Delta Research Station Project: Estuarine Research Station and Fish Technology Center

Final Environmental Impact Report/ Environmental Impact Statement

Volume I: Main Body

February 2017

Prepared for:

California Department of General Services on behalf of
California Department of Water Resources and U.S. Fish and Wildlife Service

CALIFORNIA DEPARTMENT OF GENERAL SERVICES

Prepared by:

Horizon Water and Environment

Delta Research Station – Estuarine Research Station and Fish Technology Center

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Acronyms and Abbreviations

A	attainment
AASHTO	American Association of State Highway and Transportation Officials
AB	Assembly Bill
ABAG	Association of Bay Area Governments
ABD	Army Base District
ACMs	asbestos-containing materials
AF	acre-foot
AFY	acre-feet per year
AIS	aquatic invasive species
APCD	Air Pollution Control District
ATCM	airborne toxic control measure
BAAQMD	Bay Area Air Quality Management District
BAT	best available technology economically achievable
Bay	San Francisco Bay
Bay–Delta	San Francisco Bay–Sacramento-San Joaquin River Delta
BCT	best conventional pollutant control technology
BDCP	Bay-Delta Conservation Plan
BFE	Base Flood Elevation
bgs	below ground surface
BLS	U.S. Bureau of Labor Statistics
BMP	best management practices
BNSF	Burlington Northern and Santa Fe
BOD	biological oxygen demand
CAA	Clean Air Act
CAAP	concentrated aquatic animal production
CAAQS	California Ambient Air Quality Standards
CAFE	Corporate Average Fuel Economy
CalEEMod	California Emission Estimator Model
Cal EMA	California Emergency Management Agency
Cal/EPA	California Environmental Protection Agency
CAL FIRE	California Department of Forestry and Fire Protection
Cal OES	Governor's Office of Emergency Services
Cal/OSHA	California Occupational Safety and Health Administration
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CalWater	California Water Service

CAP	Climate Action Plan
CARB	California Air Resources Board
CASGEM	California Statewide Groundwater Elevation Monitoring
CBC	California Building Codes
CCAA	California Clean Air Act
CCR	California Code of Regulations
CDC	California Department of Conservation
CDE	California Department of Education
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CEQ	White House Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
CFCs	chlorofluorocarbons
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Survey
CH_4	methane
CHRIS	California Historical Resources Information System
CIWMB	California Integrated Waste Management Board
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CRPR	California Rare Plant Rank
CSMP	Corridor System Management Plan (Caltrans)
CSO	combined sewer overflow
CTPP	Census Transportation Planning Products
CUPA	Certified Unified Program Agency
CVFPB	Central Valley Flood Protection Board
CVP	Central Valley Project
CWA	Clean Water Act
cy	cubic yards

dB	decibel
dBA	A-weighted decibels
dbh	diameter at breast height
dB_{RMS}	Decibels Root Mean Square
DBW	California Department of Parks and Recreation, Division of Boating and Waterways
Delta	Sacramento-San Joaquin River Delta
DO	dissolved oxygen
DOGGR	California Department of Conservation, Division of Oil, Gas, and Geothermal Resources
DOI	U.S. Department of Interior
DPM	diesel particulate matter
DPS	distinct population segment
DRS	Delta Research Station
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
DWSC	Deep Water Ship Channel
EA	environmental assessment
EDD	California Economic Development Department
EDR	Environmental Data Resources, Inc.
EFH	essential fish habitat
EIR	environmental impact report
EIS	environmental impact statement
EMFAC	emission factor model for on-road vehicles (California Air Resources Board)
EO	Executive Order
ERP	Ecosystem restoration program
ERS	Estuarine Research Station
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FAA	Federal Aviation Administration
FAR	floor area ratio
FCCL	University of California, Davis Fish Conservation and Culture Laboratory
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FR	Federal Register
FTA	Federal Transit Administration
FTA Manual	FTA *Transit Noise and Vibration Impact Assessment*

FTC	Fish Technology Center
g	acceleration due to gravity (measure of intensity of ground movement)
GAMAQI	*Guide for Assessing and Mitigating Air Quality Impacts* (SJVAPCD)
GGERP	*Climate Action Plan – Phase I: Greenhouse Gas Emissions Reduction Plan* (DWR)
GHG	greenhouse gas
gpm	gallons per minute
GPS	global positioning system
GSA	Groundwater Sustainability Agencies
GSP	Groundwater Sustainability Plans
Guidelines	Army Base District Design Guidelines
GWP	global warming potential
H_2O	water (vapor)
H_2S	hydrogen sulfide
HACCP	Hazard Analysis and Critical Control Points plan
HCM	Highway Capacity Manual
HCP	habitat conservation plan
HFCs	hydrofluorocarbons
HFEs	hydrofluorinated ethers
Historic District	U.S. Engineers Storehouse Historic District
HTL	high tide line
Hz	hertz
I-	Interstate
IBC	International Building Code
ICBO	International Conference of Building Officials
ICMA	International City/County Management Association
IEP	Interagency Ecological Program
IG	Industrial-General zoning designation
IL	Industrial-Limited zoning designation
INAD	Investigational New Animal Drug (study)
IPCC	Intergovernmental Panel on Climate Change
ISR	Indirect Source Review
ITE	Institute of Transportation Engineers
JRP	JRP Historical Consulting Services
LCFS	Low Carbon Fuel Standard

L_{dn}	day–night noise level
LED	light-emitting diode
LEED	Leadership in Energy & Environmental Design
L_{eq}	equivalent sound level
LID	low impact development
L_{max}	root mean square maximum obtainable noise level
L_{min}	root mean square minimum obtainable noise level
LOS	level of service
LSNFH	Livingston Stone National Fish Hatchery
LUST	Leaking Underground Storage Tank
L_V	vibration level
L_X	sound level exceeded for X percent of a given measurement period
MACT	maximum achievable control technology
MAF	million acre-feet
MAFY	million acre-feet per year
Management Plan	Land Use and Resource Management Plan for the Primary Zone of the Delta
MBTA	Migratory Bird Treaty Act
MBtu	1 million British thermal units
MCL	maximum contaminant level
MEI	Maximally Exposed Individual
mgd	million gallons per day
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MHHW	mean higher high water
mL	milliliters
MLD	Most Likely Descendent
MLLW	Mean lower low water
mm	millimeters
MMI	Modified Mercalli Intensity
MMPA	Marine Mammal Protection Act
MMS	moment magnitude scale
MMSZ	Marine mammal safety zone
MMT	million metric tons
mph	miles per hour
MS4	municipal separate storm sewer systems
MSA	Metropolitan Statistical Area
msl	mean sea level
MT CO_2e	metric tons of carbon dioxide equivalents
MUTCD	Manual on Uniform Traffic Control Devices

MW	megawatts
MWh	megawatt-hours
N	non-attainment
N_2O	nitrous oxide
N/A	not applicable or not available
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NAVD88	North American Vertical Datum 1988
NBA	North Bay Aqueduct
NCCP	Natural community conservation plan
NEHRP	National Earthquake Hazards Reduction Program
NEPA	National Environmental Policy Act
NF_3	nitrogen trifluoride
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NHPA	National Historic Preservation Act
NHTSA	National Highway Traffic Safety Administration
NIST	National Institute of Standards and Technology
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOC	Notice of Completion
NOI	Notice of Intent
NOP	Notice of Preparation
NO_X	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPPA	Native Plant Protection Act of 1977
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSF	National Science Foundation
NTU	nephelometric turbidity unit
O_3	ozone
OBD	on-board diagnostic
ODSs	ozone-depleting substances
OEHHA	[California] Office of Environmental Health Hazard Assessment
OSHA	Occupational Safety and Health Administration

PAH	polycyclic aromatic hydrocarbons
Pb	lead
PCBs	polychlorinated biphenyls
PCP	pentachlorophenol
PeMS	Performance Measurement System (Caltrans)
PERP	Portable Equipment Registration Program
PFCs	perfluorocarbons
PGA	peak ground acceleration
PG&E	Pacific Gas and Electric Company
PG&E O&M HCP	PG&E San Joaquin Valley Operation & Maintenance Habitat Conservation Plan
PM	particulate matter
$PM_{2.5}$	particles smaller than 2.5 micrometers in diameter
PM_{10}	particles smaller than 10 micrometers in diameter
ppb	parts per billion
ppm	parts per million
PPV	peak particle velocity
Preferred Alternative	Alternative 2: Rio Vista Army Reserve Center, Configuration 1
Proposed Project	Delta Research Station, including the Estuarine Research Station and the Fish Technology Center
PSU	Practical Salinity Units
Pub. Res. Code	California Public Resources Code
PUD	Planned unit development
PVC	polyvinyl chloride
RDUSD	River Delta Unified School District
REC	recognized environmental condition
Reuse Plan	Rio Vista Army Base Reuse Plan
RHA	Rivers and Harbors Act
ROD	Record of Decision
RPA	Reasonable and prudent alternative
RRI	Rough and Ready Island
RTD	San Joaquin Regional Transit District
RV	recreational vehicle
RVARC	Rio Vista Army Reserve Center
RVPD	Rio Vista Police Department
RWCF	City of Stockton Regional Wastewater Control Facility
RWQCB	Regional Water Quality Control Board
SAR	IPCC's Second Annual Report (1996)
SB	Senate Bill

SEL	sound exposure level
SEWD	Stockton East Water District
SF_6	sulfur hexafluoride
SFBAAB	San Francisco Bay Area Air Basin
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SJCOG	San Joaquin Council of Governments
SJMSCP	San Joaquin County Multi-Species Habitat Conservation and Open Space Plan
SJR	San Joaquin River
SJRRP	San Joaquin River Restoration Program
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SLRA	Sensitive Local Resource Area
SMAQMD	Sacramento Metropolitan Air Quality Management District
SO_2	sulfur dioxide
Solano HCP	Solano Multi-Species Habitat Conservation Plan
SR	State Route
SRFCP	Sacramento River Flood Control Project
STA	Solano Transportation Authority
STAA	National Network for Service Transportation Assistance Act
SUSD	Stockton Unified School District
SVAB	Sacramento Valley Air Basin
SWITRS	Statewide Integrated Traffic Records System
SWP	State Water Project
SWPPP	Stormwater pollution prevention plan
SWQCCP	Stormwater Quality Control Criteria Plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminant
TCP	traditional cultural property
TCR	tribal cultural resource
TDS	Total dissolved solids
TFCA	Transportation Fund for Clean Air
TIMS	Transportation Injury Mapping System
TMDL	Total Maximum Daily Load
TRP	Transportation Research Board
TSS	total suspended solids
U	unclassified
Update	First Update to the Scoping Plan (CARB)

USACE	U.S. Army Corps of Engineers
USA North	Underground Service Alert of Northern/Central California and Nevada
USC	U.S. Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGBC	U.S. Green Building Council
USGS	U.S. Geological Survey
UWMP	urban water management plan
V/C ratio	volume-to-capacity ratio
VdB	vibration decibels
vd/c	demand flow rate divided by the capacity of a given segment
VERA	voluntary emission reduction agreement
VOC	volatile organic compounds
WDRs	Waste discharge requirements
WMO	World Meteorological Organization
WPT	western pond turtle
YSAQMD	Yolo-Solano Air Quality Management District
ºF	degrees Fahrenheit
μg/m^3	micrograms per cubic meter
μS/cm	microsiemens per centimeter
μ℧/cm	micromhos per centimeter

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EXECUTIVE SUMMARY

ES.1 Introduction

ES.1.1 Background

The California Department of Water Resources (DWR) and U.S. Fish and Wildlife Service (USFWS) propose to construct the Delta Research Station (DRS or Proposed Project). The DRS would consolidate ongoing Interagency Ecological Program (IEP) research and monitoring activities throughout the San Francisco Bay–Sacramento-San Joaquin River Delta (Bay-Delta) and provide facilities for study and production of endangered Delta fishes.

Currently, the IEP has approximately 145 state and federal employees who conduct research throughout the Delta. The IEP collaboratively monitors, researches, models and synthesizes critical information for adaptive management water project operations, planning and regulatory purposes relative to endangered fish and the aquatic ecosystem in the Bay-Delta. To enhance interagency coordination and collaboration, DWR and USFWS are proposing to construct and operate the DRS, a set of research facilities that would be centrally located within the Bay-Delta. The two main facilities that would make up the DRS are the Estuarine Research Station (ERS) and the Fish Technology Center (FTC).

This Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) has been prepared in compliance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) to provide the public, responsible agencies, and trustee agencies with information about the potential environmental effects of the proposed DRS.

ES.1.2 Purpose, Need, and Project Objectives

The purpose of the DRS is to enhance interagency coordination and collaboration by developing a shared research facility. The ERS would consolidate existing IEP programs currently located throughout the Delta, and the FTC would house a new program to develop and apply captive propagation technologies in support of population restoration. Currently, federal and state agency staff working on similar Bay-Delta issues are distributed among different locations that are often remote from the Bay-Delta. Construction and operation of the DRS would reduce travel times and costs and improve research and monitoring activity efficiency.

