrial, and environmental uses in the Friant Division, the San Joaquin Valley, and other regions of the state. The Investigation also will evaluate integration of conjunctive management and water transfer concepts into project formulations. Additional storage is also expected to provide flood damage reduction benefits. DWR, Reclamation, and their partners have developed a two-phase Plan of Study. Phase 1 will identify water resource opportunities and issues in the Upper San Joaquin River watershed. This phase will include an appraisal of opportunities to increase surface storage and conjunctive uses for groundwater. Phase 2 will be more detailed and will begin with public meetings to determine the scope of the study. DWR and Reclamation will work with the public and key local, state and federal agencies, coordinate related activities, and present technical findings. Public involvement will be open and will guide the agencies' planning efforts. The objectives of the investigations are to: contribute to restoration of the San Joaquin River, improve water quality of the San Joaquin River, and facilitate additional conjunctive management and water exchanges that improve the quality of water deliveries to urban communities. To the extent possible, the Upper San Joaquin River Basin Storage Investigation will explore opportunities to provide other benefits that could include hydropower, flood control, and recreation. Reclamation released a Draft Feasibility Report and Draft EIS in 2014.	No	No	No	Reclamation. May 29, 2009. *Letter - Plan Formulation Report for the Upper San Joaquin River Basin Storage Investigation.* Reclamation and DWR. October 2008. *Upper San Joaquin River Basin Storage Investigation Plan Formulation Report.* Reclamation website. *Upper San Joaquin River Basin Storage Investigation.* Site accessed November 9, 2020. URL= https://www.usbr.gov/mp/sccao/storage/.
Grassland Bypass Project	Reclamation and San Luis & Delta Mendota Water Authority	The purposes and objectives of the proposed continuation of the Grassland Bypass Project are: To extend the San Luis Drain Use Agreement in order to allow the Grassland Basin Drainers time to acquire funds and develop feasible drainwater treatment technology to meet revised Basin Plan objectives (amendment underway) and Waste Discharge Requirements;	Yes	Yes	Yes	USBR and SLDMWA. August 2009. *Grassland Bypass Project, 2010–2019 Final Environmental Impact Statement and Environmental Impact Report.*

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		To continue the separation of unusable agricultural drainage water discharged from the Grassland Drainage Area from wetland water supply conveyance channels; and To facilitate drainage management that maintains the viability of agriculture in the project area and promotes continuous improvement in water quality in the San Joaquin River. The project would continue the present drainwater conveyance using the Drain with discharge of a portion of the collected drainwater to Mud Slough. New features include negotiation with the Reclamation and other interested parties for a 2010 Use Agreement for the Drain, to include an updated compliance monitoring plan, revised selenium and salinity load limits, an enhanced incentive performance fee system, a new Waste Discharge Requirement from the Regional Board, and mitigation for continued discharge to Mud Slough. In-Valley treatment/drainage reuse at the San Joaquin River Water Quality Improvement Project facility would be expanded to 6,900 acres.				Reclamation. 2019. *10-Year Use Agreement for the San Luis & Delta-Mendota Water Authority Long-Term Storm Water Management Plan for the Grasslands Drainage Area. Draft Environmental Assessment.* December. Site accessed December 8, 2021. URL= https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=41544
Agricultural Drainage Selenium Management Program Plan	Reclamation and San Luis & Delta-Mendota Water Authority	Impairment of water quality in the San Joaquin River, the Delta, and San Francisco Bay has resulted in the completion of a TMDL for selenium in the lower San Joaquin River, listing of the western Delta as having impaired water quality for selenium, and initiation of a TMDL study for selenium in North San Francisco Bay. The overall goal of the Agricultural Drainage Selenium Management Program is to minimize discharges of selenium in subsurface agricultural drainage from the western San Joaquin Valley to the river and downstream areas. Actions being taken include reduction in the generation of agricultural drainage containing elevated levels of selenium (through land and irrigation management practices) and limiting where and when the drainage water can be discharged.	Yes	Yes	Yes	CVRWQCB. 2001. *Total Maximum Daily Load for Selenium in the Lower San Joaquin River.* Sacramento, California. Staff Report. August. Reclamation and San Luis & Delta-Mendota Water Authority. 2008. *Grassland Bypass Project, 2010–2019 Environmental Impact Statement and Environmental Impact Report.* December. Reclamation. 2006. *San Luis Drainage Feature Re-evaluation Final Environmental Impact*

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						Statement. May. Mid-Pacific Region, Sacramento, California. SFBRWQCB website. Site accessed November 9, 2020. URL = http://www.swrcb.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/seleniumtmdl.shtml. DWR website. *Agricultural Drainage.* Site accessed November 9, 2020. URL= https://water.ca.gov/Programs/All-Programs/Agricultural-Drainage.
Anadromous Fish Screen Program	Reclamation and USFWS	The primary objective of the Anadromous Fish Screen Program (AFSP) is to protect juvenile Chinook salmon (all runs), steelhead, green and white sturgeon, striped bass and American shad from entrainment at priority diversions throughout the Central Valley. Section 3406 (b)(21) of the CVP Improvement Act requires the Secretary of the Interior to assist the State of California in developing and implementing measures to avoid losses of juvenile anadromous fish resulting from unscreened or inadequately screened diversions on the Sacramento and San Joaquin Rivers, their tributaries, the Delta, and the Suisun Marsh. Additionally, all Anadromous Fish Screen Program projects meet Goal 3 of the CALFED Ecosystem Restoration Program Draft Stage 1 Implementation Plan.	Yes	Yes	Yes	USFWS website. *The Anadromous Fish Screen Program.* Site accessed November 10, 2020. URL = http://www.fws.gov/cno/fisheries/cvpia/AnadromFishScreen.cfm.
Folsom Dam Safety and Flood Damage Reduction Project	Reclamation, USACE, Sacramento Area Flood Control Agency, and CVFPB	The project represents a coordinated effort among Reclamation and USACE to address dam safety and enhanced flood control at Folsom Dam. The project includes the Joint Federal Project Auxiliary Spillway, seismic improvements to the Main Concrete Dam and Mormon Island Auxiliary Dam, static improvements to earthen structures, security upgrades,	Yes	Yes	Yes	USBR, USACE, SAFCA, and CVFPB. March 2007. *Folsom Dam Safety and Flood Damage Reduction Final Environmental Impact*

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		replacement of the Main Concrete Dam spillway gates, and a 3.5-foot raise to all Folsom Facility structures. Construction on the auxiliary spillway began in 2008 and was mostly completed in 2017. The modifications to the dam allow for the release of water sooner than is now possible, with the potential for higher releases should the downstream levees be improved to accommodate the increased flows. These larger, earlier releases from Folsom Reservoir would create and conserve flood storage space based on projected reservoir inflows resulting from a major storm impacting the upper American River watershed. However, the modifications would be operated using existing criteria until the completion of a revised Folsom Water Control manual and supporting supplemental environmental compliance documentation. The manual would be completed one year prior to completion of proposed structural modifications at Folsom Dam and Reservoir, at which time the full potential benefits of the proposed modifications would be realized. In April 2020, the USACE, Sacramento District intended to prepare a Draft Supplemental Joint EIS/EIR for the 2007 Folsom Dam Safety and Flood Damage Reduction EIS/EIR (and the 2017 Folsom Dam Raise Project Final Supplemental EIS/EIR.				*Statement/Environmental Impact Report.* Reclamation website. *Folsom Dam Safety and Flood Damage Reduction Project.* Site accessed November 10, 2020. URL= https://www.usbr.gov/mp/sod/projects/folsom/.
San Joaquin River Restoration Program	Reclamation, USFWS, NMFS, DWR, and CDFW	The San Joaquin River Restoration Program is a comprehensive long-term effort to restore flows to the San Joaquin River from Friant Dam to the confluence of Merced River and restore a self-sustaining Chinook salmon fishery in the river while reducing or avoiding adverse water supply impacts from restoration flows. The restoration program is the product of more than 18 years of litigation, which culminated in a Stipulation of Settlement on the lawsuit known as NRDC, et al., v. Kirk Rodgers, et al. The settling parties reached agreement on the terms and conditions of the settlement, which was subsequently approved by Federal Court on October 23, 2006. The settling parties include the Natural Resources Defense Council, Friant Water Users Authority, and the U.S. Departments of the Interior and Commerce. The settlement's two primary goals are to: (1) Restore and maintain fish populations in "good condition" in the main stem of the San Joaquin River below Friant Dam to the confluence of the	Yes	Yes	Yes	San Joaquin River Restoration Program website. Site accessed November 10, 2020. URL = http://www.restoresjr.net/. National Marine Fisheries Service website. *San Joaquin River Restoration*. Site accessed July 28, 2021. URL = https://www.fisheries.noaa.gov/west-coast/habitat-conservation/san-joaquin-river-restoration

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish; and (2) Reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in the settlement. The settlement requires specific releases of water from Friant Dam to the confluence of the Merced River, which are designed primarily to meet the various life stage needs for spring- and fall-run Chinook salmon. The release schedule assumes continuation of the current average Friant Dam release of 116,741 acre-feet, with additional flow requirements depending on the year type. Interim flows began in October 2009, and full restoration flows would begin no later than January 2014. Salmon will be reintroduced in the upper reaches no later than December 31, 2012. There are many physical improvements within and near the San Joaquin River that will be undertaken to fully achieve the river restoration goal. The improvements will occur in two separate phases that will focus on a combination of water releases from Friant Dam, as well as structural and channel improvements. A Fisheries Management Plan, Framework, and Monitoring Plan have also been developed from 2010 to 2018 to support establishing self-sustaining spring-run and fall-run Chinook. The project was authorized and funded with the passage of San Joaquin River Restoration Settlement Act, part of the Omnibus Public Land Management Act of 2009 (Public Law 111-11).				
Ballast Water Management Program	U.S. Coast Guard (Coast Guard)	In July 2004, the Coast Guard established a ballast water management program for all vessels equipped with ballast water tanks that enter or operate within U.S. waters. This program requires vessels to maintain a ballast water management plan that is specific for that vessel and allows any master or appropriate official to understand and execute the ballast water management strategy for that vessel. The Coast Guard may impose a civil penalty if ships headed to the U.S. fail to submit a ballast water management reporting form. The National Invasive Species Act (NISA) required the Coast Guard to establish national voluntary ballast water management guidelines. If the	Yes	Yes	Yes	U.S. Coast Guard website. *Ballast Water Management.* Site accessed November 10, 2020. URL = https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Commercial-Regulations-standards-CG-5PS/Office-of-Operating-and-

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		guidelines were deemed inadequate, NISA directed the Coast Guard to convert them into a mandatory national program. To comply with NISA, the Coast Guard has established both regulations and guidelines to prevent the introduction of these species because the original voluntary guidelines were deemed inadequate prior to establishing the regulations.				Environmental-Standards/Environmental-Standards/General-Information/.
2019 NMFS Biological Opinion on the Long-term Operations of the Central Valley Project and State Water Project	U.S. Department of Commerce, NMFS, Reclamation, and DWR	On October 21, 2019, NMFS issued a final BiOp finding that continued operations of the CVP/SWP is not likely jeopardize several listed species, including Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, Southern Distinct Population Segment of North American green sturgeon, and Southern Resident killer whales. The BiOp effective through December 31, 2030. In its final 2009 BiOp, NMFS identified an RPA that, if implemented, is believed to avoid the likelihood of jeopardizing the continued existence of these listed species. Reclamation's 2019 proposed action includes changes that have similar objectives or goals as the 2009 RPA. The following summarizes the actions identified in the RPA that would be undertaken by Reclamation and/or DWR. • Manage water temperature and water storage in Shasta Reservoir to benefit winter-run Chinook salmon in the Sacramento River. • Provide flows and adequate water temperatures in Clear Creek to benefit spring-run Chinook salmon • Improve juvenile salmonids rearing habitat in the lower Sacramento River and northern Delta • Improve survival of migrating juveniles by implementing additional gate closures at the Delta Cross Channel • Limit the strength of reverse flows in Old and Middle Rivers to reduce entrainment of juvenile fish into the state and federal export facilities in the south Delta • Implement facility improvements at the state and federal export facilities to increase fish survival	Yes	Yes	Yes	NMFS. 2019. *Biological Opinion on the Long-Term Operations of the Central Valley Project and State Water Project.* October 21, 2009.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		• Implement measures, including a fish study using acoustic tags, to improve the ability to increase survival of juvenile steelhead migrating from the San Joaquin River basin • Implement a flow management standard, temperature management plan, and facility modifications to improve conditions for steelhead in the American River • Implement a new year-round minimum flow regime that improves conditions for steelhead in the Stanislaus River • Complete a Hatchery Genetic Management Plan to increase and stabilize the prey base for Southern Resident killer whales • Provide long-term fish passage at Keswick and Shasta dams on the Sacramento River, Nimbus and Folsom dams on the American River, and New Melones Dam on the Stanislaus River The final BiOp also identified research, monitoring, and reporting requirements.				
2019 USFWS Biological Opinion on the Long-Term Operations of the Central Valley Project and State Water Project (delta smelt)	Reclamation, USFWS, and DWR	On October 21, 2019, USFWS delivered its BiOp to the U.S. Bureau of Reclamation on the effects of the continued operation of the federal CVP and the SWP on the delta smelt and its designated critical habitat. USFWS determined that the continued operation of these two water projects is not likely to jeopardize the continued existence of the delta smelt and is not likely to destroy or adversely modify its critical habitat. The 2008 BiOp RPA included actions to reduce entrainment, provide for increased high quality low-salinity habitat in certain year types, create additional subtidal habitat and monitor ongoing operations. The current proposed action includes similar actions to the RPA to address entrainment risk, reduced habitat quality, and habitat restoration as articulated in the Effects Analysis. The proposed action addresses the stressors identified in 2008 RPA and in the Effects Analysis in a manner that is protective of delta smelt.	Yes	Yes	Yes	USFWS. 2019.*Biological Opinion for the Reinitiation of Consultation on the Coordinated Operations of the Central Valley Project (CVP) and State Water Project (SWP).* Sacramento, California.

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North American Waterfowl Management Plan	USFWS	The North American Waterfowl Management Plan, a collaboration of Canada, the United States, and Mexico to enhance waterfowl populations, was originally written in 1986 and envisioned as a 15-year effort to achieve landscape conditions that could sustain waterfowl populations. The plan has been modified twice since the 1986 Plan to account for biological, sociological, and economic changes that influence the status of waterfowl and the conduct of cooperative habitat conservation. This 2018 Plan Update presents examples of progress toward achieving the goals of the 2012 Revision. It also establishes important groundwork for incorporating an understanding of people's relationship with nature into the North American waterfowl conservation enterprise.	Yes	Yes	Yes	USFWS. 2018. *North American Waterfowl Management Plan Update: Connecting People, Waterfowl and Wetlands.* Site accessed November 10, 2020. URL= https://www.fws.gov/migratorybirds/pdf/management/NAWMP/2018NAWMP.pdf.
Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan	USFWS	USFWS published a final Comprehensive Conservation Plan for Stone Lakes National Wildlife Refuge in January 2007 to describe the selected alternative for managing Stone Lakes National Wildlife Refuge for the next 15 years. The refuge is located about 10 miles south of Sacramento, straddling I-5 and extending south from Freeport to Lost Slough. Under the plan, the Refuge will continue its focus of providing wintering habitat for migratory birds and management to benefit endangered species. Management programs for migratory birds and other Central Valley wildlife will be expanded and improved and public use opportunities will also be expanded. The number of refuge units open to the public will increase from one to five. In addition, environmental education, interpretation, wildlife observation, wildlife photography, hunting, and fishing programs will be expanded. The plan achieves the refuge's purposes, vision, and goals; contributes to the Refuge System mission; addresses the significant issues and relevant mandates; and is consistent with principles of sound fish and wildlife management.	Yes	Yes	Yes	USFWS. January 2007. *Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan.* Site updated on February 5, 2019. Site accessed November 10, 2020. URL = https://www.fws.gov/refuge/Stone_Lakes/what_we_do/planning.html.

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Recovery Plan for the Sacramento-San Joaquin Delta Native Fishes	USFWS	The recovery plan addresses the recovery needs for several fishes that occupy the Delta, including delta smelt, Sacramento splittail, longfin smelt, green sturgeon, Chinook salmon (spring-run, late fall-run, and San Joaquin fall-run), and Sacramento perch (believed to be extirpated). The objective of the plan is to establish self-sustaining populations of these species that will persist indefinitely. This would be accomplished by managing the estuary to provide better habitat for aquatic life in general and for the fish addressed by the plan. Recovery actions include tasks such as increasing freshwater flows; reducing entrainment losses to water diversions; reducing the effects of dredging, contaminants, and harvest; developing additional shallow-water habitat, riparian vegetation zones, and tidal marsh; reducing effects of toxic substances from urban non-point sources; reducing the effects of introduced species; and conducting research and monitoring.	Yes	Yes	Yes	U.S. Department of the Interior, Fish and Wildlife Service, 1996. *Recovery Plan for the Sacramento/ San Joaquin Delta Native Fishes*. November.
San Joaquin Basin Action Plan	Reclamation, USFWS, and CDFW	The San Joaquin Basin Action Plan is a cooperative agreement between Reclamation, USFWS, and CDFW to jointly develop a habitat acquisition and wetland enhancement project on approximately 23,500 acres of lands within the Northern San Joaquin River Basin. The plan was created in 1989 to meet Kesterson Reservoir mitigation needs. Water supply for Level 4 will be acquired under CVPIA Section 3406(d)(5).	Yes	Yes	Yes	Reclamation website. *Environmental Documents for Section 3406(d) water*. Site accessed November 10, 2020. URL = http://www.usbr.gov/mp/cvpia/3406d/env_docs/index.html.
Lower American River Temperature Reduction Modeling Project	USFWS, Anadromous Fish Restoration Program; Reclamation; Sacramento Water Forum	The objective of the Lower American River Temperature Reduction Modeling Project is to develop predictive tools that will: (1) Reduce uncertainties in the performance of identified temperature control actions that could be implemented to improve the management of cold-water resources in the Folsom/Natoma Reservoir system and the lower American River, and (2) Be available for daily operations, planning, and salmon and steelhead habitat studies by other project operators and other interested parties. The project adapted, calibrated, and verified existing thermodynamic and hydrologic mathematical models for application at Folsom Reservoir, Lake Natoma and the lower American River. The models were used to assess	Yes	Yes	Yes	Reclamation, USFWS, and Sacramento Water Forum. 2007. *Temperature Modeling of Folsom Lake, Lake Natoma, and the Lower American River.* Prepared by the Bureau of Reclamation Technical Service Center. April 2007. Site accessed November 10, 2020. URL = https://www.usbr.gov/tsc/te

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		the effectiveness of the identified actions individually and in combination in order to support a recommendation as to the development and implementation of one or more actions for the purpose of reducing temperatures in the lower American River. The actions identified to improve transport of cold water through Lake Natoma and reduce the temperature of the lower American River included: a Nimbus Dam curtain, a Lake Natoma plunge zone curtain, Nimbus powerplant debris wall removal, dredging Lake Natoma, and modifying Folsom Powerplant peak loading operation.				chreferences/hydraulics_lab/pubs/PAP/PAP-1084.pdf. Water Forum. 2019. LAR FISH Plan Action Update. Draft. Site accessed November 10, 2020. URL= https://www.waterforum.org/wp-content/uploads/2019/08/FISH-Plan-2019-Action-Update-Draft-Report-8.219.pdf.
Delta Fish Species Conservation Hatchery	USFWS, Reclamation, DWR, and CDFW	Reclamation proposes to partner with DWR to construct and operate a conservation hatchery for Delta smelt at Rio Vista by 2030. The conservation hatchery would breed and propagate a stock of fish with equivalent genetic resources of the native stock and at sufficient quantities to effectively augment the existing wild population, so that they can be returned to the wild to reproduce naturally in their habitat. Federal agencies expect to partner with the State and local agencies in conducting initial engineering design, site demolition and preparation activities, planning and environmental compliance consultation, and other activities. In addition to the conservation hatchery, DWR commits continued support of the operation and research being conducted by the University of California, Davis, Fish Conservation and Culture Laboratory (FCCL) at the existing facility in Byron, CA and a smaller population at the FCCL at Livingston Stone National Fish Hatchery in Shasta, CA.	No	Yes	Yes	U.S. Fish and Wildlife Service website. *Bay-Delta Fishery Resources*. Site accessed November 30, 2021. URL = https://www.fws.gov/sfbaydelta/Fisheries/FisheryResources/Index.htm
UCD Fish Conservation and Cultural Lab	University of California, Davis, California DWR, and Reclamation	The University of California, Davis (U.C. Davis) and DWR, working with federal agencies, operates a program to spawn and rear delta smelt for scientific studies, and develops and improves cultural methods for delta and longfin smelt.	Yes	Yes	Yes	UC Davis website. *Fish Conservation and Culture Laboratory.* Site accessed November 10, 2020. URL = https://fccl.ucdavis.edu/.

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Lower American River Flow Management Standard Implementation	Water Forum and Reclamation	Lower American River flow criteria in the NMFS BiOp described above were developed based on information prepared by the Water Forum and Reclamation, along with the participation of the USFWS, NMFS, and CDFW. The Water Forum has prepared a Draft EIR to reach consensus on the substance of the flow management standard to be included in a joint petition to the State Water Board to amend Reclamation's water right permits. Through management of water temperature and flow, the flow management standard is intended to improve the condition of aquatic resources in the lower American River, particularly fall-run Chinook salmon and steelhead. In addition, the flow management standard would benefit other fish species, the aquatic environment, and the riparian ecosystem of the lower American River corridor. Biological monitoring activities designed to support the flow management standard are currently being conducted by Reclamation and the CDFW.	Yes	Yes	Yes	U.S. Bureau of Reclamation website. Site accessed November 11, 2020. URL = http://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=23261. Water Forum. December 2008. *Flow Management Standard Program: Implementation Plan.*
West Sacramento Levee Improvements Program	West Sacramento Area Flood Control Agency and USACE	The West Sacramento Levee Improvements Program would construct improvements to the levees protecting West Sacramento to meet local and federal flood protection criteria. The program area includes the entire WSAFCA boundaries which encompasses portions of the Sacramento River, the Yolo Bypass, the Sacramento Bypass, and the Sacramento Deep Water Ship Channel. The levee system associated with these waterways includes over 50 miles of levees in Reclamation District Districts 900, 537, and 811; DWR's Maintenance Area 4; and the Deep Water Ship Channel. These levees surround the West Sacramento. For the purposes of this program, the levees have been generally divided into the nine reaches: Sacramento River Levee North, Sacramento River Levee South, Port North Levee, Port South Levee, South Cross Levee, Deep Water Ship Channel Levee East, Deep Water Ship Channel Levee West, Yolo Bypass Levee, and Sacramento Bypass Levee.	Yes	Yes	Yes	USACE website. *West Sacramento General Reevaluation Report.* Site accessed November 11, 2020. URL = https://www.spk.usace.army.mil/Missions/Civil-Works/West-Sacramento/.

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Yolo County Habitat/Natural Community Conservation Plan	Yolo Habitat Conservancy	The Yolo Habitat Conservancy, a Joint Powers Authority, launched the Yolo Natural Heritage Program in March 2007. This effort includes the continuing preparation of a joint HCP/ Natural Community Conservation Plan (HCP/NCCP). Member agencies include Yolo County, City of Davis, City of Woodland, City of West Sacramento, and City of Winters. The HCP/NCCP describes the measures that local agencies will implement to conserve biological resources, obtain permits for urban growth and public infrastructure projects, and continue to maintain the agricultural heritage and productivity of the county. The nearly 653,549-acre planning area provides habitat for covered species occurring within five dominant habitats/natural communities. The plan proposes to address 12 covered species, including seven state-listed species: palmate-bracted bird's beak, giant garter snake, Swainson's hawk, western yellow-billed cuckoo, and bank swallow. The Yolo Habitat Conservancy also consults regularly with CDFW and USFWS, as well as the Conservancy's Advisory Committee and other partners.	Yes	Yes	Yes	Yolo Habitat Conservancy website. *Yolo HCP/NCCP.* Site accessed November 11, 2020. URL = https://www.yolohabitatconservancy.org/about/.
Yolo County Stormwater Management Program	Yolo County, Public Works Division	The Yolo County Stormwater Management Program is composed of six elements: Public Education and Outreach, Public Involvement and Participation, Illicit Discharges, Construction Activities, New Development and Redevelopment, and County Operations. The program provides education, opportunities for participation, requires permanent stormwater best management practices for major development, implements improved control measures at county facilities, and delineates responsibilities. The program was adopted by the Yolo County Board of Supervisors in 1994.	Yes	Yes	Yes	Yolo County. 2003. *Stormwater Management Program (SWMP) Planning Document.* Revised October 2004.
Franklin Bulk Substation	Sacramento Municipal Utility District	This project will construct a new distribution substation with a breaker and a half bus configuration. In addition, the Rancho Seco-Pocket 230 kilovolt No. 1 Line will be looped into the substation and 2-16.2 MVAr of capacitor banks will be installed. The substation will include 5-230 kilovolt circuit breakers and a single 230/69 kilovolt transformer, rated at 224 MVA.	No	Yes	Yes	CEQAnet. *SMUD Franklin Electric Transmission Project Initial Study and Mitigated Negative Declaration Addendum.* Site accessed November 11, 2020. URL=

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						https://ceqanet.opr.ca.gov/2016042050/3.
SBX7 7 Water Conservation Act of 2009	California State Administration	The administration expanded existing programs to provide technical assistance, shared data and information, and incentives to urban and agricultural local and regional water agencies, as well as local governmental agencies, to promote agricultural and urban water conservation in excess of the amounts envisioned by SBX7 7. The administration works collaboratively with interested parties to identify and remove impediments to achieving statewide conservation targets, recycling and stormwater goals; to evaluate and update targets for additional water use efficiency, including consideration of expanding the 20 percent by 2020 targets by holding total urban water consumption at 2000 levels until 2030, achieving even greater per capita reductions in water use. The administration also works with local and regional entities to develop performance measures to evaluate agricultural water management.	Yes	Yes	Yes	DWR website. *SB X7-7.* Site accessed November 11, 2020. URL=https://water.ca.gov/Programs/Water-Use-And-Efficiency/SB-X7-7.
Klamath Basin Restoration Agreement	Klamath Basin interested parties	In April 2016, the U.S. Department of the Interior, U.S. Department of Commerce, PacifiCorp, and the States of Oregon and California signed an agreement that, following a process administered by FERC, is expected to remove four dams on the Klamath River by 2020, amounting to one of the largest river restoration efforts in the nation. State and federal officials also signed a separate agreement with irrigation interests and other parties known as the 2016 Klamath Power and Facilities Agreement. This agreement will help Klamath Basin irrigators avoid potentially adverse financial and regulatory impacts associated with the return of fish runs to the Upper Klamath Basin, which are anticipated after dams are removed. CDFW and the Natural Resources Agency will continue to work with diverse interested parties to implement the Klamath Basin restoration and settlement agreements. Those agreements include measures to improve water quality in the Klamath River, restore anadromous fish runs, including Chinook and Coho salmon, and improve water reliability for agricultural and other uses by providing a drought planning mechanism for low water years. The administration will work with Congress to secure	No	No	Yes	DOI website. *Press releases. Two New Klamath Basin Agreements Carve out Path for Dam Removal and Provide Key Benefits to Irrigators.* April 6, 2016. Site accessed November 11, 2020. URL= https://www.doi.gov/pressreleases/two-new-klamath-basin-agreements-carve-out-path-dam-removal-and-provide-key-benefits.

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		the necessary federal authorizations for the agreements and secure the necessary funding for removal of four hydroelectric dams on the Klamath River and funding for the necessary basin restoration.				
Sites Reservoir/North of the Delta Offstream Storage	Sites Reservoir Authority	By operating in conjunction with other California reservoirs, Sites Reservoir substantially increases water supply flexibility, reliability, and resiliency in drier years. Sites Reservoir is the only proposed storage facility in the State of California that will help with statewide operational effectiveness of the SWP and CVP. Located 10 miles west of the town of Maxwell in rural Glenn and Colusa counties, Sites Reservoir would be an off-stream storage facility that captures and stores stormwater flows in the Sacramento River for release in dry and critical years for environmental use and for California communities, farms and businesses when it is so desperately needed.	No	No	Yes	Sites Project website. Site accessed November 11, 2020. URL= https://sitesproject.org/.
Sustainable Groundwater Management Act	State Water Board, California Department of Toxic Substances Control, DWR	DWR has developed a Strategic Plan for its Sustainable Groundwater Management Program. The program will implement the new and expanded responsibilities identified in the 2014 Sustainable Groundwater Management Act. Some of these expanded responsibilities include: (1) developing regulations to revise groundwater basin boundaries; (2) adopting regulations for evaluating and implementing Groundwater Sustainability Plans and coordination agreements; (3) identifying basins subject to critical conditions of overdraft; (4) identifying water available for groundwater replenishment; and (5) publishing best management practices for the sustainable management of groundwater.	Yes	Yes	Yes	DWR. *Sustainable Groundwater Management Act (SGMA).* Site accessed July 29, 2021. URL = https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management.
Delta Science Plan	Delta Plan Interagency Implementation Committee	The 2019 Delta Science Plan is the first comprehensive update to the 2013 Delta Science Plan. As with the 2013 document, the update process took on an open, transparent, and inclusive approach involving input from a diverse range of federal and state agencies, interested parties, academia, and the public. The actions identified in this updated Plan are intended to promote more forward looking and nimble science and management efforts. They address how to use open and transparent processes to prioritize science activities, determine how these can be carried out	Yes	Yes	Yes	*The 2019 Delta Science Plan.* Site accessed November 11, 2020. URL = https://deltascienceplan.deltacouncil.ca.gov/.

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		effectively and efficiently, and identify how the resulting information is best communicated to those who need it.				
Twitchell Island-San Joaquin Setback Levee Project	DWR	This project would stabilize a threatened section of levee along the San Joaquin River while also creating different habitat types of waterside features to be constructed. In 2000, 2,200 linear feet of the waterside levee was re-contoured and replanted with native vegetation to create shaded riverine aquatic habitat. Additional riparian habitat, intertidal habitat, upland vegetation, and waterside beaches, benches, and undulations are planned in conjunction with an additional 23,000-feet setback along the San Joaquin River.	No	Yes	Yes	DWR website. *California EcoRestore*. Site accessed November 30, 2021. URL = https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Twitchell_Island-_SJ_River_Setback_Levee.pdf
Twitchell Island Mitigation Enhancement Site	DWR	The Twitchell Island Mitigation Enhancement Site is currently in pre-project maintenance, with work on the planting plan and freshwater marsh to begin in summer of 2022. After establishment, the project will contribute 110 advanced mitigation acres to Delta Levee Program participants, and the 70 enhancement acres will continue its current lease.	No	Yes	Yes	DWR website. Delta Ecosystem Enhancement Advance Mitigation. Site accessed October 25, 2021. URL = https://water.ca.gov/Programs/Integrated-Regional-Water-Management/Delta-Ecosystem-Enhancement-Program/Delta-Ecosystem-Enhancement-Advance-Mitigation
Grizzly Slough Floodplain Project at the Cosumnes River Preserve	DWR	The Grizzly Slough Floodplain Restoration Project is one of two main elements of the North Delta Flood Control and Ecosystem Restoration Project that consists of flood management and habitat improvements where the Mokelumne River, Cosumnes River, Dry Creek and Morrison Creeks converge. Flood flows and high-water conditions in this area threaten levees, bridges, and roadways. The North Delta project will reduce flooding and provide contiguous aquatic and floodplain habitat along the downstream portion of the Cosumnes Preserve by modifying levees on Grizzly Slough. Benefits to ecosystem processes, fish and wildlife, will be achieved by recreating floodplain seasonal wetlands and riparian	Yes	Yes	Yes	DWR website. *North Delta Program*. Site accessed November 11, 2020. URL= https://water.ca.gov/Programs/Flood-Management/Delta-Conveyance-And-Flood-Protection/North-Delta-Program.

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		habitat on the Grizzly Slough proper. As of July 28, 2021, the grantee was securing final permits and subcontractors prior to construction.				*California EcoRestore fact sheet. Grizzly Slough Floodplain Project.* Site accessed November 11, 2020. URL = https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Grizzly_Slough_Floodplain_Project.pdf. Proposition 1 Ecosystem Restoration and Water Quality Grant Program Update Staff Report. July 28, 2021. URL = http://deltaconservancy.ca.gov/wp-content/uploads/2021/07/AI-7.1-Proposition-1-Program-Update_7-28-21.pdf
Lower Putah Creek Realignment	CDFW	One of six separate projects identified and implemented to carry out the RPA Actions in the 2009 NMFS BiOp specific to the Yolo Bypass. The project will restore 300-700 acres of tidal freshwater wetlands, creating 5 miles of a new fish channel, improving anadromous fish access to 25 miles of stream, and restoring at least 5,000 square feet of salmon spawning habitat. Connectivity between these habitats will enhance salmonid in migration and spawning as well as rearing and outmigration conditions for smolts. The project will achieve this objective by enhancing habitat within Lower Putah Creek to support the recovery of local fall-run Chinook salmon, steelhead, and Sacramento splittail populations. This project has been identified as one of the projects that will be implemented under California EcoRestore.	No	Yes	Yes	DWR. *EcoRestore 5-year fact sheet.* Site accessed November 11, 2020. URL= https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/EcoRestore/EcoRestore-5YR-Fact-Sheet_ay20.pdf?la=en&hash=BF60A28CC870C32351F807CC11D5C1E35BAC5461.

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Wallace Weir Improvements and Tule Canal Agricultural Crossings	Reclamation District 108, Reclamation, and DWR	One of six separate projects identified and implemented to carry out the RPA Actions in the 2009 NMFS BiOp specific to the Yolo Bypass. The project replaced the seasonal earthen dam at Wallace Weir with a permanent, operable structure that would provide year-round operational control. The project also includes a fish rescue facility that would return fish back to the Sacramento River. Wallace Weir has been treated as a common element to the larger habitat restoration and fish passage projects included in the 2009 NMFS BiOp. This project serves primarily as a fish passage improvement action that will prevent upstream migration of straying adult salmonids and sturgeon into the Colusa Basin Drain. Operational control of water levels provides greater flexibility for managing water releases for agriculture and wetlands habitat. DWR has contracted with RD 108 to develop the project, including acting as the CEQA lead agency. This project has been identified as one of the projects that will be implemented under California EcoRestore.	Yes	Yes	Yes	USFWS website. *The Yolo Bypass.* Site accessed November 11, 2020. URL= https://www.fws.gov/cno/newsroom/Highlights/2018/yolo-bypass-restoration/. Site last updated August 8, 2018. DWR. *EcoRestore 5-year fact sheet.* Site accessed November 11, 2020. URL= https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/EcoRestore/EcoRestore-5YR-Fact-Sheet_ay20.pdf?la=en&hash=BF60A28CC870C32351F807CC11D5C1E35BAC5461.
Prospect Island Tidal Habitat Restoration Project	DWR and CDFW	The northern portion of Prospect Island (about 1,253 acres) is currently owned by the DWR, who acquired the property with the intent of restoring freshwater tidal marshes and associated aquatic habitat. Consistent with the objectives for the refuge, USACE and DWR completed the environmental documentation Mitigated Negative Declaration/Findings of No Significant Impact (MND/FONSI) for a restoration project on Prospect Island in 2001. This project would partially fulfill the 80,000-acre tidal habitat restoration obligation outlined in RPA 4 of the 2019 USFWS BiOp for the effects of long-term coordinated operations of the State Water Project (SWP) and the federal CVP on delta smelt and has been fully funded by the SWP contractors with several restoration activities in the planning process. The Final EIR was certified in 2019.	No	No	Yes	DWR. *Prospect Island Tidal Habitat* *Restoration Project*. Site accessed November 30, 2021. URL= https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Prospect_Island_Tidal_Habitat_Restoration.pdf.

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Tule Red Tidal Restoration Project	State and Federal Contractors Water Agency, DWR, and Westervelt Ecological Services	The Tule Red Tidal Restoration Project is a public-private partnership effort to restore about 460 acres of tidal wetlands in the Suisun Marsh. The project is part of both current restoration requirements for the state and federal water projects and an effort to reconnect land to water in the marsh in order to promote habitat for important native fish species, such as delta smelt and salmon. The Tule Red Tidal Restoration Project is an effort by the State and Federal Contractors Water Agency, a joint powers authority comprised of the export service contractors of the SWP and the CVP. This project has been identified as one of the projects implemented under California EcoRestore and was completed on October 15, 2019.	Yes	Yes	Yes	Westervelt Ecological Services website. Site accessed November 11, 2020. URL = https://wesmitigation.com/tule-red-tidal-restoration-project/. DWR. *EcoRestore 5-year fact sheet.* Site accessed November 30, 2021. URL = https://water.ca.gov/News/Blog/2019/Oct-19/Tule-Red-completion.
McCormack-Williamson Tract Flood Control and Ecosystem Restoration Project	DWR	This project is a part of the North Delta Flood Control and Ecosystem Restoration Project and will implement flood control improvements principally on and around McCormack-Williamson Tract in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes. Flood control improvements are needed to reduce damage to land uses, infrastructure, and the Bay-Delta ecosystem caused by catastrophic levee failures in the project study area. This project has been identified as one of the projects that will be implemented under California EcoRestore.	No	Yes	Yes	DWR website. *North Delta Program.* Site accessed November 11, 2020. URL = https://water.ca.gov/Programs/Flood-Management/Delta-Conveyance-And-Flood-Protection/North-Delta-Program. DWR. *EcoRestore 5-year fact sheet.* Site accessed November 11, 2020. URL= https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/EcoRestore/EcoRestore-5YR-Fact-Sheet_ay20.pdf?la=en&hash=BF60A28CC870C32351F807CC11D5C1E35BAC5461.

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Hill Slough Restoration Project	CDFW	The purpose of the overall project is to restore brackish tidal marsh and associated upland ecotone at the northern Suisun Marsh near the corner of Highway 12 and Grizzly Island Road to benefit endangered as well as migratory and resident species. This project will meet Ecosystem Restoration Program goals and objectives by reducing the risk of entrainment of at-risk, native anadromous species of concern including spring-run and winter-run Chinook salmon, steelhead trout, and green sturgeon, as well as other resident and transitory fish species in the Suisun Bay. The project will also meet goals calling for restoration of tidal brackish marsh that will aid in the recovery of listed plant and wildlife species while contributing to primary productivity in the estuary. This project has been identified as one of the projects that will be implemented under California EcoRestore.	No	Yes	Yes	DWR. *EcoRestore 5-year fact sheet.* Site accessed November 11, 2020. URL= https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/EcoRestore/EcoRestore-5YR-Fact-Sheet_ay20.pdf?la=en&hash=BF60A28CC870C32351F807CC11D5C1E35BAC5461.
Goat Island at Rush Ranch Tidal Marsh Restoration	Solano Land Trust	This project aims to restore tidal marsh habitat by reconnecting and reestablishing tidal marsh hydrology and related physical and ecological processes within and around Goat Island Marsh. This project will be implemented in conjunction with construction of an Interpretive Nature Trail to Goat Island Marsh to offset public access impacts resulting from closure of the levee trail. This project has been identified as one of the projects that will be implemented under California EcoRestore.	No	Yes	Yes	DWR. *Goat Island Tidal Marsh Restoration fact sheet.* Site accessed November 11, 2020. URL = https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Goat_Island.pdf.
Knights Landing Outfall Gates Fish Barrier Project	California Natural Resources Agency	Rehabilitate the outfall gates by repairing known structural deficiencies (including scouring found at the inlet and outlet gates), replacing worn out appurtenances, construct a trash barrier system to protect the gates and ease debris collection, and upgrading the electrical and communication system to include backup capability to meet current USACE operations and maintenance standards This project was one of the projects implemented under California EcoRestore.	Yes	Yes	Yes	DWR. *EcoRestore 5-year fact sheet.* Site accessed November 11, 2020. URL= https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/EcoRestore/EcoRestore-5YR-Fact-Sheet_ay20.pdf?la=en&hash=BF60A28CC870C32351F807CC11D5C1E35BAC5461.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
Lookout Slough Tidal Habitat Restoration and Flood Improvement Project	DWR	The project is designed to be a multi-benefit project to restore approximately 3,100 acres of tidal marsh, increase flood storage and conveyance in the Yolo Bypass, increase levee resilience, and decrease flood risk. Habitat restoration and flood improvement goals would be attained by excavating a network of tidal channels, constructing a new setback levee along Duck Slough, breaching and degrading the Shag Slough (Yolo Bypass West) Levee, breaching the Vogel Levee, and improving the Cache/Hass Slough Levee. On November 3, 2020, the DWR certified the EIR for the Lookout Slough Tidal Habitat Restoration and Flood Improvement Project and filed a Notice of Determination with the Governor's Office of Planning and Research. On July 16, 2021, the DSC, as part of an Appeals of the Certification of Consistency case, remanded DWR on portions of the project which had not provide enough information to be shown as consistent with the Delta Plan. DWR is responsible for providing additional information. However, on July 27, 2021, approval of Permit No. 19477 was granted by the CVFPB under California Code of Regulations, Title 23, Article 3, Section 6 to construct approximately 2.9 miles of a new setback levee along Duck Slough and Liberty Island Road and breach the existing Yolo Bypass levee at Shag Slough. This permitted work would restore and enhance approximately 3,164 acres of upland, tidal, and floodplain habitat.	No	Yes	Yes	DWR. 2021. *Delta Projects.* Site accessed April 2, 2021. URL= https://water.ca.gov/Programs/Environmental-Services/Restoration-Mitigation-Compliance/Delta-Projects. Maven's Notebook website. *Now Available: Final Determination on the Appeals of the Lookout Slough Tidal Habitat Restoration and Flood Improvement Project Certification of Consistency*. Site accessed November 23, 2021. URL = https://mavensnotebook.com/2021/07/17/now-available-final-determination-on-the-appeals-of-the-lookout-slough-tidal-habitat-restoration-and-flood-improvement-project-certification-of-consistency/ CEQA website. *SCH Number 2019039136*. Site accessed July 28, 2021. URL = https://ceqanet.opr.ca.gov/Project/2019039136

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
Decker Island Tidal Habitat Restoration Project	DWR, CDFW	Decker Island is located in the Delta along the Sacramento River. DWR is undertaking the restoration of the Decker Island Tidal Habitat Restoration Project in conjunction with CDFW to enhance roughly 140 acres of established emergent wetland with muted tidal connectivity to Horseshoe Bend, and uplands to fully tidal habitat. Construction began in August 2018 and was completed by mid-November of the same year. CDFW will implement biological monitoring to ensure desired site functions are established and to inform future restoration projects.	Yes	Yes	Yes	DWR. *Decker Island project restores 140 acres of tidal wetland habitat, aims to boost fish survival rates.* Site accessed July 29, 2021. URL = https://water.ca.gov/News/Blog/2018/Nov-18/Decker-Island-Project
SR-239 Project (East Bay – Contra Costa, Alameda, northern San Joaquin Counties)	Contra Costa Transportation Authority, Contra Costa County, Caltrans	The State Route 239 project will provide a new, four-lane highway from State Route 4 at Marsh Creek Road in Contra Costa County to Interstate 580 in Alameda County. This new state route will ultimately improve the transportation network for an area that had few viable north-south roadway connections between East Contra Costa and the Central Valley.	No	Yes	Yes	Contra Costa Transportation Authority. *State Route 239 Project.* Site accessed April 2, 2021. URL = https://ccta.net/projects/state-route-239-project/.
City of Antioch Brackish Water Desalination Project	City of Antioch	The Antioch Brackish Water Desalination Project, which utilizes existing infrastructure to the extent possible, includes the construction of new desalination facilities and associated infrastructure, in order to improve the city's water supply reliability and operational flexibility. Once constructed the desalination facility, located at the existing water treatment plant, will provide for 6 mgd of capacity (producing up to 5,500 AFY, helping the City reduce its purchases of more expensive CCWD water.	No	Yes	Yes	City of Antioch. 2019. *Antioch Brackish Water Desal Project.* Site accessed April 2, 2021. URL = http://www.antiochbrackishdesal.com/.
Three Creeks Parkway Restoration Project	Contra Costa County Flood Control and Water Conservation District	In July 2015, the Contra Costa County Flood Control and Water Conservation District partnered with American Rivers, a nonprofit partner, on the $2 million Three Creeks Parkway Restoration Project in Brentwood, a multi-agency public-private partnership to transform 1/4 mile of the Marsh Creek flood control channel into high quality salmon and riparian habitat, with enhanced public access. Since then, the project has expanded to restore ¾ mile of Marsh Creek and costs approximately $9.0 million. Approximately $5.9 million of outside funding from private, federal, and state agencies has been obtained to date. The Project has multiple local and regional partners including the City of Brentwood, Friends of Marsh Creek Watershed, East Contra Costa County Habitat Conservancy, and East	Yes	Yes	Yes	Contra Costa County. 2021. *Three Creeks Parkway Project.* Site accessed April 2, 2021. URL = https://www.contracosta.ca.gov/5814/Three-Creeks-Parkway-Project.

Project/Program	Primary Agencies	Description	Existing Conditions	No Action	Cumulative	References
		Bay Regional Park District. In 2018, planning and environmental studies were completed, and construction began in June 2020. Phase 1 has been completed.				
Winter Island Tidal Habitat Restoration Project	DWR, CDFW	The Winter Island Tidal Habitat Restoration Project was created to partially fulfill the Fish Restoration Program 8,000-acre tidal habitat restoration obligations of DWR in RPA 4 of the 2019 USFWS BiOp for the effects of the long-term coordinated operations of the SWP and the federal CVP on delta smelt. Because restoration of tidal habitat would provide access for salmonids rearing at Winter Island, the project is also consistent with RPA I.6.1 of the NMFS Salmonid Bipod for SWP/CVP operations. These obligations were upheld in the 2019 Re-evaluation of Consultation published by USFWS and NMFS, with the addition that the Fish Restoration Program now has until 2030 to reach these restoration goals. The project was also established to fulfill FRP's 800-acre mesohaline habitat requirement of CDFW Longfin Smelt ITP for the SWP Delta operations. The primary goal of the project is to restore unrestricted tidal connectivity between the interior of Winter Island and the surrounding channels, which would convert muted tidal emergent wetland and open water habitats into tidal wetland habitat and improve access for the benefit of native fish species. Construction was completed on September 25, 2019.	Yes	Yes	Yes	DWR website. Winter Island Tidal Habitat Restoration Project. URL = https://resources.ca.gov/CNRALegacyFiles/docs/ecorestore/projects/Winter_Island_Tidal_Habitat_Restoration.pdf California Department of Water Resources. 2020. Winter Island Annual Monitoring Report.

Appendix F
Public Involvement

The consultation and coordination actions described in this appendix are presented as they were provided by the California Department of Water Resources (the applicant) in the Delta Conveyance Project Draft Environmental Impact Report Chapter 35, *Public Involvement* (California Department of Water Resources 2022) and therefore is presented from the California Environmental Quality Act perspective. However, the U.S. Army Corps of Engineers relied on this information when preparing its Draft Environmental Impact Statement. All chapter references in this appendix are to those in the Draft EIR. Please refer to the Draft EIR for any information cross referenced.

This chapter discusses California Department of Water Resources' (DWR) completed and planned public involvement activities related to the Delta Conveyance Project environmental review process.

Public participation is a cornerstone of the California Environmental Quality Act (CEQA), with opportunities for public participation required during the environmental review process. During the preparation of the Draft Environmental Impact Report (Draft EIR), DWR provided numerous avenues for public education and involvement.

DWR previously studied two similar projects, the Bay Delta Conservation Plan (BDCP) and California WaterFix, and conducted public participation activities as part of those efforts. The Delta Conveyance Project is a new project and is not supplemental to BDCP or California WaterFix. The public involvement activities being conducted for the Delta Conveyance Project benefits from DWR's prior outreach experience but is a stand-alone process.

35.1 Draft EIR Scoping, Scoping Meetings, and Comments

Scoping is the earliest phase of the environmental review process in which the public is invited to participate. Scoping is also the beginning stage of developing an environmental document under CEQA; it is an opportunity for stakeholders, agencies, and the public to provide comments about what the lead agency should consider when preparing the Draft EIR. The information gathered during scoping is used to help identify the range of project alternatives to be studied, potentially affected geographical areas, resources that may be affected by the project, and the extent of impact assessments, along with recommended mitigation measures. A complete account of the public scoping activities and an overview of comments received during the public scoping process are provided in Appendix 1A, *July 2020 Delta Conveyance Project Scoping Summary Report and December 2020 Addendum A*. The following briefly summarizes scoping activities conducted by DWR.

In accordance with CEQA Guidelines Section 15082, DWR submitted a Notice of Preparation (NOP) to the California Office of Planning and Research via the State Clearinghouse on January 15, 2020 (California Department of Water Resources 2020). The NOP was also provided to federal agencies and other potential responsible and trustee agencies. In addition to the required noticing, DWR provided notice of the scoping period to the public in the following ways: publishing the NOP announcement in seven newspapers of general circulation, posting fliers with the NOP announcement at multiple locations in and around the project area, and directly mailing of a postcard with the NOP announcement to property owners and occupants in or adjacent to the project area. An email notification was sent to 7,320 members of the project mailing list and letters were sent to federal agencies, responsible and trustee agencies, and community groups from the project mailing list. Letters were also mailed to 155 disadvantaged community representatives. Through these notices, the public was also made aware of upcoming scoping meetings.

The scoping period for the Delta Conveyance Project Draft EIR began on January 15, 2020, and closed April 17, 2020. DWR conducted a total of eight public scoping meetings throughout California from February to March 2020. Table 35-1 presents a list of the scoping meeting locations and number of registered attendees (registration was not required so this is not a complete list of all attendees).

Table 35-1. Locations and Dates of Scoping Meetings

Meeting Locations	Date	Registered Attendees
Sacramento—California Environmental Protection Agency Building	February 3, 2020	106
Los Angeles—Junipero Serra State Building	February 5, 2020	43
Walnut Grove—Jean Harvie Community Center	February 10, 2020	124
San Jose—Santa Clara Valley Water District Board Room	February 12, 2020	25
Stockton—San Joaquin Council of Governments Board Room	February 13, 2020	65
Clarksburg—Clarksburg Middle School Auditorium	February 19, 2020	104
Brentwood—Brentwood Community Center Conference Room	February 20, 2020	110
Redding—Sheraton Redding Hotel	March 2, 2020	157

To announce the scoping meetings and encourage public participation, advertisements ran in seven newspapers throughout California and press releases were distributed to media outlets throughout the state for publication. In addition, multiple email notices to over 500 Delta and Southern California environmental justice organizations were sent to encourage participation in the scoping meetings. Informational workshops were held upon request for several environmental justice organizations in advance of the scoping meetings to provide background information regarding the Delta Conveyance Project, the environmental review process, and how to provide scoping comments. The format for the scoping meetings included a brief opening presentation about the project and the purpose of scoping, which was followed by a brief question and answer period. The question and answer period focused on providing clarification about the scoping process and the Draft EIR process overall. For all meetings, the presentation and question and answer portion accounted for roughly 10–15 minutes of the meeting and the remainder of the time was dedicated to gathering public comments. Those who wished to make oral comments were asked to fill out a speaker card. Speakers were called to speak in the order the cards were received. DWR made every effort to accommodate everyone who wanted to speak at the scoping meetings and reminded speakers they could submit written comments if they had additional comments they wished to make. Additionally, meeting attendees who wanted to submit comments could fill out a comment card and turn it in before leaving the meeting or mail it to DWR before the close of the scoping period. DWR provided a Spanish language interpreter at each scoping meeting to provide interpretive services if needed. The interpreters introduced themselves at the start of the meeting to make meeting attendees aware that Spanish language interpretation was available.

35.1.1 Summary of Scoping Comments Received

During the scoping process, individuals, organizations, and agencies submitted more than 2,000 letters, emails, comment cards, transcripts from public meetings, and form letter signatures. Between April 18, 2020, and December 14, 2020, DWR received letters from an additional 47 organizations and individuals. A complete account of comments received during the public scoping process is provided in Appendix 1A, *July 2020 Delta Conveyance Project Scoping Summary Report and December 2020 Addendum A*. Comments from agency representatives and members of the public included the following topics.

- Range of Alternatives
- Biological Resources
- Climate Change
- Water Supply, Surface Water Resources, and Water Quality
- Flood Management
- Tribal Cultural Resources
- Environmental Justice and Disadvantaged Communities
- Agricultural Resources
- Socioeconomics
- Recreation
- Aesthetics/Visual Resources
- Growth
- Community Issues

More detailed information regarding the scoping comments, including the specific comments organized by category and topic, is provided in Appendix 1A, *July 2020 Delta Conveyance Project Scoping Summary Report and December 2020 Addendum A*.

35.1.2 Informational Webinars

To provide information to the public in advance of the release of the Public Draft EIR, DWR hosted a series of informational webinars in the summer and fall of 2021 (videos of the webinars can be found on the DWR website: https://water.ca.gov/deltaconveyance). Because the Draft EIR is comprehensive in breadth and depth of analysis and contains highly technical information that is of interest to the public, the webinars were held to help provide the public with important background information that would be useful in helping the public navigate the Public Draft EIR. The webinars focused on providing information regarding the technical approach, key tools, assumptions, and methodologies being used to analyze potential environmental impacts that could result from the Delta Conveyance Project. The primary topics addressed in this webinar series were:

- State Water Project Operations Overview and Delta Conveyance Project Hydrologic Modeling and Assumptions
- Aquatic Resources Analytical Methods and Assumptions

- Climate Change Analytical Methods and Assumptions
- Environmental Justice Survey Results Overview and CEQA Environmental Justice Evaluation Methodology

Table 35-2. Workshop Dates, Topics, and Attendees

Workshop Topic	Date	Approximate Number of Attendees
Operations of the State Water Project and Delta Conveyance	July 14, 2021	193
Fisheries	August 3, 2021	132
Climate Change	August 25, 2021	148
Environmental Justice	September 16, 2021	128

35.1.3 Public Review of the Public Draft EIR

The Delta Conveyance Project Public Draft EIR will be available for review and comment for a minimum of 90 days following the publication of the notice of completion through the State Clearinghouse. The purpose of public review of the Public Draft EIR is to receive comments from the public on the document's completeness and adequacy in disclosing potential environmental effects of the project. DWR anticipates hosting public meetings to provide information and receive comments on the Public Draft EIR. In addition to comments received at public meetings, DWR anticipates soliciting comments via mail, email, and online comment form. The Public Draft EIR will be made available for review online.

After the close of the public comment period, DWR will review and consider all comments submitted. DWR will make refinements to the Draft EIR in response to agency and public comments and will provide written responses to substantive comments on the contents of the Public Draft EIR.

35.2 Public Outreach Activities

DWR has proactively engaged interested parties, agencies, and individuals interested in the project throughout the CEQA process. Additionally, DWR and California Natural Resources Agency officials encouraged public participation through a variety of approaches to provide an overview of the Delta Conveyance Project and to solicit input during the development of the project.

35.2.1 Project Updates

DWR keeps the public updated about its work through a series of different distribution and media avenues. These sources include blogs, eblasts, flyers, social media posts, videos, and more. The content provided within these sources covers topics such as monthly recaps of work accomplished, upcoming work and associated schedules, highlights of new staff added to the project, and detailed answers to commonly asked questions. Additionally, DWR representatives attend a variety of public meetings to provide regular updates and briefings. Table 35-3 includes a list of organizations the DWR representatives met with starting in 2019.

1 **Table 35-3. Presentations and Briefings 2019–2022**

Agency/Organization	Dates
Agricultural Council of California Legislative Conference	6/2021
Alameda County Water District Board Meeting	11/2019
American Society of Civil Engineers Environmental and Water Resources Institute	11/2019
Association of California Water Agencies Water Management Committee	12/2019, 2/2020
Association of General Contractors	3/2021
Association of Water Agencies of Ventura County	5/2021
Bay Area Council-Water & Climate Resilience Committee Briefing	12/2020
Bethel Island Municipal Improvement District (BIMID)	11/2019
BIA Southern California Water Conference	8/2021
Butte County Board of Supervisors	3/2020
Cal Chamber Water Committee Meeting	9/2020, 10/2020
California Innovation Playbook for Government Change Agents Day of Innovation	6/2021
California State Association of Counties	10/2020
California Water Commission	2/2020, 5/2021
Central Valley Flood Protection Board (CVFPB)	2/2020, 5/2020, 6/2021
Central Valley Partnership (CVP) & U.S. Bureau of Reclamation (USBR) Staff Project Update	11/2020
Congressman Garamendi	3/2020
Courtland Town Association	10/2019, 11/2021
Delta Area Gas Well Engineers	5/2019
Delta Conservancy Board	5/2019, 12/2019, 5/2020, 7/2020, 10/2020, 1/2021, 3/2021, 5/2021, 7/2021, 10/2021, 1/2022, 3/2022
Delta County Supervisors Update	3/2021
Delta Independent Science Board	8/2020, 1/2021
Delta Leadership Program	3/2021
Delta Legacy Communities	9/2019
Delta Protection Advisory Committee	1/2021
Delta Protection Commission	5/2019, 4/2020, 5/2021
Delta Stewardship Council	12/2019, 2/2020, 8/2020, 1/2021, 4/2021, 9/2021, 1/2022
Diablo Water District Board Meeting	2/2020
Dublin Rotary Club	10/2021
East Bay Leadership Council-Water and Environmental Task Force	7/2021
East County Water Management Association (ECWMA)	11/2019
Environmental Coordination Committee (ECC)	8/2019
LA Chamber of Commerce	8/2020

Agency/Organization	Dates
Metropolitan Water District of Southern California Bay Delta Committee Regulatory Update	1/2021
Northern California Tribal Chairs Association	7/2020
O&M Dam Safety Engineers	7/2019
Point Pleasant	9/2021
Reclamation District 1002	9/2021
Regional Chamber of Commerce San Gabriel Valley Briefing	3/2021
Sacramento County Environmental Commission	5/2021
San Bernardino Valley Municipal Water District	9/2019
San Francisco Bay Conservation and Development Commission (BCDC)	8/2020
San Luis & Delta-Mendota Water Authority	11/2020
Santa Clarita Valley Water Agency Board Meeting	10/2021
Society of American Military Engineers (SAME)	8/2020
Society of Military Engineers	4/2021
Southern California Edison Water Conference	11/2021
Southern California Water Coalition Annual Board Meeting	10/2019
Spring Virtual Association of California Water Agencies (ACWA) Conference and Exhibition	5/2021
Town of Hood	7/2021
Town of Hood Board Meeting	5/2020
Tribal Annual Informational Meeting	9/2019
Tribal Annual Informational Meeting	10/2020
Tribal Annual Informational Meeting	12/2021
Urban Water Institute's Spring Virtual Conference	2/2021
Valley Water Board Meeting	11/2021
Valley Water Storage Exploratory Committee	2/2021
Virtual DC Briefing-Water Advisory Meeting	6/2020
Water Association of Kern County	1/2021
Water Education Committee	7/2019
Water Education Foundation Group Meeting on Climate Change Impacts on Water Resources	8/2020
West Sacramento Mayor	4/2020
Yolo County Supervisor Villegas	6/2020
Zone 7 Water Agency	1/2021

35.2.2 Informational Materials

A variety of informational materials have been made available for public view on the DWR website (https://water.ca.gov/deltaconveyance). These materials include videos, fact sheets, infographics, slide decks, Q&A documents, and more.

Because internet connections in the Delta are often unreliable, DWR also identified over 20 libraries in the five Delta counties to provide the Central, Eastern, and Bethany Reservoir Alignment Mapbook with detailed maps of the three proposed tunnel alignments, plus a binder with printed versions of informational materials (many translated into Spanish and Chinese), and a third binder with all the presentations from the Stakeholder Engagement Committee meetings (which is discussed further in Section 35.2.6, *Design and Engineering Stakeholder Engagement Committee*). All of this material, plus many videos, was also provided on thumb drives. The purpose of providing these materials to local libraries is to ensure accurate information is available and to engage people in the environmental review process, and in other discussions, such as the Community Benefits Program and the Stakeholder Engagement Committee.

35.2.2.1 Deep Dive Videos

Deep Dive Videos are a series of YouTube videos released by DWR to inform the public about project-related topics through interviews with various experts. The videos range from 10 to 20 minutes in length and cover different topics, such as Delta Conveyance Project financing, climate change, State Water Project operations, water allocations, seismic risk, the environmental justice community survey, tunnel construction approach, fisheries, and soil investigations in the Delta.

35.2.2.2 Email Notifications

Members of the public can sign up to receive emails from DWR that include updates on the Delta Conveyance Project. These emails, dating back to 2019, can also be viewed on the DWR website. DWR regularly sends updates about the project to nearly 9,000 individuals who have signed up to be on the mailing list.

35.2.2.3 Correspondence and Documents

Members of the public can view public documents generally pertaining to the Delta Conveyance Project, as well as public correspondence documents between DWR, public organizations, elected officials, and interested parties. These documents, dating back to 2019, can be viewed on the DWR website.

35.2.3 Tribal Engagement

DWR is conducting several forms of Tribal engagement and consultation with Tribes for the proposed Delta Conveyance Project. This includes formal consultation about resources with cultural value to Tribes in accordance with Assembly Bill (AB) 52 requirements of CEQA and consultation under DWR's Tribal Engagement Policy with Tribes that are not formally consulting under AB 52. Additionally, DWR hosts annual Tribal informational meetings and participates in other Tribal informational meetings as requested by Tribes. For example, and as invited by Tribal representatives, DWR and the Delta Conveyance Design and Construction Authority (DCA) have presented project updates and preliminary engineering information from DCA Stakeholder Engagement Committee meetings to the Tribal Engagement Committee, which is convened by the Shingle Springs Band of Miwok Indians and made up of representatives from Tribes with ancestral ties to the Delta. These efforts have occurred outside of the outreach efforts and are discussed in more detail in Chapter 32, *Tribal Cultural Resources,* and Appendix 32A, *Tribal Consultation Log*. Two Tribal representatives also participate in the Stakeholder Engagement Committee, which is discussed further in Section 35.2.6, *Design and Engineering Stakeholder Engagement Committee*.

35.2.4 Environmental Justice and Disadvantaged Community Outreach

DWR is engaging with disadvantaged, historically burdened, underrepresented people of color, and low-income communities of interest that may be disproportionately affected by the proposed Delta Conveyance Project as part of the project's ongoing environmental analysis. The purpose of this outreach is twofold: determine baseline conditions and potential project-related impacts and benefits for the Delta's diverse communities and to improve awareness of, and access to, the Draft EIR and related informational resources in ways that will encourage and facilitate public participation.

35.2.4.1 Survey

To help determine baseline conditions and potential project-related impacts and benefits, DWR conducted a survey called *Your Delta, Your Voice*. The survey report includes a complete account of survey results and feedback, as well as the extensive outreach and notification efforts. In May 2021, the survey report was posted on DWR's website (https://water.ca.gov/Programs/State-Water-Project/Delta-Conveyance/Environmental-Justice) and is also included in this Draft EIR as Appendix 29A, *Environmental Justice Community Survey Report*.

The survey was available from September 20 to December 11, 2020, in English, Spanish, and Chinese, and was announced and promoted through postcard notices, email, and flyers. The survey was made accessible via desktop and mobile devices as well as hard copy. The purpose of the survey was to learn how the members of disadvantaged Delta communities value the region's cultural, recreational, and natural resources and to gather input about ways the project may cause impacts to these resources or potentially bring benefits to Delta communities. In addition, the survey provided an opportunity to increase awareness about the project and encourage future engagement among Delta environmental justice and disadvantaged community members. More than 2,117 individuals responded to the survey.

The information collected in the survey has been incorporated into Chapter 29, *Environmental Justice*.

35.2.4.2 Outreach and Informational Materials

To help ensure that disadvantaged communities in the Delta are informed about the project and engaged in the public participation process, DWR is conducting outreach and preparing a suite of informational materials. The goal of the outreach and informational materials is to raise awareness and encourage input during the public review period. The outreach and informational resources are guided by lessons learned from the *Your Delta, Your Voice* survey project and from input from local and state-level environmental justice/disadvantaged community outreach experts. DWR is working with in-Delta organizations to expand the reach to local disadvantaged community members through existing known and trusted networks, gathering places, and communication channels. Activities include attending festivals, providing briefings to organizations, placing flyers, distributing informational resources through local organizations, and holding virtual workshops. Informational materials will be translated when feasible and will be written in a culturally appropriate manner. During the public review period, independent facilitators will assist community groups and community members to participate in the public review and input process.

35.2.5 Community Benefits Program Framework Engagement

In April 2021, DWR launched a series of workshops to begin the development of the Community Benefits Program Framework. The Community Benefits Program is being developed in coordination with local communities to identify and implement commitments, if the Delta Conveyance Project is approved, to help protect and enhance the cultural, recreational, natural resource, and agricultural values of the Delta. Community Benefits Program commitments, when they are finalized, will be separate and apart from mitigation measures proposed for the project as part of the environmental review.

DWR set forth a collaborative approach to develop the Community Benefits Program Framework to provide the local Delta communities the opportunity to participate in the development of the Community Benefits Program and, if approved, and in continued collaboration during the implementation phase. Local communities are best equipped to tailor benefits to their particular needs. DWR clearly communicated to interested parties that community benefits are not dependent on support for the project.

The results of the 2020 *Your Delta, Your Voice* survey informed DWR of the local and disadvantaged communities' values regarding cultural, recreational, and natural resources of the Delta and their attitudes about the project's potential impacts and benefits. DWR then prepared a concept paper to describe the potential for community benefits and thoughts about the process for developing the Community Benefits Program in collaboration with the communities. DWR staff presented the concept to the DCA Stakeholder Engagement Committee on December 9, 2020, and again on April 28, 2021. Between February 1 and March 19, 2021, initial input was solicitated via targeted interviews with 44 interested parties representing various background and interests in the Delta.

Three public workshops were utilized to solicit input for the development of this Community Benefits Program Framework, including program objectives, potential components, and the community engagement process. Workshops were held virtually (with closed captioning online or by phone) and included simultaneous translation in both English and Spanish. All relevant information was posted on the Delta Conveyance Project website in English and Spanish (https://water.ca.gov/Programs/State-Water-Project/Delta-Conveyance/Community-Benefits-Program), including registration information, agendas, presentations, public workshop summaries, and a recording of each public workshop. Workshop materials are also included in this Draft EIR as Appendix 3G, Attachment 3G.1, *The Delta Conveyance Project Community Benefits Program*. DWR provided an email address on their website for those who could not attend workshops to provide input by email. Specific workshops for Tribal communities, including invited Tribal leadership, representatives, and members, as well as other non-Tribally affiliated Tribal persons, were held on May 17 and October 25, 2021, and covered all topics from the three public workshops. DWR used feedback from the workshops to revise the objectives, components, and process ideas that had been developed based on prior public engagement efforts. On November 17, 2021, DWR held the Delta Conveyance Project Community Benefits Program Case Study Workshop. The workshop was designed to provide information to community members about community benefits programs. The panelists presented case studies about their experiences with community benefits agreements and information related to community benefits programs in general. Additional information is provided in Appendix 3G, *Community Benefits Program Framework,* and Chapter 34, *Community Benefits Program Analysis.*

Table 35-4. Community Benefits Framework Workshops

Workshop Topic	Date
What Community Benefits Mean to You	April 14, 2021
Project Ideas	May 6, 2021
Tribal Workshop (all topics)	May 17, 2021
Jobs, Education, Infrastructure and Engagement	May 25, 2021
Second Tribal Workshop	October 25, 2021
Case Study Workshop	November 17, 2021

35.2.6 Design and Engineering Stakeholder Engagement Committee

DCA created the Stakeholder Engagement Committee to provide: (1) a forum for Delta interested parties to provide input and feedback on technical/engineering issues related to the DCA activities, including development of facilities and options for additional study; (2) an opportunity to identify engineering and design considerations that would avoid or minimize effects from construction and facility siting; and (3) a forum for committee members to relay information between respective groups and the committee. The Stakeholder Engagement Committee includes representatives of Sacramento, Yolo, San Joaquin, and Contra Costa Counties; Tribal governments; Delta recreation, public safety, local businesses and community entities; agriculture, Delta history and heritage, fish and wildlife, and Delta water agencies; and ex officio representatives with expertise on public parks, levee engineering, and public safety.

The Stakeholder Engagement Committee held 19 meetings from 2019 to 2021 to discuss a variety of engineering topics. Past meeting topics have included an overview of potential conveyance features, siting of key features, and outcomes from efforts to minimize community effects. DCA considered this information in development of facility recommendations to DWR. Additionally, DWR representatives participated in the Stakeholder Engagement Committee meetings and provided presentations and updates on the Delta Conveyance Project CEQA process and other activities, such as the Community Benefits Program Framework, as discussed above. During the conceptual design process and in response to Stakeholder Engagement Committee concerns, DCA considered ways to reduce effects to local communities, at the direction of DWR. The *Efforts to Minimize Delta Community Effects* technical memoranda for the eastern and central and Bethany Reservoir alignments summarize the approach and highlight the results of the activities conducted by the DCA to minimize local community effects (Delta Conveyance Design and Construction Authority 2022a, 2022b). The work of the Stakeholder Engagement Committee is outside of DWR's environmental review process under CEQA. Feedback provided by Stakeholder Engagement Committee members should not be construed as approval or agreement with the Delta Conveyance Project or the environmental review process or part of the DWR public outreach process. It is understood that the committee members and individuals that provided comments at the Stakeholder Engagement Committee meetings would provide their comments on the Delta Conveyance Project and CEQA documents directly to DWR under the CEQA public outreach process, and that those comments could be different than discussions that occurred at the committee meetings.

35.3 References Cited

California Department of Water Resources. 2020. *Notice of Preparation of Environmental Impact Report for the Delta Conveyance Project*. January 15.

Delta Conveyance Design and Construction Authority. 2022a. Efforts to Minimize Delta Community Effects—Central and Eastern Corridor Options (Final Draft). Technical Memorandum. May 2022. In Attachment H: Other Sitewide Considerations, *Volume 1: Delta Conveyance Final Draft Engineering Project Report—Central and Eastern Options.* May 2022. Sacramento, CA.