The specific objectives of each component of the DRS are as follows:

- ERS –
  - Establish a research station in a central location within the Bay-Delta to facilitate conducting monitoring and research; and

  - Co-locate the research station with a facility capable of studying fish in captivity (i.e., the FTC); and
  - Provide facilities to conduct monitoring and research on the Bay-Delta's aquatic resources.
- FTC –
  - Develop captive propagation technologies for the Bay-Delta's rare fish species;
  - Test and refine the captive propagation techniques;
  - Locate the facility where suitable water quality and quantity are available, and ability to discharge waste water is available, given the facility's various functions and operations; and
  - Co-locate the FTC with a facility conducting conservation research on Bay-Delta rare fish species (i.e., the ERS).

ES.1.3 Project Area

The DRS would be located in a centralized area of the Bay-Delta. Two alternative locations are evaluated throughout this EIR/EIS: the Rio Vista Army Reserve Center (RVARC) site in the City of Rio Vista and a site located at 845 Ryde Avenue in the City of Stockton (Ryde Avenue site). These locations are shown in **Figure ES-1**.

ES.1.4 Project Overview

The DRS would include two primary facilities: the ERS and FTC. These facilities would be sited adjacent to one another and would serve related functions, but would operate independently. The ERS would consolidate existing IEP programs and provide for research activities conducted throughout the Bay-Delta. The ERS would accommodate approximately 165 USFWS, DWR, and CDFW staff and 20–30 active IEP projects. The FTC would house a new program to develop and apply captive propagation technologies in support of population restoration for Delta Smelt and/or other imperiled fishes.

Figure ES-1
Location of Project Alternatives

C:\Users\GIS\Documents\ArcGIS_PROJECTS\13014_DGS_DeltaRsrchStn\MXD\EIR-EIS\Figure_ES-1_AlternativeLocations.mxd PG 3/19/2015

ES.2 Alternatives Considered in the EIR/EIS

The EIR/EIS considers the No Project Alternative and three action alternatives:

- Alternative 2, RVARC Site, Configuration 1;
- Alternative 3, RVARC Site, Configuration 2; and
- Alternative 4, Ryde Avenue Site in Stockton.

While the No Project Alternative would be a continuation of existing conditions, certain Proposed Project components are common to all three action alternatives. For the ERS, these include office space; boat storage facilities, including a marina; a boat/equipment wash facility; laboratory facilities; shop space; and a storage building. For the FTC, these include three buildings with aquaculture and research components for the study of individual fish species; an office and administrative building; a shop and vehicle storage building; a surface water intake and groundwater wells, a surface water treatment facility, and an effluent treatment system. The discussion below provides an overview of alternatives considered in this EIR/EIS. See Chapter 3, *Description of Alternatives*, for a detailed description of each alternative.

ES.2.1 Alternative 1: No Project Alternative

Under the No Project Alternative, no DRS facilities would be built and existing IEP activities would continue at their current locations. Some of the existing IEP activities that would continue to operate from various offices are fish population estimates, net surveys, and estuarine and marine fish abundance and distribution surveys. Table 3-1 in Chapter 3 summarizes specific programs that are expected to continue under the No Project Alternative.

ES.2.2 Components Common to All Action Alternatives

The following is a brief description of components common to all three action alternatives.

The ERS would include:

- Office space, consisting of employee work space for approximately 165 employees, conference room, meeting rooms, reference library, employee lunch/break room, and locker room/ shower;
- Boat storage, including a marina with mooring for up to 23 power boats, dry covered boat storage, open dry boat storage, open field experimental yard, and boat launch;
- Boat and equipment wash facility;
- Laboratory facilities, including a wet laboratory for processing field-collected samples and an experimental laboratory;

- Shop space for boat maintenance/repair, metal fabrication shop, woodwork shop, and net fabrication/maintenance area; and
- Storage buildings.

The FTC would consist of:

- Three main buildings, each devoted to the study of a different fish species;
- Groundwater wells;
- Surface water intake and water treatment facility;
- Effluent treatment system; and
- Auxiliary facilities, including an office and administrative building for 10–15 full-time personnel, small meeting room, restroom facilities, and a shop and vehicle storage building.

The DRS would include approximately 220 parking spaces for visitors, employees, and state and federal vehicles. See Chapter 3 for a detailed description of the ERS and FTC.

ES.2.3 Alternative 2: Rio Vista Army Reserve Center Site, Configuration 1

Alternative 2 would be located at the RVARC site on the southern edge of Rio Vista. Alternative 2 is the preferred alternative of DWR and USFWS and would include all of the common components described above. Figure 3-1 in Chapter 3 shows the proposed site layout for Alternative 2; the development footprint would be approximately 14 acres. Under this alternative, development of ERS and FTC facilities would be consolidated in the predominantly undeveloped portions of the site. The marina would be partially excavated and established in the Sacramento River at the southeastern end of the site.

ES.2.4 Alternative 3: Rio Vista Army Reserve Center Site, Configuration 2

Alternative 3 would include all of the common components described above and would also be located at the RVARC site. The development footprint under Alternative 3 would be approximately 18 acres, and the site layout is presented in Figure 3-2. Alternative 3 would repurpose some existing buildings situated adjacent to the Sacramento River. The marina and other ERS facilities would be constructed within the northern and northeastern portions of the site. Unlike Alternative 2, the marina would require more land to be excavated for its construction.

ES.2.5 Alternative 4: Ryde Avenue Site in Stockton

Alternative 4 would be located at 845 Ryde Avenue in Stockton. This alternative would include all of the common components described above. Figure 3-3 shows the site layout for Alternative 4. No existing buildings are located at the Ryde Avenue site, so no buildings would be repurposed. Similar to Alternative 3, the marina would require land to be excavated for its construction.

ES.2.6 Environmentally Superior Alternative

Among the action alternatives, when considering all aspects on balance, Alternative 2 (the Preferred Alternative) is considered environmentally superior. Of the action alternatives, Alternative 2 would have a smaller construction footprint, would not exceed the nitrogen oxides (NO_X) threshold, and would have reduced greenhouse gas (GHG) emissions compared to the other action alternatives. In comparison to Alternative 3, Alternative 2 would avoid the most direct impacts on the potential Historic District at the RVARC site and would result in fewer areas of conflict with the Army Base District Design Guidelines because more space would be available for additional future development on the RVARC site. Alternative 2 would also avoid the impacts to groundwater that would occur under Alternative 4.

Because Alternative 2 is the Proposed Project for CEQA purposes, other action alternatives were also considered when determining the environmentally superior alternative. Aside from Alternative 2, Alternative 3 is considered environmentally superior to Alternative 4 for the following reasons: the Solano subbasin's Tehama Formation (which underlies the RVARC site) reportedly has sufficient groundwater supplies to support FTC operations, whereas the Eastern San Joaquin subbasin (which underlies the Ryde Avenue site) is substantially overdrawn; and Alternative 3 would require less excavation for the new marina in comparison to Alternative 4 and thus result in fewer air pollutant and GHG emissions during construction.

ES.3 Public Involvement Process

ES.3.1 Scoping Comment Period

The scoping period for the DRS was initiated on December 8, 2014, with circulation of a Notice of Preparation of an EIR (NOP). The Notice of Intent (NOI) was published in the Federal Register on December 10, 2014. The NOP and NOI presented background information on the DRS and the environmental review process, and invited the public to provide comments during the scoping period. Copies of the NOP were mailed to all landowners with properties adjacent to the proposed facility locations in Rio Vista and Stockton, as well as to other potentially interested individuals and agencies. Notices were also published in local newspapers. Two scoping meetings were held during the scoping period, in Rio Vista and Stockton. Written comments were received throughout the scoping period. The scoping period closed on January 6, 2015. See Chapter 1, *Introduction,* for a detailed description of the scoping comment period and scoping meetings.

ES.3.2 Draft EIR/EIS Public Comment Period

This Draft EIR/EIS is being circulated for a 45-day public review and comment period. During this period, DWR and USFWS will host two public meetings, one in Rio Vista and one in Stockton. Written comments will also be accepted by mail or email (preferably by email in Microsoft Word or PDF format) during this period. Written comments should be directed to the name and address listed below.

Attention: John Engstrom
California Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236-0001
Email: comments@deltaresearchstation.com

The Draft EIR/EIS is available for review at the Proposed Project website: www.deltaresearchstation.com. Hard copies are also available for review at DWR's offices in Sacramento. To arrange to view the documents during business hours, call 916-651-8745. The Draft EIR/EIS also can be reviewed on CD at the following libraries:

Rio Vista Library
44 South Second Street
Rio Vista, CA 94571

Stockton-San Joaquin County Library
605 N. El Dorado Street
Stockton, CA 95202

Written comments received on the Draft EIR/EIS during the public review period will be addressed in the Responses to Comments chapter of the Final EIR/EIS.

ES.3.3 Preparation of the Final EIR/EIS

Following the close of the Draft EIR/EIS public comment period, a Final EIR/EIS will be prepared that incorporates responses to comments on the Draft EIR/EIS and revisions to the Draft EIR/EIS based on the comments received. The Final EIR/EIS will also include a list of all individuals, organizations, and agencies that provided comments on the draft document, and will contain copies of all comments received during the public comment period. The Final EIR/EIS will serve as the basis for approving or denying the Proposed Project.

ES.4 Areas of Known Controversy and Issues to Be Resolved

CEQA and NEPA require that lead agencies identify areas of known controversy and issues to be resolved that have been raised during the scoping process and throughout development of action alternatives in the EIR/EIS. To date, several issues have been raised that may be considered controversial to certain parties:

- Effects on the U.S. Engineers Storehouse Historic District as a result of buildout of Alternative 3;
- Inconsistencies with the Army Base District Design Guidelines, including guidelines pertaining to waterfront access for the public; and
- Traffic effects on local roadways.

ES.5 CEQA/NEPA Terminology and Approach

Both CEQA and NEPA require preparation of an environmental analysis to evaluate the potential environmental effects on the environment of proposed actions (and alternatives to those actions) that are subject to governmental approvals. Several differences exist between the two, however, in terminology, procedures, environmental document content, and substantive mandates to protect the environment. For the EIR/EIS, the more rigorous of the two laws was applied in cases in which NEPA and CEQA differ.

As described in more detail in Chapter 4, *Approach to the Environmental Analysis*, the significance determinations used for evaluating the Proposed Project's effects on the environment are primarily based on CEQA thresholds of significance, with consideration given to NEPA guidance for impact analysis, including issues such as context and intensity. Where the conclusions under NEPA differ from those under CEQA, the NEPA conclusions have been explicitly identified in the impact analysis. Certain resource topics, such as Chapter 18, *Socioeconomics*, and Chapter 9, *Cultural Resources*, include separate conclusions under both CEQA and NEPA.

ES.6 Topics Analyzed in this Draft EIR/EIS

The following environmental resource topics are evaluated in this Draft EIR/EIS for potential impacts from the Proposed Project:

- Aesthetics
- Air Quality and Greenhouse Gas Emissions
- Biological Resources – Terrestrial
- Biological Resources – Aquatic
- Cultural Resources
- Geology and Soils
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Noise
- Transportation and Traffic
- Public Services, Utilities, and Energy
- Recreation
- Socioeconomics and Environmental Justice
- Population and Housing

As described in Chapter 4, *Introduction to the Environmental Analysis,* two resource topics were eliminated from analysis in the EIR/EIS: agriculture and forestry uses, and mineral resources. Based on the nature and scope of the Proposed Project activities, it was determined that there was no potential for impacts to these resources.

ES.7 Summary of Impacts and Levels of Significance

Table ES-1 summarizes the impacts, levels of significance and mitigation measures identified in this EIR/EIS analysis.