Delta Conveyance Design and Construction Authority. 2022b. Efforts to Minimize Delta Community Effects Supplement—Bethany Reservoir Alternative (Draft). Technical Memorandum. May 2022. In Attachment: Technical Memoranda, *Volume 1: Delta Conveyance Final Draft Engineering Project Report—Bethany Reservoir Alternative.* May 2022. Sacramento, CA.

Appendix G
Potentially Relevant Laws, Regulations, and Programs

This appendix provides the federal, state, and local/regional laws, regulations, policies, and programs that may apply to the action alternatives, and to the resources analyzed in Draft Environmental Impact Statement Chapter 3, *Affected Environment and Environmental Consequences*, of the that may be affected by the action alternatives.

G.1 Section 3.1: Aesthetics and Visual Resources

Laws, Regulations, and Programs for Aesthetics and Visual Resources Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Federal Highway Administration's (FHWA's) *Guidelines for the Visual Impact Assessment of Highway Projects*	The FHWA guidelines' approach addresses analysis of the natural environments and cultural environments (i.e., human-altered/built environments). These guidelines include a phased approach to analyzing existing visual resources and the future condition with the action alternative using changes in visual quality and the sensitivity of viewers (i.e., receptors) to determine aesthetics and visual impacts.
State	
Delta Protection Act of 1992 (Division 19.5 of the California Public Resources Code)	The Delta Protection Act facilitates the recognition, preservation, and protection of Delta resources for the use and enjoyment of current and future generations. The act includes a series of findings and declarations related to the quality of the Delta environment and emphasizes the national, state, and local importance of protecting the unique resources of the Delta.
Land Use and Resource Management Plan (LURMP) for the Primary Zone of the Delta	The LURMP for the Primary Zone of the Delta contains policies to protect the Delta's unique character, expands public access and recreation, and locates new transmission lines and utilities within existing corridors to minimize impacts (Delta Protection Commission 2010:8-33).
Sacramento-San Joaquin Delta Reform Act of 2009 (Wat. Code §§ 85000–85350) and *Delta Plan*	The Delta Reform Act, established by SB X7-1, established the co-equal goals for the Delta of "providing a more reliable water supply for California and protecting, restoring, and enhancing the delta ecosystem." (Pub. Resources Code § 29702; Wat. Code § 85054). These coequal goals are to be achieved "in a manner that protects and enhances the unique cultural, recreational, natural resources, and agricultural values of the Delta as an evolving place." (Wat. Code § 85054). The Delta Reform Act also established the DSC. The DSC is tasked with furthering the state's coequal goals for the Delta through development of the *Delta Plan*, a comprehensive, long-term, resource management plan for the Delta, containing both regulatory policies and recommendations aimed at furthering the coequal goals and promoting a healthy Delta ecosystem. The *Delta Plan* provides for a distinct regulatory process for activities that qualify as Covered Actions under Water Code Section 85057.5. State and local agencies proposing Covered Actions, prior to initiating implementation of that action, must prepare a written certification of consistency with detailed findings regarding consistency with applicable *Delta Plan* policies and submit that certification to the DSC.

Law, Regulation, Policy, Program, or Agency	Description
California Scenic Highway Program	In 1963, the California Legislature created the Scenic Highway Program to preserve and protect scenic highway corridors from changes that would diminish the aesthetic value of lands adjacent to the highways. The state regulations and guidelines governing the Scenic Highway Program are found in Sections 260 to 263 *et seq*. of the Streets and Highways Code. As described in the *Scenic Highway Guidelines*, highways can be nominated to be an eligible State Scenic Highway under Streets and Highways Code Section 263 when they are believed to have outstanding scenic values and becoming an eligible State Scenic Highway does not require any legislative action. Once a state route is identified as eligible under Streets and Highways Code Section 263, it may be nominated for official designation by the local governing body with jurisdiction over the lands adjacent to the proposed scenic highway. Division 1, Chapter 2, Article 2.5, Sections 260–284 of the California State Streets and Highway Code establishes the following: The standards for official scenic highways shall also require that local governmental agencies have taken such action as may be necessary to protect the scenic appearance of the scenic corridor, the band of land generally adjacent to the highway right-of-way, including, but not limited to (1) regulation of land use and intensity (density) of development; (2) detailed land and site planning; (3) control of outdoor advertising; (4) careful attention to and control of earthmoving and landscaping; and (5) the design and appearance of structures and equipment.
Regional/Local [1]	
East Bay Regional Park District Master Plan	EBRPD manages 113,000 acres of regional parklands in Alameda and Contra Costa Counties (East Bay Regional Park District 2013:20). EBRPD's 2013 master plan guides the management of EBRPD lands through policies and guidelines. The master plan specifically recognizes the conservation of its scenic, natural, and open space resources as a primary duty and includes scenic resources among the many resources that EBRPD seeks to protect.
Alameda County General Plan, Scenic Route Element	The plan's Scenic Route Element includes text and a map, designed to preserve and enhance the scenic quality of natural scenic areas adjacent to and visible from scenic routes. (County of Alameda 1994:1) The plan provides principles that apply to the scenic route system, scenic route rights-of way, scenic route corridors, and areas beyond the scenic route corridors (County of Alameda 1994:4). The Scenic Route Element map identifies existing and proposed scenic freeways and expressways, major thoroughfares, and major rural roads, as well as pending freeway considerations (County of Alameda 1994:6–7). A small portion of Bethany-Byron Road (Byron Highway) and Mountain House Road are Alameda County-designated scenic routes within the study area.
Alameda *East County Area Plan*	The ECAP functions as the general plan document for eastern Alameda. The Land Use Element, Sensitive Lands and Regionally Significant Open Space, includes a sensitive viewsheds goal "to preserve unique visual resources and protect sensitive viewsheds" (County of Alameda 2000:30). Policies on visual protection, trees, landscaping, alteration of landforms, and utilities seek to minimize visual impacts and enhance scenic qualities. Specifically, grading along natural watercourses is to be avoided and utility lines are to be placed underground (County of Alameda 2000:30–33).
Contra Costa County General Plan 2005–2020	The general plan addresses aesthetic resources primarily in several elements. In Chapter 5, *Transportation and Circulation Element*, SR 160 and the SR 4 Bypass are both Contra Costa County–designated scenic highways, as well as eligible State Scenic Highways. SR 4, County Road J4, Bethel Island Road, Jersey Island Road, Walnut Boulevard, and other roadways as mapped on Contra Costa County's Scenic Routes Plan are also county-designated scenic routes within the Delta (County of Contra Costa 2005:5–25).

[1] State agencies are required to comply with regional and local requirements only in very limited circumstances.

Law, Regulation, Policy, Program, or Agency	Description
Sacramento County General Plan of 2005–2030	The general plan addresses aesthetic resources associated with scenic highways in its Circulation Element, with the goal of preserving and enhancing the aesthetic quality of scenic roads. SR 160, a designated state scenic highway, spans Sacramento County alongside the Sacramento River from the Sacramento City limits to the northern edge of Freeport at the southern tip of the Delta at Antioch Bridge. In addition, a portion Isleton Road between Isleton and Paintersville Bridges is an officially designated County Scenic Highway. Additional county roads that have scenic qualities are protected by county scenic corridor designations, including county freeways. The general plan also proposes to provide scenic corridor protection for Twin Cities Road between SR 160 and SR 99. In addition, the Sacramento and American Rivers are protected in Sacramento County by scenic corridors extending 500 feet on each side of the middle of the channel or a minimum 300 feet from the edge of the river (County of Sacramento 2017:32, 34, 35).
2035 San Joaquin County General Plan	The general plan includes policies related to scenic resources in the Community Development Element, which acts as the land use element for San Joaquin County. The focus of this element is to identify ways the County can encourage employment generating development while preserving prime farmland and protecting natural habitats (County of San Joaquin 2016:3.1-3). The Natural and Cultural Resources element includes information on scenic routes, including Interstate 5 from Stockton to the northern county line (San Joaquin County 2016:3.4-13).
2030 Countywide General Plan (Yolo County)	The general plan was adopted on November 10, 2009. Aesthetic resources are addressed in the land use and community character element. Goals and policies seek to protect and enhance the rural landscape and night sky, important site features (e.g., watercourses), and scenic views, and to minimize the aesthetic impact of infrastructure and utility facilities. Yolo County has designated the following roadways as local scenic roadways: SR 16 (Colusa County line to Capay); SR 128 (Winters to Napa County line); County Roads 116 and 116B (Knights Landing to eastern terminus of County Road 16); County Roads 16 and 117 and Old River Road (County Road 107 to West Sacramento); South River Road (West Sacramento City limits to Sacramento County line) (County of Yolo 2009:LU-23–LU-24, LU-26).
City of Brentwood General Plan	Scenic and visual resources are addressed in the Conservation and Open Space element and the Land Use element with the following policies: • **Policy COS 3-5:** Avoid removal of large, mature trees that provide wildlife habitat or contribute to the visual quality of the environment to the greatest extent feasible through appropriate project design and building siting. If full avoidance is not possible, prioritize planting of replacement trees on-site over off-site locations (City of Brentwood 2014:4-5). • **Policy LU 4-6:** Protect selected significant habitat areas for their ecological, educational, scenic, and recreational values (City of Brentwood 2014:9-25).
Envision Stockton 2040 General Plan	The general plan was adopted in 2018. It streamlined the document from the previous version, consolidating mandated elements and incorporating some optional elements into four chapters, Land Use, Transportation, Safety, and Community Health (City of Stockton 2018:1-2, 1-3). Policy LU-5.2 addresses visual and scenic resources.
City of Rio Vista General Plan	The general plan contains numerous goals, policies, and implementing actions related to preserving scenic resources included in the Resource Conservation Element, including protecting scenic resources and minimizing visibility of structures and graded areas.

Sources: Bureau of Land Management 1986:7, 2008:20, 20–21, 21, 39; California Department of Parks and Recreation 1988:9, 19–20, 47, 64, 73; California Department of Transportation 2008:1-9, 2019, 2021; City of Brentwood 2014:4-5, 9-25; of Rio Vista 2002:9-40, 10-41; City of Sacramento 2015:2-20, 2-335, 2-336; City of Stockton 2018:1-2, 1-3, 3-19; County of Alameda 1994:1, 4, 6–7, 2000:2, 30, 30–33; County of Contra Costa 2005:5-24, 5-25, 5-26, 8-15, 9-3, 9-7, 9-8; County of Sacramento 2011:32, 34, 35, 40, 40–41; County of San Joaquin 2016:3.1-3, 1-65, 3.4-12, 3.4-13, 3.4-15; County of Solano 1999:Apdx C-1, 2008:RS-36, RS-39, RS-37; County of Yolo 2009:LU-23, LU-24, LU-26; Cosumnes River Preserve

2008:ES-1, 1–4, 6-7–6-9; Delta Protection Commission 2010:3, 8–33, 2020:1–4; Delta Stewardship Council 2019; East Bay Regional Park District 2013:18, 20, 2013a:84, 89, 90, 92, 100, 102,106, 2013b; Suisun City 2015:2-15, 2-19.

ACEC = Area of Critical Environmental Concern; BCDC = Bay Conservation and Development Commission; BLM = Bureau of Land Management; Caltrans = California Department of Transportation; CEQA = California Environmental Quality Act; Delta = Sacramento–San Joaquin River Delta; Delta Protection Act = Delta Protection Act of 1992; Delta Reform Act = Sacramento–San Joaquin Delta Reform Act of 2009; DPC = Delta Protection Commission; DWR = California Department of Water Resources; EBRPD = East Bay Regional Park District; FHWA = Federal Highway Administration; ISTEA = Intermodal Surface Transportation Efficiency Act of 1991; LPP = Local Protection Program; LURMP = Land Use and Resource Management Plan; NHA = National Heritage Area; SAFETEA-LU = Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users; TEA-21 = Transportation Equity Act for the 21st Century; USC = United States Code; VRM = visual resource management.

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G.2 Section 3.2: Agricultural Resources

Laws, Regulations, and Programs for Agricultural Resources Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Farmland Protection Policy Act (7 USC § 4201 *et seq*.)	This act involves a rating system developed to help assess options for land use on evaluation of productivity weighted against alternative proposed uses. Minimizes the impact that federal programs have on unnecessary and irreversible conversion of farmland to nonagricultural uses.
Agricultural Conservation Easement Program (Public Law 113-79) (ACEP)	The Agricultural Act of 2014 established the ACEP, which consolidated previously separate federal farmland conservation programs. Under the ACEP, the NRCS provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits. Under the Agricultural Land Easements component, NRCS helps Native American tribes, state and local governments, and nongovernmental organizations protect working agricultural lands and limit nonagricultural uses of the land.
Central Valley Project Improvement Act	Reclamation and USFWS, in coordination with the State of California, and other partners, have implemented numerous programs, projects, and actions to meet the goals of the CVPIA, many of which have affected land use and agriculture throughout the Central Valley. Among these are directs for retirement of farmlands through the Land Retirement Program and implementation of an “Agricultural Waterfowl Incentives Program.” The goal of the Land Retirement Program is to retire 15,000 acres of agricultural lands. In the Agricultural Waterfowl Incentives Program, farmers are paid to keep private agricultural fields flooded during the winter months when doing so would increase the amount of habitat and the availability of food for waterfowl.
U.S. Environmental Protection Agency Pesticide Regulatory Program	Regulates pesticide use in conjunction with the CDPR. Pesticides are registered or licensed for use with a tolerance level set for each. This tolerance limits the amount of a particular pesticide that can be present on produce grown in the United States. Tolerances are set after determining the toxicity of the pesticide and the products of its breakdown, how much pesticide remains in or on food by its market time, and the amount and frequency of pesticide application. Testing and enforcement of these tolerance levels is conducted by EPA and CDPR.
State	
California Department of Pesticide Regulation Programs	CDPR regulates pesticides under a comprehensive program that encompasses enforcement of pesticide use in agricultural and urban environments. It is vested by the EPA with primary responsibility to enforce federal pesticide laws in California. It also is responsible for the statewide licensing of commercial applicators, dealers, consultants, and other pesticide professionals to ensure they are adequately trained to uses pesticides safely. The agency evaluates the health risk impact of pesticides through illness surveillance and risk assessment by conducting environmental monitoring of air, water and soil and residue testing of fresh produce. The agency also directs and oversees the County Agricultural Commissioners who carry out and enforce pesticide and related environmental laws and regulations locally.
Farmland Mapping and Monitoring Program	Established by the California Department of Conservation, the FMMP establishes the categorical definitions of Important Farmland for inventory purposes. Land identified as Important Farmland is mapped into one of the following eight categories: Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, Grazing Land, Urban and Built-up Land, Other Land, and water. These classifications recognize the land’s suitability for agricultural production rather than solely reflecting the physical and chemical characteristics of the soil.

Law, Regulation, Policy, Program, or Agency	Description
Delta Protection Act of 1992 (Public Res. Code 19.5 §§ 29700–29780)	This act created the DPC and enabled it to promote, facilitate, and administer the acquisition of agricultural conservation easements. DPC does not have land use authority, but it can suspend local projects under an appeal process while it reviews them for consistency with the Delta Protection Act and the 2011 LURMP for the Primary Zone of the Delta.
Sacramento–San Joaquin Delta Reform Act of 2009 (Wat. Code §§ 85000–85350) and *Delta Plan*	The Delta Reform Act, created in 2009 via SB X7-1, established the co-equal goals for the Delta of "providing a more reliable water supply for California and protecting, restoring, and enhancing the delta ecosystem." (Pub. Resources Code § 29702; Wat. Code § 85054). These coequal goals are to be achieved "in a manner that protects and enhances the unique cultural, recreational, natural resources, and agricultural values of the Delta as an evolving place." (Wat. Code § 85054). The Delta Reform Act also established the DSC. The DSC is tasked with furthering the state's coequal goals for the Delta through development of the *Delta Plan*, a comprehensive, long-term, resource management plan for the Delta, containing both regulatory policies and recommendations aimed at furthering the coequal goals and promoting a healthy Delta ecosystem. The *Delta Plan* provides for a distinct regulatory process for activities that qualify as Covered Actions under Water Code Section 85057.5. State and local agencies proposing Covered Actions, prior to initiating implementation of that action, must prepare a written certification of consistency with detailed findings regarding consistency with applicable *Delta Plan* policies and submit that certification to the DSC.
California Land Conservation Act of 1965 (Government Code § 51200 *et seq*.)	Also known as the Williamson Act, this act helps to maintain the agricultural economy of the state by preserving its agricultural uses and discourages premature and unnecessary conversion of such lands to urban development. It benefits landowners by allowing them to enter long-term contracts with cities or counties to keep agricultural land in production, in return for reduced property taxes. The minimum Williamson Act contract term is 10 years, and the contract is automatically renewed each year, adding an additional year to its term, making the actual term essentially indefinite. Williamson Act contracts may be terminated if the landowner or local government initiates the process of term nonrenewal. If a county agrees to establish a Farmland Security Zone (or "Super-Williamson Act") program, landowners may choose to enter into a 20-year contract to establish a Farmland Security Zone or include the land within an established zone. Farmland Security Zone contracts offer landowners greater property tax reduction than under a 10-year Williamson Act contract.
Central Valley Regional Water Quality Control Board	The Delta is within the boundaries of the Central Valley Regional Water Quality Control Board, one of nine Regional Boards under the State Water Resources Control Board. The Central Valley Regional Board manages the Irrigated Lands Regulatory Program with the adoption of Conditional Waiver of Waste Discharge Requirements. The Irrigated Lands Regulatory Program is designed to restore and/or maintain the highest reasonable quality of state waters considering all the demands being placed on the water; minimize waste discharge from irrigated agricultural lands that could degrade the quality of state waters; maintain the economic viability of agriculture in California's Central Valley; and ensure that irrigated agricultural waste discharge to water designated as municipal/domestic supply is of sufficient quality to provide Central Valley communities a sustainable source of drinking water.
California Department of Food and Agriculture Programs	This agency implements programs to support California agriculture and food production with improved quality assurance, animal safety programs, production, and on-farm safety management practices, and programs for processors of farm products. It also conducts pest and disease prevention activities and programs to respond to emergencies that threaten California's food and agriculture. The agency relies on the county agricultural commissioners to implement many of its programs.

Law, Regulation, Policy, Program, or Agency	Description
Regional/Local [2]	
Contra Costa County General Plan 2005–2020	The general plan directs future growth, development, and resource conservation through 2020. Potentially relevant policies in this general plan pertaining to agricultural resources include those in the Land Use Element (Policies 3-10 through 3-14, 3-58, 3-59, 3-30, 3-64, and 3-69) and those in the Conservation Element (Policy 8-29, 8-32, 8-38, and 8-46). The general plan calls for preservation and conservation of agricultural lands outside the county's urban limit line whenever possible
Sacramento General Plan of 2005–2030	The general plan guides development within unincorporated areas of the county through 2030. Policies potentially relevant to the protection of agricultural resources occur in the Agricultural Element (Policies AG-5, AG-10, AG-11, AG-17 and AG-21) and the Conservation Element (Policy CO-51). Policies established by the plan potentially relevant to agricultural resources include those seeking preservation and conservation of agricultural lands and maintaining the productivity of these lands, encouraging cooperation of agricultural property landowners and landowners of natural resource preserves, the County, and other governmental; and encouraging landowners to enter into Williamson Act contracts.
San Joaquin County General Plan	The general plan includes several policies targeted as preserving and protecting agricultural land within the county. These include policies to continue the county agricultural mitigation requirement for projects that convert agricultural lands and promote use of the Williamson Act program to encourage agricultural land preservation. Potentially relevant policies protecting agricultural resources are present in the Community Development Element (Policies LU-2.15, LU-2.17, LU-4.10, LU-7.1 through LU-7.7) of the general plan.
Solano County General Plan	The general plan guides conversation and land development practices within its unincorporated areas. The plan establishes policies potentially relevant to the project seeking to protect and preserve agricultural land and require mitigation for actions resulting in the conversion of land use from agriculture to another use. Potentially relevant policies guiding agricultural resources use and protection are present throughout multiple elements of the general plan including the Agriculture Element (Policies AG.P-4 and AG.P-28). Resources Element (Policies RS.P-13, RS.P-14, and RS.P-23) and Suisun Marsh Policy Addendum (Agriculture Policy 1).
2030 Countywide General Plan (Yolo County)	This plan for Yolo County guides future development within the county and ensures long-term preservation of agricultural heritage within the county. The plan's Land Use and Community Character element and Agriculture and Economic Development element establishes policies potentially relevant to the project seeking to prohibit the division of agricultural land for purposes of nonagricultural use and minimize land use incompatibilities. Other notable policies seek to continue the County's agricultural land mitigation program and promote cooperation between habitat protection and management and agricultural land uses. Those policies potentially relevant to agricultural resources within the general plan include Land Use and Community Character Element, Policy LU-2.3; Agriculture and Economic Development Element, Policies AG-1.3, AG-1.4, AG-1.5, AG-1.6, AG-2.9, AG-2.10, and AG-6.1; Conservation and Open Space Element, Policy CO-1.17.

Sources: California Department of Conservation 2020; California Department of Food and Agriculture 2020; California Department of Pesticide Regulation 2021; County of Alameda 2000:22–24; County of Contra Costa 2005; County of Sacramento 2017a, 2017b; County of San Joaquin 2016; County of Solano 2008:AG-29, AG-31, RS-27–RS-28, C-2; County of Yolo 2009:LU-18, AG-22, AG-25, AG-30, CO-15; State Water Resources Control Board 2020; U.S. Department of Agriculture n.d.

ACEP = Agricultural Conservation Easement Program; AMS = Agriculture Marketing Service; CDPR = California Department of Pesticide Regulation; CVPIA = Central Valley Project Improvement Act; DPC = Delta Protection Commission; DSC = Delta Stewardship Council; ECAP = East County Area Plan; FMMP = Farmland Mapping and

[2] State agencies are required to comply with regional and local requirements only in very limited circumstances.

Monitoring Program; NRCS = Natural Resources Conservation Service; Regional Water Board = Regional Water Quality Control Board; State Water Board = State Water Resources Control Board; EPA = U.S. Environmental Protection Agency; U.S. = United States; USFWS = U.S. Fish and Wildlife Service; Williamson Act = California Land Conservation Act of 1965.

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G.3 Section 3.3: Air Quality and Greenhouse Gases

Laws, Regulations, and Programs for Air Quality and Greenhouse Gases Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Clean Air Act (42 USC § 7401 *et seq*.) and National Ambient Air Quality Standards	Comprehensive federal law administrated by the USEPA that regulates air emissions from national stationary and mobile sources. The Clean Air Act gives California authority to enact stricter air pollution standards for motor vehicles than the federal government. The NAAQS define clean air and represent the maximum amount of pollution that can be present in outdoor air without any harmful effects on people and the environment. See Appendix J, *General Conformity Determination,* for more details.
National Emissions Standards for Hazardous Air Pollutants (40 CFR Parts 61 and 63)	Articulated in local rules (SMAQMD Rule 902, SJVAPCD Rule 7050, BAAQMD Regulation 11 Rule 2, and YSAQMD Rule 9.9). These rules ensure that asbestos and lead-based paint are disposed of appropriately and safely (Sacramento Metropolitan Air Quality Management District 2020a:5-5).
General Conformity Rule (40 CFR Parts 51 and 93)	USEPA's General Conformity Rule (40 CFR Parts 51 and 93) applies to federal actions that are taken in USEPA-designated "nonattainment" or "maintenance" areas. As outlined in Section III.A of the General Conformity Rule, "only actions which cause emissions in designated nonattainment and maintenance areas are subject to the regulations." The four regions covered by the No Action Alternative include areas currently designated nonattainment or maintenance for one or more NAAQS. Projects, plans, and programs under the No Action Alternative that are subject to general conformity and located in nonattainment or maintenance areas for the NAAQS must demonstrate project-level compliance with the General Conformity Rule if emissions exceed the General Conformity *de minimis* thresholds.
Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles (FR 2016–21203)	Sets GHG emissions and fuel economy standards for three regulatory categories of heavy-duty vehicles with model years 2014–2018. The EPA and NHTSA signed Phase 2 of these standards on August 16, 2016, which apply to model years 2019–2027 medium- and heavy-duty vehicles.
State	
California Clean Air Act and California Ambient Air Quality Standards (42 USC § 7401)	Establishes a statewide air pollution control program to meet the CAAQS by the earliest practical date. The CAAQS are generally more stringent than NAAQS and incorporate additional standards for sulfates, hydrogen sulfide, visibility-reducing particles, and vinyl chloride.
California Air Resources Board Advanced Clean Truck Regulation	Requires zero-emission truck/chassis sales to be 55% of Class 2b–3 statewide truck sales, 75% of Class 4–8 straight statewide truck sales, and 40% of truck tractor statewide sales.
California Air Resources Board Truck and Bus Regulation	Requires heavy trucks with a gross vehicle weight rating greater than 14,000 pounds to be retrofitted with particulate matter filters and other emissions controls.
California Air Resources Board Tailpipe Emission Standards	State emission standards for new offroad diesel equipment, on-road diesel trucks, and harbor craft operating in California.
Carl Moyer Program	Voluntary program operated in partnership between CARB and local air districts that offers grants to owners of heavy-duty vehicles and equipment to reduce emissions.

Law, Regulation, Policy, Program, or Agency	Description
Toxic Air Contaminant Identification and Control Act	Created California's program to reduce exposure to air toxics through AB 1807. The Air Toxics "Hot Spots" Information and Assessment Act supplements the AB 1807 program by requiring a statewide air toxics inventory, notification of people exposed to a significant health threat, and facility plans to reduce these hazards.
Assembly Bill 1493	GHG emissions standards for automobiles and light trucks designed to increase average fuel economy of new vehicle sold in California to roughly 54.5 miles per gallon in 2025.
Renewables Portfolio Standard	Requires investor-owned utilities, energy service providers, and Community Choice Aggregators to procure additional retail sales per year from eligible renewable sources.
Senate Bill 32	Requires the state to reduce GHG emissions to 40% below the 1990 level by 2030. CARB (2017) adopted the *2017 Climate Change Scoping Plan* in November 2017 to meet the GHG reduction requirement set forth in SB 32.
Senate Bill 100	Expands the RPS renewable resource targets to 50% by December 31, 2026, 60% December 31, 2030, and 100% (carbon-free) by December 31, 2045.
Executive Order B-55-18	Establishes a goal for state agencies to achieve carbon neutrality as soon as possible, and no later than 2045, and to achieve and maintain net negative emissions thereafter.
California Department of Water Resources Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan, Update 2020	DWR's updated guide to addressing climate change in the programs, projects, and activities over which it has authority, and establishes DWR's GHG reduction goals and strategies for 2030 and 2045, consistent with reduction targets established by SB 32, EO-30-15, and EO B-55-18.
Regional/Local[3]	
Sacramento Regional 8-Hour Attainment and Reasonable Further Progress Plan	SMAQMD, along with the other air districts that comprise the SFNA, developed the *Sacramento Regional 8-Hour Attainment and Reasonable Further Progress Plan* to demonstrate attainment of 2008 8-hour ozone NAAQS by 2024. See Appendix J, *General Conformity Determination*, for more details.
PM2.5 Implementation/ Maintenance Plan and Resignation Request for Sacramento PM2.5 Nonattainment Area	Addresses how the SFNA will attain and continue to attain the 24-hour PM2.5 NAAQS. See Appendix J, *General Conformity Determination,* for more details.
Sacramento Metropolitan Air Quality Management District PM10 Implementation/Maintenance Plan and Redesignation Request for Sacramento County	Addresses how Sacramento County will continue to attain the PM10 NAAQS. See Appendix J, *General Conformity Determination,* for more details.
Guide to Air Quality Assessment in Sacramento County	Includes guidance and advisory emission thresholds to assist CEQA lead agencies in determining the level of significance of a project's emissions in the SVAB.

[3] State agencies are required to comply with regional and local requirements only in very limited circumstances.

Law, Regulation, Policy, Program, or Agency	Description
Sacramento Metropolitan Air Quality Management District Rules	• **Rule 403 (Fugitive Dust).** This rule controls fugitive dust emissions through implementation of BMPs. • **Rule 404 (Particulate Matter).** This rule restricts emissions of PM greater than 0.23 grams per cubic meter. • **Rule 412 (Stationary Internal Combustion Engines).** This rule controls emissions of NO_X, CO, and non-CH_4 hydrocarbons from stationary internal combustion engines greater than 50 brake horsepower. • **Rule 453 (Cutback and Emulsified Asphalt Paving).** This rule limits the application of cutback and emulsified asphalt. See Appendix J, *General Conformity Determination,* for more details.
Sacramento Metropolitan Air Quality Management District Heavy-Duty Low-Emission Vehicle Incentive Programs	Includes the Carl Moyer and SECAT Programs. The HDLEVIP and associated incentive programs are managed and implemented by the SMAQMD on behalf of all air districts within the SFNA. They are a means of generating revenue to fund projects and programs capable of achieving emissions reduction. See Appendix J, *General Conformity Determination,* for more details.
San Joaquin Valley Air Pollution Control District *2007 PM10 Maintenance Plan and Request for Redesignation*	On September 25, 2008, the EPA redesignated the San Joaquin Valley to attainment for the PM10 NAAQS and approved the 2007 PM10 Maintenance Plan.
San Joaquin Valley Air Pollution Control District *2007 8-Hour Ozone Plan*	On May 5, 2010, EPA reclassified the 8-hour O_3 nonattainment status of the San Joaquin Valley from *serious* to *extreme*. The reclassification required the state to incorporate more stringent requirements, such as lower permitting thresholds, and implement reasonably available control technologies at more sources. The 2007 8-hour Ozone Plan contained a comprehensive and exhaustive list of regulatory and incentive-based measures to reduce emissions of O_3 and PM precursors throughout the San Joaquin Valley. On December 18, 2007, the SJVAPCD Governing Board adopted the plan with an amendment to extend the rule adoption schedule for organic waste operations. On January 8, 2009, EPA found that the motor vehicle budgets for 2008, 2020, and 2030 from the 2007 8-hour Ozone Plan were not adequate for transportation conformity purposes. The next plan will address EPA's 2008 8-hour O_3 standard of 75 parts per billion. See Appendix J, *General Conformity Determination,* for more details.
San Joaquin Valley Air Pollution Control District 2013 *Plan for the Revoked 1-Hour Ozone Standard*	On September 19, 2013, EPA approved the San Joaquin Valley's 2013 Plan for the Revoked 1-Hour Ozone Standard. Effective June 15, 2005, EPA revoked the federal 1-hour O_3 standard for areas including the SJVAB.
San Joaquin Valley Air Pollution Control District 2015 *Plan for the 1997 PM2.5 Standard*	On April 30, 2008, the SJVAPCD adopted the 2008 PM2.5 Plan satisfying all federal implementation requirements for the 1997 federal PM2.5 standard. Per guidance from EPA, the plan addressed the 1997 PM2.5 standard under Subpart 1 of federal CAA Title 1, Part D (Subpart 1). Subsequently, in 2013, the D.C. Circuit Court ruled that EPA erred by solely using CAA Subpart 1 in establishing its PM2.5 implementation rule, without consideration of the PM-specific provisions in CAA Title 1, Part D, Subpart 4 (Subpart 4). In June 2014, EPA classified the SJVAB as a moderate nonattainment area under Subpart 4. EPA recently reclassified the Valley as serious nonattainment effective May 7, 2015. The 2015 PM2.5 Plan addresses the federal mandates for a serious nonattainment area related to the 1997 PM2.5 standard. See Appendix J, *General Conformity Determination,* for more details.
San Joaquin Valley Air Pollution Control District 2016 *Moderate Area Plan for the 2012 PM2.5 Standard*	The plan addresses the federal mandates for areas classified as moderate nonattainment for the 2012 PM2.5 federal annual air quality standard of 12 micrograms per cubic meter. See Appendix J, *General Conformity Determination,* for more details.