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Table ES-1. Summary of Impacts and Mitigation Measures

Impact	Significance Determination										Mitigation Measure
	Alternative 2: RVARC, Configuration 1			Alternative 3: RVARC, Configuration 2			Alternative 4: Ryde Avenue Site			No Action Alternative	
	ERS	FTC	DRS	ERS	FTC	DRS	ERS	FTC	DRS		
Aesthetics											
Impact AES-1: Adverse Effects on Scenic Vistas, Scenic Resources, and the Visual Character or Quality of the Site and its Surroundings during Construction.	LSM	LSM	LSM	LSM	LSM	LSM	LS	LS	LS	NI	▪ Mitigation Measure AES-1: Maintain Site during Construction and Install Fencing (Alternatives 2 and 3)
Impact AES-2: Long-term Adverse Effects on Scenic Vistas, Scenic Resources, and the Visual Character or Quality of the Site and its Surroundings during Operation.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure AES-2a: Incorporate Army Base District Design Standards and Guidelines (Alternatives 2 and 3) ▪ Mitigation Measure AES-2b: Incorporate Stockton Citywide Design Guidelines (Alternative 4)
Impact AES-3: Permanent Source of Substantial Light or Glare.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure AES-3a: Implement Army Base District Design Standards and Guidelines Related to Site Lighting (Alternatives 2 and 3) ▪ Mitigation Measure AES-3b: Implement Nighttime Lighting and Daytime Glare Reduction Measures (Alternatives 2 and 3) ▪ Mitigation Measure AES-3c: Implement Nighttime Lighting and Daytime Glare Reduction Measures (Alternative 4)
Air Quality and Greenhouse Gases											
Impact AQ/GHG-1: Potential for Construction to Conflict with or Obstruct Implementation of the Applicable Air Quality Plan.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	▪ None required.
Impact AQ/GHG- 2: Potential for Project Construction to Violate Any Air Quality Standard Established by USEPA or CARB, or Contribute Substantially to an Existing or Projected Air Quality Violation.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure AQ/GHG-2a: Implement Fugitive Dust Best Management Practices and Emission Tracking (Alternatives 2, 3, and 4) ▪ Mitigation Measure AQ/GHG-2b: Implement Construction Emission Reductions (Alternatives 2, 3 and 4) ▪ Mitigation Measure AQ/GHG-2c: Implement Construction Phasing (Alternatives 2, 3 and 4) ▪ Mitigation Measure AQ/GHG-2d: Complete General Conformity Determination and, if necessary, enter into a Voluntary Emission Reduction Agreement if Emissions Remain above *de minimis* Conformity Thresholds for Project Portions Subject to General Conformity or above Local Air District Mass Emissions Significance Thresholds (Alternatives 2, 3 and 4)
Impact AQ/GHG-3: Potential for Project Construction to Expose Sensitive Receptors to Substantial Air Pollutant Concentrations.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure AQ/GHG-2a: Implement Fugitive Dust Best Management Practices and Emission Tracking (Alternatives 2, 3, and 4)
Impact AQ/GHG-4: Potential for Project Construction to Create Objectionable Odors Affecting a Substantial Number of People.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.

Impact	Significance Determination										Mitigation Measure
	Alternative 2: RVARC, Configuration 1			Alternative 3: RVARC, Configuration 2			Alternative 4: Ryde Avenue Site			No Action Alternative	
	ERS	FTC	DRS	ERS	FTC	DRS	ERS	FTC	DRS		
Impact AQ/GHG-5: Potential for Project Construction to Generate Substantial GHG Emissions, Either Directly or Indirectly.	LS	LS	LS	LS	LS	LS	LSM	LSM	LSM	NI	▪ Mitigation Measure AQ/GHG-6: Implement DWR Climate Action Plan BMPs and Mitigation for Construction (Alternative 4)
Impact AQ/GHG-6: Potential for Project Construction to Conflict with an Applicable Plan, Policy, or Regulation Adopted for the Purpose of Reducing Emissions of GHGs.	LSM	LS	LSM	LSM	LS	LSM	LSM	LS	LSM	NI	▪ Mitigation Measure AQ/GHG-6: Implement DWR Climate Action Plan BMPs and Mitigation for Construction (Alternatives 2, 3, and 4 - ERS)
Impact AQ/GHG-7: Potential for Project Operations to Conflict with or Obstruct Implementation of the Applicable Air Quality Plan.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact AQ/GHG-8: Potential for Operations to Violate Any Air Quality Standard Established by USEPA or CARB, or Contribute Substantially to an Existing or Projected Air Quality Violation.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact AQ/GHG-9: Potential for Operations to Expose Sensitive Receptors to Substantial Air Pollutant Concentrations.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact AQ/GHG-10: Potential for Operation to Create Objectionable Odors Affecting a Substantial Number of People.	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	None.
Impact AQ/GHG-11: Potential for Project Operations to Generate Substantial GHG Emissions, and Potential for Conflicts with Applicable Plans, Policies or Regulations Adopted for the Purpose of Reducing Emissions of GHGs.	LSM	LS	LSM	LSM	LS	LSM	LSM	LS	LSM	LS	▪ Mitigation Measures AQ/GHG-11: Implement DWR Greenhouse Gas Emission Reduction Plan BMPs and Mitigation Measures for Operation (Alternatives 2, 3, and 4 - ERS)
Biological Resources - Terrestrial											
Impact BIO-1: Effects on Special-Status Plants.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure BIO-1a: Design Project to Avoid or Minimize Impacts on Known Occurrences of Special-Status Plants (Alternatives 2, 3, and 4) ▪ Mitigation Measure BIO-1b: Perform Focused Surveys for Special-Status Plants (Alternatives 2, 3, and 4) ▪ Mitigation Measure BIO-1c: Avoid or Minimize Impacts on Special-Status Plant Species during Construction (Alternatives 2, 3, and 4) ▪ Mitigation Measure BIO-1d: Compensate for Impacts to Special-Status Plant Species (Alternatives 2, 3, and 4)
Impact BIO-2: Effects on Western Pond Turtle.	LSM	LSM	LSM	LSM	LSM	LSM	NI	NI	NI	NI	▪ Mitigation Measure BIO-2: Avoid or Minimize Impacts on Western Pond Turtle (Alternatives 2 and 3)
Impact BIO-3: Effects on Burrowing Owl.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure BIO-3: Avoid or Minimize Impacts on Burrowing Owls (Alternatives 2, 3, and 4)

Impact	Significance Determination										Mitigation Measure
	Alternative 2: RVARC, Configuration 1			Alternative 3: RVARC, Configuration 2			Alternative 4: Ryde Avenue Site			No Action Alternative	
	ERS	FTC	DRS	ERS	FTC	DRS	ERS	FTC	DRS		
Impact BIO-4: Effects on Special-Status Passerine Species and Species Protected under the Migratory Bird Treaty Act.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure BIO-4a: Avoid Impacts on Nesting Birds (Alternatives 2, 3, and 4) ▪ Mitigation Measure BIO-4b: Implement Preconstruction Surveys and Minimization Measures for Special-Status Passerine Species (Alternatives 2 and 3) ▪ Mitigation Measure BIO-4c: Implement Preconstruction Surveys for Birds Protected under the MBTA (Alternatives 2, 3, and 4)
Impact BIO-5: Effects on Raptors, including Special-Status Raptor Species.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure BIO-5: Avoidance and Minimization Measures for Nesting Raptors, including Swainson's Hawk and White-Tailed Kite (Alternatives 2, 3, and 4)
Impact BIO-6: Effects on Bats, including Special-status Species.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure BIO-6a: Conduct Preconstruction Surveys for Townsend's Big-eared Bats (Alternatives 2 and 3) ▪ Mitigation Measure BIO-6b: Avoid and Minimize Impacts to Bats Roosting in Structures (Alternatives 2 and 3) ▪ Mitigation Measure BIO-6c: Avoid Direct Mortality of Bats Roosting in Trees (Alternatives 2, 3, and 4) ▪ Mitigation Measure BIO-6d: Replace Bat Special-Status Bat Roost Sites (Alternatives 2, 3, and 4)
Impact BIO-7: Effects on Riparian Habitat and Other Sensitive Natural Communities.	LSM	LSM	LSM	LSM	LSM	LSM	LS	LS	LS	NI	▪ Mitigation Measure BIO-7a: Minimize Area of Disturbance of Riparian Habitat (Alternatives 2 and 3). ▪ Mitigation Measure BIO-7b: Develop and Implement a Restoration Plan for Riparian Habitat and Sensitive Natural Communities Disturbed during Construction (Alternatives 2 and 3).
Impact BIO-8: Effects on Waters of the United States.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure BIO-8: Provide Compensatory Mitigation for Impacts from Work Activities Taking Place in Wetlands and Waters of the United States and the State) (Alternative 2 - ERS) ▪ Mitigation Measure HYD/WQ-2a: Monitor Turbidity during In-water Construction (Alternatives 2, 3, and 4) ▪ Mitigation Measure HYD/WQ-2b: Implement Turbidity Barrier Surrounding In-water Construction, if Necessary (Alternatives 2, 3, and 4)
Impact BIO-9: Effects of Site Operations on Terrestrial Wildlife.	LSM	LSM	LSM	LSM	LSM	LSM	LS	LS	LS	NI	▪ Mitigation Measure BIO-6a: Conduct Preconstruction Surveys for Townsend's Big-eared Bats (Alternatives 2 and 3). ▪ Mitigation Measure BIO-6b: Avoid and Minimize Impacts to Bats Roosting in Structures (Alternatives 2 and 3). ▪ Mitigation Measure BIO-6d: Replace Bat Special-Status Bat Roost Sites (Alternatives 2 and 3)

Impact	Significance Determination										Mitigation Measure
	Alternative 2: RVARC, Configuration 1			Alternative 3: RVARC, Configuration 2			Alternative 4: Ryde Avenue Site			No Action Alternative	
	ERS	FTC	DRS	ERS	FTC	DRS	ERS	FTC	DRS		
Impact BIO-10: Conflict with Local Ordinances or Policies Protecting Biological Resources.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure BIO-10: Use Native, Drought-Tolerant Plants for Landscaping (Alternatives 2, 3, and 4) ▪ Mitigation Measures BIO-1a, BIO-1b, BIO-2, BIO-3, BIO-4a, BIO-5, BIO-6c, HYD/WQ-2a, HYD/WQ-2b, FISH-3a, FISH-3b, and FISH-3c (Alternatives 2, 3, and 4) ▪ Mitigation Measures BIO-4b, BIO-6a, BIO-6b, BIO-6d, BIO-7a, and BIO-7b (Alternatives 2 and 3) ▪ Mitigation Measure BIO-8 (Alternative 2 – ERS) ▪ Mitigation Measures FISH-1a and FISH-1b (Alternatives 1, 2, and 3 – ERS) ▪ Mitigation Measure FISH-1c, FISH-2, and FISH-3d (Alternatives 2 and 3 – ERS) ▪ Mitigation Measure FISH-5 and FISH-9 (Alternatives 2, 3, and 4 – ERS)
Impact BIO-11: Conflict with the Provisions of an Adopted Habitat Conservation Plan or other Approved Local, Regional, or State Habitat Conservation Plan.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Biological Resources – Aquatic Resources											
Impact FISH-1: Hydroacoustic Effects on Fish and Marine Mammals during Construction.	LSM	LS	LSM	LS	LSM	LS	LSM	LS	LSM	NI	▪ Mitigation Measure FISH-1a: In-Water Work Period (Alternatives 2, 3, and 4 - ERS) ▪ Mitigation Measure FISH-1b: Minimize Hydroacoustic Effects of Pile Driving on Fish (Alternatives 2, 3, and 4 - ERS) ▪ Mitigation Measure FISH-1c: Minimize Hydroacoustic Effects of Pile Driving on Marine Mammals (Alternatives 2 and 3 – ERS)
Impact FISH-2: Effect of Removal of Existing Piers and Piles.	LSM	NI	LSM	NI	LSM	NI	NI	NI	NI	NI	▪ Mitigation Measure FISH-1a: In-Water Work Period (Alternatives 2 and 3 - ERS) ▪ Mitigation Measure FISH-2: Adhere to Best Management Practices When Removing & Disposing of Creosote Piles (Alternatives 2 and 3 - ERS)
Impact FISH-3: Direct Effects on Special-status Fish from Other In-water and Shoreline Construction Activities.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure FISH-1a: In-Water Work Period (Alternatives 2, 3, and 4). ▪ Mitigation Measure FISH-3a: Construct and Maintain Fish Exclosure for Instream and Shoreline Work Areas (Alternatives 2, 3, and 4) ▪ Mitigation Measure FISH-3b: Relocate Fish Outside of Fish Exclosure Work Area (Alternatives 2, 3, and 4) ▪ Mitigation Measure BIO-3c: Compensate for Impacts on Special-Status Fish Species and their Habitat (Alternatives 2, 3, and 4) ▪ Mitigation Measure FISH-3d: Minimize Impacts on Fish and Water Quality during Connection of Off-channel Marina (Alternatives 3 and 4 - ERS)

Impact	Significance Determination										Mitigation Measure
	Alternative 2: RVARC, Configuration 1			Alternative 3: RVARC, Configuration 2			Alternative 4: Ryde Avenue Site			No Action Alternative	
	ERS	FTC	DRS	ERS	FTC	DRS	ERS	FTC	DRS		
Impact FISH-4: Effects of Sedimentation and Turbidity on Fish and Their Habitat Resulting from Construction Activity.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure FISH-1a: In-Water Work Period (Alternatives 2, 3, and 4) ▪ Mitigation Measure HYD/WQ-1: Implement Construction Best Management Practices for Erosion Control (Alternative 2) ▪ Mitigation Measure HYD/WQ-2a: Monitor Turbidity during In-water Construction (Alternatives 2, 3, and 4) ▪ Mitigation Measure HYD/WQ-2b: Implement Turbidity Barrier Surrounding In-water Construction, if Necessary (Alternatives 2, 3, and 4) ▪ Mitigation Measure FISH-3d: Minimize Impacts on Fish and Water Quality during Connection of Off-channel Marina (Alternatives 3 and 4)
Impact FISH-5: Effects of Marina Facilities on Aquatic Habitat Functions.	LSM	NI	LSM	LSM	NI	LSM	LSM	NI	LSM	NI	▪ Mitigation Measure FISH-5: Provide Compensatory Mitigation to Offset Adverse Effects on Aquatic Habitat Functions (Alternatives 2, 3, and 4 - ERS)
Impact FISH-6: Effects on Freshwater Marsh and Riparian Habitat.	LSM	LSM	LSM	LSM	LSM	LSM	LS	LS	LS	NI	▪ Mitigation Measure BIO-7a: Minimize Area of Disturbance of Riparian Habitat (Alternatives 2 and 3) ▪ Mitigation Measure BIO-7b: Develop and Implement a Restoration Plan for Riparian Habitat and Sensitive Natural Communities Disturbed during Construction (Alternatives 2 and 3)
Impact FISH-7: Risk of Release of Construction-Related Hazardous Materials, Chemicals, and Waste into Water, Potential Harming Fish.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Measure HYD/WQ-3: Implement Construction-Related Best Management Practices for Hazardous Materials and Water Management (Alternatives 2, 3, and 4)
Impact FISH-8: Effects of Maintenance Dredging on Special-Status Fish and Their Habitat.	LSM	NI	LSM	LSM	NI	LSM	LSM	NI	LSM	NI	▪ Mitigation Measure FISH-1a: In-Water Work Period (Alternatives 2, 3, and 4). ▪ Measure HYD/WQ-2a: Monitor Turbidity during In-water Construction (Alternatives 2, 3, and 4 - ERS) ▪ Mitigation Measure HYD/WQ-2b: Implement Turbidity Barrier Surrounding In-water Construction, if Necessary (Alternatives 2, 3, and 4 - ERS) ▪ Mitigation Measure BIO-3c: Compensate for Impacts on Special-Status Fish Species and their Habitat (Alternatives 2, 3, and 4 - ERS)
Impact FISH-9: Inadvertent Propagation or Spread of Invasive or Nuisance Species during Construction and Operations.	LSM	LS	LSM	LSM	LS	LSM	LSM	LS	LSM	NI	▪ Mitigation Measure FISH-9: Identify and Inspect All Marine Construction Equipment before Mobilization (Alternatives 2, 3, and 4 - ERS)
Impact FISH-10: Alterations to Water Quality in the Sacramento or San Joaquin River Resulting from Process Water Discharges from the Fish Technology Center.	NI	LS	LS	NI	LS	LS	NI	LS	LS	NI	None.
Impact FISH-11: Alterations to Water Quality in the Sacramento or San Joaquin River Resulting from Increased Boat Traffic Related to the Marina.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.

Impact	Significance Determination										Mitigation Measure
	Alternative 2: RVARC, Configuration 1			Alternative 3: RVARC, Configuration 2			Alternative 4: Ryde Avenue Site			No Action Alternative	
	ERS	FTC	DRS	ERS	FTC	DRS	ERS	FTC	DRS		
Cultural Resources											
Impact CUL-1: Potential for Accidental Discovery and Substantial Adverse Effect on Archaeological Resources, TCPs/TCRs, and Human Remains.	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	NI; No Effect (NEPA)	▪ Mitigation Measure CUL-1a: Immediately Halt Construction if Cultural Resources are Discovered (Alternatives 2, 3, and 4) ▪ Mitigation Measure CUL-1b: Immediately Halt Construction if Human Remains are Discovered and Implement California Health and Safety Code (Alternatives 2, 3, and 4)
Impact CUL-2: Potential for a Substantial Adverse Effect on Built Environmental Resources.	LSM; No Effect (NEPA)	LSM; No Effect (NEPA)	LSM; No Effect (NEPA)	SU; No Effect (NEPA)	LSM; No Effect (NEPA)	SU; No Effect (NEPA)	NI; No Effect (NEPA)	NI; No Effect (NEPA)	NI; No Effect (NEPA)	NI; No Effect (NEPA)	▪ Mitigation Measure CUL-2a(i): Protect Historic Structures during Project Construction (Alternatives 2 and 3) ▪ Mitigation Measure CUL-2a(ii): Prepare Historic American Building Records/Historic American Engineering Records (Alternative 2 – ERS) ▪ Mitigation Measure CUL-2b: Prepare Historic Structure Reports (Alternative 3 - ERS) ▪ Mitigation Measure CUL-2c: Follow the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings (Alternative 3 – ERS) ▪ Mitigation Measure CUL-2d: Prepare Interpretive Materials (Alternative 3 – ERS)
Impact CUL-3: Potential for a Substantial Adverse Effect on a Unique Paleontological Resource or Geological Feature from Project Construction.	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	LSM; Moderate Adverse Effect (NEPA)	NI; No effect (NEPA)	▪ Mitigation Measure CUL-3: Immediately Halt Construction if Paleontological Resources are Discovered (Alternatives 2, 3, and 4)
Geology and Soils											
Impact GEO-1: Exposure of People or Structures to Adverse Effects from Seismic-Related Ground Shaking, Ground Failure, Fault Rupture, Landslide, or Liquefaction During Construction or Operational Activities.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact GEO-2: On- or Off-Site Landslide, Lateral Spreading, Subsidence, Liquefaction, or Collapse due to an Unstable Geologic Unit or Soil.	LSM	LSM	LSM	LSM	LSM	LSM	SU	SU	SU	NI	▪ Mitigation Measure GEO-2: Conduct a Geotechnical Investigation and Incorporate Report Recommendations into the Design and Construction of the Proposed Project (Alternatives 2, 3, and 4) ▪ Mitigation Measure HYD/WQ-9: Perform Groundwater Supply Testing and Implement Groundwater Supply and Quality Protection Measures (Alternative 4 - FTC)
Impact GEO-3: Substantial Risks to Life or Property due to Underlying Expansive Soils.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure GEO-2: Conduct a Geotechnical Investigation and Incorporate Report Recommendations into the Design and Construction of the Proposed Project (Alternatives 2, 3, and 4)

Impact	Significance Determination										Mitigation Measure
	Alternative 2: RVARC, Configuration 1			Alternative 3: RVARC, Configuration 2			Alternative 4: Ryde Avenue Site			No Action Alternative	
	ERS	FTC	DRS	ERS	FTC	DRS	ERS	FTC	DRS		
Impact GEO-4: Substantial Soil Erosion or Loss of Topsoil during Construction Activities.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure HYD/WQ-1: Implement Construction Best Management Practices for Erosion Control (Alternatives 2, 3, and 4)
Hazards and Hazardous Materials											
Impact HAZ-1: Risk to the Public or the Environment due to an Accidental Spill or Release Resulting from the Transport, Use, and Disposal of Hazardous Materials during Construction.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measures HYD/WQ-1: Implement Construction Best Management Practices for Erosion Control (Alternatives 2, 3, and 4) ▪ Mitigation Measure HYD/WQ-3: Implement Construction-Related Best Management Practices for Hazardous Materials and Waste Management (Alternatives 2, 3, and 4)
Impact HAZ-2: Risk to the Public or the Environment from an Accidental Spill or Release Resulting from the Transport, Use, and Disposal of Hazardous Materials during Project Operation.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact HAZ-3: Accidental Rupture of a Pipeline.	LS	LS	LS	LS	LS	LS	NI	NI	NI	NI	None.
Impact HAZ-4: Emit or Handle Hazardous Materials within 0.25 mile of an Existing School.	LSM	LSM	LSM	LSM	LSM	LSM	NI	NI	NI	NI	▪ Mitigation Measure AQ/GHG-2a: Implement Fugitive Dust Best Management Practices and Emission Tracking (Alternatives 2 and 3) ▪ Mitigation Measure HYD/WQ-1: Implement Construction Best Management Practices for Erosion Control (Alternatives 2 and 3) ▪ Mitigation Measure HYD/WQ-3: Implement Construction-Related Best Management Practices for Hazardous Materials and Waste Management (Alternatives 2 and 3)
Impact HAZ-5: Disturbance of Contaminated Media Associated with a Known Hazardous Materials Site (i.e., a Site Identified under Government Code Section 65962.5) or that Could Pose a Hazard to Workers, Public Health, or the Environment.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure HAZ-5a: Preconstruction Hazardous Materials Assessment (Alternatives 2, 3, and 4) ▪ Mitigation Measure HAZ-5b: Soil and Groundwater Management Plan (Alternatives 2, 3, and 4) ▪ Mitigation Measure HYD/WQ-6: Spoils Materials Assessment, Handling, and Disposal Plan (Alternatives 2, 3, and 4) ▪ Mitigation Measure HYD/WQ-9: Perform Groundwater Supply Testing and Implement Groundwater Supply and Quality Protection Measures (Alternative 4 – FTC)
Impact HAZ-6: Potential for the Project to Impede Emergency Response.	LS	LS	LS	LS	LS	LS	NI	NI	NI	NI	None.
Hydrology and Water Quality											
Impact HYD/WQ-1: Potential Sedimentation Impacts from Upland Construction-Related Ground-Disturbing Activities.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure HYD/WQ-1: Implement Construction Best Management Practices for Erosion Control (Alternatives 2, 3, and 4) ▪ Mitigation Measure AQ/GHG-2a: Implement Fugitive Dust Best Management Practices and Emission Tracking (Alternatives 2, 3, and 4)

Impact	Significance Determination										Mitigation Measure
	Alternative 2: RVARC, Configuration 1			Alternative 3: RVARC, Configuration 2			Alternative 4: Ryde Avenue Site			No Action Alternative	
	ERS	FTC	DRS	ERS	FTC	DRS	ERS	FTC	DRS		
Impact HYD/WQ-2: Potential Turbidity Impacts from In-Water Construction Activities.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure HYD/WQ-2a: Monitor Turbidity during In-Water Construction (Alternatives 2, 3, and 4) ▪ Mitigation Measure HYD/WQ-2b: Implement Turbidity Barrier Surrounding In-Water Construction, if Necessary (Alternatives 2, 3, and 4)
Impact HYD/WQ-3: Degrade Water Quality from Use of Hazardous Materials during Upland Construction Activities.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure HYD/WQ-1: Implement Construction Best Management Practices for Erosion Control (Alternatives 2, 3, and 4) ▪ Mitigation Measure HYD/WQ-3: Implement Construction–Related Best Management Practices for Hazardous Material and Waste Management (Alternatives 2, 3, and 4)
Impact HYD/WQ-4: Degrade Water Quality from Hazardous Materials Use During In-Water Construction Activities.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure HYD/WQ-3: Implement Construction–Related Best Management Practices for Hazardous Material and Waste Management (Alternatives 2, 3, and 4)
Impact HYD/WQ-5: Potential Water Quality Impacts from Construction Related Dewatering.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	▪ None.
Impact HYD/WQ-6: Potential Water Quality Impacts from In-Water Spoils Material Storage, Transport, and Disposal of Spoils from In-water Excavation.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure HYC/WQ-6: Spoils Material Assessment, Handling, and Disposal Plan (Alternatives 2, 3, and 4)
Impact HYD/WQ-7: Interfere Substantially with Groundwater Recharge from Site Development.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact HYD/WQ-8: Deplete Groundwater Supplies from Construction Activities.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact HYD/WQ-9: Substantially Deplete Groundwater Supplies from Operational Water Usage.	LS	LSM	LSM	LS	LSM	LSM	LS	SU	SU	NI	▪ Mitigation Measure HYD/WQ-9: Perform Groundwater Supply Testing and Implement Groundwater Supply and Quality Protection Measures (Alternatives 2, 3, and 4 - FTC)
Impact HYD/WQ-10: Degrade Water Quality from Wastewater Discharges.	LS	LSM	LSM	LS	LSM	LSM	LS	LSM	LSM	NI	▪ Mitigation Measure HYD/WQ-10: Effluent Treatment System Design and Maintenance (Alternatives 2, 3, and 4 - FTC)
Impact HYD/WQ-11: Degrade Groundwater Quality from Operational Groundwater Use.	LS	LS	LS	LS	LS	LS	LS	LSM	LSM	NI	▪ Mitigation Measure HYD/WQ-9: Perform Groundwater Supply Testing and Implement Groundwater Supply and Quality Protection Measures (Alternative 4 - FTC)
Impact HYD/WQ-12: Violate Groundwater or Surface Water Quality Standards or Degrade Water Quality from Operational Hazardous Materials Use.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LS	▪ Mitigation Measure HYD/WQ-12: Implement Operation-Related Best Management Practices for Hazardous Material and Waste Management (Alternatives 2, 3, and 4)
Impact HYD/WQ-13: Create or Contribute Runoff Water Exceeding the Capacity of Existing or Planned Stormwater Drainage Systems from Project Operation and Substantially Alter the Existing Drainage Pattern of the Site Resulting in Flooding On-site or Off-site.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure HYD/WQ-13: Prepare and Implement a Drainage Plan (Alternatives 2, 3, and 4)