Law, Regulation, Policy, Program, or Agency	Description
San Joaquin Valley Air Pollution Control District 2016 *Plan for the 2008 8-Hour Ozone Standard*	SJVAPCD adopted the plan in June 2016. This plan satisfies CAA requirements and ensures expeditious attainment of the 75 parts per billion 8-hour O_3 standard. See Appendix J, *General Conformity Determination,* for more details.
San Joaquin Valley Air Pollution Control District 2018 *PM2.5 Plan*	The plan provides a single integrated plan to attain the federal health-based 1997, 2006, and 2012 NAAQS. The plan builds upon comprehensive strategies already in place from previously adopted SJVAPCD attainment plans and measures. See Appendix J, *General Conformity Determination,* for more details.
San Joaquin Valley Air Pollution Control District *Guide for Assessing and Mitigating Air Quality Impacts*	Includes guidance and advisory emission thresholds to assist CEQA lead agencies in determining the level of significance of a project's emissions in the SJVAB.
San Joaquin Valley Air Pollution Control District Rules	• **Rule 2010 (Permits Required).** This rule requires any person constructing, altering, replacing, or operating any source operation which emits, may emit, or may reduce emissions to obtain an Authority to Construct or a Permit to Operate. • **Rule 2201 (New and Modified Stationary-Source Review Rule).** This rule applies to all new stationary sources and all modifications to existing stationary sources subject to SJVAPCD permit requirements that, after construction, emit or may emit one or more pollutants regulated by the rule. • **Rule 3135 (Dust Control Plan Fees).** This rule requires the applicant to submit a fee in addition to a dust control plan. The purpose of this rule is to recover SJVAPCD's cost for reviewing these plans and conducting compliance inspections. • **Rule 4002 (National Emission Standards for Hazardous Air Pollutants).** This rule incorporates the NESHAP from Part 61, Chapter I, Subchapter C, Title 40, CFR and the NESHAP for Source Categories from Part 63, Chapter I, Subchapter C, Title 40, CFR. The rule requires sources of HAP to comply with the standards, criteria, and requirements set forth therein. • **Rule 4101 (Visible Emissions).** This rule prohibits emissions of visible air contaminants to the atmosphere and applies to any source operation that emits or may emit air contaminants. • **Rule 4102 (Nuisance).** This rule applies to any source operation that emits or may emit air contaminants or other materials. In the event that the project or construction of the project creates a public nuisance, it could be in violation and subject to SJVAPCD enforcement action. • **Rule 4641 (Cutback, Slow-Cure, and Emulsified Asphalt, Paving, and Maintenance Operations).** This rule applies to the manufacture and use of cutback asphalt, slow-cure asphalt, and emulsified asphalt for paving and maintenance operations. • **Rule 4701 (Internal Combustion Engines—Phase 1).** This rule limits the emissions of NO_X, CO, and volatile organic compounds (VOC) [a] from internal combustion engines. These limits are not applicable to standby engines as long as they are used fewer than 200 hours per year (e.g., for testing during non-emergencies). • **Rule 4702 (Internal Combustion Engines—Phase 2).** This rule limits the emissions of NO_X, CO, and VOC from spark-ignited internal combustion engines. • **Rule 9510 (Indirect Source Review).** This rule places application and emission-reduction requirements on projects that generate construction exhaust emissions that equal or exceed 2.0 tons of NO_X or PM10 exhaust. Rule 9510 is intended to mitigate a project's impact on air quality through project design elements or by payment of applicable off-site mitigation fees. Any applicant subject to District Rule 9510 is required to submit an Air Impact Assessment application to the district no later than when the applicant applies

Law, Regulation, Policy, Program, or Agency	Description
	for final discretionary approval, and to pay any applicable off-site mitigation fees before issuance of the first building permit. • **Regulation VIII (Fugitive PM10 Prohibitions).** This is a series of rules (Rules 8011–8081) designed to reduce PM10 emissions (predominantly dust/dirt) generated by human activity, including construction, road construction, bulk materials storage, landfill operations, and other activities. See Appendix J, *General Conformity Determination,* for more details.
San Joaquin Valley Air Pollution Control District Voluntary Emission Reduction Agreement	Incentive program implemented by SJVAPCD that funds grants for emissions reduction projects in the SJVAB. The SJVAPCD has operated the program since 1992, resulting in considerable criteria pollutant reductions throughout the region. Project applicants relying on the VERA to reduce adverse air quality impacts must (1) calculate the off-site mitigation fee required to reduce project-level emissions to below applicable thresholds, and (2) include the mitigation fee in the environmental document, project approval conditions, and in the MMRP.
Bay Area Air Quality Management District *2001 San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard*	In a March 30, 2001, Federal Register notice (66 FR 17379), EPA proposed to make a finding that the Bay Area has not attained the national 1-hour O_3 standard. EPA proposed partial approval and partial disapproval of the 1999 Ozone Attainment Plan. On August 28, 2001, EPA took final action on its March 2001 notice, triggering a CAA requirement that a new plan be submitted within 1 year of the effective date of EPA's final action. See Appendix J, *General Conformity Determination,* for more details. The revised 2001 Ozone Attainment Plan included the necessary changes to address EPA's disapproval of the prior plan. In addition, to address the requirements triggered by EPA's finding of failure to attain, the plan included a new emissions inventory and commitments to adopt and implement additional control measures to attain the standard by 2006, the attainment deadline. It also included additional contingency measures in the event the Bay Area did not attain the standard by 2006.
Bay Area Air Quality Management District 2017 *Clean Air Plan: Spare the Air, Cool the Climate*	Although not a federal planning document, the Clean Air Plan provided a comprehensive plan to improve Bay Area air quality and protect public health. The Clean Air Plan defined a control strategy that the BAAQMD and its partners is implementing to (1) attain all state and national ambient air quality standards, (2) eliminate disparities among Bay Area communities in cancer health risk from toxic air contaminants, and (3) reduce GHG emissions to protect the climate. See Appendix J, *General Conformity Determination,* for more details.
Bay Area Air Quality Management District *California Environmental Quality Act Air Quality Guidelines*	Includes guidance and advisory emission thresholds to assist CEQA lead agencies in determining the level of significance of a project's emissions in the SFBAAB.
Bay Area Air Quality Management District Rules	• **Regulation 2, Rule 5 (New Source Review of Toxic Air Contaminates).** This rule outlines guidance for evaluating TAC emissions and their potential health hazards. • **Regulation 6, Rule 1 (Particulate Matter).** This rule restricts emissions of PM darker than No. 1 on the Ringlemann Chart to less than 3 minutes in any 1 hour. • **Regulation 7 (Odorous Substances).** This regulation establishes general odor limitations on odorous substances and specific emission limitations on certain odorous compounds. • **Regulation 8, Rule 15 (Emulsified and Liquid Asphalts).** This rule limits emissions of VOCs caused by paving materials. • **Regulation 9, Rule 8 (Stationary Internal Combustion Engines).** This rule limits emissions of NO_X and CO from stationary internal combustion engines of more than 50 horsepower.

Law, Regulation, Policy, Program, or Agency	Description
	See Appendix J, *General Conformity Determination,* for more details.
Yolo-Solano Air Quality Management District *Handbook for Assessing and Mitigating Air Quality Impact*	Includes guidance and advisory emission thresholds to assist CEQA lead agencies in determining the level of significance of a project's emissions in the YSAQMD.
Yolo-Solano Air Quality Management District Rules	• **Regulation II, Rule 2.5 (Nuisance).** This rule prohibits the discharge of any air contaminant that causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health, or safety of any such persons or the public or which cause to have a natural tendency to cause injury or damage to business or property. • **Regulation II, Rule 2.8 (Particulate Matter Concentration).** This rule limits the emissions of particulate matter from any source operation which emits, or may emit dust, fumes, or total suspended PM.
Local Climate Action Plans	Plans to reduce communitywide GHG emissions to achieve a city or county reduction target that is typically consistent with the State's larger goal under SB 32 or various EOs.

Sources: Bay Area Air Quality Management District 2001, 2017a, 2017b; California Air Resources Board 2017; California Department of Water Resources 2020; Council on Environmental Quality 2019; Sacramento Air Quality Management District 2010, 2020; Sacramento Air Quality Management District et al. 2013, 2017; San Joaquin Valley Air Pollution Control District 2007a, 2007b, 2013, 2015a, 2016a, 2016b, 2018; Yolo-Solano Air Quality Management District 2007.

AB = Assembly Bill; BAAQMD = Bay Area Air Quality Management District; BMPs = best management practices; CAA = Clean Air Act; CAAQS = California ambient air quality standards; CAP = climate action plan; CARB = California Air Resources Board; CEQ = Council on Environmental Quality; CEQA = California Environmental Quality Act; CFR = Code of Federal Regulations; CH_4 = methane; Clean Air Plan = Bay Area 2017 *Spare the Air, Cool the Climate*; CO = carbon dioxide; CO_2e = carbon dioxide equivalent; DWR = California Department of Water Resources; EO = Executive Order; EPA = U.S. Environmental Protection Agency; FR = *Federal Register*; GHG = greenhouse gas; HDLEVIP = Heavy-Duty Low-Emission Vehicle Incentive Programs; HFCs = hydrofluorocarbons; MMRP = mitigation monitoring and reporting program; NAAQS = national ambient air quality standards; NESHAP = National Emission Standards for Hazardous Air Pollutants; NHTSA = National Highway Traffic Safety Administrative; NO_X = nitrogen oxides; 0_3 = ozone; PERP = CARB Portable Equipment Registration Program; PM = particulate matter; RPS = Renewables Portfolio Standard; SAFE = Safer Affordable Fuel-Efficient; SB = Senate Bill; SECAT = Sacramento Emergency Clean Air Transportation; SFBAAB = San Francisco Bay Area Air Basin; SFNA = Sacramento Federal Nonattainment Area; SIP = state implementation plan; SJVAPCD = San Joaquin Valley Air Pollution Control District; SLCP = short-lived climate pollutants; SMAQMD = Sacramento Metropolitan Air Quality Management District; SVAB = Sacramento Valley Air Basin; TAC = toxic air contaminant; USC = United States Code; VOC = volatile organic compound; VERA = San Joaquin Valley Air Pollution Control District Voluntary Emission Reduction Agreement; YSAQMD = Yolo-Solano Air Quality Management District.

[a] Various regulations use of the term *VOC*, such as those for consumer products. *VOC* and *ROG* both refer to organic gases and are used interchangeably in this analysis, consistent with how they are referenced in the source CARB and air district materials.

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G.4 Section 3.4: Fisheries and Aquatic Habitat

Laws, Regulations, and Programs for Fish and Aquatic Resources Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Federal Endangered Species Act (16 USC § 1531 *et seq.*)	The federal ESA and subsequent amendments provide guidance for conserving federally listed species and the ecosystems upon which they depend. Three sections of the ESA are potentially relevant to this analysis as described below. Section 7 of the act requires federal agencies to consult with USFWS or NMFS, as appropriate, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered fish, wildlife, or plant species, or result in the destruction or adverse modification of designated critical habitat for any such species. As part of the consultation, USFWS or NMFS issues a biological opinion and may issue an incidental take statement for wildlife species to allow exceptions to the Section 9 take prohibition. Section 9 of the act and its implementing regulations prohibit the take of any fish or wildlife species listed under the ESA as endangered or threatened, unless otherwise authorized by federal regulations. The term *take* means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct. Take includes the modification of a listed species' designated critical habitat. Section 9 prohibits several specified activities with respect to endangered and threatened plants as well as adverse modifications to critical habitat. Section 10 of the act provides a process by which nonfederal entities may obtain an incidental take permit from USFWS or NMFS for otherwise lawful activities that might incidentally result in take of endangered or threatened species, subject to specific conditions.
U.S. Fish and Wildlife Service and National Marine Fisheries Service Biological Opinions on the Long-Term Operations of the Central Valley Project and State Water Project	These two 2019 BiOps include criteria for CVP and SWP operations for delta smelt, winter-run Chinook salmon, spring-run Chinook salmon, green sturgeon, and steelhead. As a result of the coordinated operation of the SWP and CVP, DWR will operate the SWP for the protection of federally listed steelhead and green sturgeon in addition to operations for the protection of state-listed species. In some cases, these operations and the ITS for federally listed species may result in reductions in SWP pumping in addition to the reductions that would be necessary to comply with state law.
Collaborative Science and Adaptive Management Program	CSAMP, and its associated Collaborative Adaptive Management Team, focuses on science and adaptive management issues related to the BiOps for SWP/CVP operations. CSAMP has identified the need to maintain flexibility to address emerging science and information needs regarding water management and species of concern in the Delta and upriver, including actions to improve the resiliency of delta smelt and salmonids.
Magnuson-Stevens Fishery Conservation and Management Act (16 USC § 1801 *et seq.*)	The Pacific Fishery Management Council designated the Delta, San Francisco Bay, and Suisun Bay as EFH to protect and enhance habitat for coastal marine fish and macroinvertebrate species that support commercial fisheries. Three fishery management plans (for Pacific salmon, coastal pelagic, and groundfish species) issued by the Pacific Fishery Management Council cover species occurring in the project area, and designate EFH within the entire Bay-Delta Estuary.

Law, Regulation, Policy, Program, or Agency	Description
Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-Run Chinook Salmon and Central Valley Spring-Run Chinook Salmon and the Distinct Population Segment of Central Valley Steelhead	The Recovery Plan contains several priority recovery actions to address specific limiting factors were identified at the statewide, Central Valley–wide, and site-specific levels to help meet recovery objectives.
Recovery Plan for the Southern Distinct Population Segment of North American Green Sturgeon	The purpose and goal of the recovery plan (National Marine Fisheries Service 2018) is to guide recovery of southern DPS green sturgeon and consequently remove it from the Federal List of Endangered and Threatened Wildlife, through provision of recovery needs and implementation measures to address previously identified limiting factors.
Fish and Wildlife Coordination Act of 1934 (16 USC §§ 661–667e)	The FWCA ensures that fish and wildlife receive equal consideration with water resources development during planning and construction of federal water projects by requiring that the federal agencies consult with USFWS and the state wildlife resources agency before the waters of any stream or other body of water are impounded, diverted, deepened or otherwise controlled or modified. The FWCA requires that the views of USFWS and the state agency be considered when evaluating impacts and determining mitigation needs. NEPA regulations further require that an EIS meet the consultation requirements of the FWCA. Therefore, the FWCA consultation requirements for the action alternatives are being satisfied through the EIR/EIS process. Terrestrial biological resources are a principal focus of the FWCA coordination occurring for the action alternative conservation planning process.
Central Valley Project Improvement Act (23 Cal. Code Regs. § 5016 Appendix 2b)	Authorized the CVP to include fish and wildlife protection, restoration, and mitigation as project purposes of the CVP having equal priority with irrigation and domestic uses of CVP water and elevates fish and wildlife enhancement to a level having equal purpose with power generation. Water exports at the CVP pumping facilities can be reduced under section 3406(b)(2) water to decrease the risk of fish entrainment at the salvage facilities and to augment river flows.
Anadromous Fish Restoration Program	The CVPIA directs the Secretary of the Interior to develop and implement the program to restore natural populations and ensure the sustainability of anadromous fish (e.g., Chinook salmon, steelhead, green sturgeon, white sturgeon, American shad, and striped bass) in Central Valley rivers and streams.
State	
California Endangered Species Act (14 Cal. Code Regs. 6 §§ 783.0–787.9)	CESA prohibits the “take” of listed and candidate (petitioned to be listed) species (Fish & G. Code § 2080). In accordance with Section 2081 of the California Fish and Game Code, a permit from CDFW is required for projects “that could result in the incidental take of a wildlife species state-listed as threatened or endangered.” Where the species is listed under both the ESA and CESA and incidental take has been authorized under the ESA, DFW may issue a consistency determination under Section 2020.1 of the California Fish & Game Code and no separate take authorization under CESA is necessary.
Incidental Take Permit for Long-Term Operation of the State Water Project in the Sacramento–San Joaquin Delta	CDFW issued an ITP to DWR in 2020 for long-term operations of the SWP. The ITP dedicates water for Delta outflows during dry periods and allows flexibility to capture water during wet years. It provides final approval authority to CDFW on certain operational changes to protect fish.

Law, Regulation, Policy, Program, or Agency	Description
California Fish and Game Code Section 1602, Lake and Streambed Alteration Program	Diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by CDFW. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation. CDFW's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife.
California Aquatic Invasive Species Management Plan	CDFW's plan (2008) meets federal requirements to develop statewide nonindigenous aquatic nuisance species management plans under Section 1204 of the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990. The plan identifies the steps to minimize the harmful ecological, economic, and human health impacts of aquatic invasive species in California by providing a comprehensive, coordinated effort to prevent new invasions, minimize impacts from established aquatic invasive species, and establish priorities for action statewide.
Sacramento-San Joaquin Delta Reform Act of 2009 (Wat. Code §§ 85000–85350) and *Delta Plan*	The Delta Reform Act, created via SB X7-1, established the co-equal goals for the Delta of "providing a more reliable water supply for California and protecting, restoring, and enhancing the delta ecosystem." (Pub. Resources Code § 29702; Wat. Code § 85054). These coequal goals are to be achieved "in a manner that protects and enhances the unique cultural, recreational, natural resources, and agricultural values of the Delta as an evolving place." (Wat. Code § 85054). The Delta Reform Act also established the DSC. The DSC is tasked with furthering the state's coequal goals for the Delta through development of the *Delta Plan*, a comprehensive, long-term, resource management plan for the Delta, containing both regulatory policies and recommendations aimed at furthering the coequal goals and promoting a healthy Delta ecosystem. The *Delta Plan* provides for a distinct regulatory process for activities that qualify as Covered Actions under Water Code Section 85057.5. State and local agencies proposing Covered Actions, prior to initiating implementation of that action, must prepare a written certification of consistency with detailed findings regarding consistency with applicable *Delta Plan* policies and submit that certification to the DSC.
Delta Fisheries Management Policy	• The Fish and Game Commission and CDFW shall seek to collaborate and coordinate with other agencies whose actions may affect species and other resources in the Delta and its tributaries.
California EcoRestore	A multiagency initiative launched in 2015 to advance 30,000 acres of habitat restoration and enhancement in the Delta, Suisun Marsh, and Yolo Bypass region. California EcoRestore and its partners pursue complex multi-benefit habitat restoration projects to deliver results. DWR is a lead partner on majority of projects focused on implementing a comprehensive suite of habitat restoration actions to support the long-term health of the Delta and its native fish and wildlife species. A notice of preparation was released on April 2, 2019.
Regional/Local[4]	
Ecosystem Restoration Program (ERP)	A multi-agency effort (CDFW, NMFS, and USFWS) aimed at improving and increasing aquatic and terrestrial habitats and ecological function in the Delta and its tributaries. The ERP implements restoration projects through grants administered by the ERP Grants Program. The majority of these projects focus on fish passage issues, species assessment, ecological processes, environmental water quality, or habitat restoration.
Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary	The *Bay-Delta Plan* identifies beneficial uses of water, water quality objectives for the reasonable protection of those beneficial uses, and a program of implementation for achieving those objectives. The implemented actions include flow objectives on the Lower San Joaquin River and its three eastside tributaries for the protection of fish and wildlife beneficial uses.

[4] State agencies are required to comply with regional and local requirements only in very limited circumstances.

Law, Regulation, Policy, Program, or Agency	Description
Delta Vision Strategic Plan	The Governor's Delta Vision Blue Ribbon Task Force plan was approved and adopted in 2008. It is intended to ensure a reliable water supply for the two-thirds of California's population that depends, in whole or in part, on water from the Delta. the plan identifies seven goals and recommends 22 strategies and 73 actions to meet these goals. The plan also recommends 10 near-term actions to address immediate threats to the Delta, including threats to aquatic resources and habitat.
Delta Smelt Resiliency Strategy (DSRS)	In July 2016, CNRA developed the DSRS to address immediate and near-term need of delta smelt. The DSRS focuses on actions that can be implemented in the next few years to benefit delta smelt. These actions are intended to increase delta smelt growth rates and fecundity levels, as well as improve habitat conditions.

Sources: Baxter et al. 2010; California Department of Fish and Game 2008; California Fish and Game Commission 2020; Department of Fish and Wildlife n.d.; California Department of Water Resources 2019; California Natural Resources Agency 2020; California Natural Resources Agency and California Environmental Protection Agency 2020; Delta Protection Council 2019:32; Delta Stewardship Council 2013; Governor's Delta Vision Blue Ribbon Task Force 2008; National Marine Fisheries Service 2014, 2018, 2019; State of California 2015; State Water Resources Control Board 2018; U.S. Fish and Wildlife Service 1995; U.S. Fish and Wildlife Service 2019; National Marine Fisheries Service 2019.

AB = Assembly Bill; Bay-Delta Plan = Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; BDCP = Bay-Delta Conservation Plan; BiOp = biological opinion; CalEPA = California Environmental Protection Agency; CDFW = California Department of Fish and Wildlife; CEQA = California Environmental Quality Act; CESA = California Endangered Species Act; CNRA = California Natural Resources Agency; CSAMP = Collaborative Science and Adaptive Management Program; CDFW = California Department of Fish and Wildlife; Commission = Fish and Game Commission; CVP = Central Valley Project; CVPIA = Central Valley Project Improvement Act; CWA = Clean Water Act; Delta Reform Act = Sacramento–San Joaquin Delta Reform Act of 2009; DPS = distinct population segment; DPS = distinct population segment; DSC = Delta Stewardship Council; DSRS = Delta Smelt Resiliency Strategy; DWR = California Department of Water Resources; EFH = essential fish habitat; EIR = environmental impact report; EPA = U.S. Environmental Protection Agency; ERP = Ecosystem Restoration Program; ESA = federal Endangered Species Act; ITP = Incidental Take Permit; LTMS = Long-Term Management Strategy for Dredged Materials in the Delta; NMFS = National Marine Fisheries Service; POD = pelagic organism decline; Reclamation = Bureau of Reclamation; Regional Water Board = Regional Water Quality Control Board; SB = Senate Bill; State Water Board = State Water Resources Control Board; SVSRS = Sacramento Valley Salmon Resiliency Strategy; SWP = State Water Project; TAF = thousand acre-feet; USACE = U.S. Army Corps of Engineers; USC = United States Code; USFWS = U.S. Fish and Wildlife Service; WQCP = Water Quality Control Plan.

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G.5 Section 3.5: Natural Communities, Special-status Terrestrial Species, and Wetlands and Other Waters

Laws, Regulations, and Programs for Natural Communities, Special-status Terrestrial Species, and Wetlands and Other Waters Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Clean Water Act of 1972 Section 404 (33 USC § 1344)	CWA Section 404 authorizes USACE and EPA to issue permits to regulate the discharge of "dredged or fill materials into waters of the United States." Should activities such as dredging or filling of wetlands or surface waters be required for project implementation, then permits obtained in compliance with CWA Section 404 would be required for the project applicant(s).
Clean Water Act of 1972 Section 401 (33 USC § 1341)	CWA Section 401 specifies that states must certify that any activity subject to a permit issued by a federal agency (e.g., USACE) meets all state water quality standards. In California, the State Water Board and the Regional Water Boards are responsible for certifying activities subject to any permit issued by the USACE pursuant to CWA Section 404 or pursuant to Section 10 of the Rivers and Harbors Act of 1899.
Clean Water Act Section 402, National Pollutant Discharge Elimination System Program: Storm Water Permitting	Established the NPDES permit program that regulates point and nonpoint source discharges to waters of the United States. In California, the State Water Board and nine Regional Water Boards administer the NPDES permit program.
Endangered Species Act (16 USC § 1531 *et seq.*)	The federal ESA and subsequent amendments provide guidance for conserving federally listed species and the ecosystems upon which they depend. Three sections of the ESA are potentially relevant to this analysis section 7, section 9, and section 10 Section 7 of the act requires federal agencies to consult with USFWS or NMFS, as appropriate, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered fish, wildlife, or plant species, or result in the destruction or adverse modification of designated critical habitat for any such species. Section 9 of the act and its implementing regulations prohibit the take of any fish or wildlife species listed under the ESA as endangered or threatened, unless otherwise authorized by federal regulations. Section 10 of the act provides a process by which nonfederal entities may obtain an incidental take permit from USFWS or NMFS for otherwise lawful activities that might incidentally result in take of endangered or threatened species, subject to specific conditions.
Fish and Wildlife Coordination Act of 1934 (16 USC §§ 661–667e)	The FWCA ensures that fish and wildlife receive equal consideration with water resources development during planning and construction of federal water projects by requiring that the federal agencies consult with USFWS and the state wildlife resources agency before the waters of any stream or other body of water are impounded, diverted, deepened or otherwise controlled or modified. The FWCA requires that the views of USFWS and the state agency be considered when evaluating impacts and determining mitigation needs. NEPA regulations further require that an EIS meet the consultation requirements of the FWCA. Therefore, the FWCA consultation requirements for the action alternatives are being satisfied through the EIR/EIS process. Terrestrial biological resources are a principal focus

Law, Regulation, Policy, Program, or Agency	Description
	of the FWCA coordination occurring for the action alternative conservation planning process.
Bald and Golden Eagle Protection Act of 1940	Prior to 2009, permits for purposeful take of birds or body parts were limited to scientific religious, or falconry pursuits; eagles causing serious injury to livestock or other wildlife and golden eagle nests that interfere with resource development or recovery operations In 2009, USFWS issued the 2009 Final Rule authorizing programmatic take of eagles only if avoidance measures have been implemented to the maximum extent achievable such that take was no longer avoidable. In 2016, USFWS issued revisions to the Final Rule pertaining to incidental take and take of eagle nests. The Final Rule changed the programmatic take standard to a new standard authorizing "incidental take" if all "practicable" measures to reduce impacts on eagles are implemented. final regulations under the 2016 Revisions to the Final Rule also include a maximum permit term of 30 years, subject to a recurring 5-year review process throughout the life of the permit (81 FR 91494–91554).
CALFED Bay-Delta Program	Federal and state agencies developed a regulatory and management strategy to implement a long-term comprehensive plan to restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The federal agencies involved in the CALFED Bay-Delta Program are Reclamation, USFWS, NMFS, USACE, and EPA. The state agencies involved in the program are CDFW, DWR, and the State Water Board (CALFED Bay-Delta Program 2000).
Migratory Bird Treaty Act, 16 USC § 703 *et seq*., 50 CFR Part 21	This act protects migratory birds by prohibiting intentional taking, selling, or conducting other activities that would harm migratory birds, their eggs, or nests, unless authorized under a special migratory birds treaty by prohibiting intentional taking, selling, or conducting other activities that would harm migratory birds, their eggs, or nests, unless authorized under a special permit.
Rivers and Harbors Act of 1899 (33 USC § 403)	Under Section 10 of the Rivers and Harbors Act of 1899, the construction of structures in, over, or under, excavation of material from, or deposition of material into navigable waters are regulated by USACE. Navigable waters of the United States are defined as those waters subject to the ebb and flow of the tide shoreward to the mean high-water mark or those that are currently used, have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. A Letter of Permission or permit from USACE is required prior to any work begun within navigable waters. Numerous terrestrial species that are addressed in this Draft EIS require navigable waters for a part of their habitat.
Federal Noxious Weed Act (7 USC §§ 2801–2813) and 7 CFR Part 360	These laws and regulations are primarily concerned with the introduction of federally designated noxious weed plants or seeds across the international borders of the United States. The Federal Noxious Weed Act also regulates the interstate movement of designated noxious weeds under USDA's permit system. This act would be a factor in any decisions to import construction materials and equipment, including aggregate, from out-of-state or out-of-country.
Executive Order 13112 Invasive Species	EO 13112 (February 3, 1999) directs all federal agencies to prevent and control the introduction and spread of invasive nonnative species in a cost-effective and environmentally sound manner to minimize their effects to economic, ecological, and human health Federal agencies with any decision-making authority over the action alternatives and its implementation must ensure that construction and restoration actions do not result in the spread of invasive species into terrestrial habitats.
State	
California Endangered Species Act (Fish & Game Code §§ 2050–2116)	CESA prohibits the take of any fish, wildlife, or plant species that has been listed as endangered or threatened or designated as a candidate for listing. CESA contains a procedure for CDFW to issue an incidental take permit, authorizing take of listed and candidate species that is incidental to an otherwise lawful activity, subject to

Law, Regulation, Policy, Program, or Agency	Description
	specified conditions, including impacts of take that are fully mitigated. Under CESA, if a project would result in take, including take from obstructions to wildlife movement or migration, mitigation would be required to avoid impacts on listed wildlife species.
Fully Protected Species (Fish & Game Code §§ 3511, 3513, 4700, and 5050)	These statutes prohibit take or possession of fully protected species at any time. CDFW is unable to authorize incidental take of fully protected species when activities are proposed in areas inhabited by these species, except pursuant to an approved Natural Community Conservation Plan. Fish & Game Code Section 5515 lists fully protected fish species.
California Native Plant Protection Act of 1977 (Fish & Game Code § 1900–1913)	The NPPA, which is intended to preserve, protect, and enhance endangered or rare native plants in the state. The NPPA gave the California Fish and Game Commission the power to designate native plants as endangered or rare, and the act protected endangered and rare plants from take. According to CDFW, a CESA Section 2081 permit for incidental take of listed threatened and endangered plants from all activities is required, except for activities specifically authorized by the NPPA. Because rare plants are not included under CESA, mitigation measures for impacts on rare plants are specified in a formal agreement between CDFW and the project proponent. CNPS has developed and maintains lists of plants of special concern in California that are considered rare plants pursuant to CEQA Guidelines section 15380,
Lake and Streambed Alteration Agreement (California Fish & Game Code Sections 1600–1607)	Section 1600 *et seq.* of the Fish & Game Code requires notifying CDFW prior to any project activity that might (1) substantially divert or obstruct the natural flow of any river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement that may pass into any river, stream, or lake. If, after notification, CDFW determines that the activity may substantially adversely affect fish and wildlife resources, a Lake or Streambed Alteration Agreement under Section 1602 will need to be obtained. The Streambed Alteration Program (§ 1600 *et seq*.) requires an entity to notify CDFW prior to commencing any activity that may result in the modification of a river, stream, or lake that could adversely affect existing fish or wildlife resources. This program may require design modifications to avoid impacts on such resources.
Porter-Cologne Water Quality Control Act of 1969 (Wat. Code § 7)	Under the Porter-Cologne Act definition, *waters of the State* are “any surface water or groundwater, including saline waters, within the boundaries of the state.” Although all waters of the United States that are within the borders of California are also waters of the State, the reverse is not true. Therefore, California retains authority to regulate discharges of waste into any waters of the State, regardless of whether USACE has concurrent jurisdiction under CWA Section 404, and defines *discharges to receiving waters* more broadly than the CWA does.
Delta Protection Act of 1992 (Wat. Code § 12220)	The Delta Protection Act of 1992 established the Delta Protection Commission (DPC) to prepare and oversee a comprehensive Land Use and Resources Management Plan (LURMP) for the Primary Zone of the Delta. The Primary Zone encompasses 487,625 acres (approximately 66% of the statutory Delta) of varied land uses, waterways, and levees in parts of Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties.
Delta Vision Strategic Plan	The plan was approved and adopted in 2008. It is intended to ensure a reliable water supply for the two-thirds of California’s population that depends, in whole or in part, on water from the Delta. the plan identifies seven goals and recommends 22 strategies and 73 actions to meet these goals. The plan also recommends ten near-term actions to address immediate threats to the Delta, which includes terrestrial species and their habitat.

Law, Regulation, Policy, Program, or Agency	Description
Sacramento-San Joaquin Delta Reform Act of 2009 (Wat. Code §§ 85000–85350) and *Delta Plan*	The Delta Reform Act, created by SB X7-1, established the co-equal goals for the Delta of "providing a more reliable water supply for California and protecting, restoring, and enhancing the delta ecosystem." (Pub. Resources Code § 29702; Wat. Code § 85054). These coequal goals are to be achieved "in a manner that protects and enhances the unique cultural, recreational, natural resources, and agricultural values of the Delta as an evolving place." (Wat. Code § 85054). The Delta Reform Act also established the DSC. The DSC is tasked with furthering the state's coequal goals for the Delta through development of the *Delta Plan*, a comprehensive, long-term, resource management plan for the Delta, containing both regulatory policies and recommendations aimed at furthering the coequal goals and promoting a healthy Delta ecosystem. The *Delta Plan* provides for a distinct regulatory process for activities that qualify as Covered Actions under Water Code Section 85057.5. State and local agencies proposing Covered Actions, prior to initiating implementation of that action, must prepare a written certification of consistency with detailed findings regarding consistency with applicable *Delta Plan* policies and submit that certification to the DSC.
California Aquatic Invasive Species Management Plan (CAISMP)	The CAISMP provides a comprehensive, coordinated effort between state agencies and other entities to prevent new invasions, minimize impacts from established aquatic invasive species, and establish priorities for action statewide. The CAISMP identifies eight primary objectives and actions needed to minimize the harmful effects of aquatic invasive species on ecosystems, the economy, and human health. An example of the implementation of the CAISMP's long-term control and management objective in the Delta is CDBW's Aquatic Weed Control Program, which primarily focuses on the control of Brazilian waterweed and water hyacinth. These control practices must be taken into consideration in developing restoration actions for the terrestrial and aquatic species.
Regional/Local[5]	
Alameda *East County Area Plan*	The Open Space Element of the ECAP addresses sensitive lands and regionally significant open space, including biological resources. In addition, the EACCS was developed in 2010 as a planning document that identifies regionally-coordinated mitigation strategies aimed at conserving endangered or threatened species, under ESA, certain nonlisted species, and habitat in order to offset specific anticipated development, transportation, and infrastructure projects (East Alameda County Conservation Strategy Steering Committee 2010).
Contra Costa County General Plan 2005–2020	Three goals in the general plan's Conservation Element provide broad guidance for preservation of plant and animal habitat in the county. The element includes policies that are intended to protect natural habitat, ecological resources, and riparian zones in the county.
Sacramento County General Plan of 2005–2030	The plan's Open Space Element addresses preservation of natural resources over an extensive area that includes terrestrial and aquatic habitats and agricultural areas. The Open Space Element contains policies regarding protection of wetlands preserves, riparian corridors, woodlands, and floodplains. The Conservation Element contains policies relating to habitat protection, management and restoration, vernal pools and other wetlands, channel modifications, maintenance of river and stream functions, native and landmark tree protections, and special-status species.

[5] State agencies are required to comply with regional and local requirements only in very limited circumstances.

Law, Regulation, Policy, Program, or Agency	Description
San Joaquin County 2035 General Plan	The plan's Natural and Cultural Resources Element addresses protection of biological resources, including wetlands; riparian areas; rare, threatened, and endangered species and their habitats; potentially rare or commercially important species; vernal pools; significant oak groves; and heritage trees. Five policies from the Natural and Cultural Resources Element are considered applicable to the action alternatives.
East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan	The HCP/NCCP provides regional conservation while improving and streamlining the permit process for endangered species. In 2012, USACE issued a Regional General Permit to the East Contra Costa County Habitat Conservancy to provide additional streamlining for wetland regulations. Within the 174,115-acre plan area, the ECCCHCP/NCCP covers 8,670–11,853 acres of development and 1,126 acres of rural infrastructure projects. The ECCCHCP/NCCP requires creation of a preserve system of 23,800–30,300 acres that will be managed for the benefit of 28 covered species and their associated natural communities. The range of impacts and conservation requirements varies depending on whether the current urban limit lines of the participating cities are expanded.
San Joaquin County Multi-Species Habitat Conservation and Open Space Plan	This 50-year plan addresses 97 special-status plant, fish and wildlife species (47 of which are on the federal permit) throughout most of San Joaquin County (more than 900,000 acres), including a substantial portion of the eastern Delta. Activities covered under the plan nonagricultural activities occurring outside of urban boundaries, levee maintenance undertaken by the San Joaquin Area Flood Control Agency, transportation projects, nonfederal flood control projects, maintenance of existing facilities for non-federal irrigation district projects, managing preserves, and similar public agency projects.
East Alameda County Conservation Strategy (EACCS)	EACCS provides a mechanism for endangered species permitting under CESA and ESA within 271,485 acres of eastern Alameda County. The conservation strategy addresses the conservation needs of 19 species. In June 2012, USFWS issued a programmatic Section 7 BioOp with USACE that can be used for CWA Section 404 compliance using the framework of the conservation strategy for federally listed species.
South Sacramento Habitat Conservation Plan	The SSHCP addressed issues related to species conservation, agricultural protection, and urban development in south Sacramento County. The SSHCP covers 28 species of plants and wildlife, including 11 that are federally or state-listed as threatened or endangered.

Sources: CALFED Bay-Delta Program 2000; City of Oakley 2002; County of Alameda 2000; County of Contra Costa 2005; County of Sacramento 2017a, 2017b; County of Sacramento et al. 2018; County of San Joaquin 2016; County of Solano 2008a, 2008b; County of Yolo 2009; East Alameda County Conservation Strategy Steering Committee 2010; Roche pers. comm. 2009; Yolo Habitat Conservancy 2018.

AB = Assembly Bill; CAISMP = California Aquatic Invasive Species Management Plan; CCP = comprehensive conservation plans; CDBW = California Department of Boating and Waterways; Caltrans = California Department of Transportation; CESA = California Endangered Species Act; CDFW = California Department of Fish and Wildlife; CEQA = California Environmental Quality Act; CFR = Code of Federal Regulations; CNPS = California Native Plant Society; CWA= Clean Water Act; Delta = Sacramento–San Joaquin River Delta; Delta Protection Act = Delta Protection Act of 1992; DPC = Delta Protection Commission; DSC = Delta Stewardship Council; DWR = California Department of Water Resources; EACCS = East Alameda County Conservation Strategy; ECAP = *East County Area Plan*; ECCCHCP/NCCP = East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan; EIR = environmental impact report; EIS = environmental impact statement; EO = executive order; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act; FAST Act = Fixing America's Surface Transportation Act; FR = *Federal Register*; FWCA = Fish and Wildlife Coordination Act; HCP = Habitat Conservation Plan; LURMP = Land Use and Resource Management Plan; MAP 21 = Moving Ahead for Progress in the 21st Century; MSHCP = Solano Multispecies Habitat Conservation Plan; NCCP = Natural Community Conservation Plan; NEPA = National Environmental Policy Act; NMFS = National Marine Fisheries Service; NPPA = California Native Plant Protection Act; NWR = National Wildlife Refuge; Porter-Cologne Act = Porter Cologne Water Quality Control Act of 1969; Reclamation = Bureau of Reclamation; SB = Senate Bill; SJCMSHCP = San Joaquin County Multi-Species Habitat Conservation and Open Space Plan; SSHCP = South Sacramento Habitat Conservation Plan;

State Water Board = State Water Resources Control Board; USACE = U.S. Army Corps of Engineers; USDA = U.S. Department of Agriculture; USFWS = U.S. Fish and Wildlife Service.

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G.6 Section 3.6: Climate Change

Laws, Regulations, and Programs for Climate Change Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
U.S. Department of the Interior Sustain and Manage America's Resources for Tomorrow (ongoing)	The Department of the Interior established the WaterSMART program in February 2010 to implement the SECURE Water Act, a federal law that authorizes federal water and science agencies to work together with state and local water managers to plan for climate change and the other threats to the nation's water supplies and take action to secure water resources for the communities, economies, and the ecosystems they support. WaterSMART allows all bureaus of the Department of the Interior to work with states, Tribes, local governments, and non-governmental organizations to pursue a sustainable water supply for the nation by establishing a framework to provide federal leadership and assistance on the efficient use of water, integrating water and energy policies to support the sustainable use of natural resources, and coordinating the water conservation activities of the various Interior offices.
State	
Executive Order B-30-15	Directs state agencies to factor climate change into their planning and investment decisions.
Executive Order N-10-19	Requires agencies to prepare a water resilience portfolio and update projected climate change impacts to California's water systems, including drought and flooding, and other challenges to water supply reliability.
Senate Bill 246 Climate Change Adaptation (2015)	Establishes the Integrated Climate Adaptation and Resiliency Program by the OPR to coordinate regional and local efforts for climate change adaptation. Requires the Strategic Growth Council to review activities and funding programs of member state agencies for improved air and water quality.
California Water Resilience Portfolio (2020)	Under EO N-10-19, the Water Resilience Portfolio is an inventory and assessment of key aspects of California water, and it includes detailed actions to build resilience across California's ten hydrological regions.
California Department of Water Resources *2017 Central Valley Flood Protection Plan Update* (2017)	Provides strategies to prioritize California's investment in flood management over three decades, promote multi-benefit projects, and integrate and improve ecosystem functions associated with flood risk reduction projects. The 2022 CVFPP Update will focus on climate resilience, project implementation, accomplishments, and performance tracking, and alignment with other state efforts.
Fourth California Climate Change Assessment (2018)	Provides scientific foundation for California climate-related vulnerability; provides policies, strategies, and guidance to promote effective and integrated action for climate change response.
Sustainable Groundwater Management Act of 2014	Passed in 2014, SGMA provides a statewide framework for sustainable groundwater management in California (via SB 1168, AB 1739, and SB 1319). SGMA is intended to support local groundwater management through technical assistance and oversight of GSAs and the implementation of their GSPs to achieve and/or maintain groundwater basin sustainability by 2040 for critically overdrafted groundwater basins, and by 2042 for all other high- and medium-priority groundwater basins (both of which are located in the project area).

Law, Regulation, Policy, Program, or Agency	Description
California Department of Water Resources *Climate Action Plan, Phase 1: Greenhouse Gas Emissions Reduction Plan, Update 2020, July 2020* (2020)	DWR's GHG emissions reduction goals and strategies for the near-term (present to 2030) and long-term (2045).
California Department of Water Resources *Climate Action Plan, Phase 2: Climate Change Analysis Guidance, September 2018* (2018)	DWR's framework and guidance for consistent incorporation and alignment of analysis for climate change impacts in DWR's project and program planning activities.
California Department of Water Resources *Climate Action Plan, Phase 3: Climate Change Vulnerability Assessment, February 2019* (2019)	Describes, evaluates, and quantifies the vulnerabilities of DWR's assets and business to potential climate change impacts.
California Department of Water Resources *Climate Action Plan, Phase 3: Climate Change Adaptation Plan, July 2020* (2020)	Helps prioritize DWR resiliency efforts such as infrastructure improvements, enhanced maintenance and operation procedures, revised health and safety procedures, and improved habitat management.
Ocean Protection Council State of California *Sea-Level Rise Guidance 2018 Update* (2018)	Outlines a step-wise approach to coastal adaptation planning for sea level rise risk, incorporating existing law, expressed policy preferences by the Governor and Legislature, and the goal of fostering consistency across coastal and government agencies.
State Water Project *Delivery Capability Report 2019* (2019)	Updates the 2019 and future (2040) SWP delivery capability as a source of water.

Sources: Council on Environmental Quality 2016; Parris et al. 2012; U.S. Environmental Protection Agency 2021; U.S. Forest Service 2009; Millar et al. 2008; National Fish, Wildlife, and Plants Climate Adaptation Network 2021; U.S. Department of Interior, Bureau of Reclamation 2021; U.S. Fish and Wildlife Service 2010; U.S. Army Corps of Engineers 2015; Council on Environmental Quality 2020; California Department of Fish and Wildlife 2011; State of California 2008, 2020; California Department of Water Resources 2017, 2018; California Department of Food and Agriculture 2017; California Department of Public Health 2021; State of California Office of Planning and Research, Energy Commission, Natural Resources Agency 2018; California Natural Resources Agency 2018; State of California Delta Protection Commission 2015; California Department of Water Resources 2019, 2020; California Ocean Protection Council 2018.

AB = Assembly Bill; CCHEP = California Department of Public Health Climate Change & Health Equity Program; CNRA = California Natural Resources Agency; CVFPP = Central Valley Flood Protection Plan; DWR = California Department of Water Resources; EO = Executive Order; EPA = U.S. Environmental Protection Agency; GHG = greenhouse gas; GSA = groundwater sustainability agency; GSP = groundwater sustainability plan; NEPA = National Environmental Protection Act; OPR = Governor's Office and Planning and Research; SB = Senate Bill; SECURE Water Act = Science and Engineering to Comprehensively Understand and Responsibly Enhance Water Act; SCC = social cost of carbon; SCN = social cost of nitrous oxide; SCM = social cost of methane; SGMA = Sustainable Groundwater Management Act; SWP == State Water Project; USACE = U.S. Army Corps of Engineers; USFWS = U.S. Fish and Wildlife Service; WaterSMART Program = Sustain and Manage America's Resources for Tomorrow Program.

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G.7 Section 3.7: Cultural Resources

Table 4A-16. Laws, Regulations, and Programs for Cultural Resources Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
National Environmental Policy Act (42 USC §§ 4321–4347, 40 CFR § 1508.27)	Establishes the federal policy of preserving important historic, cultural, and natural aspects of our national heritage during federal project planning.
Section 106 of the National Historic Preservation Act (54 USC § 306101 *et seq*., 36 CFR Part 800)	Requires federal agencies to consider the effects of their actions on historic properties.
Native American Graves Protection and Repatriation Act (25 USC § 3001 *et seq*., 43 CFR Part 10)	Provides a process for federal agencies to determine custody of Native American cultural items to lineal descendants and culturally affiliated Indian Tribes.
American Indian Religious Freedom Act (42 USC § 1996)	Requires agency policies to respect the free exercise of Native religion and to accommodate access to, and use of, religious sites to the extent that the use is practicable and is not inconsistent with an agency's essential functions.
Archaeological Resources Protection Act (16 USC § 470, 43 CFR Part 7)	Requires a permit for intentional excavation of archaeological materials on federal lands.
Section 304(a) of the National Historic Preservation Act (54 USC § 307103[a])	Protects sensitive information about historic properties.
John D. Dingell, Jr. Conservation, Management, and Recreation Act and National Heritage Areas	NHAs are designated by Congress as places where natural, cultural, historical, and recreation resources combine to form a cohesive, nationally important landscape. The Delta NHA was created on March 12, 2019, when the John D. Dingell, Jr. Conservation, Management, and Recreation Act was signed into law. The DPC is to prepare a management plan within 3 years from the designation to provide guidance on ways to preserve, enhance, and educate the public about Delta and Carquinez Strait heritage. (Delta Protection Commission 2020:1–4)
State	
California Environmental Quality Act Guidelines Section 15064.5 (Pub. Resources Code § 21083.2, 14 Cal. Code Regs. § 4852(b))	Requires the lead agency to consider the effects of a project on cultural resources. Two categories of cultural resources are specifically identified in the CEQA Guidelines; historical resources and unique archaeological resources. Also applies to the identification of human remains during construction.
California Native American Graves Protection and Repatriation Act (Cal. Health & Safety Code §§ 8010–8011)	Establishes a state policy consistent with and that facilitates the federal Native American Graves Protection and Repatriation Act.
California Environmental Quality Act Guidelines Section 15120(d) (Pub. Resources Code §§ 5097.9 and 5097.993, Gov. Code § 6254(r)	CEQA and the California Public Records Act restrict the amount of information regarding cultural resources that can be disclosed in an EIR in order to avoid the possibility that such resources could be subject to vandalism or other damage.

Law, Regulation, Policy, Program, or Agency	Description
Sacramento-San Joaquin Delta Reform Act of 2009 (Wat. Code §§ 85000–85350) and *Delta Plan*	The Delta Reform Act of 2009, established by SB X7-1, established the co-equal goals for the Delta of "providing a more reliable water supply for California and protecting, restoring, and enhancing the delta ecosystem." These coequal goals are to be achieved "in a manner that protects and enhances the unique cultural, recreational, natural resources, and agricultural values of the Delta as an evolving place." The Delta Reform Act also established the DSC. The DSC is tasked with furthering the state's coequal goals for the Delta through development of the *Delta Plan*, a comprehensive, long-term, resource management plan for the Delta, containing both regulatory policies and recommendations aimed at furthering the coequal goals and promoting a healthy Delta ecosystem. The *Delta Plan* provides for a distinct regulatory process for activities that qualify as Covered Actions under Water Code Section 85057.5. State and local agencies proposing Covered Actions, prior to initiating implementation of that action, must prepare a written certification of consistency with detailed findings regarding consistency with applicable *Delta Plan* policies and submit that certification to the DSC.
Delta Protection Act of 1992 (Pub. Resources Code §§ 29701–2; § 29703.5[a])	The DPC was created via the Delta Protection Act, and most recently amended by SB X7-1 in November 2009. The Delta Protection Act declared that the Delta is a natural resource of statewide, national, and international significance, containing irreplaceable resources, and that it is the policy of the State to recognize, preserve, and protect those resources of the Delta for the use and enjoyment of current and future generations, in a manner that protects and enhances the unique values of the Delta as an evolving place. The DPC is a forum for Delta residents to engage in decisions regarding actions to recognize and enhance the unique cultural, recreational, and agricultural resources of the Delta. The DPC is also guided by regulations found in 14 Cal. Code Regs. Division 9. The Delta Protections Act has been amended in 1996, 1998, 1999, 2000 and was renamed the Delta Reform Act in 2009. It includes mandates for the designation of primary and secondary zones within the legal Delta, creation of the DPC, and completion of an LURMP for the Primary Zone of the Delta.
Pub. Resources Code §§ 5024 and 5024.5	Requires that California state agencies take a number of actions to ensure preservation of state-owned historical resources under their jurisdictions.
Regional/Local[6]	
Alameda County East County Plan Area	The ECAP's Open Space Element addresses sensitive lands and regionally significant open space, including cultural resources. ECAP goals and policies include identification of, protection of, and preservation of archaeological and historical resources.
Contra Costa County General Plan 2005–2020	The general plan's Open Space Element includes goals, policies, and implementing measures to identify and preserve the county's historic and cultural resources though inventory, planning, and ordinance, including maintaining a local register of historic resources.
Sacramento County General Plan of 2005–2030	Section VIII of the general plan's Conservation Element includes goals, objectives, policies and implementing measures to ensure inventory, preservation, protection and interpretation of the county's cultural heritage, including maintaining a local register of historic resources and consulting with Native American Tribes.
San Joaquin County General Plan	The general plan's Natural and Cultural Resources Element includes goals and policies to protect, preserve, and enhance its cultural resources through

[6] State agencies are required to comply with regional and local requirements only in very limited circumstances.

Law, Regulation, Policy, Program, or Agency	Description
	planning, study, Tribal consultation, education, and compatibility with the *Delta Plan*.
2030 Countywide General Plan (Yolo County)	Section F of the general plan's Conservation and Open Space Element includes one goal to preserve and protect its cultural resources, with 30 implementing policies and actions, including maintaining a local register of historic resources and compatibility with the *Delta Plan*.
City of Elk Grove General Plan	Chapter 7, *Community and Resource Protection*, of the general plan includes three goals and 14 policies requiring the city to encourage efforts to preserve historic resources, to protect and preserve archaeological and Tribal resources, to plan new development compatible with historical resources, and to ensure that its ordinances, programs, and policies foster these goals.
Envision Stockton 2040 General Plan	Chapter 3, *Land Use*, of the general plan includes one policy and five actions requiring the city to ensure that new development is compatible with adjacent buildings, public spaces, and cultural and historic resources and requires the city to maintain a local register of historic resources.

Sources: County of Contra Costa 2005:9.9–9.14; County of Sacramento 2011:75–84; County of San Joaquin 2016:3.4.1–3.4.30; County of Yolo 2009:CO.34–CO.44; City of Elk Grove 2019:7.2–7.31; City of Stockton 2018: 3.8–3.10.

Cal. Code Regs. = California Code of Regulations; CEQ = Council on Environmental Quality; CEQA = California Environmental Quality Act; CFR = Code of Federal Regulations; Delta = Sacramento–San Joaquin River Delta; Delta Reform Act = Sacramento–San Joaquin Delta Reform Act of 2009; DPC = Delta Protection Commission; ECAP = East County Area Plan; NEPA = National Environmental Policy Act; USC = United States Code.

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G.8 Section 3.8: Environmental Justice

Laws, Regulations, Policies and Guidance for Environmental Justice Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Executive Order 12898	Requires federal agencies to identify and address any disproportionate environmental or health effects that federal actions or programs create on minority and low-income populations. Instructs each federal agency to make achieving environmental justice a part its mission and to develop an agency-wide environmental justice strategy. The accompanying Presidential Memo requires incorporation of environmental justice concerns into agency NEPA practices and policies.
Presidential Executive Order 14008, *Tackling the Climate Crisis at Home and Abroad* (86 FR §§ 7619–763386).	Ordered integration of environmental justice with climate resiliency efforts. Established a policy "to secure environmental justice and spur economic opportunity for disadvantaged communities that have been historically marginalized and overburdened by pollution and underinvestment in housing, transportation, water and wastewater infrastructure… ." Established the White House Environmental Justice Interagency Council. Instructed federal agencies to make achieving environmental justice a part of their missions and to coordinate with local environmental justice leaders.
Council on Environmental Quality Guidance (1997)	Provides definitions, thresholds, and overall methodological guidance for environmental justice analyses as part of the NEPA process.
U.S. Army Corps of Engineers	USACE implements EO 12898 by following the interim guidance in the March 15, 2022, memorandum *Implementation of Environmental Justice and the Justice40 Initiative*, EPA guidance *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis* (1998), and EPA's *Toolkit for Assessing Potential Allegations of Environmental Injustice* (2004)
State	
California SB 115 (Solis) (1999)	Establishes the CalEPA as the coordinating agency for state government environmental justice programs and defines environmental justice. Implemented in Public Resources Code Sections 71110–71116.
Government Code Section 65040.12 and Public Resources Code Sections 71110–71118	Assigns OPR to coordinate and consult with the secretaries of the California Natural Resources Agency and other state agencies on environmental justice programs. Defines environmental justice as "the fair treatment and meaningful involvement of people of all races, cultures, incomes, and national origins, with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies."
California Natural Resources Agency Environmental Justice Policy (2003)	It is CNRA policy that the fair treatment of people of all races, cultures, and income shall be fully considered during the planning, decision making, development and implementation of all CNRA programs, policies, and activities. The intent of this policy is to ensure that the public, including minority and low-income populations, are informed of opportunities to participate in the development and implementation of all CNRA programs, policies, and activities, and that they are not discriminated against, treated unfairly, or caused to experience disproportionately high and adverse human health or environmental effects from environmental decisions.

Law, Regulation, Policy, Program, or Agency	Description
California Environmental Protection Agency Environmental Justice Strategy (2004)	The strategy strives for the following. 1. Ensure meaningful public participation and promote community capacity-building to allow communities to effectively participate in environmental decision-making processes. 2. Integrate environmental justice into the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies. 3. Improve research and data collection to promote and address environmental justice related to the health and environment of communities of color and low-income populations. 4. Ensure effective cross-media coordination and accountability in addressing environmental justice issues.

Sources: Council on Environmental Quality 1997; U.S. Army Corps of Engineers n.d.; California Natural Resources Agency 2003; California Environmental Protection Agency 2004; National Oceanic and Atmospheric Administration 1999:50; U.S. Environmental Protection Agency 1998, 2004; White House 2009.

CalEPA = California Environmental protection Agency; CE = categorical exclusion; CNRA = California Natural Resources Agency; EA = environmental assessment; EIS= environmental impact statement; EO = Executive Order; EPA = U.S. Environmental Protection Agency; FR = *Federal Register*; NEPA = National Environmental Protection Act; NOAA = National Oceanic and Atmospheric Administration; Governor's Office of Planning and Research; SB = Senate Bill; USACE = U.S. Army Corps of Engineers.

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G.9 Section 3.9: Flood Protection

Laws, Regulations, and Programs for Flood Protection Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Executive Order 11988, Floodplain Management	Charged federal agencies with floodplain management responsibilities when planning/designing federally funded projects or when considering any permit applications for which a federal agency has review and approval authority. These responsibilities include identifying measures to minimize flood hazards and reduce the risks of flood losses.
FEMA National Flood Insurance Program (NFIP)	The NFIP has three main components: risk identification and mapping, floodplain management assistance, and flood insurance assistance. For a community to be eligible to participate in the NFIP, the community must adopt a local floodplain management ordinance and must adhere to all floodplain management requirements, with oversight from FEMA.
FEMA Levee Design and Maintenance Regulations (44 CFR § 65.10)	Provides guidance and criteria for levees included in the NFIP. The major criteria include freeboard, closure structures, embankment protection, embankment and foundation stability, settlement, interior drainage, and other design criteria. These criteria include specific design guidelines that must be met in order for the levee to remain in the NFIP.
FEMA Levee Design and Maintenance Regulations: 100-Year (Base Flood) Protection	Based on criteria established in the CFR. and is often used with established USACE criteria to meet certain freeboard, slope stability, seepage/underseepage, erosion, and settlement requirements. Meeting this level of flood protection means that communities will not require mandatory purchase of flood insurance for houses in the floodplain or be subject to building restrictions.
Flood Control Act of 1917 (Ch. 144, 39 Stat. 948)	Authorized the formation of the State/federal Sacramento River Flood Control Project which includes most of the levees, weirs, control structures, bypass channels, and river channels that make up the SPFC in accordance with initial plans contained in the 1910 California Debris Commission report as modified in 1913 and subsequently modified and extended by the acts of 1928, 1937, and 1941.
Flood Control Act of 1936 (Public Law 74–738)	Established a nationwide policy that flood management on navigable waters or their tributaries is in the interest of the general public welfare and is, therefore, a proper activity of the federal government in cooperation with states and local entities. Projects are either specifically authorized through legislation by Congress or through a small project blanket authority.
Flood Control Act of 1944 (Public Law 78–534)	Authorized construction of Folsom Lake in the Sacramento River Flood Control System. In the San Joaquin watershed, this act authorized the Lower San Joaquin River and Tributaries Project, flood improvements to the San Joaquin River and tributaries upstream from the Merced River on the Tuolumne, Stanislaus, and Calaveras rivers, and Littlejohns Creek.
Emergency Flood Control Funds Act of 1955 (Public Law 84-99)	Authorizes emergency funding and response for levee repairs and flood preparation. Also provided for the development of a levee design standard as a minimum requirement for all federal flood management project levees.

Law, Regulation, Policy, Program, or Agency	Description
Standard Operation and Maintenance Manual for the Sacramento River Flood Control Project	The Sacramento River Flood Control Project was authorized by the Flood Control Act of 1 March 1917, Public 367 – 64th Congress, (H. Doc. 81, 62nd Congress, 1st Session, as modified by Rivers and Harbors Committee Doc. No. 5, 63rd Congress 1st Session), and modified by the Flood Control Act of 15 May 1928, Public No. 391–70th Congress, (S. Doc. No. 23, 69th Congress 1st Session), the River and Harbor Act of 26 August 1937, Public 392, 75th Congress, 1st Session, (Senate Committee Print 75th Congress (1st Session), and the Flood Control Act of 18 August 1941, Public 228, 77th Congress, 1st Session (H. Doc. No. 205, 77th Congress, 1st Session). The Manual establishes requirements for the local districts to manage levees as determined by USACE.
CALFED Bay-Delta Program Levee System Integrity Program	Federal and state program that provides maintenance and improvement work to the Delta levee system. Goals and objectives of the program include base level protection, special improvement projects, Suisun Marsh protection and ecosystem enhancement, and levee emergency response planning.
Rivers and Harbors Act Section 14 (33 USC 408)	Activities that would involve work or the construction of a structure affecting a navigable water of the United States must obtain authorization from USACE pursuant to Section 10 of the RHA of 1899 (33 USC § 403 *et seq*.; 33 CFR §§ 322 *et seq*.). Structures or work outside the limits defined for navigable waters of the United States require a Section 10 permit if "the structure or work affects the course, location, or condition of the water body" (33 CFR § 322.3(a)). The law applies to any dredging or disposal of dredged materials, excavation, filling, rechannelization, or any other modification of a navigable water of the United States, and applies to all structures, from the smallest floating dock to the largest commercial undertaking (33 CFR § 322.2(b)).
State	
Delta Levees Maintenance Subventions Program	State cost-sharing program in which participating local levee maintenance agencies receive funds for the maintenance and rehabilitation of non-project and eligible project levees in the Delta. The program's purpose is to preserve the Delta's resources including agriculture, recreational assets, fisheries, and wildlife.
Delta Levees Special Flood Projects Program	Provides financial assistance to local levee-maintaining agencies for levee rehabilitation in the Delta. Since the inception of the program in 1988, more than $200 million has been provided to local agencies in the Delta for flood management and related habitat projects.
Urban Levee Design Criteria (ULDC)	Developed pursuant to SB 5, the ULDC provides guidance for design, evaluation, operation, and maintenance of levees and floodwalls in urban and urbanizing areas (population over 10,000), providing a 1-in-200 chance of occurrence in any given year. The ULDC provides criteria for two types of levees: (1) intermittently loaded, and (2) frequently loaded. The ULDC establishes criteria for levee resilience by requiring factors of safety for slope stability and under-seepage for a water surface elevation that is higher than the 200-year design water surface elevation.
DWR Bulletin 192-82	DWR Bulletin 192-82 levee guidance was developed and recommended for major central Delta islands that protect significant State interests. This standard is appropriate where tides are the major consideration for establishing design flood elevations. Bulletin 192-82 recommendations produce a levee that is like one built per the PL 84-99 guidelines, except that the design water level has a 0.33% (1 in 300) annual chance of occurrence.

Law, Regulation, Policy, Program, or Agency	Description
Title 23 California Code of Regulations	Provides guidance to DWR and the Central Valley Flood Protection Board on enforcing appropriate standards for flood control projects in the Central Valley. For projects included in the SPFC, the Board, as the nonfederal sponsor, coordinates reviews and submits project requests, project designs, and technical engineering documents to USACE for consideration under 33 USC Sections 408 and 208.10.
Central Valley Flood Protection Plan	The CVFPP addresses current and future flood risks and recommends an investment approach to improve public safety, ecosystem conditions, and economic sustainability in areas protected by the SPFC.
California Water Action Plan	Identifies 10 priority actions to guide the state's effort to create more resilient, reliable water systems and to restore critical ecosystems. These actions are organized around long-term objectives including making conservation a way of life, increasing regional self-reliance in water supplies, improving flood protection, managing/preparing for dry periods, expanding water storage capacity, and improving operational and regulatory efficiency.
Regional/Local[7]	
Regional Flood Management Plans	Consistent with the 2012 CVFPP, DWR funded six regionally led RFMPs that prioritized regional flood management. The six RFMPs represent the following regions: Feather River; Lower Sacramento/Delta North; Mid and Upper Sacramento River; Lower San Joaquin River and Delta South; Mid San Joaquin River; and Upper San Joaquin River. The RFMPs help inform CVFPP investment strategies and implementation through a collaborative effort between DWR and local and regional flood planning entities.

Sources: California Department of Water Resources 1995:37, 2017, 2021; County of Alameda 2014; County of Contra Costa 2005; County of Sacramento 2017; County of San Joaquin 2016; County of Solano 2008; County of Yolo 2009; Federal Emergency Management Agency 1982, n.d.; National Committee on Levee Safety 2009;.

AB = Assembly Bill; CALFED = CALFED Bay-Delta Program; CDFW = California Department of Fish and Wildlife; CFR = Code of Federal Regulations; CVFPP = Central Valley Flood Protection Plan; DPC = Delta Protection Commission; DWR = California Department of Water Resources; EO = Executive Order; FEMA = Federal Emergency Management Agency; PL = Public Law; NFIP = National Flood Insurance Program; PL = Public Law; RFMP = Regional Flood Management Plan; SB = Senate Bill; SPFC = State Plan of Flood Control; ULDC = Urban Levee Design Criteria; USACE = U.S. Army Corps of Engineers; USC = United States Code.

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[7] State agencies are required to comply with regional and local requirements only in very limited circumstances.

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G.10 Section 3.10: Geology, Soils, and Paleontological Resources

Laws, Regulations, and Programs for Geology, Soils, and Paleontology Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
U.S. Geological Survey National Seismic Hazard Maps	Seismic hazard maps of the 48 conterminous states, including the Delta. Maps depict contour plots of PGA and spectral accelerations at selected frequencies for various ground motion return periods. These maps have been adopted by many building and highway codes for minimum design requirements.
U.S. Army Corps of Engineers Engineer Circular 1165-2-211, *Water Resource Policies and Authorities Incorporating Sea-Level Change Considerations in Civil Works Programs*	EC 1165-2-212 mandates that USACE coastal activity influenced by tidal waters include potential relative sea level change in the starting water surface elevation and must determine how sensitive plans and designs are to future sea level change (which could impact geologic hazards such as seiche/tsunami), how this sensitivity affects calculated risk, and what design or operations and maintenance measures should be implemented to minimize adverse consequences while maximizing beneficial effects.
State	
California Water Code Section 6002	DSOD has oversight and approval authority for structures considered a dam under the Water Code. Some levees qualify as "dams" (Wat. Code § 6002) and are required to meet DSOD standards and design review requirements. Dams under DSOD jurisdiction are artificial barriers more than 6 feet high impounding more than 50 AF of water or more than 25 feet high impounding more than 15 AF. Water Code Section 6004(c) specifically excludes structures in the Sacramento-San Joaquin Delta "… if the maximum possible water storage elevation of the impounded water does not exceed four feet above mean sea level, as established by the United States Geological Survey 1929 Datum."
Liquefaction and Landslide Hazard Maps (Seismic Hazards Mapping Act)	The act (Public Res. Code §§ 2690–2699.6) directs the California Geological Survey to identify and map areas prone to earthquake-induced liquefaction, landslides, and amplified ground shaking. It requires site-specific geotechnical investigations for seismic hazard and mitigation measure identification prior to permitting most developments designed for human occupancy. Cities and counties are required to incorporate these maps into their plans' safety elements.
Alquist-Priolo Earthquake Fault Zones	Public Resources Code Section 2621 *et seq*. directs the California Geological Survey to identify and map known active faults to prevent building construction for human occupancy on a fault surface trace. The Alquist-Priolo Earthquake Fault Zone establishes a 200- to 500-foot zone on each side of the mapped fault trace to account for potential branches of active faults. Title 14 Cal. Code Regs. Section 3601(e) defines buildings intended for human occupancy as those that would be inhabited for more than 2,000 hours per year. California Geological Special Publication 42 shows mapped faults capable of surface fault rupture.
Regulatory Design Codes and Standards for Project Structures	Numerous State, federal and professional association design codes and standards regulate and guide structure construction. These codes and structures establish minimum design and construction requirements including for: concrete and steel structures, levees, tunnels, pipelines, canals, buildings, bridges, and pumping stations.

Law, Regulation, Policy, Program, or Agency	Description
	Project-specific design criteria and guidelines will be developed as part of future design activities either to meet or exceed the requirements of the design standards listed below. Project design engineers and construction contractors will be required to follow these project specific design criteria and guidelines. These design and construction codes and standards include, but may not be limited to: • AASHTO *Guide Specifications for LRFD Seismic Bridge Design*, 7th Edition (2014) • *American Railway Engineering and Maintenance-of-Way Manual for Railway Engineering*, Volume 2, Chapter 9, *Seismic Design for Railway Structures* (2019) • ASCE *Minimum Design Loads for Buildings and Other Structures*, ASCE/SEI 7-10, 2013 • California Building Code Standards, 2019 (24 Cal. Code Regs.) • Caltrans SDC, Version 2.0, April 2019 • 8 Cal. Code Regs. Section 3203 (Cal/OSHA Workplace Injury and Illness Prevention Program) • 8 Cal. Code Regs. Section 1509 requires employers to adopt a written Code of Safe Practices (8 Cal. Code Regs. 1938, Appendix A) • DWR *DSOD Guidelines for Use of the Consequence Hazard Matrix and Selection of Ground Motion Parameters*, 2002 • DWR ULDC, May 2012 • DWR, *Division of Engineering State Water Project–Seismic Loading Criteria Report*, September 2012 • DWR, *Delta Seismic Design*, June 2012 • FHWA Seismic Retrofitting Manual for Highway Structures, Parts 1 and 2, 2006 • State of California, Sea-Level Rise Guidance, 2018 • USACE SOP EDG-03, *Geotechnical Levee Practice,* 2004 • USACE ER 1110-2-1806, *Engineering and Design—Earthquake Design and Evaluation for Civil Works Projects,* 1995 • USACE EM 1110-2-6053, *Engineering and Design—Earthquake Design and Evaluation of Concrete Hydraulic Structures,* 2007 • USACE EM 1110-2-2300, *Engineering and Design—General Design and Construction Considerations for Earth and Rock-Fill Dams,* 2004 • USACE EM 1110-2-6050, *Engineering and Design—Response Spectra and Seismic Analysis for Concrete Hydraulic Structures,* 1999 • USACE EM 111-2-2100, *Engineering and Design—Stability Analysis of Concrete Structures,* 2005 • USACE EM 1110-2-2400, *Engineering and Design—Structural Design of Outlet Works,* 2003 • USACE EM 1110-2-6051, *Engineering and Design—Time History Dynamic Analysis of Concrete Hydraulic Structures,* 2003 • USACE EM 1110-2-1902, *Slope Stability,* 2003 • USACE EM 1110-1-1904, *Engineering and Design—Settlement Analysis,* 1990 • USACE EM 1110-2-2906, *Engineering and Design—Design of Pile Foundations,* 1991 • U.S. Department of the Interior and USGS Circular 1331, *Climate Change and Water Resources Management: A Federal Perspective*

Law, Regulation, Policy, Program, or Agency	Description
Regional/Local[8]	
Alameda *East County Area Plan*	The ECAP Environmental Health and Safety Element, which is part of the *Alameda County General Plan*, implements soil and slope stability, seismic, and geologic hazards consistent with State law and policies.
Contra Costa County General Plan 2005–2020	The general plan's Safety Element implements seismic, ground failure, and landslide hazard requirements consistent with State law and policies.
Sacramento County General Plan of 2005–2030	The general plan's Safety Element implements seismic and geologic hazards avoidance and minimization measures consistent with state law and policies.
San Joaquin County General Plan Policy Document	The general plan's Public Health and Safety Element implements seismic hazards and ground failure and landslide hazard avoidance and minimization measures consistent with state law and policies.
2030 Countywide General Plan (Yolo County)	The general plan's Health and Safety Element contains policies that require a geotechnical analysis for construction in areas with potential geological hazards and requires review of all development and construction proposals by the County to ensure conformance with applicable building standards.
Federal	
Clean Water Act Section 402, National Pollutant Discharge Elimination System Program: Storm Water Permitting	Established the NPDES permit program that regulates point and nonpoint source discharges to waters of the United States. In California, the State Water Board and nine Regional Water Boards administer the NPDES permit program.
State	
Porter-Cologne Water Quality Control Act of 1969 (California Wat. Code, Div. 7, 2009 Amendments, and 2021 Amendments)	California's principal law governing water quality control. Applies broadly to all state waters, including surface waters, wetlands, and ground water; it covers waste discharges to land as well as to surface and groundwater, and applies to both point and nonpoint sources of pollution.
General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, State Water Board Order 2009-0009-DWQ, NPDES Permit CAS000002 (Construction General Permit) (as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ)	The Construction General Permit covers stormwater discharges from construction sites that involve 1 acre or more of disturbed area. Coverage under the General Permit is obtained by submitting permit registration documents to the State Water Board, which include a SWPPP for construction activities.
National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System Permits	NPDES MS4 permits require permittees to develop and implement stormwater management plans that include provisions for reducing pollutant discharges from construction activities. Local jurisdictions are responsible for enforcement of those provisions. Included in municipal stormwater management plans are requirements for erosion control measures.
Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program	The state's policy describes how the nonpoint source plan is to be implemented and enforced, in compliance with Section 319 of the CWA, Coastal Zone Act Reauthorization Amendments, and the Porter-Cologne Act. In contrast to point source pollution that enters water bodies from discrete conveyances, NPS pollution enters water bodies from diffuse sources, such as land runoff, seepage, or hydrologic modification.

[8] State agencies are required to comply with regional and local requirements only in very limited circumstances.

Law, Regulation, Policy, Program, or Agency	Description
California Building Code (Cal. Code Regs., Title 24)	The CBC provides standards for various aspects of construction, including excavation, grading, and fill. It provides requirements for classifying soils and identifying corrective actions when soil properties (e.g., expansive and corrosive soils) could lead to structural damage.
Regional/Local[9]	
Contra Costa County General Plan 2005–2020	The general plan establishes goals and policies to protect and conserve soil resources, promote soil management practices, and discourage on-site wastewater disposal systems in limiting soils. Also contains a policy to ensure proper engineering design of structures on soils subject to subsidence.
Sacramento County General Plan of 2005–2030	The general plan establishes a goal to preserve and protect the long-term health and resource value of agricultural soils (Policy AG-28). Establishes a policy to curtail tillage of organic Delta soils to reduce erosion and subsidence (Policy DP-6).
San Joaquin County General Plan Policy Document	The general plan establishes goals to support soil conservation and restoration efforts by the USDA NRCS and Resource Conservation Districts.
2030 Countywide General Plan (Yolo County)	The general plan establishes a policy pertaining to unstable soils.
Federal	
Antiquities Act of 1906 (Public Law 59-209; 16 USC § 431 *et seq.*; 34 Stat. 225)	Requires protection of historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest on federal lands. Paleontological resources are included in this category by many federal agencies. In addition, NEPA (USC § 4321 et seq.; 40 CFR § 1502.25), as amended, requires federal agencies to consider the impact of their actions (including the issuance of entitlements or permits, or financial support, to a project) on important historic, cultural, and natural aspects of our national heritage. Because federal entitlement or permits will be required, these statutes extend to paleontological resources in the Delta.
Code of Federal Regulations, Title 43	Subpart 8200: Addresses procedures and practices for the management of lands that have outstanding natural history values, including fossils, which are of scientific interest. Subpart 8365.1-5: Addresses the willful disturbance, removal, and/or destruction of scientific resources or natural objects. Subpart 8360.0-7: Identifies the penalties for such violations.
State	
Public Resources Code Chapter 1.7, Section 5097.5/5097.9 (Stats. 1965, c. 1136, p. 2792), Archaeological, Paleontological, and Historical Sites	Defines any unauthorized disturbance or removal of a fossil site or remains on public land as a misdemeanor, and specifies that state agencies may undertake surveys, excavations, or other operations as necessary on state lands to preserve or record paleontological resources.
Regional/Local[10]	
Alameda County *East County Area Plan*	ECAP emphasizes the preservation of historic and cultural resources, including heritage resources, but does not address paleontological resources. Nevertheless, county approval of projects includes review for CEQA compliance, and the CEQA Environmental Checklist employed does include the Appendix G, Section V, part c question regarding paleontological resources. [Note, this is a previous version of the CEQA Checklist, and paleontological resources are now addressed in Section VII part (f).]