Impact	Significance Determination										Mitigation Measure
	Alternative 2: RVARC, Configuration 1			Alternative 3: RVARC, Configuration 2			Alternative 4: Ryde Avenue Site			No Action Alternative	
	ERS	FTC	DRS	ERS	FTC	DRS	ERS	FTC	DRS		
Impact HYD/WQ-14: Provide Substantial Additional Sources of Polluted Runoff from Project Operation or Substantially Alter the Existing Drainage Pattern of the Site Resulting in Substantial Erosion or Siltation On-site or Off-site.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure HYD/WQ-13: Prepare and Implement a Drainage Plan (Alternatives 2, 3, and 4) ▪ Mitigation Measure HYD/WQ-14: Perform Hydraulic Analysis and Conform to Standards in Applicable County, State, and Federal Requirements (Alternatives 2, 3, and 4)
Impact HYD/WQ-15: Place Structures that Impede or Redirect Flood Flows and Expose People or Structures to Significant Risk of Loss, Injury or Death Involving Flooding.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure HYD/WQ-14: Perform Hydraulic Analysis and Conform to Standards in Applicable County, State, and Federal Requirements (Alternatives 2, 3, and 4)
Impact HYD/WQ-16: Risk of Inundation by Tsunami, Seiche, or Mudflow.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact HYD/WQ-17: Expose People or Structures to Significant Risk of Loss, Injury or Death Involving Sea Level Rise.	LS	LS	LS	LS	LS	LS	LS	LS	LSM	NI	▪ Mitigation Measure HYD/WQ-14: Perform Hydraulic Analysis and Conform to Standards in Applicable County, State, and Federal Requirements (Alternative 4)
Land Use and Planning											
Impact LU-1: Potential for the Project to Physically Divide an Established Community.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact LU-2: Potential for the Project to Conflict with Applicable Land Use Plans, Policies, and Regulations.	NI	NI	NI	SU	SU	SU	LS	LS	LS	NI	None.
Noise											
Impact NOI-1: Potential for Proposed Project Construction Activities to Expose Persons to a Temporary Increase in Ambient Noise Levels.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure NOI-1: Comply with local noise regulations during construction and provide advanced notification to nearby residences. (Alternative 2, 3 and 4)
Impact NOI-2: Potential for Project Construction to Expose Persons to Excessive Ground-borne Vibration or Ground-borne Noise Levels	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact NOI-3: Increase in Ambient Noise Levels in the Project Vicinity above Existing Conditions from Project Operations.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Transportation and Traffic											
Impact TRA-1: Impacts on Study Intersections due to DRS Operational Traffic.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact TRA-2: Impacts on Study Roadway Segments due to DRS Operational Traffic.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact TRA-3: Impacts on Study Area Freeway Segments from Delta Research Station Operational Traffic.	NI	NI	NI	NI	NI	NI	SU	SU	SU	NI	▪ Mitigation Measure TRA-3: Pay Fair Share Toward Roadway Network Improvements (Alternative 4)

Impact	Significance Determination										Mitigation Measure
	Alternative 2: RVARC, Configuration 1			Alternative 3: RVARC, Configuration 2			Alternative 4: Ryde Avenue Site			No Action Alternative	
	ERS	FTC	DRS	ERS	FTC	DRS	ERS	FTC	DRS		
Impact TRA-4: Impacts on Public Transit Facilities from Delta Research Station Operational Traffic.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact TRA-5: Impacts on Pedestrian Facilities from Delta Research Station Operational Traffic.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact TRA-6: Impacts on Bicycle Facilities from Delta Research Station Operational Traffic.	LS	LS	LS	LS	LS	LS	LSM	LSM	LSM	NI	▪ Mitigation Measure TRA-6: Revise Ryde Avenue Site Plan So as Not to Preclude Bike Path (Alternative 4)
Impact TRA-7: Impacts on Traffic Hazards from Delta Research Station Operational Traffic.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact TRA-8: Impacts on Emergency Access from Delta Research Station Operational Traffic.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact TRA-9: Impacts on Roadway and Intersection Operating Conditions due to Construction-related Traffic.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure TRA-9: Construction Management Plan (Alternatives 2, 3, and 4)
Impact TRA-10: Effects on Vessel Traffic.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact TRA-11: Impacts on Study Area Freeway Segments from DRS Operational Traffic. (Existing Plus Approved Projects Analysis)	NI	NI	NI	NI	NI	NI	SU	SU	SU	NI	▪ Mitigation Measure TRA-3: Pay Fair Share Towards Regional Transportation Roadway Network Improvements (Alternative 4)
Impact TRA-12: Cumulative Impacts on Study Intersections in Rio Vista (Cumulative Analysis)	SU	SU	SU	SU	SU	SU	N/A	N/A	N/A	NI	▪ Mitigation Measure TRA-12a: Pay Fair-Share to the City of Rio Vista Toward the Construction of a Northbound Left-turn Lane at the SR 12/Main Street Intersection (Alternatives 2 and 3) ▪ Mitigation Measure TRA-12b: Pay Fair-share to the City of Rio Vista towards the Construction of a Traffic Signal at the SR 12/North Front/River Road Intersection (Alternatives 2 and 3)
Impact TRA-13: Cumulative Impacts on Study Area Roadway Segments (Cumulative Analysis)	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Public Services, Utilities and Energy											
Impact UTIL-1: Adverse Effects on Performance Objectives of Fire Protection Services.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact UTIL-2: Adverse Effects on Performance Objectives of Law Enforcement Service.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact UTIL-3: Adverse Effects on Performance Objectives of Schools during Project Operation.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact UTIL-4: Exceedence of Wastewater Treatment Capacity and/or NPDES Permit Requirements during Project Operation	LSM	LS	LSM	LSM	LS	LSM	LS	LS	LS	NI	▪ Mitigation Measure UTIL-4: Coordinate with City of Rio Vista Regarding Existing Wastewater Treatment Capacity and Contribution of Fair Share Funding toward Any Necessary System Improvements (Alternatives 2 and 3 - ERS)

Impact	Significance Determination										Mitigation Measure
	Alternative 2: RVARC, Configuration 1			Alternative 3: RVARC, Configuration 2			Alternative 4: Ryde Avenue Site			No Action Alternative	
	ERS	FTC	DRS	ERS	FTC	DRS	ERS	FTC	DRS		
Impact UTIL-5: Effects on Water Supply from Project Operations.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact UTIL-6: Potential for Exceedance of Landfill Capacity or Non-Compliance with Regulations Related to Solid Waste.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact UTIL-7: Potential for Wasteful, Inefficient, or Unnecessary Energy Use.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure AQ/GHG-6: Implement DWR Climate Action Plan BMPs and Mitigation for Construction (Alternatives 2, 3, and 4)
Impact UTIL-8: Effects on Energy Demand.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Recreation											
Impact REC-1: Increased Use of Existing Recreational Facilities in Project Vicinity during Project Operation.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact REC-2: Potential for Creation of Hazardous Conditions for Water-based Recreationists during Project Construction.	LSM	LS	LSM	LS	LS	LS	LS	LS	LS	NI	▪ Mitigation Measure REC-1: Marking of Marina In-Channel Construction Areas and Posting Signage for Boater and Recreationalist Safety (Alternative 2 - ERS)
Impact REC-3: Potential Disruption of Water-Based Recreationists from Increased Vessel Traffic during Project Operations.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact REC-4: Temporary Reduction or Displacement of Existing Recreational Uses.	LS	LS	LS	LS	LS	LS	NI	NI	NI	NI	None.
Socioeconomics and Environmental Justice											
Impact SOC-EJ-1: Potential for Project Construction to Affect Regional Economics and Employment in the Project Vicinity.	B	B	B	B	B	B	B	B	B	NI	None.
Impact SOC-EJ-2: Potential for Project Operations to Affect Regional Economics and Employment in the Project Vicinity.	B	B	B	B	B	B	B	B	B	NI	None.
Impact SOC-EJ-3: Potential for Relocation of Project Operations to Adversely Affect the Local Community Character.	B	B	B	B	B	B	B	B	B	NI	None.
Impact SOC-EJ-4: Potential to Result in Adverse Environmental Effects that would Disproportionately Affect a Minority or Low-income Population.	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	None.
Population and Housing											
Impact PH-1: Potential to Induce Substantial Population Growth, both Directly and Indirectly during Construction.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.

Impact	Significance Determination										Mitigation Measure
	Alternative 2: RVARC, Configuration 1			Alternative 3: RVARC, Configuration 2			Alternative 4: Ryde Avenue Site			No Action Alternative	
	ERS	FTC	DRS	ERS	FTC	DRS	ERS	FTC	DRS		
Impact PH-2: Long-term Inducement of Substantial Population Growth both Directly and Indirectly.	LS	LS	LS	LS	LS	LS	LS	LS	LS	NI	None.
Impact PH-3: Displacement of Substantial Numbers of Existing Housing or Substantial Numbers of People, Necessitating Construction of Replacement Housing Elsewhere.	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	None.
Cumulative Impacts											
Impact CUM-1: Cumulative Impacts on Scenic Vistas and the Visual Character and Quality of the Site.	LSM	LSM	LSM	LSM	LSM	LSM	LS	LS	LS	NI	▪ Mitigation Measure AES-2a (Alternatives 2 and 3)
Impact CUM-2: Contributions to Non-Attainment Status of Criteria Air Pollutants.	LS	LS	LS	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measures AQ/GHG-2a, AQ/GHG-2b, AQ/GHG-2c, and AQ/GHG-2d (Alternatives 3 and 4)
Impact CUM-3: Contributions to Global Climate Change.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measures AQ/GHG-5 and AQ/GHG-11 (Alternatives 2, 3, and 4)
Impact CUM-4: Cumulative Impacts on Terrestrial Biological Resources.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure BIO-1a, BIO-1b, BIO-1c, BIO-3, BIO-4a, BIO-4c, BIO-5, BIO-6c, BIO-6d, (Alternatives 2, 3, and 4) ▪ Mitigation Measures BIO-1d, BIO-2, BIO-4b, BIO-6a, BIO-6b, BIO-7a, and BIO-7b (Alternatives 2 and 3) ▪ Mitigation Measure BIO-8 (Alternatives 2, 3, and 4 - ERS)
Impact CUM-5: Cumulative Impacts on Aquatic Biological Resources.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measures FISH-1a, FISH-1b, FISH-3a, FISH-3b, FISH-3c, FISH-5, FISH-9, HYD/WQ-2a, HYD/WQ-2b, and HYD/WQ-3 (Alternatives 2, 3, and 4) ▪ Mitigation Measure FISH-2 (Alternatives 2 and 3) ▪ Mitigation Measure FISH-3d (Alternatives 3 and 4) ▪ Mitigation Measure HYD/WQ-1 (Alternative 2)
Impact CUM-6: Cumulative Impacts on the Potential U.S. Engineers Storehouse Historic District.	LS; No Effect (NEPA)	LS; No Effect (NEPA)	LS; No Effect (NEPA)	SU; No Effect (NEPA)	SU; No Effect (NEPA)	SU; No Effect (NEPA)	NI; No Effect (NEPA)	NI; No Effect (NEPA)	NI; No Effect (NEPA)	NI; No Effect (NEPA)	▪ Mitigation Measures CUL-2b, CUL-2c, and CUL-2d (Alternative 3)
Impact CUM-7: Cumulative Impacts on Land Subsidence.	NI	NI	NI	NI	NI	NI	SU	SU	SU	NI	▪ Mitigation Measure HYD/WQ-9 (Alternative 4)
Impact CUM-8: Cumulative Impacts on Hydrology and Water Quality.	LSM	LSM	LSM	LSM	LSM	LSM	SU	SU	SU	NI	▪ Mitigation Measure HYD/WQ-2a, HYD/WQ-2b, HYD/WQ-3, HYD/WQ-6, and HYD/WQ-9 (Alternatives 2, 3, and 4)
Impact CUM-9: Cumulative Impacts on Noise.	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	LSM	NI	▪ Mitigation Measure NOI-1 (Alternatives 2, 3, and 4)
Impact CUM-10: Cumulative Impacts on Wastewater Treatment.	LSM	LSM	LSM	LSM	LSM	LSM	NI	NI	NI	NI	▪ Mitigation Measure UTIL-4 (Alternatives 2 and 3)
Impact CUM-11: Cumulative Impacts on Police Protection.	LS	LS	LS	LS	LS	LS	LS	NI	NI	NI	None.
Impact CUM-12: Cumulative Impacts on Recreation.	LS	LS	LS	LS	LS	LS	LS	NI	NI	NI	None

Impact	Significance Determination										Mitigation Measure
	Alternative 2: RVARC, Configuration 1			Alternative 3: RVARC, Configuration 2			Alternative 4: Ryde Avenue Site			No Action Alternative	
	ERS	FTC	DRS	ERS	FTC	DRS	ERS	FTC	DRS		
Impact CUM-13: Cumulative Impacts on Transportation and Traffic.	SU	SU	SU	SU	SU	SU	LS	LS	LS	NI	▪ Mitigation Measures TRA-12a and TRA-12b (Alternatives 2 and 3)

B = Beneficial
LSM = Less than Significant with Mitigation incorporated
NI = No Impact
LS = Less than Significant, no mitigation required
SU = Significant and Unavoidable
N/A = Not Applicable

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Chapter 1
Introduction

1.1 Project Introduction and Background

Fisheries declines in the Sacramento-San Joaquin River Delta (the Delta) have contributed to major water and resource conflicts of national importance. Developing viable and lasting solutions to these conflicts requires research and a strong scientific understanding of the Delta ecosystem. Currently, the Interagency Ecological Program (IEP) collaboratively monitors, researches, models, and synthesizes critical information for adaptive management, water project operations, and planning and regulatory purposes relative to endangered fish and the aquatic ecosystem in the San Francisco Bay (Bay) and Delta (collectively, the Bay-Delta). The IEP consists of approximately 145 state and federal employees who conduct research activities throughout the Delta region.

To enhance interagency coordination and collaboration, the California Department of Water Resources (DWR) and the U.S. Fish and Wildlife Service (USFWS) are proposing to construct and operate the Delta Research Station (DRS or Proposed Project), a set of research facilities that would be built in a central location within the Bay-Delta. The DRS is intended to advance the interests of researchers, local communities, and other groups that are dependent on the Bay-Delta by facilitating coordinated monitoring and research efforts on the Bay-Delta's aquatic resources.

The two facilities that would make up the DRS are the Estuarine Research Station (ERS) and Fish Technology Center (FTC). The ERS would consolidate existing IEP programs. The FTC would house a new program to develop and apply captive propagation technologies in support of research and population restoration.

1.1.1 Project Location

The DRS would be located in a centralized area of the Bay-Delta. Two alternative locations are evaluated throughout this environmental impact report (EIR)/environmental impact statement (EIS): the Rio Vista Army Reserve Center (RVARC) in the City of Rio Vista and a site located at 345 Ryde Avenue in the City of Stockton (Ryde Avenue site) (see **Figure 1-1 through Error! Reference source not found.**).

Figure 1-1

Location of Project Alternatives

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Figure 1-2

Rio Vista Army Reserve Center (Location of Alternatives 2 and 3)

Horizon WATER and ENVIRONMENT

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Figure 1-3

Ryde Avenue Site (Location of Alternative 4)

Horizon WATER and ENVIRONMENT

1.2 CEQA and NEPA Process

1.2.1 Overview of CEQA and NEPA Requirements

The basic purposes of the California Environmental Quality Act (CEQA, California Public Resources Code [Pub. Res. Code] Section 21000 *et seq.*) are to:

- Inform governmental decision makers and the public about the potential significant environmental effects of proposed activities;
- Identify the ways that environmental damage can be avoided or substantially reduced;
- Prevent significant, avoidable damage to the environment by requiring implementation of feasible mitigation measures or project alternatives that would substantially lessen any significant effects that a project would have on the environment; and
- Disclose to the public the reasons why a governmental agency approved the project in the manner the agency chose if significant environmental effects are involved.

As described in the CEQA Guidelines (Section 15121[a]), an EIR is an informational document that assesses potential environmental effects of a proposed project, and identifies mitigation measures and alternatives to the project that could reduce or avoid potentially significant environmental impacts. Other key CEQA requirements include developing a plan for implementing and monitoring the success of the identified mitigation measures and carrying out specific public notice and distribution steps to facilitate public involvement in the environmental review process. As an informational document used in the planning and decision-making process, an EIR's purpose is not to recommend either approval or denial of a project. An EIR does not expand or otherwise provide independent authority to the lead agency to impose mitigation measures or avoid project-related significant environmental impacts beyond the authority already within the lead agency's jurisdiction. DWR is the CEQA lead agency for this project.

Similarly, under the National Environmental Policy Act (NEPA, 2 U.S. Code [USC] 432) and the Council on Environmental Quality's (CEQ's) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] Sections 1500-1508), preparation of an EIS is required for major federal actions that would substantially affect the quality of the human environment. An EIS is required to explore and objectively evaluate the environmental effects of an action, including a range of reasonable alternatives, and identify mitigation measures to minimize adverse effects for a range of environmental topics prior to approval or funding of a project that may have a significant effect on the environment. USFWS is the NEPA lead agency for this action.

CEQA and NEPA both allow for a single combined (or "joint") document to be prepared to meet the requirements of both regulations.

1.2.2 Scope and Intent of this Document

Construction and operation of the ERS and FTC, which together constitute the DRS, are referred to in this EIR/EIS as the "Proposed Project." Several alternatives for the Proposed Project are considered in the document; of these, Alternative 2 is preferred and therefore sometimes referred to as the "Preferred Alternative."

Chapter 3, *Description of Alternatives*, provides a detailed description of activities proposed for construction and operation of both the ERS and FTC facilities. Construction and operation of the ERS would be undertaken by both DWR and USFWS and constitute a discretionary project subject to CEQA (CEQA Guidelines Section 15378). Construction and operation of the FTC would be undertaken by USFWS (but not DWR) and constitute a major federal action subject to NEPA (40 CFR Section 1508.18).

Note that, if DWR and USFWS approve the Proposed Project following completion of this CEQA/NEPA process, the ERS and FTC may be built at different times. This CEQA/NEPA document has therefore been designed to clarify which impacts and mitigation measures apply to each facility, as well as to the Proposed Project as a whole.

1.2.3 Public Involvement Process

CEQA and NEPA require that lead agencies provide two periods during the EIR/EIS process when public and agency comments on the environmental analysis of the Proposed Project are to be solicited: during the scoping comment period and during the review period for the Draft EIR/EIS. CEQA and NEPA also allow lead agencies to hold public meetings or hearings to obtain scoping comments and input on both the draft and final versions of an EIR/EIS. Brief descriptions of these milestones are provided below as they apply to this document.

Notice of Preparation and Notice of Intent

Both a Notice of Preparation (NOP) and a Notice of Intent (NOI) were prepared for the Proposed Project in accordance with CEQA Guidelines Section 15082 and NEPA regulations (40 CFR Section 1508.22), respectively. The NOP was circulated on December 8, 2014; the Governor's Office of Planning and Research received the NOP on December 8, 2014. The NOI was published in the Federal Register on December 10, 2014 (see **Appendix A**). Both the NOP and NOI presented general background information on the Proposed Project, the scoping process, potential project alternatives, the anticipated environmental issues to be addressed in the Draft EIR/EIS, and the intended uses of the Draft EIR/EIS.

The NOP and NOI invited the public to offer comments during the scoping period, which began on December 8, 2014, and ended on January 6, 2015.

Scoping Comments and Meetings

To provide members of the public and regulatory agencies with additional opportunities to ask questions and submit comments on the scope of the Draft EIR/EIS, DWR and USFWS conducted two scoping meetings: one in Rio Vista and another in Stockton. These meetings were opportunities for the public and interested public agencies to provide input regarding project alternatives and the nature and scope of environmental impacts to be addressed in the Draft EIR/EIS.

Scoping meeting information and notices were mailed to potentially interested parties, published in local newspapers, and posted on the DRS website (www.deltaresearch station.com) before the meetings, to invite attendance.

The scoping meeting dates, times, and locations were as follows:

- **Rio Vista:** December 15, 2014, 5:30–7:30 p.m., D.H. White Elementary School (500 Elm Way, Rio Vista, CA)
- **Stockton:** December 16, 2014, 5:30-7:30 p.m., Arnold Rue Community Center (5758 Lorraine Avenue, Stockton, CA)

The Rio Vista scoping meeting was attended by 23 people and the Stockton scoping meeting was attended by three people. Both scoping meetings used the same format, and interested parties were invited to attend one or both meetings. At the beginning of each meeting, a brief presentation was provided with an overview of the Proposed Project, the objectives and description of the Proposed Project, and a general summary of the CEQA/NEPA process. Scoping meeting materials are provided in **Appendix B.** Following the presentation, a public comment session was held, during which staff received public comments about the Proposed Project. In addition to oral comments, written comments were accepted during the meetings, as well as during the scoping period. Comment forms were distributed at the scoping meetings for submission of written comments during or after the meeting.

Eight comment letters were received during the scoping period. Written comments were submitted by the following agencies: Central Valley Flood Protection Board, Native American Heritage Commission, San Joaquin Valley Air Pollution Control District, Metropolitan Water District of Southern California, and San Joaquin County Public Works Department. Written comments were also received from the Rio Vista Army Base Steering Committee and two members of the public. These comments are provided in their entirety in **Appendix C**.

Seven people spoke at the scoping meetings. In general, oral comments pertained to concerns related to traffic that could be generated by the Proposed Project, support for incorporating an environmental education component (e.g., an interpretive center), the Proposed Project’s socioeconomic effects, potential for renewable energy resources on-site, and nighttime lighting effects. No transcript was prepared of these meetings.

Draft EIR/EIS Public Review and Comment Period

A Notice of Availability (NOA) has been issued to provide agencies and the public with formal notification that this Draft EIR/EIS is available for review. The NOA has been sent to all responsible and trustee agencies,[1] any person or organization requesting a copy, and relevant county clerks' offices for posting. The notice has also been published in general-circulation newspapers in the Rio Vista and Stockton areas. DWR has also submitted the NOA and a Notice of Completion (NOC) to the State Clearinghouse at the Governor's Office of Planning and Research. USFWS has submitted an NOA to the U.S. Environmental Protection Agency (USEPA) for publication in the Federal Register.

Publication of the NOA initiates a 45-day public review period, during which DWR and USFWS will receive and consider public and agency comments on the Proposed Project and the Draft EIR/EIS. DWR and USFWS may also host public meetings during the public review period. Public circulation and the public meetings are intended to provide public agencies, other stakeholders, and interested individuals with opportunities to comment on the contents of and analysis contained in the Draft EIR/EIS. Details regarding any public meetings are provided in the NOA and are also available on the DRS website (www.deltaresearchstation.com).

Preparation of the Final EIR/EIS

CEQA and NEPA require the lead agencies to prepare a Final EIR/EIS, addressing all substantive comments received on the Draft EIR/EIS, before certifying the EIR/EIS and considering approval of the Proposed Project. The Final EIR/EIS must include a list of all individuals, organizations, and agencies that provided comments on the draft document and must contain copies of all comments received during the public review period, along with the lead agencies' responses.

These responses, together with the Draft EIR/EIS and any related changes to the substantive discussion in the Draft EIR/EIS, will constitute the EIR/EIS in its entirety. DWR is responsible for the final steps in the CEQA process, which include certifying the EIR/EIS as adequate under CEQA; adopting findings of fact, a statement of overriding considerations (if needed), and a mitigation monitoring and reporting program; considering approval of the project; and (if the project is approved) filing a Notice of Determination. USFWS is responsible for the final steps in the NEPA process, which include making a decision on the proposed action and preparing a Record of Decision (ROD).

1.2.4 CEQA/NEPA Terminology and Approach

Both CEQA and NEPA require preparation of an environmental analysis to evaluate the potential environmental effects on the environment of proposed actions (and alternatives to those actions) that are subject to governmental approvals. Several differences exist, however, between the two in terminology, procedures, required content, and substantive mandates to protect the environment. For this Draft EIR/EIS, the more rigorous of the two

[1] Responsible agencies include all public agencies other than the lead agency that have discretionary approval power over the project (CEQA Guidelines Section 15381). Trustee agencies are state agencies with jurisdiction by law over natural resources that are held in trust for the people of the State of California and would be affected by a project (CEQA Guidelines Section 15386).

laws is applied for components in which NEPA and CEQA differ. As described in more detail in Chapter 4, *Approach to the Environmental Analysis*, the significance determinations used for evaluating the Proposed Project's effects on the environment are primarily based on CEQA thresholds of significance, with consideration given to NEPA guidance for impact analysis, including issues such as context and intensity. Where the conclusions under NEPA are different from those made under CEQA, such NEPA conclusions have been explicitly identified in the impact analysis.

In general, several concepts are common to both CEQA and NEPA, including their intent and the review process that is required under both regulations. Both statutes encourage a joint state/federal review where a project requires both state and federal approvals. Both require an initial scoping process that involves public notification and involvement, development of alternatives, preparation of an environmental document that evaluates various alternatives, and consideration of public and agency input. Subsequent to these steps, both regulations require preparation of a final environmental document and agency decisions. Because the laws sometimes use different terms for similar concepts, **Table 1-1** describes how each concept is addressed in this environmental document.