[9] State agencies are required to comply with regional and local requirements only in very limited circumstances.

[10] State agencies are required to comply with regional and local requirements only in very limited circumstances.

Law, Regulation, Policy, Program, or Agency	Description
Sacramento County General Plan of 2005–2030	General plan policies CO-161 to 163 help to ensure that future finds of paleontological resources are protected by requiring appropriate mitigation and monitoring to reduce potential impacts where development could adversely affect paleontological resources and requiring that a certified geologist or paleoresources consultant determine appropriate protection measures when resources are discovered during development and land-altering activities.
San Joaquin County General Plan Policy Document	The general plan does not specifically describe paleontological resources in its goals or policies but does provide protection through its Specific Implementation Program for Natural and Cultural Resources under NCR-N, Historic and Cultural Resource Preservation Regulations.
Solano County General Plan	The general plan does not address paleontological resources, but county approval includes review for CEQA compliance.
Contra Costa County General Plan 2005 – 2020	The general plan includes fossils in its inventory of significant ecological resource areas. Conservation Goal 8-A states that ecological resource should be preserved and protected.
2030 Countywide General Plan (Yolo County)	General plan Action CO-A54 requires the inventory of paleontological resources in areas where preliminary surveys have indicated a medium high potential for these resources. Also requires a mitigation plan to protect paleontological resources before the issuance of permits. Action CO-A56 requires that, if paleontological resources are encountered during site preparation or construction, all work in the vicinity immediately be halted and the Planning and Public Works Department notified.

Sources: California Geological Survey 2018a; County of Alameda 2000:74–75; County of Contra Costa 2005:10-17–10-26; County of Sacramento 2017:2; County of San Joaquin 2016:3.3-9–3.3-10; County of Yolo 2009:HS-10; Delta Stewardship Council 2019:ES-2, 3; U.S. Army Corps of Engineers 2009:1; U.S. Geological Survey 2018:website.

AASHTO = American Association of State Highway and Transportation Officials; AF = acre-feet; ASCE = American Society of Civil Engineers; Cal/OSHA = California Division of Occupational Safety and Health; Caltrans = California Department of Transportation; Cal. Code Regs. = California Code of Regulations; Delta = Sacramento–San Joaquin River Delta; Delta Reform Act = Sacramento–San Joaquin Delta Reform Act of 2009; DSC = Delta Stewardship Council; DSOD = California Division of Safety of Dams; DWR = California Department of Water Resources; EC = Engineer Circular; ECAP = East County Area Plan; EM = Engineer Manual; ER = Engineer Regulation; FHWA = Federal Highway Administration; PGA = peak ground acceleration; LRFD = load and resistance factor design; SB = Senate Bill; SDC = seismic design criteria; SOP = standard operating procedure; ULDC = Urban Levee Design Criteria; USACE = U.S. Army Corps of Engineers; USGS = U.S. Geological Survey; USGS = U.S. Geological Survey.

Sources: County of Alameda 2000; County of Contra Costa 2005:7-14,7-40, 8-40; County of Sacramento 2017:5, 2019:22; County of San Joaquin 2016:3.3-10; County of Yolo 2009:LU-19; State Water Resources Control Board and California Environmental Protection Agency 2004.

CBC = California Building Code; CWA = Clean Water Act; ECAP = East County Area Plan; NPDES = National Pollutant Discharge Elimination System; MS4 = Municipal Separate Storm Sewer System; NPS = nonpoint source; Porter-Cologne Act = Porter Cologne Water Quality Control Act of 1969; Regional Water Board = Regional Water Quality Control Board; State Water Board = State Water Resources Control Board; SWPPP = stormwater pollution prevention plan; USDA NRCS = U.S. Department of Agriculture Natural Resources Conservation Service.

Sources: County of Alameda 2002:36; County of Sacramento 2017:77–79; County of San Joaquin 2016:4–37; County of Solano Planning Services Division 2020:2; County of Contra Costa 2005:8-2 to 8-6; County of Yolo 2009:CO-41–CO-43.

CEQA = California Environmental Quality Act; CFR = Code of Federal Regulations; Delta = Sacramento–San Joaquin River Delta; ECAP = East County Area Plan; NEPA = National Environmental Protection Act; USC = United States Code.

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G.11 Section 3.11: Groundwater

Laws, Regulations, and Programs for Groundwater Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Safe Drinking Water Act (42 USC § 300f)	Authorizes the EPA to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in drinking water.
Clean Water Act (33 USC §§ 1251–1376)	Requires states to develop a list of water bodies (or sections of water bodies) that will not attain water quality standards after implementation of minimum required levels of treatment by point-source dischargers and adopt total maximum daily loads for these waters.
Federal Antidegradation Policy	Designed to protect existing uses and the level of water quality necessary to protect existing uses and provide protection for higher quality and national water resources and directs states to adopt a statewide policy (40 CFR § 131.12).
State	
Porter-Cologne Water Quality Control Act of 1969 (California Water Code, Div. 7 and 2009 Amendments)	Applies broadly to all State waters, including groundwater; it covers waste discharges to land as well as to surface and groundwater, and applies to both point and nonpoint sources of pollution. Applicable to managing groundwater resources by preserving groundwater quality and the ability to use groundwater resources for municipal, agricultural, and environmental purposes.
State Water Resources Control Board Policy with Respect to Maintaining High Quality Waters in California (Resolution 68-16—Statement of State Antidegradation Policy)	The goal of Resolution 68-16 is to maintain high quality waters where they exist in the state. The State Water Board has interpreted Resolution 68-16 to incorporate the federal antidegradation policy. Applicable to the managing groundwater resources by preserving groundwater quality and the ability to use groundwater resources for municipal, agricultural, and environmental purposes.
State Water Resources Control Board Sources of Drinking Water Policy (Resolution 88-63)	Established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. Applicable to the managing groundwater resources by preserving groundwater quality and the ability to use groundwater resources for municipal, agricultural, and environmental purposes.
Central Valley Regional Water Quality Control Board *Water Quality Control Plan (Basin Plan) for the Sacramento and San Joaquin River Basins—5th Edition*	Defines the beneficial uses, water quality objectives, implementation programs, and surveillance and monitoring programs for waters of the Sacramento River and San Joaquin River groundwater basins.
Area of Origin Statute (California Wat. Code § 1220)	Pursuant to California Water Code Section 1220, no groundwater shall be pumped for export from within the combined Sacramento and Delta-Central Sierra Basins, as defined in DWR's Bulletin 160-74, unless the pumping is in compliance with a groundwater management plan that is adopted by ordinance pursuant to subdivision (b) by the county board of supervisors, in full consultation with affected water districts, and that is subsequently approved by a vote in the counties or portions of counties that overlie the groundwater basin, except that water that has seeped into the underground from any reservoir, afterbay, or other facility of an export project may be returned to the water supply of the export project.

Law, Regulation, Policy, Program, or Agency	Description
California Statewide Groundwater Elevation Monitoring (CASGEM) Program (SB X7-6)	Mandates a statewide groundwater elevation monitoring program to track seasonal and long-term trends in groundwater elevations in California's groundwater basins. Codified in California Water Code Section 10920 *et. seq*, the CASGEM Program requires collaboration among local monitoring entities and DWR to collect groundwater elevation data with the goal of establishing a permanent, locally managed program of regular and systematic monitoring in all of the state's alluvial groundwater basins.
Sustainable Groundwater Management Act	SGMA provides a statewide framework for sustainable groundwater management in California (SB 1168, AB 1739, and SB 1319). SGMA is intended to support local groundwater management through technical assistance and oversight of GSAs and the implementation of their GSPs to achieve and/or maintain groundwater basin sustainability by 2040 for critically overdrafted groundwater basins, and by 2042 for all other high- and medium-priority groundwater basins (both of which are located in the project area).
Regional/Local[11]	
Contra Costa County General Plan 2005–2020	The general plan establishes goals and policies to protect, manage and enhance groundwater resources including protecting recharge areas and managing land use dependent on groundwater to avoid overdraft conditions.
Sacramento County General Plan 2005–2030	The general plan establishes goals and policies to protect and manage the sustainable yield of the underlying groundwater basins.
San Joaquin County 2035 General Plan	The general plan establishes goals and policies to protect recharge areas and to manage the underlying groundwater basins.
Solano County General Plan	The general plan establishes goals and policies to protect, manage and enhance groundwater resources including protecting recharge areas and management to avoid overdraft conditions.
2030 Countywide General Plan (Yolo County)	The general plan establishes goals and policies to protect recharge areas and to manage the sustainable yield of the underlying groundwater basins.
County Groundwater Ordinances	Various county ordinances establish policies to protect groundwater use within basins, govern ability to export out-of-basin (groundwater exports), permit construction or destruction wells, and other groundwater management activities.

Sources: California Department of Water Resources 2021; Central Valley Regional Water Quality Control Board 2018; County of Contra Costa 2005; County of Sacramento 2017; County of San Joaquin 2016; County of Solano 2008; County of Yolo 2009.

AB = Assembly Bill; CFR = Code of Federal Regulations; CASGEM Program = California Statewide Groundwater Elevation Monitoring Program; CDFW = California Department of Fish and Wildlife; Delta Reform Act = Sacramento–San Joaquin Delta Reform Act of 2009; DSC = Delta Stewardship Council; DWR = California Department of Water Resources; EPA = U.S. Environmental protection Agency; GSA = groundwater sustainability agency; GSP = groundwater sustainability plan; GWMP = Groundwater Management Plan; Porter-Cologne Act = Porter Cologne Water Quality Control Act of 1969; SB = Senate Bill; SB X7-6 = California Statewide Groundwater Elevation Monitoring Program; SGMA = Sustainable Groundwater Management Act; State Water Board = State Water Resources Control Board; USC = United States Code.

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G.12 Section 3.12: Hazards, Hazardous Materials, and Wildfire

Laws, Regulations, and Programs for Hazards, Hazardous Materials, and Wildfire Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Comprehensive Environmental Response, Compensation and Liability Act of 1980, as Amended (42 USC § 9601 *et seq*.)	Provides federal funds to clean up uncontrolled or abandoned hazardous waste sites, accidents, spills, discharges, and other emergency releases of pollutants and contaminants into the environment. Through CERCLA, EPA was given authority to seek out those parties responsible for any hazardous release and assure their cooperation in the cleanup.
Resource Conservation and Recovery Act of 1976, as Amended (42 USC § 6901 *et seq*.)	Provides for cradle to grave regulation of hazardous wastes and includes the Hazardous and HSWA of 1984. RCRA and HSWA protect human health and the environment, and impose regulations on hazardous waste generators, transporters, and operators of treatment, storage, and disposal facilities. HSWA also requires EPA to establish a comprehensive regulatory program for USTs.
Superfund Amendments and Reauthorization Act of 1986 (40 CFR Parts 350–372)	Reauthorizes CERCLA to continue cleanup activities around the country. Several site-specific amendments, definition clarifications, and technical requirements were added to the statute, including additional enforcement authorities.
Toxic Substances Control Act of 1976 (15 USC § 2601 *et seq*.)	Gives the EPA authority to establish reporting, recordkeeping and testing requirements, and restrictions relating to chemical substances and/or mixtures. TSCA addresses the production, import, use, and disposal of specific chemicals, including PCB, asbestos, radon, and lead-based paint.
Lautenberg Chemical Safety Act of 2016	Amends the TSCA. The new law, enacted in June 2016, includes a mandatory requirement for EPA to evaluate existing chemicals with clear and enforceable deadlines; risk-based chemical assessments; increased public transparency for chemical information; and consistent source of funding for EPA to carry out the responsibilities under the new law.
Hazardous Materials Transportation Act of 1975 (49 USC §§ 5101–5127; 49 CFR 171 (C)	DOT, FHWA, and FRA are the three entities that regulate the transport of hazardous materials at the federal level. The Hazardous Materials Transportation Act governs the transportation of hazardous materials. These regulations are promulgated by DOT and enforced by EPA.
Clean Water Act of 1972 (33 USC § 1251 *et seq*.)	CWA Section 402 establishes the NPDES (33 USC § 1342), a permitting system for the discharge of any pollutant (except for dredged or fill material) into waters of the United States. This permit program is administered by the Central Valley Regional Water Quality Control Board. For projects greater than 1 acre (such as this project) an NPDES General Construction Permit must be obtained prior to any construction activities. One requirement for an NPDES permit is the development and implementation of a SWPPP that provides BMPs to prevent the discharge of pollutants and sediments into receiving waters.
Safe Drinking Water Act of 1974 (42 USC § 300f et seq. 6939b; 15 USC § 1261 et seq.)	Authorizes EPA to set national health-based MCLs for drinking water to protect against both naturally occurring and human-made contaminants that may be found in drinking water. EPA also protects underground sources of drinking water, and many environmental regulations use the MCLs for environmental cleanup standards. EPA has designated the California Department of Public Health as the primary agency to administer and enforce the requirements of the SDWA.

Law, Regulation, Policy, Program, or Agency	Description
Federal Railroad Administration	Responsible for promulgating and enforcing rail safety regulations (49 CFR Parts 200–299). FRA administers a safety program that oversees the movement of hazardous materials (including dangerous goods), such as petroleum, chemical, and nuclear products, throughout the United States' rail transportation system.
Safe, Efficient Use and Preservation of Navigable Airspace (14 CFR Part 77)	Prime objectives of the FAA are to promote air safety and the efficient use of navigable airspace. Projects near an airport must provide the FAA with a Notice of Proposed Construction or Alteration for review prior to initiating construction. Title 14 CFR Part 77.9 details the construction or alterations that require FAA notification and approval. Caltrans' Division of Aeronautics performs safety functions with regard to the state's navigable airspace which are not FAA's responsibility (e.g., permitting for hospital heliports).
State	
California Hazardous Substance Account Act of 1999 (Health & Saf. Div. 20, Ch. 6.8)	The California equivalent to CERCLA, this act requires past and present owners and operators to assume liability for the remediation of hazardous waste sites within California. Health and Safety Code Section 25356.1 requires that the California DTSC prepare or approve remedial action plans for Superfund sites. RWQCBs oversee cleanup and abatement goals and objectives for water quality protection. RWQCBs also regulate the disposal of contaminated soil.
California Hazardous Waste Control Law of 1972 (Health & Saf. Code, Div. 20, Ch. 6.5)	This law is the basic hazardous waste statute in California and is administered by DTSC. This law is similar to, but generally more stringent than, RCRA, and applies to a broader range of hazardous wastes, and requires recycling and waste reduction programs.
Hazardous Waste Program (Health & Saf. Code §§ 25100–25250.28)	Generation, transportation, treatment, storage, and disposal of characteristic and listed hazardous wastes.
Hazardous Materials Release Response Plans and Inventory (Hazardous Materials Business Plan) (Health & Saf. Code Div. 20, Ch. 6.95 §§ 25500–25520)	Requires a business using hazardous materials to prepare a business plan describing the facility, inventory, emergency response plans, and training programs and submit a business plan to the local Certified Unified Program Agency.
Aboveground Petroleum Storage Act of 2007 (Health & Saf. Code Div. 20, Ch. 6.67, §§ 25270–25270.13)	Tracks the amount and type of hazardous substances being stored in aboveground tanks and applies to facilities with aggregate petroleum tank storage capacities of 1,320 gallons or more and requires development and implementation of a SPCC plan consistent with 40 CFR Part 112. Facilities must submit annual Tank Facility Statements or, depending on CUPA, a Hazardous Materials Business Plan (HMBP).
California Solid Waste (14 Cal. Code Regs. Div. 7; 27 Cal. Code Regs. Div. 2)	Solid waste is regulated under Title 14, Division 7 and Title 27, Division 2 of the Cal. Code Regs., which establish minimum standards for the handling and disposal of solid wastes.
Control of Pesticides (Food & Agr. Code §§ 11401–14155)	Divisions 6 and 7, Sections 11401–14155 of the Food and Agricultural Code, regulate pest control operations, application of pesticides, and applicators, and restrict the use of some pesticides and are implemented by the CalEPA, Department of Pesticide Regulation.
Hazardous Wastes and Substances Site List	CalEPA maintains the Cortese List used by state and local agencies and developers to comply with CEQA requirements in providing information about the locations of hazardous materials release sites. The list is updated at least once annually. The DTSC, State Water Board, and California Department of Resources Recycling and Recovery contribute to the hazardous material release site listings.

Law, Regulation, Policy, Program, or Agency	Description
Water Code (Wat. Code Div. 7, Ch. 5)	Requires the State Water Board and DTSC to establish policies and procedures for investigation of, and remediation and abating the effects of, a hazardous substance discharge that creates, or threatens to create, a condition of contamination, pollution, or nuisance. The policies and procedures are established in State Water Board Resolution 92-49.
State Water Resources Control Board Resolution 92-49 (Wat. Code § 13304)	This resolution establishes policies and detailed procedures for all investigations and remediation of any discharge (release) that causes, or threatens to cause, conditions of soil, water pollution, or nuisance associated with the migration of waste or fluid from waste management units. The resolution also requires coordination among other agencies, including DTSC, the EPA, and local governances
California Law for Conservation of Petroleum (Pub. Resources Code, Div. 3, Oil and Gas, Ch. 1, Oil and Gas Conservation)	Regulates operators of oil wells and oil production facilities. Governs notices of intent to drill wells, proper abandonment of oil wells to ensure protection of surface and groundwater, and abandonment of old wells that pose a present danger to life, health, or naturals resources (land, air, and water). Sections also establish emergency reporting requirements for oil discharges to land.
California Geologic Energy Management Division Construction-Site Plan Review Program (14 Cal. Code Regs., Div. 2, Ch. 4, Subch. 1, Art. 3 §§ 1723–1723.8)	Regulates drilling, operation, maintenance, and abandonment of oil, gas, and geothermal wells. The program is aimed at addressing potentially dangerous issues associated with development near oil or gas wells. CalGEM serves in an advisory role to make relevant information available to local agencies.
California Occupational Safety and Health Act: Tunnel Safety Orders of the California Code of Regulations (Cal. Code Regs. Title 8, Div. 1, Ch. 4, Subch. 20 §§ 8400–8469)	Sets forth safety standards and provisions, intended to protect workers during tunneling operations. Section 8425, "Operation of Gassy and Extrahazardous Tunnels" identifies safety measures, as follows, to ensure safe work in tunnels classified as "gassy" or "extrahazardous" by Cal/OSHA's Mining and Tunneling Unit.
California Occupational Safety and Health Act of 1973 (Cal. Code Regs. Title 8, Subch. 4, Art. 4 § 1529)	Asbestos Standard for Construction prohibits asbestos emissions from demolition and construction activities; requires medical examinations and monitoring of employees working with asbestos; specifies precautions and safe work practices; and require notice to federal and local government agencies before beginning demolition or construction activities that could disturb asbestos. Title 8 of the Cal. Code Regs., Subchapter 4, Article 4, Section 1529 regulates asbestos exposure in all construction work as defined in Section 1502.
Accidental Release Prevention Law of 1996 (Health & Saf. Code §§ 25531–25543.3)	State programs created under the ARPL were intended to expand control over materials that can produce toxic clouds after fires, explosions or other accidents. Implemented by the state's local CUPAs, the main purpose of the program is to prevent accidental releases of substances that can cause serious harm to the public and the environment, to minimize the damage if releases do occur, and to satisfy community right-to-know laws. Requires businesses that handle more than a threshold quantity of a regulated substance listed in the regulations to develop an RMP.
Fire Hazard Severity Zones (Pub. Resources Code §§ 4201–4204; Gov. Code §§ 51178, 51179)	Government Code Section 51178 requires CAL FIRE to identify fire hazard severity zones in the state. Government Code Section 51179 requires a local agency to designate, by ordinance, high and very high fire hazard severity zones in its jurisdiction.

Law, Regulation, Policy, Program, or Agency	Description
State Aeronautics Act of 2017 (Pub. Util. Code § 21001 et seq.)	Authorizes Caltrans and local governments to protect navigable airspace and prohibits the construction of any structure or permitting any natural growth of a height which would constitute a hazard to air navigation without a permit from Caltrans. The permit is not required if the FAA has determined that the structure or growth does not constitute a hazard to air navigation or would not create an unsafe condition for air navigation.
Regional/Local[12]	
Certified Unified Program Agencies	CUPAs consolidate, coordinate, and make consistent the administrative requirements, permits, inspections, and enforcement activities of six environmental and emergency response programs. The CalEPA and other state agencies set the standards for their programs, and local governments implement the standards through CUPAs. CUPAs regulate various activities related to hazardous materials waste and disposal (e.g., fire code implementation, hazardous materials business plans).
Contra Costa County Airport Land Use Compatibility Plan	The plan aims to promote compatibility between the airports in Contra Costa County and the land uses that surround them to minimize the public's exposure to excessive noise and safety hazards within areas around public airports.

Sources: County of Alameda 2000:35; County of Contra Costa 2000, 2005:10-39; County of Sacramento 2017a:4, 7–10, 2017b:11; County of San Joaquin 2016:3.3-11, 3.3-13, 3.3-15; County of Solano 2008:HS-53, HS-62; County of Yolo 2009:HS-26, HS-29.

ARPL = Accidental Release Prevention Law; BMP = best management practice; CalEPA = California Environmental Protection Agency; CAL FIRE = California Department of Forestry and Fire Protection; CalGEM = California Geologic Energy Management Division; Cal/OSHA = California Division of Occupational Safety and Health; Caltrans = California Department of Transportation; CERCLA = Comprehensive Environmental Response, Compensation and Liability Act; CFR = Code of Federal Regulations; Cortese List = Hazardous Wastes and Substances Site List; CUPA = Certified Unified Program Agency; CWA = Clean Water Act; DOT = U.S. Department of Transportation; DTSC = Department of Toxic Substances Control; ECAP = East County Area Plan; EPA = U.S. Environmental Protection Agency; FAA = Federal Aviation Administration; FHWA = Federal Highway Administration; FRA = Federal Railroad Administration; HSWA = Hazardous and Solid Waste Amendments; MCL = maximum contaminant level; NPDES = National Pollutant Discharge Elimination System; MCL = maximum contaminant levels; PCB = polychlorinated biphenyl; RCRA = Resource Conservation and Recovery Act; RMP = risk management plan; RWQCB = regional water quality control board; SDWA = Safe Drinking Water Act; State Water Board = State Water Resources Control Board; SWPPP = stormwater pollution protection plan; TSCA = Toxic Substances Control Act; UST = underground storage tank.

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[12] State agencies are required to comply with regional and local requirements only in very limited circumstances.

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G.13 Section 3.13: Land Use

Laws, Regulations, and Programs for Land Use Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
The National Wildlife Refuge System Improvement Act of 1997	The act authorizes and directs habitat management planning of units and directs environmental health and management of units to prevent further degradation of environmental conditions. Implementation of one or more of the action alternatives may result in a temporary or permanent encroachment in planning areas established and managed under this act.
Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan	The plan guides development and management of wetlands in a manner that reflects historic hydrologic patterns and is consistent with federal, state, and local floodplain management goals and programs. The plan establishes goals related to land use, including preserving, enhancing, and restoring natural resources and coordinating land acquisition and management activities with other agencies and organizations.
Uniform Relocation Assistance and Real Property Acquisition Policies Act for Federal and Federally Assisted Programs (42 USC 4601 *et seq.*)	The act establishes policies and provisions that must be followed by federal, state, and local government agencies that require the acquisition of real property. Implementation of one or more of the action alternatives may require that one or more parcels in the study area be acquired. Relocation advisory services, moving cost reimbursement, replacement housing, and reimbursement for related expenses and rights of appeal are provided for by the act.
State	
Delta Protection Act of 1992 (Pub. Resources Code 19.5 §§ 29700–29780)	T Established the DPC to prepare and oversee a comprehensive LURMP for the Primary Zone of the Delta. The Primary Zone encompasses 487,625 acres (approximately 66% of the statutory Delta) of varied land uses, waterways, and levees. Land uses in the Delta Primary Zone are subject to DPC review for consistency with the management plan. The remaining areas of the statutory Delta are designated as the Secondary Zone and are not under Commission land use jurisdiction (Delta Protection Commission 2010). DPC does not have land use authority, but it can suspend local projects under an appeal process while it reviews them for consistency with the Delta Protection Act and the 2011 LURMP for the Primary Zone of the Delta.
Land Use and Resource Management Plan for the Primary Zone of the Delta (LURMP)	All local governments must submit to the DPC proposed amendments that will be incorporated into their general plans, being consistent with respect to lands located in the Primary Zone of the Delta. Nothing in the law makes the LURMP binding on state agencies such as DWR as a proponent of the Delta Conveyance Project. The LURMP establishes several goals and policies affecting land use and relevant to the Delta Conveyance Project. The LURMP is composed of seven elements: land use, agriculture, natural resources, recreation and access, water, levees, and utilities and infrastructure. Relevant goals from the LURMP related to avoiding and mitigating environmental impacts are too numerous to elaborate here.
Sacramento-San Joaquin Delta Reform Act of 2009 (Wat. Code §§ 85000–85350) and *Delta Plan*	The Delta Reform Act, created by SB X7-1, established the co-equal goals for the Delta of "providing a more reliable water supply for California and protecting, restoring, and enhancing the delta ecosystem." (Pub. Resources Code § 29702; Wat. Code § 85054). These coequal goals are to be achieved "in a manner that protects and enhances the unique cultural, recreational, natural resources, and agricultural values of the Delta as an evolving place." (Wat. Code § 85054). The Delta Reform Act also established the DSC. The DSC is tasked with furthering the state's coequal goals for the Delta through development of the *Delta Plan*, a comprehensive, long-term, resource management plan for the

Law, Regulation, Policy, Program, or Agency	Description
	Delta, containing both regulatory policies and recommendations aimed at furthering the coequal goals and promoting a healthy Delta ecosystem. The *Delta Plan* provides for a distinct regulatory process for activities that qualify as Covered Actions under Water Code Section 85057.5. State and local agencies proposing Covered Actions, prior to initiating implementation of that action, must prepare a written certification of consistency with detailed findings regarding consistency with applicable *Delta Plan* policies and submit that certification to the DSC.
California Relocation Assistance Act (California Gov. Code §§ 7260 *et seq*.)	Requires state and local governments to provide relocation assistance and benefits to any person, business, farm, or nonprofit operation displaced by programs or projects undertaken by a public entity. Construction of one or more action alternatives would result in the removal or relocation of structures in the study area. Assistance includes providing information regarding availability, sales prices, and rentals of comparable replacement dwellings for displaced homeowners and tenants, and similar information for suitable locations for businesses and farm operations. This act also includes provisions for payment to displaced individuals for moving and related expenses and requires that, within a reasonable period of time prior to displacement, comparable replacement housing be made available or provided to each displaced person.
Regional/Local[13]	
Sacramento Area Council of Governments, *Borges-Clarksburg Airport Comprehensive Land Use Plan*	The plan designates different land use and development policies based on proximity to the airport within three safety zones: a Clear Zone that covers the runway and extends outward 1,000 feet from each end, an approach/departure zone that extends 2,000 feet from the runway ends, and an overflight zone that generally coincides with normal air traffic patterns. The plan deems nearly all land uses other than limited agricultural uses to be incompatible with the clear zone. Among land uses considered compatible with the approach/departure zone are roads, highways, and rail lines; parking lots; open space and natural areas; natural water areas; and agricultural activities. Open space and natural areas and natural water areas are considered incompatible if they result in concentrations of more than 25 people per acre, the aboveground storage of flammable or explosive material, a water area that may cause ground fog, a bird hazard, or high-intensity uses, such as ballfields or picnic pavilions. Most land uses are considered compatible with the overflight zone, unless they have the potential to cause ground fog or a bird hazard, interfere with aircraft or airport instrumentation, or attract large congregations of people. The plan is overseen by SACOG.
Byron Airport Master Plan	The plan designates different land use and development policies based on proximity to the airport within six safety zones: A, B1, B2, C1, C2, and D. Policies for each zone dictate the type and height of structures built, maximum number of people per acre, limitations on storage of fuel and hazardous materials, and percentages of open land. The plan describes the applicability of exceptions to usage intensity limits, acceptable noise exposure levels, a prohibition of any land use in the Byron Airport influence area which would result in an increased attraction of birds, and a description of open land criteria. The plan is overseen by the Contra Costa County Airport Land Use Commission.
Aviation System Airport Land Use Compatibility Plan	The plan designates different land use and development policies based on proximity to the airport within eight safety zones for each airport within the

[13] State agencies are required to comply with regional and local requirements only in very limited circumstances.

Law, Regulation, Policy, Program, or Agency	Description
	plan. One airport in the plan is in the study area or has planning compatibility areas within the study area: Kingdon Airpark Airport. policies for each safety zone dictate the type and height of structures built, maximum number of people per acre, limitations on storage of fuel and hazardous materials, percentages of open land, and prohibition of visual and electronic interference. The plan describes the applicability of exceptions to usage intensity limits, acceptable noise exposure levels, and prohibition of any land use for the influence area of each airport which would result in wildlife attraction. The plan is overseen by the SJCOG.
Alameda *East County Area Plan*	Policies established by the plan potentially relevant to the project include those seeking preservation of open space and rangeland for agricultural production, wildlife habitat, and grazing; conservation of soils; and establishment of adequate buffers between agricultural uses and new nonagricultural uses.
Contra Costa County General Plan 2005–2020	Policies established by the plan potentially relevant to the project include those seeking preservation and conservation of ecological resources, scenic resources, existing vegetation, agricultural land, open space, wetlands, parks, hillsides, and ridgelines; protection and preservation of Bethel Island, riparian resources within the Delta, and agricultural areas; and integrating public trail facilities into the design of flood control facilities and other public works whenever possible. Policies relevant to land use in the project area include the following: Policies 3-54, 8-19, and 9-20.
Sacramento County General Plan of 2005–2030	The plan seeks to provide a sustainable growth management program for the unincorporated county through 2030. The portion of Sacramento County potentially affected by the project alternatives is largely agricultural. The small, unincorporated communities of Courtland, Hood, Locke, and Walnut Grove are in the vicinity of some project alternatives. The primary land use designations and allowed uses associated with each in the portion of Sacramento County potentially affected by the action alternatives include agricultural area and conservation area (combining designation), natural preserve, industrial intensive, commercial and offices, and residential (agricultural, low, and medium density residential). Nearly all the industrial, commercial and residential land use designations are located in the unincorporated communities. Policies established by the plan potentially relevant to land use in the project area include those seeking preservation and conservation of agricultural lands and maintaining the productivity of these lands, prime and unique farmland, open space, and areas of natural resource value.
Sacramento County Zoning Code	The Sacramento County Zoning code was adopted to implement the policies of the *Sacramento County General Plan of 2005–2030*, as may be amended from time to time, to preserve resources and to protect the public health, safety, and general welfare of the residents of Sacramento County.
Sacramento County, Courtland Special Planning Area Ordinance	Sacramento County adopted this SPA ordinance for retaining viable commercial establishments, historic conservation, and preserving the rural setting and cultural aspects of the community. The SPA allows for local, timely review of projects that may not necessarily be consistent with Sacramento County zoning, land use and building standards. The SPA defines the boundary and parcels within Courtland and defines prohibited and permitted land uses. Land uses and design guidelines in the SPA seek to preserve, rehabilitate, and restore historic buildings and structures within the community.
Sacramento County, Locke Special Planning Area Ordinance	Sacramento County adopted this SPA ordinance for retaining viable commercial establishments, historic conservation, and preserving the rural setting and cultural aspects of the community. The SPA seeks to ensure construction of new structures will be consistent with the area and minimize disruption to the lifestyle of the residents. The SPA defines the boundary and

Law, Regulation, Policy, Program, or Agency	Description
	parcels within Locke and defines prohibited and permitted land uses. Land uses and design guidelines in the SPA seek to preserve, rehabilitate, and restore historic buildings and structures within the community.
San Joaquin County General Plan Policy Document	The plan guides all future land use, development, preservation, and resource conservation decisions. The primary land use designations in the portion of San Joaquin County affected by the action alternatives are: Agricultural General and Open Space Resource Conservation. Land Use element policies established by the plan potentially relevant to the project area include those seeking preservation and protection of agricultural land, farmland, and open space resources.
Solano County General Plan	The plan is the guide for both land development and conservation in the unincorporated portions of the county and contains the policy framework necessary to fulfill the community's vision for Solano County. The study area includes lands designated as agriculture or marsh with a resource conservation overlay in the southeastern portion of Solano County. An additional area covers the Lambie Industrial Park, designated as a Specific Project Area and dedicated primarily to general industrial uses. The plan's Agriculture element establishes policies potentially relevant to the project area seeking to protect and preserve agricultural land and require mitigation for actions resulting in the conversion of land use from agriculture to another use.
2030 Countywide General Plan (Yolo County)	The plan guides decision-making in the unincorporated areas in the county. The study area includes lands in the southeastern portion of Yolo County designated as agriculture with a Delta Protection overlay. The agriculture designation includes all agriculture and agricultural support land uses including worker housing and incidental wildlife habitat areas. Within the area encompassed by the Delta Protection overlay, land uses consistent with the base designation and DPC's LURMP for the Primary Zone of the Delta are allowed. The plan's Land Use and Community Character element and Agriculture and Economic Development element establishes policies potentially relevant to the project area seeking to prohibit the division of agricultural land for purposes of nonagricultural use and minimize land use incompatibilities.
Clarksburg Area Community Plan (ACP)	The ACP goals and policies seek to preserve, conserve, and enhance agriculture, agricultural land, natural vegetation and wildlife, scenic vistas, riverfront areas, and historic buildings. The ACP further establishes policies regarding noise protection. Policy OS-3 is relevant to land us in the project area.
General Plan (City of Brentwood)	The plan Conservation and Open Space element lists goals and policies specific to the preservation of open space, agricultural lands, water resources, mineral resources, historic and cultural resources, and visual impacts on hillsides and ridgelines. The Land Use element lists goals and policies to establish a land use pattern that provides a diverse, self-sufficient community that offers a broad spectrum of job opportunities, housing types, community facilities, commercial services, a high-quality natural environment, and recreation opportunities. Land use goals and policies for the preservation of agricultural lands, open space, and visual quality around the city are also identified. The Noise and Safety elements include measures to reduce the effects of noise and hazards within the city.
Lodi General Plan	The plan's Conservation and Parks, Recreation, and Open Space elements establish policies and designations seeking avoidance of or mitigation for environmental impacts. These include consideration of agricultural and soil resources, biological resources, cultural resources, historic resources, water quality, energy, and air quality.