Table 1-1. Related CEQA and NEPA Terminology

CEQA Term	NEPA Term	How Addressed in this EIR/EIS
Proposed Project	Proposed Action	Proposed Project
Responsible Agency	Cooperating Agency	Both CEQA and NEPA terminology will apply to applicable agencies
Goals and Objectives	Purpose and Need	Both terms are used
No Project Alternative (represents existing conditions at the time the NOP was circulated)	No Action Alternative	No Project Alternative (note: this EIR/EIS also compares the future effects of the action alternatives to future conditions under the No Action Alternative where the future conditions under the No Action Alternative would be different from existing baseline conditions)
Environmentally Superior Alternative	Environmentally Preferred Alternative	Environmentally Superior Alternative
Notice of Preparation (of an EIR)	Notice of Intent (to prepare an EIS)	Both terms are used as applicable
Environmental Setting	Affected Environment	Environmental Setting
Environmental Impacts	Environmental Consequences	Environmental Impacts
Environmental Impact Report (EIR)	Environmental Impact Statement (EIS)	EIR/EIS
Project Findings and Notice of Determination (NOD)	Record of Decision (ROD)	USFWS will publish a ROD in accordance with NEPA; DWR will adopt Findings and publish an NOD in accordance with CEQA

1.3 Project History

The DRS planning process was initiated in the mid-1990s. During this time, the IEP agencies, including DWR and USFWS, expressed interest in developing an estuarine research station at the RVARC, and this interest has been reflected in several City of Rio Vista planning documents. In 1998, the City of Rio Vista prepared the Rio Vista Army Base Reuse Plan, which proposed a public-private redevelopment concept for the RVARC (Economic & Planning Systems 1998). This concept included possible development of a marine research station and other public uses, including sports fields and a multi-purpose community center.

Subsequent planning documents set forth by the City of Rio Vista also considered development of the ERS and FTC at the RVARC site. The City prepared the Rio Vista Army Reserve Center Redevelopment Plan and EIR in 2011, rezoned the site as Army Base District, and prepared the *Rio Vista Army Base District Design Guidelines* in 2011 (MIG 2011). The Rio Vista Army Reserve Center Redevelopment Plan EIR evaluated a marine research station similar to the ERS. The following section provides a brief discussion about how the research station was evaluated in that EIR.

Note that other uses considered at the RVARC site besides the ERS and FTC are not within the scope of this EIR/EIS. In addition, no similar planning history exists for the Ryde Avenue site.

1.3.1 Rio Vista Army Reserve Center Redevelopment Plan EIR

The City of Rio Vista prepared an EIR for the Rio Vista Army Reserve Center Redevelopment Plan in 2011. The Redevelopment Plan was expected to provide the former Rio Vista Redevelopment Agency with powers, duties, and obligations to redevelop, rehabilitate, and revitalize the RVARC. Anticipated redevelopment activities included infrastructure improvements; site preparation; asbestos and lead-based paint clean-up; and development of public recreation facilities, affordable housing, and other economic development uses, including a marine research station.

The 2011 EIR assumed that the Redevelopment Plan would facilitate development of a 110,000-square-foot research station, which is similar to the subject of this EIR/EIS. As such, the Rio Vista Redevelopment Plan EIR served as a key background document in preparing this EIR/EIS. Note that the Redevelopment Plan is considered a separate project from the DRS; therefore, this document does not tier from the 2011 Redevelopment Plan EIR.

Relevant findings and impacts found to be significant and unavoidable in the Redevelopment Plan EIR are summarized below:

- **Presence of Hazardous Materials**. While hazardous substances and petroleum products were stored, used, and released into the environment during the site's previous use by the U.S. Army, between 1996 and 2001 various soil, groundwater, and sediment investigations were conducted on and around the RVARC.

Contaminated soils were removed and properly disposed off-site, and the investigations revealed no significant effects on groundwater or river surface water quality (City of Rio Vista 2011). The existing buildings that remain on the site, however, still contain asbestos siding and other asbestos-containing materials and likely contain lead-based paint.

- **Loss of Historic Resources and Cumulative Loss of Cultural Resources.** A 1997 historic resources evaluation report prepared for the U.S. Army Corps of Engineers (USACE) concluded that, collectively, twelve of the buildings originally constructed by USACE appeared to be eligible for listing in the California Register of Historical Resources. Even with implementation of mitigation, including adherence to the Secretary of the Interior's Standards for Rehabilitation of Historic Properties, loss of continued eligibility of the potential historic district would be significant and unavoidable.

  The loss of potentially significant historical resources as a result of the Redevelopment Plan would also result in a cumulatively considerable contribution to loss of cultural resources in the region (significant and unavoidable).

- **Increased Traffic Volumes, Peak-hour Volumes, Transit System Delays, and Cumulative Traffic Impacts.** Traffic volumes on portions of State Route (SR) 12 and Main Street, peak-hour volumes through the SR 12/Front Street intersection, and associated transit system delays would substantially worsen. Widening of SR 12 and Main Street would improve traffic conditions but, because full funding for these mitigation measures was not assured and right-of-way acquisitions could be required, these impacts were found to be significant and unavoidable. For these reasons, future development would represent a considerable contribution to cumulative traffic impacts (significant and unavoidable).

- **Aquatic Invasive Species Impacts.** Boat use and mooring associated with future development could increase the spread of non-native aquatic organisms or aquatic invasive species. Because the effectiveness of recommended best management practices and mitigation measures was unknown, the Redevelopment Plan's contribution to this cumulative impact was found to be significant and unavoidable.

- **Traffic Noise.** Residences on Beach Drive and 2nd Street may be exposed to substantial increases in traffic noise (5 A-weighted decibels or greater). Because the actual amount of noise reduction needed (through mitigation) was unknown, traffic noise impacts were found to be significant and unavoidable.

- **Carbon Monoxide Concentration Impacts**. Operational traffic under the Redevelopment Plan would cause or exacerbate existing unacceptable traffic congestion at four intersections on SR 12, which could cause violations of state ambient air quality standards for carbon monoxide. Because funding for the traffic mitigation measures was not assured, this impact was found to be significant and unavoidable.

- **Long-Term Greenhouse Gas Emissions from Operations.** Non-residential development facilitated by the Redevelopment Plan would generate substantial volumes of carbon dioxide emissions, which could exceed the significance threshold and therefore result in a considerable contribution to global climate change (significant and unavoidable).
- **Emergency Response Impacts**. In the event that flood waters are not passable at 2nd Street where it crosses Marina Creek, development facilitated by the Redevelopment Plan would place additional people and property at risk due to longer response times. This impact was found to be significant and unavoidable.

1.4 Alternatives Development Process

1.4.1 Development of Alternatives

Alternatives screening is the process of evaluating a broad range of conceptual alternatives to identify those that should be carried forward for detailed EIR/EIS analysis. An integrated approach to alternatives development and screening for the Proposed Project was used by incorporating a combination of engineering analysis and environmental review. For this project, this approach entailed three basic steps – Level 1, Level 2, and Level 3 screening.

- Level 1 screening required that suitable sites have an owner who was amenable to the development; be located within 15 miles of amenities such as housing and a major state highway; and consist of at least 17 contiguous acres.
- Level 2 screening further considered those sites passing the Level 1 screening criteria based on the extent to which they met the criteria, as well as several additional criteria, including groundwater quality and waterfront access to a major Delta waterway.
- Level 3 screening accounted for more specific environmental factors, such as cultural and biological resources constraints, vulnerability to sea level rise, and compatibility with surrounding land uses.

For details regarding these three levels of screening, refer to **Appendix K**.

1.4.2 Alternatives Considered and Dismissed from Further Evaluation

The CEQ requires that a full range of reasonable alternatives be analyzed in a NEPA document. Reasonable alternatives are those that are “practical or feasible from the technical and economic standpoint and using common sense” (CEQ 1981). Alternatives that cannot be implemented or do not resolve the need for action and fulfill the purpose in taking action are eliminated from further analysis. Alternatives can be dismissed from further analysis for a variety of other reasons, including cost, technical or logistical barriers, and/or unacceptable environmental impacts. This section describes alternatives that have been considered but eliminated from further study. This discussion includes only alternatives initially considered during the Level 3 screening process. The rationale for their elimination (e.g., technical/economic infeasibility, inability to meet project objectives) is also included. Refer to the screening report in **Appendix K** for additional information about alternatives dismissed.

South River Road Property, West Sacramento

During the Level 3 screening process, DWR and USFWS considered an alternative that entailed constructing the ERS and FTC on a 42-acre parcel in the City of West Sacramento. The land at this site is zoned for residential uses, but allowable uses include public/quasi-public uses such as government-owned facilities.

The West Sacramento site alternative was dismissed from further analysis for the following reasons:

- Development of the marina would conflict with USACE and the West Sacramento Area Flood Control Agency's Southport Sacramento Early Implementation Project, which is proposed along this portion of the Sacramento River. Development of a marina in this area would negate most of the benefits of the restored floodplain habitat associated with the Southport project, which would support aquatic and riparian habitats for fish such as Chinook salmon.
- The site is not centrally located within the IEP monitoring region because it is located in the northeastern area of the Bay-Delta.
- The site is vulnerable to sea level rise.

Wilbur Avenue, Antioch

During the Level 3 screening process, DWR and USFWS considered an alternative that involved construction of the ERS and FTC at 2151 Wilbur Avenue in Antioch. This site comprises five parcels totaling 18.15 acres and is located in an unincorporated area of Contra Costa County that has been identified for potential future annexation by the City of Antioch. The site and surrounding land are designated for general industrial uses and the site was identified as suitable for development of a marina.

Based on the screening analysis, this alternative was dismissed from further consideration for the following reasons:

- A substantial portion of the Wilbur Avenue site has potential to support federally listed endangered species associated with the site's dune habitat. Such species include Antioch Dunes evening-primrose (*Oenothera deltoids* ssp*. Howellii)*, Contra Costa wallflower (*Erysimum capitatum* var. *angustatum*), and Lange's metalmark butterfly (*Apodemia mormo langei*).
- An adjacent property (2151 Wilbur Avenue) that was formerly used for industrial purposes is contaminated. The site is listed on several hazardous materials databases, including the California Waste Management Unit Database System/SWAT; CA Cortese; Spills, Leaks Investigation and Cleanup; and Contra Costa County Site List.

- According to Geotracker, four former impoundments on the site have been identified as areas of concern because plumes of copper and ammonia intersect the San Joaquin River.
- Because the site is listed in the state's Geotracker database for groundwater contamination, the contamination could impair water quality at the site for use at the FTC.

1.5 Relationship with the Fish Conservation Hatchery Project

USFWS is considering development of a fish conservation hatchery, which would be associated with the DRS. The proposed hatchery would be capable of producing fish from broodstock, should supplementation or reintroduction of rare species become desirable or necessary for recovery. The hatchery would make use of research conducted at the FTC and would be used to support conservation of imperiled species native to the Bay-Delta. Currently, the hatchery project is in the early conceptual planning stages and NEPA environmental review phase. Because of the preliminary nature of plans for the hatchery; the fact that its characteristics would be defined in the future, in part as a result of research conducted at the FTC; and the fact that the Proposed Project has independent utility from and can move forward in the absence of the hatchery, the hatchery is not part of the Proposed Project evaluated in this Draft EIR/EIS. It is, however, discussed where appropriate in the EIR/EIS as part of the cumulative impact analysis.

1.6 EIR/EIS Organization

This EIR/EIS is organized as shown below.

Chapter 1: Introduction. Contains a background summary and description of the Proposed Project area; information related to the statutory basis for preparing an EIR/EIS; intended uses of the document by lead agencies; a summary of the Proposed Project's history and alternatives development process; and a summary of document organization.

Chapter 2: Purpose, Need, and Project Objectives. Identifies the purpose of and need for the Proposed Project and the Proposed Project objectives, as required under NEPA and CEQA.

Chapter 3: Alternatives Description. Describes the alternatives evaluated in the EIR/EIS, including the No Project Alternative.

Chapter 4: Approach to the Environmental Analysis. Summarizes the framework for the environmental impact analysis and the organization of each resource chapter, including environmental setting, regulatory setting, methods for analysis, and environmental impacts. Includes a discussion of topics dismissed from further analysis and the rationale for their dismissal.

Chapters 5 through 19: For each resource topic, includes a discussion of the environmental setting, regulatory setting, analysis methods, environmental impacts, and proposed mitigation measures for the DRS alternatives.

Chapter 5: Aesthetics

Chapter 6: Air Quality and Greenhouse Gas Emissions

Chapter 7: Biological Resources – Terrestrial

Chapter 8: Biological Resources – Aquatic

Chapter 9: Cultural Resources

Chapter 10: Geology, Soils, and Seismicity

Chapter 11: Hazards and Hazardous Materials

Chapter 12: Hydrology and Water Quality

Chapter 13: Land Use and Planning

Chapter 14: Noise

Chapter 15: Transportation and Traffic

Chapter 16: Public Services, Utilities, and Energy

Chapter 17: Recreation

Chapter 18: Socioeconomics and Environmental Justice

Chapter 19: Population and Housing

Chapter 20: Cumulative Impacts. Discusses the impacts of the Proposed Project in the context of past, present, and probable future projects and assesses whether the Proposed Project's contribution to any significant cumulative impacts would be "considerable."