Law, Regulation, Policy, Program, or Agency	Description
Sacramento 2035 General Plan	The plan's Land Use and Urban Design element lists land use designations, goals, and policies seeking to reduce environmental impacts. These include Open Space and Parks and Recreation designations, goals, and policies seeking preservation of such areas for environmental and community values. The Environmental Resources element establishes policies for protecting water, biological species and habitat, urban forest, agricultural land, mineral resources, air quality, and aesthetic resources. The Environmental Constraints element establishes policies related to flooding, noise, and seismic and geologic hazards, and the Public Health and Safety element addresses risks related to fires and hazardous materials. The southwestern portion of the city, including the Pocket area, is in the study area.
Envision Stockton 2040 General Plan	The plan's Land Use element maintains an Open Space/Agriculture designation seeking preservation of natural resources and agriculture to remain under the jurisdiction of San Joaquin County. The Land Use element establishes policies designed to reduce environmental effects within the city. The element addresses biological, cultural, agricultural, soil, scenic, mineral, and energy resources; defines goals; and establishes policies aimed toward these resources. Other plan elements, including those dedicated to transportation, safety, and community health, and other policies and guidelines seeking avoidance or reduction of environmental effects in the city. Of the land assigned land use designations in the City's general plan, approximately the western third is in the study area.

Sources: California Department of Parks and Recreation 2011:1; City of Brentwood 2014; City of Lodi 2010; City of Sacramento 2015a, 2015b; City of Stockton 2018; County of Alameda 2000:i; Contra Costa County Airport Land Use Commission 2000; County of Contra Costa 2005a, 2005b; County of Sacramento 2011, 2016:1, 2017:1; County of San Joaquin 2016; County of Solano 2008; County of Yolo 2009, 2015:11; Delta Protection Commission 2010; Delta Stewardship Council 2019; Sacramento Area Council of Governments 1994, 2013; San Joaquin County Aviation System 2009; U.S. Fish and Wildlife Service 2007:3–5.

AB = Assembly Bill; ACA = Area Community Plan; Delta = Sacramento–San Joaquin River Delta; Delta Reform Act = Sacramento–San Joaquin Delta Reform Act of 2009; Delta Protection Act = Delta Protection Act of 1992; DPC = Delta Protection Commission; DSC = Delta Stewardship Council; DWR = California Department of Water Resources; ECAP = East County Area Plan; LURMP = Land Use and Resource; Management Plan; NHA = National Heritage Areas; NPS = National Park Service; SACOG = Sacramento Area Council of Governments; SJCOG = San Joaquin Council of Governments; SPA = Special Planning Ordinance; TDR = transfer of development rights; USC = United States Code; Williamson Act = California Land Conservation Act of 1965.

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G.14 Section 3.14: Navigation

Laws, Regulations, and Programs for Navigation Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Rivers and Harbors Act of 1899	The Rivers and Harbors Act of 1899, Section 10 requires that all obstructions to the navigable capacity of navigable waters of the United States must be authorized by Congress. USACE must authorize any construction outside established harbor lines or where no harbor lines exist. USACE must also authorize any alterations within the limits of any breakwater or channel of any navigable water of the United States.
U.S. Coast Guard (33 CFR Part 162)	14 USC, Title 33 USC, and other portions of the CFRs give the U.S. Coast Guard authority for maritime law enforcement on the navigable waters of the United States, as well as responsibilities for search and rescue, among other roles. Specific to the Delta, Inland Waters Navigation Regulations, provides regulations for the navigation by both commercial and noncommercial vessels on the San Joaquin River Deep Water Ship Channel (between Suisun Bay and Stockton), and the Sacramento River Deep Water Ship Channel (between Suisun Bay and West Sacramento).

G.15 Section 3.15: Noise and Vibration

Laws, Regulations, and Programs for Noise and Vibration Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Federal Transit Administration/Federal Railroad Administration	FTA has prepared guidance and procedures for evaluation of noise and vibration from transit related sources as required by NEPA, pursuant to 23 CFR Part 771. Noise impact assessment for operation of trains, horns at at-grade crossings, rail yards and park-and-ride lots is provided in the guidance, *Transit Noise and Vibration Impact Assessment Manual.* The assessment of impacts from project sources considers a project's contribution to existing noise levels using a sliding scale, according to the land uses affected. The criteria correspond to heightened community annoyance due to the introduction of a new transit facility relative to existing ambient noise conditions. FRA defers to FTA for analysis of rail/transit facilities and trains that travel at speeds of less than 90 miles per hour.
Occupational Safety and Health Administration	Workers are subject to OSHA standards that govern permissible noise exposure levels. Federal OSHA standards are defined in 29 CFR Part 1910.
State	
California Department of Water Resources Specification 05-16	Establishes noise limits for assessment of noise impacts from construction of DWR projects. The specification indicates the following performance standards: • Between the hours of 7:00 a.m. and 10:00 p.m., noise levels during project construction would be considered to exceed the daytime noise threshold where overall equipment noise levels are predicted to exceed 60 dBA on an hourly L_{eq} basis, AND overall equipment noise levels are predicted to increase by 5 dB or more relative to existing daytime ambient noise levels at a sensitive receptor location, as determined through a sound level monitoring program. • Between the hours of 10:00 p.m. and 7:00 a.m., noise levels during project construction would be considered to exceed the nighttime noise threshold where overall equipment noise levels are predicted to exceed 50 dBA on an hourly L_{eq} basis, AND overall equipment noise levels are predicted to increase by 5 dB or more relative to existing nighttime ambient noise levels at a sensitive receptor location, as determined through a sound level monitoring program. These noise limits reflect the rural character of the area, the lower tolerance for increases in ambient noise levels, and the duration required for construction of permanent project features. The specification described above includes limits that are more stringent than those recommended by FTA guidance and do not include an exemption for construction during certain hours, as is the case with the Counties of Sacramento, San Joaquin and others.
Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects	Provides a standard for consideration of noise abatement due to a substantial increase in traffic noise levels on existing or new roads.
California Department of Transportation Vibration Criteria	Provides levels of groundborne vibration that potentially result in annoyance to sensitive receptors and damage to building structures. Vibration is considered to cause annoyance from continuous or frequent intermittent sources at a level of 0.04 in/sec PPV. Depending on the condition of building structures, vibration may cause damage at levels of 0.08 in/sec PPV for fragile structures, and 0.25 in/sec PPV for buildings of older construction.

Law, Regulation, Policy, Program, or Agency	Description
Regional/Local[14]	
Alameda County General Plan	The general plan identifies exterior and interior standards for residential use.
Contra Costa County General Plan 2005–2020	The general plan provides policies for land use compatibility of community noise environments, and noise exposure contours from existing transportation facilities in the county.
Sacramento General Plan of 2005–2030	The general plan provides standards for land use compatibility with various levels of noise from transportation and nontransportation sources. Defines a significant increase in noise based on the pre-project noise environment.
San Joaquin County General Plan	The general plan provides standards for land use compatibility with various levels of noise from transportation and nontransportation sources.
2030 Countywide General Plan (Yolo County)	The general plan establishes Exterior Noise Standards, or Noise Compatibility Guidelines, for development in the county. These guidelines are intended to apply to the outdoor use areas of new development and include different criteria for the variety of land uses that are present in the county.

Sources: California Department of Transportation 2020a, 2020b; County of Alameda 1975; County of Contra Costa 2005; County of Sacramento 2015; County of San Joaquin 2016; County of Yolo 2009; Federal Transit Administration 2018; U.S. Environmental Protection Agency 1971.

Caltrans = California Department of Transportation; dBA = A-weighted decibel; DWR = California Department of Water Resources; in/sec = inches per second; Leq = equivalent continuous sound level; PPV = peak particle velocity; NEPA = National Environment Protection Act; OSHA = Occupational Safety and Health Administration; FRA: Federal Railroad Administration; FTA = Federal Transit Administration.

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[14] State agencies are required to comply with regional and local requirements only in very limited circumstances.

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G.16 Section 3.16: Recreation

Laws, Regulations, and Programs and Management Plans for Recreation Potentially relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan	The plan provides management guidance for visitor use and natural resources (e.g., fish, wildlife, plants) within the refuge through the year 2022. The approved refuge boundary encompasses more than 17,000 acres of land; USFWS manages approximately one-third of that land, including state- and county-owned land managed under cooperative agreements. The plan calls for USFWS to provide visitors with recreation, interpretation, and education opportunities that foster an understanding of the refuge's unique wildlife and plant communities as well as boat-in fishing and additional parking areas.
14 USC, 33 CFR Part 2 for U.S. Coast Guard maritime law enforcement	Provides the U.S. Coast Guard authority for enforcing maritime law on the navigable waters of the United States, as well as responsibilities for search and rescue, marine environmental protection, and the maintenance of river aids to navigation, among other roles. Included within the Coast Guard's authority are inland waters, which are those waters shoreward of the territorial sea baseline.
State	
Sacramento–San Joaquin Delta Protection Act of 1992 (California Pub. Resources Code § 21080.22, Div. 19.5) and the Delta Protection Commission *Land and Resource Management Plan for the Primary Zone of the Delta*	The Delta Protection Act established the DPC, a state entity to plan for and guide the conservation and enhancement of the Delta's natural resources while sustaining agriculture and meeting increased recreation demand. DPC's LURMP for the Primary Zone of the Delta that includes eight recreation and access policies. The plan emphasizes the need to provide recreation opportunities and encourage investment in recreation infrastructure.
Delta Protection Commission, *Delta Trail Eastern Blueprint Report*	Plan addressing the 2006 approved SB 1556 supporting creation of a Great California Delta Trail. This report establishes the planning and feasibility process for the establishment of the Delta Trail in the eastern areas of the Delta. The report also documents the vision, goals and policies for the Delta Trail.
Recreation Proposal for the Sacramento-San Joaquin Delta and Suisun Marsh	The Delta Reform Act mandated that the Department of Parks (DPR) and Recreation develop recommendations to expand state recreation areas in the region. The proposal developed by DPR recommends improvement, and in some cases expansion, of four recreation areas in the Delta (i.e., Delta Meadows and Locke Boarding House, Stone Lakes, and Brannan Island and Franks Tract SRAs).
Central Valley Vision Draft Implementation Plan	The 2008 *Central Valley Vision Draft Implementation Plan* provides a "catalog of potential future projects" that includes expanding existing parks and adding new parks in the Central Valley. The plan outlines potential projects in the Delta: acquiring more land, developing facilities and improving access, developing interpretation and education opportunities, expanding facilities, and providing recreation facilities. It also recommends creation of the California Delta Heritage Corridor, which would link historic Delta towns, recreation sites, nature areas, and farm stands.

Law, Regulation, Policy, Program, or Agency	Description
California Department of Parks and Recreation's Division of Boating and Waterways Regulations and Programs	Although boating law enforcement in California is performed at the local level by local agencies, such as county sheriff and municipal marine patrol units, CDBW, through its Boating Law Enforcement Unit, acts to meet the goals of providing for adequate and consistent law enforcement through local agencies throughout the state. California boating laws are contained in instruments of state law, including the California Harbors and Navigation Code, Vehicle Code, Penal Code, and California Code of Regulations, among others. California boating laws and regulations apply uniformly on all waters of the State. However, California law does not replace the U.S. Coast Guard and other federal regulations in force on federally navigable waters, but it is in general conformity with these regulations.
California State Lands Commission Regulations	The California State Lands Commission has jurisdiction over nearly 4 million acres of lands that underlie navigable and tidal waterways. Known as "Sovereign Lands," these include riverbeds, streams, sloughs, non-navigable lakes, tidal navigable bays and lagoons, tide and submerged lands adjacent to the coast, and offshore islands from the mean high tide line to 3 nautical miles offshore. The California State Lands Commission offers leases and permits for marinas, and developers of marinas along the state's navigable rivers, natural lakes, and bays are required by law to lease state land at marina sites.
Regional/Local[15]	
Contra Costa County General Plan 2005–2020	The general plan addresses recreation resources in the Open Space Element. Overall goals and policies seek to preserve and protect the county's recreational resource lands. Policies specifically related to parks and open space areas, local parks, and trails provide protection and enhancement of the recreational value of the Delta, allow only recreational development that complements the natural features of the area, and provide distribution and management of recreation activities according to an area's carrying capacity while recognizing the regional importance of each area's recreation resources. The general plan includes the several policies related to recreation including those in the Land Use Element (Growth Management 3-a, and 3-12, and Business and Employment Uses 3-46), the Transportation and Circulation Element (5-48, 5-50, 5-51), Conservation Element (8-96) and Open Space Element, Park and Recreation Facilities goals and policies.
2030 Sacramento County General Plan	Of most relevance to recreation resources and the project area are the Open Space and Delta Protection elements. The Open Space Element defines valuable open space uses that are important to preserve and protect including natural areas that provide for passive recreation such as wildlife viewing and pedestrian and bicycle travel, as well as wildlife habitat and can encompass historic sites, scenic vistas, and trails. The Delta Protection Element is based on DPC's LURMP for the Primary Zone of the Delta (2010), as required by Public Resources Code Section 29725. Within the Delta Protection Element, the recreation and access policy provides the goal to promote continued recreational use of the land and waters of the Delta; to promote facilities that support the construction, maintenance and supervision of recreational uses; to protect landowners from unauthorized recreational uses on private lands; and to maximize dwindling public funds for recreation by promoting public-private partnerships and multiple use of Delta lands.

[15] State agencies are required to comply with regional and local requirements only in very limited circumstances.

Law, Regulation, Policy, Program, or Agency	Description
2035 General Plan for San Joaquin County	The general plan is comprehensive, providing a framework for the county's physical, economic, and social development and environmental resources preservation. The plan looks ahead to 2035, while at the same time presenting policies to guide day-today decisions. The Natural and Cultural Resources Element supports the balanced management and conservation recreational resources in addition to natural and cultural resources.
Cosumnes River Preserve Management Plan	The plan directs how the preserve will be managed over the next 10 years. The plan adopts two broad and long-term goals addressing restoration of native biological communities and improve compatible uses and stewardship of lands. The plan addresses recreational use of the Preserve is to be compatible with the plan's Natural Resources Stewardship goals, promoting the teaching of environmental stewardship.

Sources: California Department of Parks and Recreation 2008b, 2011; California Department of Parks and Recreation's Division of Boating and Waterways 2009; California State Lands Commission 2020; County of Contra Costa 2005, 2016:3.4-1–3.4-21; Cosumnes River Preserve 2008; Delta Protection Commission 2010:22–23, 2019b; Sacramento County 2017a, 2017b; U.S. Fish and Wildlife Service 2007.

CDBW = California Department of Boating and Waterways; Cal. Code Regs. = California Code of Regulations; Delta = Sacramento–San Joaquin River Delta; Delta Protection Act = Delta Protection Act of 1992; DPC = Delta Protection Commission; LURMP = Land Use and Resource Management Plan; NWR = National Wildlife Refuge; SB= Senate Bill; SRA = State Recreation Area; USFWS = U.S. Fish and Wildlife Service.

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G.17 Section 3.17: Socioeconomics and Public Health

Laws, Regulations, and Programs for Socioeconomics and Public Health Potentially relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 USC §§ 4601–4655)	Title II Section 201 (b) of the act establishes a uniform policy for the fair and equitable treatment of persons displaced as a direct result of programs or projects undertaken by a federal agency or with federal financial assistance. The primary purpose of this title is to ensure that such persons shall not suffer disproportionate injuries as a result of programs and projects designed for the benefit of the public as a whole and to minimize the hardship of displacement on such persons. Title III Section 301 of the act was developed "to encourage and expedite the acquisition of real property by agreements with owners, to avoid litigation and relieve congestion in the courts, to assure consistent treatment for owners in the many federal programs, and to promote public confidence in federal land acquisition practices."
Housing and Community Development Act of 1974(Public Law 93-383, 42 USC 5301 et seq.)	A residential anti-displacement and relocation assistance plan is required and must provide for: (1) one-for-one replacement of occupied and vacant occupiable low- and moderate-income dwelling units demolished or converted to another use in connection with a development project assisted under Parts 570 and 92; and (2) provide relocation assistance for all low- and moderate-income persons who occupied housing that is demolished or converted to a use other than low- or moderate-income housing.
Agriculture Improvement Act of 2018	USDA administers a number of programs that regulate and support agricultural production. USDA also compiles and publishes many reports on agricultural production and costs, land use, and commodity prices, plus it supports significant research on agricultural production, marketing, and economics. A key set of USDA's programs, commonly known as the Farm Bill, are reauthorized and revised approximately every 5 years. The current Farm Bill contains 12 titles that are authorized through FY 2023, including the following key provisions. • Nutrition programs including the Supplemental Nutrition Assistance Program. • Programs that support and stabilize farm commodity prices. • Federal crop insurance programs and disaster payments. • Conservation programs including the Conservation Reserve Program and Environmental Quality Incentives Program. • Farm credit. • Trade provisions, including international food aid. Rural development provisions that support rural health and business and infrastructure development.
State	
California Constitution: Article 1 Declaration of Rights, Section 19	Under the California Constitution and other statutes, public agencies may use eminent domain power to: (1) acquire private property (real, business, personal, tangible, or intangible property); or (2) reduce the economic value of property for a public purpose (these are referred to as "damages") if they pay "just compensation" to the owner. Just compensation includes: (1) the fair market value of the real property and its improvements; and (2) any diminution in value of the remaining property when property taken is part of a larger parcel.
Mello-Roos Act of 1982 (Gov. Code §§ 53311–53368.3)	The Mello-Roos Act provides a mechanism for certain public entities, such as cities, counties, schools, local districts, and joint power authorities, to finance public infrastructure and certain governmental services. The public entity forms

Law, Regulation, Policy, Program, or Agency	Description
	a community facilities district and may levy a special tax on the real property within its boundaries. The district can apply the special tax revenues, or proceeds from bonds secured by special taxes, to finance general benefit facilities and services or special benefit improvements.
California Land Conservation Act of 1965	The Williamson Act was enacted to maintain the agricultural economy of the state by preserving its agricultural land. The act allows cities and counties to discourage conversion of agricultural land to urban uses by creating agricultural preserves, which generally comprise at least 100 acres of farmland. Once a preserve has been established, an individual landowner can enter into a contract with the county, which binds the land to remain in agricultural uses for at least 10 years. Counties administer the act to assure compatible uses and manage the nonrenewal or cancellation of contracts. Most California counties, including all Delta and San Joaquin Valley counties, allow owners of agricultural land to sign rolling, 10-year agreements with the county that restrict the land to agricultural and open space uses. In return, the landowner receives a lower property tax assessment based on the value of the land in agricultural use. According to the California DOC, the annual property tax savings can range from 20% to 75%. The county must approve the cancellation of an existing contract, and the landowner must pay a cancellation fee equal to 12.5% of the property's current fair market value. If land in a Williamson Act contract is acquired by a public agency for a defined public purpose, the act provides a process for cancellation (California Department of Conservation 2006).
John D. Dingell, Jr. Conservation, Management, and Recreation Act	In 2019, this act established the Sacramento-San Joaquin Delta National Heritage Area (Delta NHA). The Delta Protection Commission is preparing a Delta NHA Management Plan that will include long-range policies, goals, strategies and actions. At present, public outreach is being conducted, including the creation of the NHA Management Plan Advisory Committee.
Economic Sustainability Plan for the Sacramento–San Joaquin Delta	The Economic Sustainability Plan (ESP) was completed and adopted by the Delta Protection Commission (DPC) in 2012. It provides background information and data about the economics and demographics of the Delta, along with information about existing policies and the state of Delta levees. The ESP also analyzes key industry sectors in the Delta, including industry trends and an assessment of the effects of various policy proposals. The final section of the ESP provides a summary of integrative issues, identifying key issues and strategies for the legacy communities. Finally, the ESP identifies eight categories of recommendations for supporting economic sustainability in the Delta: levee and public safety, general economic sustainability, economic sustainability of agriculture, economic sustainability of recreation and tourism, infrastructure, habitat and ecosystem improvements, water supply reliability, and research and monitoring (Delta Protection Commission 2012a). Because of its different purpose and its 2012 completion date, the data and assumptions used in the ESP differ from those used in the socioeconomics analysis for this Draft EIS. DPC is in process of updating sections of the ESP. The Recreation and Tourism chapter was updated in 2020.
Sustainable Groundwater Management Act of 2014	In 2014, California enacted SGMA, which directs local agencies to work together to create GSPs for high- and medium-priority groundwater basins that must achieve long-term sustainability over a 20-year period (either by 2040 or 2042). Each GSP must define sustainability and the path to achieve it, but the GSP must avoid six undesirable results: significant groundwater level declines, groundwater storage reductions, seawater intrusion, water quality degradation, land subsidence, and surface water depletions. Many areas that would be affected by the construction, operation, and especially the water deliveries associated with Delta conveyance are in groundwater

Law, Regulation, Policy, Program, or Agency	Description
	basins that are in process of developing or implementing GSPs. Many of these areas have used groundwater unsustainably in the recent past, in part as a buffer to manage the unreliability of surface deliveries conveyed through the Delta. As a result, the requirements of SGMA implementation could change how these areas may be affected by Delta conveyance alternatives.
Sacramento-San Joaquin Delta Reform Act of 2009 (Wat. Code §§ 85000–85350) and *Delta Plan*	The Delta Reform Act, which was established by SB X7-1, established the co-equal goals for the Delta of "providing a more reliable water supply for California and protecting, restoring, and enhancing the delta ecosystem." (Pub. Resources Code § 29702; Wat. Code § 85054). These coequal goals are to be achieved "in a manner that protects and enhances the unique cultural, recreational, natural resources, and agricultural values of the Delta as an evolving place." (Wat. Code § 85054). The Delta Reform Act also established the DSC. The DSC is tasked with furthering the state's coequal goals for the Delta through development of the *Delta Plan*, a comprehensive, long-term, resource management plan for the Delta, containing both regulatory policies and recommendations aimed at furthering the coequal goals and promoting a healthy Delta ecosystem. The *Delta Plan* provides for a distinct regulatory process for activities that qualify as Covered Actions under Water Code Section 85057.5. State and local agencies proposing Covered Actions, prior to initiating implementation of that action, must prepare a written certification of consistency with detailed findings regarding consistency with applicable *Delta Plan* policies and submit that certification to the DSC.
Regional/Local[16]	
Sacramento County General Plan of 2005–2030	Adopted on November 9, 2011, the plan provides a sustainable growth management program for the unincorporated territory through 2030. The portion of Sacramento County potentially affected by the action alternatives is largely agricultural. The small, unincorporated communities of Courtland, Hood, Locke, and Walnut Grove are in the vicinity of some action alternatives. An Economic Development Element was added as part of the 2011 update and amended in 2017 and 2019. This element introduced goals, objectives, policies, and implementation measures under 12 strategic objectives which include five measures of socioeconomic nature.
San Joaquin County General Plan	This general plan guides all future land use, development, preservation, and resource conservation decisions for the County through 2035. Guiding principles and goals from the Community Development Element cover the topics of land use, housing, communities, and economic development. The County adopted a Housing Element in 2015 (County of San Joaquin 2015) and subsequently incorporated it into the general plan. The Housing Element includes an inventory, needs assessment, and policy goals that cover new construction, affordable and special needs housing, neighborhood preservation, discrimination prevention, and energy efficiency. In addition to these County-wide principles and goals, the plan's Delta element contains goals specific to the lands within the statutory Delta, and was developed to be consistent with the DPC LURMP for the Primary Zone of the Delta (Delta Protection Commission 2011). Goals include Delta as Place, Governance, Economy and Recreation, Development, Resources, Water Supply and Quality, and Safety.

[16] State agencies are required to comply with regional and local requirements only in very limited circumstances.

Law, Regulation, Policy, Program, or Agency	Description
Solano County General Plan	The general plan was adopted in 2008, with the Housing Element and the Public Health and Safety Element both updated in 2015. This policy document guides both land development and conservation of agricultural and natural resources in the unincorporated portions of the county through the year 2030. The plan also includes an update to the Suisun Marsh Local Protection Program (County of Solano 2018).
2030 Countywide General Plan (Yolo County)	The general plan was adopted in 2009, with a Climate Action Plan added in 2011, the Housing Element updated in 2013, and the 2018 Multi-Jurisdictional Hazard Mitigation Plan Update incorporated into the Health and Safety Element in 2019. According to the plan, key purposes are to identify the County's land use, circulation, environmental, economic, and social goals and policies as they relate to land use. And to provide a basis for County decision-making, particularly as related to land use, land use regulation and proposals for development.
Federal	
Clean Water Act of 1972 Section 303(d)	Requires states to develop a list of waterbodies (or sections of waterbodies) that will not attain water quality standards after implementation of minimum required levels of treatment by point-source dischargers and adopt total maximum daily loads for these waters.
National Toxics Rule (60 FR 2228, 65 FR 3162, 66 FR 9960)	The National Toxics Rule established numeric criteria for priority toxic pollutants applicable in a number of states, including California.
Safe Drinking Water Act (40 CFR § 141 *et seq.*)	Authorizes EPA to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in drinking water.
Surface Water Treatment Rule (54 FR 27486, 63 FR 69478, 65 FR 20314, 66 FR 31086, 67 FR 1812, 71 FR 653)	Provides protection from disease-causing pathogens and also protects against contaminants that can form during drinking water treatment. Applies to all public water systems using surface water sources or groundwater sources under the direct influence of surface water.
Stage 1 and Stage 2 Disinfectants and Disinfection Byproducts Rule (63 FR 69390, 65 FR 20314, 71 FR 387)	Establishes maximum residual level goals and maximum residual levels for disinfectants; sets maximum contaminant level goals and maximum contaminant levels for disinfection byproducts; and requires water systems that use surface water and conventional filtration treatment to remove specified percentages of organic materials.
State	
Central Valley Regional Water Quality Control Board Water Quality Control Plan (Basin Plan) for the Sacramento and San Joaquin River Basins	Defines the beneficial uses, water quality objectives, implementation programs, and surveillance and monitoring programs for waters of the Sacramento River and San Joaquin River basins.
San Francisco Bay Regional Water Quality Control Board San Francisco Bay Basin Water Quality Control Plan (Basin Plan)	Defines the beneficial uses, water quality objectives, implementation programs, and surveillance and monitoring programs for waters of the San Francisco Bay as well as portions of Marin and San Mateo Counties, from Tomales Bay in the north to Pescadero and Butano Creeks to the south.
California Toxics Rule	The California Toxics Rule promulgated new toxics criteria specifically for California and incorporated the previously adopted National Toxics Rule criteria applicable in California.
California Safe Drinking Water Act	Establishes that every California resident has the right to safe drinking water and is intended to establish primary drinking water standards that are at least as stringent as those established under the federal SDWA.
State Water Resources Control Board Sources of Drinking	Established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply.

Law, Regulation, Policy, Program, or Agency	Description
Water Policy (Resolution No. 88-63)	
Assembly Bill 1200	AB 1200 amended Section 139.2 of the State Water Code to require DWR to evaluate the potential impacts on water supplies derived from the Delta based on 50-, 100-, and 200-year projections for each of these possible impacts on the Delta. • Subsidence • Earthquakes • Floods • Changes in precipitation, temperature, and ocean levels • A combination of these impacts
California Health and Safety Code Section 2040	Mosquito vector control districts have the authority to conduct surveillance for vectors, prevent the occurrence of vectors, and abate production of vectors.
California Health and Safety Code Section 2041	Mosquito vector control districts have authority to participate in review, comment, and make recommendations regarding local, state, or federal land use planning and environmental quality processes, documents, permits, licenses, and entitlements for projects and their potential effects related to vector production.
California Health and Safety Code Sections 2060–2065	Mosquito vector control districts have broad authority to direct landowners to reduce or abate the source of a vector problem. Actions may include imposing civil penalties of up to $1,000 per day. Agencies have authority to abate vector sources on private and publicly owned properties.
California Department of Public Health *Best Management Practices for Mosquito Control in California*	This plan describes mosquito control best management practices to be implemented by property owners and managers to reduce mosquito populations through a variety of ways including: 1) reducing or eliminating breeding sites; 2) increasing the efficacy of biological control, and 3) decreasing the amount of pesticides applied while increasing the efficacy of chemical control measures. In addition to these recommended practices, the plan stresses coordination between property owners and local vector control agencies regarding control practices on lands located within or near a local agency's jurisdiction and appropriately integrated pest management strategies that are most suitable for specific land-use types.
California Public Utilities Commission Decision 06-01-042	A. CPUC has established an EMF Policy, which acknowledges that health hazards from exposure to EMF have not been established and that state and federal public health regulatory agencies have determined that setting numeric exposure limits is not appropriate. However, CPUC requires utilities to update their EMF Design Guidelines to reflect various key elements including low-cost EMF mitigation and how, where and to whom it should be applied.
California Public Utilities Commission Electromagnetic Field Design Guidelines for Electrical Facilities (CPUC 2006)	CPUC Decision 06-01-042 directed utilities to develop standard approaches for their EMF Design Guidelines. These guidelines describe the routine magnetic field reduction measures that all regulated California electric utilities will consider for new and upgraded transmission line and transmission substation projects. The EMF Design Guidelines include methods for reducing magnetic fields as follows. A) Increasing the distance from electrical facilities by: a. Increasing structure height or trench depth b. Locating power lines closer to the centerline of the corridor. B) Reducing conductor (phase) spacing. C) Phasing circuits to reduce magnetic fields.

Law, Regulation, Policy, Program, or Agency	Description
Standards for School Site Selection (subsection c) (Cal. Code Regs., tit. 5, § 14010)	The property line of the site even if it is a joint use agreement as described in subsection (o) of this section shall be at least the following distance from the edge of respective power line easements: 1. 100 feet for 50-133 kV line 2. 150 feet for 220-230 kV line 3. 350 feet for 500-550 kV line
Regional/Local[17]	
Alameda County Vector Control Services District	The Alameda County Vector Control Services District was established in June 1984 as a County Service Area (VC 1984-1). The District serves all of the cities in Alameda County, as well as the unincorporated area.
Contra Costa Mosquito and Vector Control District	The Contra Costa Mosquito and Vector Control District began service in 1927 as the Contra Costa Mosquito Abatement District. Funded through tax dollars, the District offers free services for mosquitoes, rats and mice, ground-nesting yellowjackets, ticks, and skunks.
Sacramento-Yolo Mosquito and Vector Control District	The Sacramento County–Yolo County Mosquito Abatement District was formed in 1946 to protect the public against diseases transmitted by mosquitoes and provide relief from serious pest nuisance.
San Joaquin County Mosquito and Vector Control District	San Joaquin County Mosquito and Vector Control District provides comprehensive vector surveillance and control services to enhance the public health and quality of life for the residents and visitors of San Joaquin County. This independent agency seeks to fulfill its mission by utilizing advanced technology; educating the public regarding the health implications of disease-transmitting pests; encouraging citizen participation; providing stewardship for public funds by stressing efficiency in operations; providing services consistent with a concern for environmental protection; and maintaining a safe and effective public health pest management program.
Solano County Mosquito Abatement District	The Solano County Mosquito Abatement District is responsible for mosquito abatement throughout the incorporated and unincorporated areas of Solano County. The function of the district is to control all mosquitoes that may bring disease or harassment to humans and domestic animals. The district uses a variety of preventive correctional management, naturalistic, physical, and chemical control measures singly or in combination. Preventive measures are emphasized, principally naturalistic and physical control. Chemical control is integrated with other measures as necessary.
The Central Valley Joint Venture's Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands	This document was prepared by the Central Valley Joint Venture to present a full range of best management practices specific to managed wetlands. Prior to the implementation of best management practices, consultation should be conducted with MVCDs and appropriate resource agencies to determine the suitability of best management practices and ensure compliance with state and federal wetland regulations and conservation easements. The best management practices included in the guide are organized into five categories and are generally used in combination. • Water Management Practices • Vegetation Management Practices • Wetland Infrastructure Maintenance • Wetland Restoration and Enhancement Features • Biological Controls
Sacramento County General Plan of 2005–2030	The general plan's Public Facilities Element includes Policy F-111 which addresses electromagnetic fields and setback requirements for buildings such as schools.

[17] State agencies are required to comply with regional and local requirements only in very limited circumstances.

Law, Regulation, Policy, Program, or Agency	Description
Alameda County *East County Area Plan* Electromagnetic Fields Policy	The ECAP's Environmental Health and Safety Element includes Policy 325 regarding electromagnetic fields and setback requirements for residential subdivisions, and sensitive uses such as schools.

Sources: California Department of Conservation 2006; Delta Protection Commission 2011, 2012; Delta Stewardship Council 2013; County of Sacramento 2011, 2017:2, 2019:2; County of San Joaquin 2015, 2017:3.1-2; County of Solano 2008, 2015a, 2015b, 2018; County of Yolo 2009, 2013, 2019.

CFR = Code of Federal Regulations; DPC = Delta Protection Commission; DOC = California Department of Conservation; Delta Reform Act = Sacramento–San Joaquin Delta Reform Act of 2009; DSC = Delta Stewardship Council; DWR = California Department of Water Resources; EIR = environmental impact report; ESP = economic sustainability plan; Farm Bill = Agriculture Improvement Act of 2018; ESP = FY = fiscal year; GSP = groundwater sustainability plan; LURMP = Land Use and Resource Management Plan; Mello-Roos Act = Mello-Roos Act of 1982; SGMA = Sustainable Groundwater Management Act; USDA = U.S. Department of Agriculture; Williamson Act = California Land Conservation Act of 1965.

Sources: California Department of Public Health 2012; California Public Utilities Commission 2006; Central Valley Regional Water Quality Control Board 2018; County of Alameda 2000:77; County of Sacramento 2017:49; Kwasny et al. 2004; San Francisco Bay Regional Water Quality Control Board 2019.

Assembly Bill = AB; CPUC = California Public Utilities Commission; CWA = Clean Water Act of 1972; Delta = Sacramento–San Joaquin River Delta; DWR = California Department of Water Resources; ECAP = East County Area Plan; EMF = electromagnetic field; EPA = U.S. Environmental Protection Agency; FR = *Federal Register*; kV = kilovolt; ROW = right-of-way; SB = Senate Bill; SDWA = federal Safe Drinking Water Act; MVCD = mosquito vector control district.

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G.18 Section 3.18: Surface Water

Laws, Regulations, and Programs for Surface Water Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Rivers and Harbors Act of 1899 (33 USC §§ 401, 403)	Sections 9 and 10 of the act authorize USACE to regulate the construction of any structure or work over, under, or within navigable waters. The act authorizes USACE to regulate the construction of infrastructure or other modifications affecting the course, location, condition, or capacity of navigable waters.
State	
Sacramento-San Joaquin Delta Reform Act of 2009 (Wat. Code §§ 85000–85350) and *Delta Plan*	The Delta Reform Act, created by SB X7-1, established the co-equal goals for the Delta of "providing a more reliable water supply for California and protecting, restoring, and enhancing the delta ecosystem." (Pub. Resources Code § 29702; Wat. Code § 85054). These coequal goals are to be achieved "in a manner that protects and enhances the unique cultural, recreational, natural resources, and agricultural values of the Delta as an evolving place." (Wat. Code § 85054). The Delta Reform Act also established the DSC. The DSC is tasked with furthering the state's coequal goals for the Delta through development of the *Delta Plan*, a comprehensive, long-term, resource management plan for the Delta, containing both regulatory policies and recommendations aimed at furthering the coequal goals and promoting a healthy Delta ecosystem. The *Delta Plan* provides for a distinct regulatory process for activities that qualify as Covered Actions under Water Code Section 85057.5. State and local agencies proposing Covered Actions, prior to initiating implementation of that action, must prepare a written certification of consistency with detailed findings regarding consistency with applicable *Delta Plan* policies and submit that certification to the DSC.
California Water Action Plan	Identifies 10 priority actions to guide the state's effort to create more resilient, reliable water systems and to restore critical ecosystems. These actions are organized around long-term objectives including making conservation a way of life, increasing regional self-reliance in water supplies, improving flood protection, managing/preparing for dry periods, expanding water storage capacity, and improving operational and regulatory efficiency.
California Water Resilience Portfolio (Executive Order N-10-19)	Directed state agencies to "identify key priorities for the administration's water portfolio…and [to] identify how to improve integration across state agencies to implement these priorities." This EO directed DWR to restore and protect the reliability of the SWP (and potentially the CVP) water deliveries south of the Delta by improving Delta conveyance.

Sources: Bureau of Reclamation, U.S. Fish and Wildlife Service, and California Department of Fish and Wildlife 2011; CALFED Bay-Delta Program 2000; County of Alameda 1973; County of Contra Costa 2005; County of Sacramento 2017; County of San Joaquin 2016; County of Solano 2008; County of Yolo 2009; California Natural Resources Agency et al. 2016.

BMPs = best management practices; CALFED = CALFED Bay-Delta Program; CVP = Central Valley Project; CWA = Clean Water Act; Delta = Sacramento–San Joaquin Delta; Delta Reform Act = Sacramento–San Joaquin Delta Reform Act of 2009; DSC = Delta Stewardship Council; DWR = California Department of Water Resources; EO = Executive Order; EPA = U.S. Environmental Protection Agency; NFIP = National Flood Insurance Program; NPDES = National Pollutant Discharge Elimination System; Reclamation = Bureau of Reclamation; Regional Water Board = Regional Water Resources Control Board; ROD = Record of Decision; State Water Board = State Water Resources Control Board; SWP = State Water Project; USACE = United States Army Corps of Engineers; USC = U.S. Code.

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G.19 Section 3.19: Transportation

Laws, Regulations, and Programs for Transportation Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Federal Highway Administration Federal-Aid Highway Program	FHWA coordinates highway transportation in cooperation with states and other partners to enhance the country's safety, economic vitality, quality of life and the environment. Among the program areas of the FHWA is the Federal-Aid Highway Program, which provided federal financial assistance to states for construction and improvement of the NHS, urban and rural roads, and bridges. This program provides for general improvements and development of safe highways and roads.
Federal Aviation Administration	Under the provisions of the FAA for the development and operation of the common air traffic control system, airports operate under the authority and guidance of the FAA. Any potential project-related effect on aviation and any measures to address such effects would be subject to the regulations of the FAA.
Rivers and Harbors Act of 1899	The Rivers and Harbors Act of 1899, Section 10 requires that all obstructions to the navigable capacity of navigable waters of the United States must be authorized by Congress. USACE must authorize any construction outside established harbor lines or where no harbor lines exist. USACE must also authorize any alterations within the limits of any breakwater or channel of any navigable water of the United States.
U.S. Coast Guard (33 CFR Part 162)	14 USC, Title 33 USC, and other portions of the CFRs give the U.S. Coast Guard authority for maritime law enforcement on the navigable waters of the United States, as well as responsibilities for search and rescue, among other roles. Specific to the Delta, Inland Waters Navigation Regulations, provides regulations for the navigation by both commercial and noncommercial vessels on the San Joaquin River Deep Water Ship Channel (between Suisun Bay and Stockton), and the Sacramento River Deep Water Ship Channel (between Suisun Bay and West Sacramento).
Fixing America's Surface Transportation Act (Public Law 114-94)	the FAST Act provides long-term funding for surface transportation infrastructure planning and investment. "The FAST Act authorizes $305 billion over fiscal years 2016 through 2020 for highway, highway and motor vehicle safety, public transportation, motor carrier safety, hazardous materials safety, rail, and research, technology, and statistics programs. The FAST Act maintains our focus on safety, keeps intact the established structure of the various highway-related programs we manage, continues efforts to streamline project delivery and, for the first time, provides a dedicated source of federal dollars for freight projects. With the enactment of the FAST Act, states and local governments are now moving forward with critical transportation projects with the confidence that they will have a federal partner over the long term" (Federal Highway Administration 2019b). In addition, the FAST Act requires MPOs to prepare transportation improvement programs.
State	
Senate Bill 743	SB 743 changed the focus of transportation impact analysis in CEQA from measuring impacts to drivers to measuring the impact of driving by replacing vehicle LOS with vehicle miles of travel (VMT).
Technical Advisory on Evaluating Transportation Impacts in CEQA	To aid in SB 743 implementation, in December 2018, OPR released a Technical Advisory. The Technical Advisory provides advice and recommendations to CEQA lead agencies on how to implement the SB 743 changes. This includes technical recommendations regarding the assessment of VMT, thresholds of significance, VMT mitigation measures, and screening thresholds for certain land use projects.

Law, Regulation, Policy, Program, or Agency	Description
Public Resources Code Section 21092.4	A lead agency for a project that would have statewide, regional, or area-wide significance is required to consult with the regional transportation planning agency and public agencies that have transportation facilities that could be affected.
Land Use and Resource Management Plan for the Primary Zone of the Delta	Policy P-5 of the Utilities and Infrastructure chapter states that roads within the Delta must be maintained to serve the existing agricultural uses and supporting commercial uses, recreational users, and Delta residents. The maintenance and enhancement of major thoroughfares already used as cross-Delta corridors must be promoted.
California Department of Transportation	Caltrans is responsible for planning, designing, constructing, operating, and maintaining the State Highway System (SHS). Federal highway standards are implemented in California by Caltrans. Any improvements or modifications to the SHS within the study area would need to be approved by Caltrans. The following Caltrans planning documents emphasize the State of California's focus on transportation infrastructure that supports mobility choice through multimodal options, smart growth, and efficient development. • *Complete Streets Implementation Action Plan* (California Department of Transportation 2010a) • *Smart Mobility 2010: A Call to Action for the New Decade* (California Department of Transportation 2010b) • *California Transportation Plan 2040* (California Department of Transportation 2016) • *Strategic Management Plan 2015–2020, 2019 Update* (California Department of Transportation 2019a) • *State Highway System Management Plan* (California Department of Transportation May 2019b)
Regional/Local[18]	
Sacramento Area Council of Governments	SACOG oversees Sacramento and Yolo Counties in the Delta area, including the cities of West Sacramento, Elk Grove, and Galt. SACOG developed the 2019–22 Metropolitan Transportation Improvement Program, which identifies roadway and transit projects in or near the Delta area.
San Joaquin Council of Governments	SJCOG oversees an eight-county region in the San Joaquin Valley, which includes San Joaquin County in the Delta area. SJCOG developed the current Federal Transportation Improvement Program, which covers FY 2018–2019 through 2021–2022. SJCOG planning region includes roadway and transit improvement projects within the Delta area.
Metropolitan Transportation Commission	MTC is the transportation planning, coordinating, and financing agency for the nine-county San Francisco Bay Area, which includes Alameda, Contra Costa, and Solano Counties in the Delta area.

Sources: California Department of Transportation 2010a, 2010b, 2016, 2019a, 2019b; Delta Protection Commission 2010:35; Federal Aviation Administration 2021; Federal Highway Administration 2019a, 2019b; Metropolitan Transportation Commission 2019; U.S. Fish and Wildlife Service 2021.

AB = Assembly Bill; Caltrans = California Department of Transportation; CEQA = California Environmental Quality Act; CFR = Code of Federal Regulations; Delta Protection Act = Delta Protection Act of 1992; FAA = Federal Aviation Administration; FAST Act = Fixing America's Surface Transportation Act; FHWA = Federal Highway Administration; FY = fiscal year; GHG = greenhouse gas; LOS = level of service; LURMP = Land Use and Resource Management Plan; MPO = metropolitan planning organization; MTC = Metropolitan Transportation Commission; NHS = National Highway System; OPR = Governor's Office of Planning and Research; SACOG = Sacramento Area Council of Governments; SB= Senate Bill; SHS = State Highway System; SJCOG = San Joaquin Council of Governments; TIP = Transportation Improvement Program; USACE = U.S. Army Corps of Engineers; VMT = vehicle miles of travel.

[18] State agencies are required to comply with regional and local requirements only in very limited circumstances.

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G.20 Section 3.20: Utilities and Public Services

Laws, Regulations, and Programs for Public Services and Utilities Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
National Fire Protection Association 1710 Standard	Although not a law or a federally mandated regulation, this NFPA standard is a “best practice” that sets minimum requirements for organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public by career fire departments. This standard requires an initial response (four firefighters) within 5 minutes, 90% of the time, and a full effective fire force (15 firefighters) within 9 minutes, 90% of the time. Response times in the study area meet this standard.
Federal Energy Regulatory Commission	FERC is an independent agency with authority to regulate interstate electricity and energy transmission and is responsible for reviewing proposals to build liquefied natural gas terminals, interstate natural gas pipelines, and for licensing hydropower projects. FERC also regulates transmission and wholesale marketing of oil, natural gas, and electricity in interstate commerce. FERC also licenses and inspects private, municipal, and state hydropower projects, and supervises environmental concerns related to hydroelectricity and major electricity policy initiatives. FERC monitors and investigates energy markets and ensures the reliability of interstate transmission systems.
State	
California Occupational Health and Safety Code Sections 8426–8428	Requires employers to prepare and post a plan of action for use in case of emergency, including firefighting equipment, evacuation plans, and communications. Work near a tunnel requires precautions be taken to protect against a sudden inrush of water, such as vertical test holes, and removing employees to 2,000 feet from blasting sites. An underground telephone is required when more than 5 employees are underground or as soon as tunnel lengths reach 1,000 feet, and there should never be less than one phone per 1,000 feet.
State Fire Responsibility Act (Pub. Resources Code § 4125)	Requires the State Board of Forestry to classify all lands within the state and identify the areas in which the State of California has financial responsibility of preventing and suppressing fires.
California Office of Emergency Services	Coordinates and facilitates mitigation for multiple hazards that may affect emergency services.
Land Use and Resource Management Plan for the Primary Zone of the Delta	Prepared by the DPC in 1995, this plan sets forth policies that provide a Delta-wide approach to local government actions that may be adopted into city and county general plans. The primary goal of the Utilities and Infrastructure section is to protect the Delta from excessive construction of utilities and infrastructure facilities, including those that support development outside the Delta. Where construction is appropriate, local projects must ensure that impacts on the integrity of levees, wildlife, and agriculture are minimized. Local plans and decisions in the Delta Primary Zone must be in conformance with the plan and will be subject to appellate review by the DPC. Utilities and infrastructure goals and policies pertain to locations of new utilities infrastructure, requirements for new construction related to wastewater, limitations on solid waste disposal, operation of bridges and ferries, reuse of dredged material, and levee maintenance costs.
California Energy Commission	CEC has regulatory authority over energy planning and policy. Its duties and responsibilities include forecasting future energy needs, licensing of

Law, Regulation, Policy, Program, or Agency	Description
	thermal power plants, supporting energy efficiency and renewable energy, as well as planning for and responding to energy emergencies.
California Public Utilities Commission	CPUC regulates privately owned water, energy, and telecommunications utilities and is responsible for safety enforcement, including the investigation of all accidents on the property of any public utilities.
California Integrated Waste Management Act (Assembly Bill 939, Chapter 1095) (1989)	Delegates responsibility for planning and implementing diversion of solid waste from solid waste disposal facilities to all California cities, counties, and regional solid waste management agencies. CalRecycle oversees and assists local governments in implementing statewide mandates. This act required every city and county to prepare a source reduction and recycling element with its solid waste management plan that identified how each jurisdiction would meet the mandatory waste diversion goals of 25% by 1995 and 50% by 2000. SB 2202 mandated that jurisdictions continue 50% diversion after January 1, 2000. The purpose of the act is to facilitate the reduction, recycling, and reuse of solid waste to the greatest extent possible. Activities involving removal and disposal of sediments within irrigation and flood control facilities or the use of inert materials in levee or flood control work by federal, state, or local governments may be excluded from solid waste permitting by CalRecycle Tiered Regulatory Placement criteria for construction and demolition waste and inert debris disposal. These activities would require permitting from the Regional Water Quality Control Boards and State Water Resources Control Board requirements.
Regional/Local[19]	
Alameda *East County Area Plan*	The ECAP includes policies that set standards for emergency response, fire protection, and police staffing and establish general guidance for these agencies. Potentially relevant policies in this general plan pertaining to public services and utilities include those in the Public Utilities and Services Element (Policies 218 through 222, Policies 241 and 242, and Policy 248).
Contra Costa County General Plan 2005–2020	The general plan establishes standards for sheriff facilities, sheriff patrols, and emergency response times. The plan also establishes goals and policies related to fire protection emergency response times and sets fire protection and prevention requirements for development of open space areas according to the County's Fire Protection Code and Fire Access Standards. Fire protection agencies must review proposed projects and determine whether there is adequate water supply for firefighting, whether road widths, road grades, and turnaround radii are adequate for emergency equipment, and that structures are built to meet fire and building code standards.
Sacramento General Plan of 2005–2030	The general plan Public Facilities Element (2019) outlines specific goals, objectives, policies, and implementation measures that provide guidance and regulation for the provision of public services and utilities within Sacramento County. Demand for law enforcement already exceeds the supply of resources, and the Public Facilities Element includes plans to develop law enforcement facilities in unincorporated areas Potentially relevant policies in this general plan pertaining to public services and utilities are Policies PF-27 through PF-39 and PF-50 through PF-64.
San Joaquin County General Plan	The general plan's Community Development and Public Facilities and Services chapters outline specific goals, policies, and implementation measures that provide guidance for the public services and utilities in the

[19] State agencies are required to comply with regional and local requirements only in very limited circumstances.

Law, Regulation, Policy, Program, or Agency	Description
	county. The general plan requires fire hazards to be determined during project review and prevented or mitigated to acceptable levels of risk. The general plan's Community Development chapter also contains policies intended to minimize the negative impacts of overhead transmission lines and regulate and encourage new utility development to occur within existing utility corridors. New or expanded utility lines must address the potential adverse effects on development as a result of a rupture or malfunction and include mitigation for such an event.
Solano County General Plan	The general plan contains policies for maintaining adequate staffing and resource levels for law enforcement and emergency services, including a policy requiring the identification and incorporation of fire protection and emergency response measures in the review and approval of new projects. The general plan also contains policies to ensure adequate public school and library services for the county. The general plan includes policies guiding utility development along existing rights-of-way for gas, electric, and telephone utility alignments to minimize disruption to the existing landscape. Potentially relevant policies in this general plan pertaining to public services and utilities include those in the Public Facilities and Services Element (PF.P-1 through PF.P-8, PF.P-21, PF.P-22, PF.P-23 through PF.P-27, PF.P-33, and PF.P-38 through PF.P-45).
2030 Countywide General Plan (Yolo County)	The general plan includes policies regarding the number of law enforcement and fire protection personnel and the appropriate response times for emergency response personnel to ensure adequate law enforcement and fire protection. The plan also requires underground utilities in new development in unincorporated communities, and, where feasible, utility and pipelines should be installed away from agricultural operations. Those policies potentially relevant to public services and utilities within the general plan include Public Facilities and Services Element, Goal PF-1, Policies PF 1.1 and 1.2, Goal PF-2, Policy PF-2.1 through PF-2.4, Goal PF-4, Policy PF-4.1 through PF-4.8, Goal PF-5, and Policy PF-5.1 through PF-5.11.
Federal	
Western Area Power Administration	WAPA markets and delivers power from multiuse water projects that are operated by Reclamation, USACE, and the International Boundary and Water Commission. WAPA markets and delivers CVP's installed capacity of 2,112 MW through 956 circuit-miles of transmission lines.
State	
California Public Utilities Commission	Regulates investor-owned utilities to establish safe and reliable utility service, protect consumers against fraud, provide service at reasonable costs, and promote a healthy state economy. In addition, CPUC regulates privately owned natural gas, electric, telecommunications, water, railroad, rail transit, and passenger transportation companies.
California Independent System Operator	CAISO is a not-for-profit public benefit corporation that acts as the independent operator of California's transmission grid. While transmission lines remain owned by utility companies, CAISO ensures that non-discriminatory open access to transmission service is available to all users. CAISO manages transmission congestion through use of locational marginal pricing and manages an integrated forward market for energy

Law, Regulation, Policy, Program, or Agency	Description
	purchases and sales. Additionally, CAISO coordinates transmission usage and energy flows with neighboring Balancing Authorities.[20]
Warren-Alquist Energy Resources Conservation and Delivery Act – California Energy Commission	The Warren-Alquist Act established the CEC and granted it statutory authority. Promotes energy efficiency throughout the state, supports renewable energy and public interest energy research, and plans and directs the State's responses to energy emergencies. The CEC provides permitting for new energy facilities and funds for a variety of technologies that would reduce GHGs.
CEQA Guidelines Appendix F	Outlines analysis requirements for the evaluation of potential energy impacts of proposed projects. Particular emphasis is placed on "avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy." Moreover, the CEQA Guidelines state that significant energy impacts should be "considered in an EIR to the extent relevant and applicable to the project." The review of potential impacts should include a discussion of project energy requirements, effects on local and regional energy supplies, effects on peak and base period demands, compliance with energy standards, and effects on energy resources. Alternatives should be compared in terms of total and inefficient energy use. Mitigation for potential significant energy impacts could include a variety of strategies, including measures to reduce wasteful energy consumption and project siting.
California Endangered Species Act (Fish & G. §§ 2050–2089; § 2080; § 2081)	CESA establishes various requirements and protections regarding species listed as threatened or endangered under state law. California's Fish and Game Commission is responsible for maintaining lists of threatened and endangered species under CESA. CESA prohibits the "take" of listed and candidate (petitioned to be listed) species. In accordance with Section 2081 of the California Fish and Game Code, a permit from CDFW is required for projects "that could result in the incidental take of a wildlife species state-listed as threatened or endangered".
Renewables Portfolio Standard	SB 100 (2018) mandated that 60% of electricity sales must be served by renewable resources by 2030. Moreover, SB 100 requires that all of the state's electricity come from carbon-free resources by 2045. CPUC implements and administers RPS compliance rules for California's retail sellers of electricity.
Regional/Local[21]	
Alameda County General Plan, Community Climate Action Plan	The plan identifies goals and policies related to sustainability and energy use, including building energy use, water use, waste, and green infrastructure.
Contra Costa County General Plan 2005–2020	The general plan includes goals to reduce energy use to avoid air pollution risks and encourages the use of renewable resources where they are compatible.
Sacramento County General Plan of 2005–2030	The general plan identifies policies and goals related to safe, reliable, efficient, and economical electric service.
San Joaquin County General Plan Policy Document	The general plan identifies policies that encourage energy consumption in an effort to minimize air quality impacts.

[20] Balancing Authorities are the entities responsible for maintaining system frequency for an area comprising a collection of generation, transmission, and loads within metered boundaries (defined as a "balancing authority area"). Responsibilities of a balancing authority include scheduling supply resources, transmission, and loads in the day-ahead, maintaining the area's load-resource balance in real time, and supporting the area's interconnection frequency in real time.

[21] State agencies are required to comply with regional and local requirements only in very limited circumstances.

Law, Regulation, Policy, Program, or Agency	Description
Solano County General Plan	The general plan identifies goals and policies related to ensuring sustainable provision and use of energy resources and promoting use of renewable energy.
2030 Countywide General Plan (Yolo County)	The general plan identifies policies and implementation actions to promote energy efficiency and conservation.

Sources: County of Alameda 2000:59, 62, 63; County of Contra Costa 2005:7-3, 7-4, 7-27–7-29; County of Sacramento 2017:3, 11-13, 2019:18-21, 30-35; County of San Joaquin 2016:3.2-1–3.2-2; County of Solano 2008:PF-4, PF-15, PF-16, PF-19, PF-22, PF-25, PF-29–PF-33; County of Yolo 2009:PF-6, PF-7, PF-11, PF-18–PF-19, PF-22–PF-23; National Fire Protection Association 2020a, 2020b.

AB = Assembly Bill; CalRecycle = California Department of Resources Recycling and Recovery; CEC = California Energy Commission; CPUC = California Public Utilities Commission; DPC = Delta Protection Commission; ECAP = East County Area Plan; FERC = Federal Energy Regulatory Commission; NFPA = National Fire Protection Association; SB = Senate Bill.

Sources: Federal Energy Regulatory Commission 2018; California Department of Water Resources 2006; Western Area Power Administration 2021; California Public Utilities Commission 2021; California Independent System Operator 2019; California Energy Commission 2021; California Air Resources Board 2017; County of Alameda 2014; County of Contra Costa 2005; County of Sacramento 2017; County of San Joaquin 2016; County of Solano 2008; County of Yolo 2009.

AB = Assembly Bill; CAISO = California Independent System Operator; CDFW = California Department of Fish and Wildlife; CEC = California Energy Commission; CED = Conservation and Delivery Act; CESA = California Endangered Species Act; CEQA = California Environmental Quality Act; CPUC = California Public Utilities Commission; CVP = Central Valley Project; CVPIA = Central Valley Project Improvement Act; DWR = California Department of Water Resources; EIR = environmental impact report; EO = executive order; FERC = Federal Energy Regulatory Commission; GHG = greenhouse gas; MW = megawatt; Reclamation = Bureau of Reclamation; RPS = Renewables Portfolio Standard SB = Senate Bill; SWP = State Water Project; USACE = U.S. Army Corps of Engineers; WAPA = Western Area Power Administration; Warren-Alquist Act = Warren-Alquist Energy Resources Conservation and Delivery Act;.

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G.21 Section 3.21: Water Quality

Laws, Regulations, and Programs for Water Quality Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Clean Water Act of 1972 Section 303(d) (33 USC § 1251 *et seq.*)	Requires states to develop a list of waterbodies (or sections of waterbodies) that will not attain water quality standards after implementation of minimum required levels of treatment by point-source dischargers and adopt total maximum daily loads for these waters.
Clean Water Act of 1972 Section 401 (33 USC § 1251 *et seq.*)	Requires applicants for a federal permit or license to conduct any activity including the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the state in which the discharge originates or will originate that the discharge will comply with all applicable water quality standards, limitations, and restrictions.
Clean Water Act of 1972 Section 402 (33 USC § 1251 *et seq.*)	Established the NPDES permit program that regulates point and nonpoint source discharges to waters of the United States. In California, the State Water Board and nine Regional Water Boards administer the NPDES permit program.
Clean Water Act of 1972 Section 404 (33 USC § 1251 *et seq.*)	Established a program to regulate the discharge of dredged or fill material into waters of the United States. Activities in waters of the United States that are regulated under this program include fill for development, water resource projects (e.g., dams and levees), infrastructure development (e.g., highways and airports), and conversion of wetlands to uplands for farming and forestry.
Federal Antidegradation Policy (40 CFR § 131.12)	Designed to protect existing uses, and the level of water quality necessary to protect existing uses, and provide protection for higher quality and national water resources and directs states to adopt a statewide policy.
National Toxics Rule and California Toxics Rule (60 FR 2228 [May 4, 1995]; 65 FR 3162 [May 18, 2000]; 66 FR 9960 [February 13, 2001])	The National Toxics Rule established numeric criteria for priority toxic pollutants applicable in a number of states, including California. The California Toxics Rule promulgated new toxics criteria specifically for California and incorporated the previously adopted National Toxics Rule criteria applicable in California.
State	
Porter-Cologne Water Quality Control Act of 1969 (California Water Code, Div. 7 and 2009 Amendments)	California's principal law governing water quality control. Applies broadly to all State waters, including surface waters, wetlands, and ground water; it covers waste discharges to land as well as to surface and groundwater, and applies to both point and nonpoint sources of pollution.
State Water Resources Control Board Policy with Respect to Maintaining High Quality Waters in California (Resolution 68-16—Statement of State Antidegradation Policy)	The goal of Resolution 68-16 is to maintain high quality waters where they exist in the state. The State Water Board has interpreted Resolution 68-16 to incorporate the federal antidegradation policy.
State Water Resources Control Board Sources of Drinking Water Policy (Resolution 88-63)	Established State policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply.
State Water Resources Control Board *Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary*	The *Bay-Delta Plan* identifies beneficial uses of water, water quality objectives for the reasonable protection of those beneficial uses, and a program of implementation for achieving those objectives. The 2018 *Bay-Delta Plan* amendments to the 2006 *Bay-Delta Plan* established revised

Law, Regulation, Policy, Program, or Agency	Description
	water quality objectives for the protection of agricultural beneficial uses in the southern Delta
State Water Resources Control Board Revised Water Rights Decision 1641	This decision amended certain water rights by assigning responsibilities to the persons or entities holding those rights to help meet the objectives of the 1995 *Bay-Delta Plan.*
State Water Resources Control Board *Policy for the Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California*	Commonly called the SIP, this policy applies to discharges of toxic pollutants into inland surface waters, enclosed bays, and estuaries. Describes methods for setting of effluent limits in NPDES permits for priority pollutants; establishes certain monitoring requirements and chronic toxicity control provisions, and includes special provisions for certain types of discharges.
Central Valley Regional Water Quality Control Board *Water Quality Control Plan for the Sacramento and San Joaquin River Basins*	Defines the beneficial uses, water quality objectives, implementation programs, and surveillance and monitoring programs for waters of the Sacramento and San Joaquin River basins.
San Francisco Bay Regional Water Quality Control Board *San Francisco Bay Basin (Region 2) Water Quality Control Plan*	Defines the beneficial uses, water quality objectives, implementation programs, and surveillance and monitoring programs for waters of the Suisun Marsh and San Francisco Bay as well as portions of Marin and San Mateo Counties, from Tomales Bay in the north to Pescadero and Butano Creeks to the south.
Regional/Local[22]	
Alameda County General Plan	The general plan establishes goals and policies to preserve and enhance surface and groundwater quality.
Contra Costa County General Plan 2005–2020	The general plan establishes goals and policies to preserve and enhance surface and groundwater quality.
Sacramento County General Plan of 2005–2030	The general plan establishes goals and policies to protect beneficial uses of waters of the State.
San Joaquin County 2035 General Plan	The general plan establishes goals and policies to protect beneficial uses and improve water quality in the Delta.
Solano County General Plan	The general plan establishes goals and policies to protect and enhance the quality of surface and groundwater resources.
2030 Countywide General Plan (Yolo County)	The general plan establishes goals and policies to improve and protect water quality for beneficial uses.

Sources: County of Alameda 1994; County of Contra Costa 2005; County of Sacramento 2011; County of San Joaquin 2011; County of Solano 2008; County of Yolo 2009; Central Valley Regional Water Quality Control Board 2018; San Francisco Bay Regional Water Quality Control Board 2019; State Water Resources Control Board 2005, 2018.

Bay-Delta Plan = Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; CFR = Code of Federal Regulations; CWA = Clean Water Act of 1972; Delta = Sacramento–San Joaquin River Delta; NPDES = National Pollutant Discharge Elimination System; SIP = state implementation plan; USC = United States Code.

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[22] State agencies are required to comply with regional and local requirements only in very limited circumstances.

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G.22 Section 3.22: Water Supply

Laws, Regulations, and Programs for Water Supply Potentially Relevant to the Project

Law, Regulation, Policy, Program, or Agency	Description
Federal	
Coordinated Operation Agreement (COA) between the United States of America and the State of California for Coordinated Operation of the Central Valley Project and the State Water Project	The COA identifies methods for sharing responsibilities to meet Delta standards identifies how unstored flow will be shared, sets up a framework for exchange of water and services between the SWP and CVP, and provides for periodic review of the agreement.
CALFED Bay-Delta Implementation Act	Consists of activities including storage and, water supply reliability. The ROD identified numerous programs to provide protection to fish in the Bay-Delta Estuary through environmentally beneficial changes in SWP and CVP operations at no loss of uncompensated water cost to SWP and CVP water users.
Trinity River Mainstem Fishery Restoration	Establishes a restoration strategy that includes a variable annual flow regime (368,600 to 815,200 AF depending on water year type), mechanical channel rehabilitation, sediment management, watershed restoration, and adaptive management.
National Marine Fisheries Service and U.S. Fish and Wildlife Service Biological Opinions for Long-Term Operation of the CVP/SWP (2019)	As a result of coordinated operation of the SWP and CVP, DWR will operate the SWP for the protection of federally listed steelhead and green sturgeon in addition to operations for the protection of state-listed species. In some cases, these operations and the ITP for federally listed species may result in reductions in SWP pumping in addition to the reductions that would be necessary to comply with state law.
U.S. Army Corps of Engineers Public Notice 5820A (1981, updated 2017)	DWR’s application for extension of Permit SPK-1999-0715E is under review, where the maximum allowable daily diversion rate into the Clifton Court Forebay during the months of July, August, and September would be maintained consistent with the existing activity at 13,870 AF to 14,860 AF and the maximum three-day average diversion rate will be maintained at 13,250 AF to 14,240 AF.
State	
Central Valley Project Act	Authorizes DWR to build facilities described in the Act and to issue bonds. The CVPA describes specific facilities that have been built by DWR, including the Feather River Project and California Aqueduct, Silverwood Lake, and the North Bay Aqueduct. The Act allows DWR to administratively add other units and develop power facilities.
Davis-Dolwig Act of 1961	Establishes the policy that preservation of fish and wildlife is part of State costs to be paid by water supply contractors; recreation and enhancement of fish and wildlife are to be provided by appropriations from the General Fund.
California State Water Resources Control Board: State Water Project Water Rights	DWR has State Water Board permits and licenses to appropriate water for the SWP. The State Water Board has issued several decisions and orders that have modified DWR’s permits, many of which are the same decisions and orders that affect Reclamation’s CVP operations.
California State Water Resources Control Board: Central Valley Project Water Rights	Reclamation was issued water rights by the State Water Board to appropriate water for the CVP. Many of the rights for the CVP were issued pursuant to State Water Board D-990; several other decisions and State Water Board actions cover the remaining rights for the CVP.
State Water Resources Control Board: Water Right Decision 1485	The State Water Board adopted Water Right Decision 1485 to implement portions of the 1978 WQCP for the Delta and Suisun Marsh through modification of SWP and CVP operations.

Law, Regulation, Policy, Program, or Agency	Description
State Water Resources Control Board: Water Right Decision 1641	Requires the CVP and SWP to meet flow and water quality objectives to assure protection of agricultural, M&I, and fishery uses in the Delta. D-1641 also authorizes SWP and CVP to jointly use each other's points of diversion in the southern Delta.
State Water Resources Control Board: Joint Points of Diversion	Conditioned the use of JPOD capabilities based on a staged implementation and conditional requirements for each stage of implementation. All stages require a response plan to ensure that (1) water levels in the southern Delta will not be lowered to the injury of local riparian water users and that (2) water quality in the southern and central Delta will not be significantly degraded through operations.
State Water Resources Control Board: Water Transfers	The California Water Code provides the framework of the regulatory process that governs water transfers in California. The State Water Board has responsibility for administering appropriative water rights in the state. Any transfers conveyed through project facilities will need to satisfy all applicable requirements at the time of the transfer's approval.
California State Water Resources Control Board: Revised Water Quality Control Plan	Established water quality control objectives for the protection of beneficial uses in the Delta. The WQCP identified (1) beneficial uses of the Delta to be protected, (2) water quality objectives for the reasonable protection of beneficial uses, and (3) a program of implementation for achieving the water quality objectives.
State Water Project Operations Agreements: 1987 Suisun Marsh Preservation Agreement	Contains provisions for DWR and Reclamation to mitigate the effects on Suisun Marsh channel water salinity from SWP and CVP operations as well as other upstream diversions. The Agreement defines (1) methods and obligations for DWR and Reclamation to meet water supply and salinity standards, (2) sets a timeline for implementing the Plan of Protection, and (3) delineates monitoring and mitigation requirements.
Sacramento-San Joaquin Delta Reform Act of 2009 (Wat. Code §§ 85000–85350) and *Delta Plan*	The Delta Reform Act, created by SB X7-1, established the co-equal goals for the Delta of "providing a more reliable water supply for California and protecting, restoring, and enhancing the delta ecosystem." (Pub. Resources Code § 29702; Wat. Code § 85054). These coequal goals are to be achieved "in a manner that protects and enhances the unique cultural, recreational, natural resources, and agricultural values of the Delta as an evolving place." (Wat. Code § 85054). The Delta Reform Act also established the DSC. The DSC is tasked with furthering the state's coequal goals for the Delta through development of the *Delta Plan*, a comprehensive, long-term, resource management plan for the Delta, containing both regulatory policies and recommendations aimed at furthering the coequal goals and promoting a healthy Delta ecosystem. The *Delta Plan* provides for a distinct regulatory process for activities that qualify as Covered Actions under Water Code Section 85057.5. State and local agencies proposing Covered Actions, prior to initiating implementation of that action, must prepare a written certification of consistency with detailed findings regarding consistency with applicable *Delta Plan* policies and submit that certification to the DSC.
California Department of Fish and Wildlife Incidental Take Permit (2020)	Permit dedicates water for Delta outflows during dry periods and allows flexibility to capture water during wet years.

Sources: California Department of Fish and Wildlife 2020; State Water Resources Control Board 2006, 2018; County of Alameda 1994; County of Contra Costa 2005; County of Sacramento 2017a, 2017b; County of San Joaquin 2016; County of Solano 2008; County of Yolo 2009; Reclamation et al. 2011.

AF = acre-feet; Bay-Delta Plan = Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; BioOp = Biological Opinion; CDFW = California Department of Fish and Wildlife; cfs = cubic feet per second; COA = Coordinated Operations Agreement; CVP = Central Valley Project; CVPA = Central Valley Project Act; CVPIA = Central Valley Project Improvement Act; D-1275 = State Water Resources Control Board Water Right Decision 1275; D-1422 = State Water Resources Control Board Water Right Decision 1422; D-1485 = State Water Resources Control Board Water Right Decision 1485; D-1641 = State Water Resources Control Board Water Right Decision 1641; Delta = Sacramento–

San Joaquin Delta; Delta Reform Act = Sacramento-San Joaquin Delta Reform Act of 2009; DSC = Delta Stewardship Council; DWR= California Department of Water Resources; ECAP = East County Area Plan; FERC = Federal Energy Regulatory Commission; ITP = Incidental Take Permit; ITS = needs definition; JPOD = Joint Points of Diversion; M&I = municipal and industrial; Reclamation = Bureau of Reclamation; ROD = record of decision; State Water Board = State Water Resources Control Board; SWP = State Water Project; USACE = U.S. Army Corps of Engineers; WQCP = Water Quality Control Plan.

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