Chapter 21: Other Sections Required by CEQA and NEPA. Discusses the relationship between short-term uses of the environment and maintenance and enhancement of long-term productivity, the irreversible and irretrievable commitment of resources, and the environmentally superior alternative.

Chapter 22: Consultation and Coordination. Describes the consultation activities that took place during the document preparation process and future consultation activities.

Chapter 23: Report Preparation. Identifies the individuals who prepared this document.

Chapter 24: References. Lists all printed references, including published documents and on-line resources, and personal communications cited in the text.

Chapter 25: Index. Lists all key terms used throughout the EIR/EIS and the page numbers where these terms are referenced.

Appendices

Appendix A. Notice of Preparation and Notice of Intent

Appendix B. Scoping Meeting Materials

Appendix C. Comments Received on the Notice of Preparation and Notice of Intent

Appendix D. Air Quality Emission Calculations

Appendix E. Biological Resources Technical Appendix

Appendix F. Best Management Practices for Pile Removal and Disposal

Appendix G. CDFW Protocols for Decontamination and Monitoring of Aquatic Invasive Species

Appendix H. Archaeological Inventory Report for the Delta Research Station

Appendix I. Historical Architectural Evaluation for the Delta Research Station

Appendix J. Supporting Documentation for the Noise Analysis

Appendix K. Delta Research Station Estuarine Research Station/Fish Technology Center Site Screening Report

Appendix L. Greenhouse Gas Emissions Reduction Plan Consistency Determination Checklist

1.7 Submittal of Comments

The purpose of public circulation and public meetings is to provide agencies and interested individuals with opportunities to comment on or express concerns regarding the contents of the Draft EIR/EIS. Specific dates, times, and locations for these meetings is provided in the NOA, on the DRS website (www.deltaresearchstation.com) and in newspaper notices.

For those interested, written comments or questions concerning this Draft EIR/EIS should be submitted (preferably by e-mail in Microsoft Word or PDF format) within this review period and directed to the following:

California Department of Water Resources
1416 Ninth Street, Room 315-3/P.O. Box 942836
Sacramento, CA 95814
Attention: John Engstrom
E-mail: comments@deltaresearchstation.com

This CEQA/NEPA document is also available for review at the Proposed Project website: www.deltaresearchstation.com. In addition, hard copies can be reviewed at DWR's offices in Sacramento, California. To arrange to view documents during business hours, call 916-651-8745. This Draft EIR/EIS also can be reviewed electronically at the following libraries:

Rio Vista Library
44 South Second Street
Rio Vista, CA 94571

Stockton-San Joaquin County Library
605 N. El Dorado Street
Stockton, CA 95202

Written comments received in response to the Draft EIR/EIS during the public review period will be addressed in the Response to Comments chapter of the Final EIR/EIS.

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Chapter 2
Purpose, Need, and Project Objectives

2.1 Introduction

The DRS is intended to serve as an aquatic research and monitoring facility that is located in a centralized area of the Bay-Delta. The Proposed Project reflects the outcome of a multiyear collaboration between DWR, USFWS, California Department of Fish and Wildlife (CDFW), other agencies involved in the IEP, and other local agencies. This chapter summarizes the DRS's regulatory background, as well as the objectives and purpose and need for the Proposed Project. Chapter 3, *Description of Alternatives,* sets out the range of reasonable alternatives to meet the project objectives and purpose and need for the DRS.

2.2 Regulatory Background

CEQA project objectives are important to document the reasons the CEQA lead agency is undertaking the proposal and what objectives the agency intends to achieve by that proposal. CEQA project objectives also serve a role in assessing the feasibility of project alternatives analyzed in an EIR. NEPA requires that an EIS include a statement of "purpose and need" to which the federal agency is responding in proposing the alternatives, including the proposed action (40 CFR 1502.13).

Both the project objectives and the purpose and need statement are the starting points for the state and federal agencies in developing the reasonable range of alternatives to be evaluated in detail in the EIR/EIS (State CEQA Guidelines Sections 15124[b], 15126[a]; 40 CFR 1502.14). The following sections present the project objectives for the DRS in compliance with the requirements for CEQA, and the statement of purpose and need for the DRS in compliance with the requirements of NEPA.

2.3 Project Objectives

The specific objectives of each component of the DRS are as follows:

- ERS
  - Establish a research station in a central location within the Bay-Delta to facilitate conducting monitoring and research;
  - Co-locate the research station with a facility capable of studying fish in captivity (i.e., the FTC); and
  - Provide facilities to conduct monitoring and research on the Bay-Delta's aquatic resources.

- FTC
  - Develop captive propagation technologies for the Bay-Delta's rare fish species;
  - Test and refine the captive propagation techniques;
  - Locate the facility where suitable water quality and quantity are available, and where ability to discharge wastewater is available, given the facility's various functions and operations; and
  - Co-locate the FTC with a facility conducting conservation research on Bay-Delta rare fish species (i.e., the ERS).

2.4 Purpose Statement

The purpose of the DRS is to enhance interagency coordination and collaboration by developing a shared research facility. The DRS would advance the interests of researchers, local communities, and other groups that are dependent on the Bay-Delta by facilitating coordinated monitoring and research efforts on the Bay-Delta's aquatic resources.

2.5 Project Need

The DRS is needed to improve the effectiveness and efficiency of scientific efforts related to Bay-Delta rare fish species because federal and state agency staff currently working on similar Bay-Delta issues are distributed among different locations, sometimes in areas remote from the Bay-Delta, or have limited resources, inhibiting efficient research and monitoring efforts and collaboration. By consolidating facilities associated with the IEP (including boating facilities) in one centralized place in the Bay-Delta, the DRS would reduce redundancies and costs related to operating existing IEP facilities. This project is even more urgent given the challenges facing California during the ongoing drought as the state struggles with species declines, deteriorating water quality, and reduced water supply reliability.

Chapter 3
Description of Alternatives

3.1 Introduction

As described in Chapter 2, *Purpose, Need, and Project Objectives*, the Proposed Project would serve as a research facility located in a centralized area of the Bay-Delta. This chapter describes the three action alternatives and the No Project Alternative for the DRS. Action alternatives for this Draft EIR/EIS have been developed to meet the purpose and need and all or most of the objectives of the DRS, as described in Chapter 2. The three action alternatives share many common elements and differ primarily in configuration and location. As such, Section 3.2.2 describes common components shared among these alternatives. Construction methods and operation and maintenance activities associated with the DRS would also be similar among the alternatives, as described in Sections 3.2.6 and 3.2.7.

3.2 Alternatives Description

3.2.1 Alternative 1: No Project Alternative

Under the No Project Alternative, neither the ERS facility, which would have otherwise consolidated existing IEP programs, nor the FTC facility would be built. The No Project Alternative would be the continuation of existing IEP long-term monitoring activities that occur within a region approximately bounded by the cities of Sacramento, San Francisco, San Jose, and Stockton. Examples of existing IEP programs that would continue to operate from various offices include fish population estimates, townet surveys, and estuarine and marine fish abundance and distribution surveys. Employees working on these projects commute from various locations in the Bay-Delta region. **Table 3-1** summarizes specific programs that are expected to continue to operate under the No Project Alternative.

Table 3-1. IEP Activities that Would Continue under the No Project Alternative and Action Alternatives

IEP Program	Program Description	Field Work and Dock Location	Office Location	Number of Staff, Number of Vessels
CDFW Programs				
Adult Striped Bass Population Estimates	This study provides scientists, managers, and stakeholders with adult Striped Bass population dynamics and status information for use when considering Striped Bass habitat, ecological role, and fishing regulations.	Field work location: Knights Landing Docking location: Knights Landing Total trips per year: 70 (5 days per week) Field work time: 8 hours per day	CDFW Stockton Office 2109 Arch Airport Road, Suite 100 Stockton, CA 95206	55 employees, 28 vessels
Fall Mid-water Trawl Survey	The survey includes sampling 122 stations from San Pablo Bay through the Delta every month from September to December.	Field work location: varies Docking location: Antioch (Martinez and Tower Park are used during survey) Total trips per year: 44 (4 surveys, each completed over 10 days, plus one boat move day) Field work time: 8-10 hours per day		
Adult Sturgeon Population Estimates	This study involves estimating sturgeon abundance, relative abundance, harvest rate, and survival rate by using data from commercial passenger fishing vessels, various creel surveys, and a mark-recapture program.	Field work location: San Pablo Bay Docking location: Vallejo Total trips per year: 70 Field work time: 10 hours		
Summer Townet Survey	The survey develops indices for the abundance of young Striped Bass when the average size is 38.1 mm by sampling 31 stations from San Pablo Bay through the Delta. An additional 9 stations were added for Delta Smelt distribution, the majority of which are in the North Delta.	Field work location: varies Docking location: Antioch (Martinez and Tower Park are used during survey) Total trips per year: 42 (6 surveys, each completed over 6 days, plus one boat move day) Field work time: 8 hours per day		

IEP Program	Program Description	Field Work and Dock Location	Office Location	Number of Staff, Number of Vessels
Estuarine and Marine Fish Abundance and Distribution Survey	Monthly mid-water and otter trawling survey (since 1980) at 52 channel and shoal stations from South San Francisco Bay to the lower Sacramento and San Joaquin Rivers to track abundance and distribution trends of marine and estuarine fishes. Data are used to assess the status of marine and estuarine fishes in the estuary as required by State Water Resources Control Board Decision 1641.	Field work location: varies Docking location: Antioch (Benicia, Berkeley, and Coyote Point are used during survey) Total trips per year: 84 (12 surveys, each completed over 6 days, plus one boat move day) Field work time: Approximately 8 hours per day		
Bay Shrimp and Crab Abundance and Distribution Surveys	Monthly mid-water and otter trawling survey (since 1980) at 52 channel and shoal stations from South San Francisco Bay to the lower Sacramento and San Joaquin rivers to track abundance and distribution trends of marine and estuarine shrimp and crab. Conducted during "Estuarine and Marine Fish Abundance and Distribution Survey."	Field work location: varies Docking location: Antioch (Benicia, Berkeley, and Coyote Point are used during survey) Total trips per year: 84 (12 surveys, each completed over 6 days, plus one boat move day) Field work time: Approximately 8 hours per day		
20 mm Delta Smelt Survey	This study monitors post-larval juvenile Delta Smelt distribution and relative abundance throughout their historical spring range from San Pablo Bay through the Delta.	Field work location: varies Docking location: Antioch (Martinez and Tower Park are used during survey) Total trips per year: 72 (9 surveys, each completed over 8 days) Field work time: 8 hours per day		
Upper Estuary Zooplankton Sampling	This study estimates the abundance of zooplankton taxa as a means of assessing trends in fish food resources from eastern San Pablo Bay through the eastern Sacramento-San Joaquin River Delta and Suisun Marsh. The study samples 19 stations monthly.	Field work location: varies Docking location: Antioch Total trips per year: 60 (12 surveys, each completed over 5 days) Field work time: 8-10 hours per day		

IEP Program	Program Description	Field Work and Dock Location	Office Location	Number of Staff, Number of Vessels
Spring Kodiak Trawl	This survey determines the relative abundance and distribution of spawning Delta Smelt. Each month from January to May, this survey samples 40 stations from San Pablo Bay upstream to Stockton on the San Joaquin River, Walnut Grove on the Sacramento River, and the Sacramento Deep Water Ship Channel.	Field work location: varies Docking location: Antioch (Tower Park is used during survey) Total trips per year: 25 (5 surveys, each completed over 5 survey days) Field work time: 8 hours per day		
Smelt Larva Survey	This survey includes real-time distribution data for Longfin Smelt larvae in Suisun Bay and Suisun Marsh through the eastern Sacramento-San Joaquin River Delta.	Field work location: Varies Docking location: Antioch (Martinez and Tower Park are used during survey) Total trips per year: 30 (6 surveys, each completed over 5 survey days) Field work time: Approximately 8 hours per day		
Administration and Support	CDFW administrative and support work	N/A		
DWR Programs				
Environmental Monitoring Program	The Environmental Monitoring Program provides necessary information for compliance with flow-related water quality standards specified in the DWR and U.S. Bureau of Reclamation's (USBR's) water right permits for the California water projects. The program's water quality stations are sampled monthly using a research vessel and a laboratory van. They also collect and analyze benthos, phytoplankton, and zooplankton samples.	Field Work Location: San Francisco Estuary and Delta Docking Location: Newbridge Marina, Antioch Total trips/year: 90 (not including special studies).	DWR West Sacramento Office 3500 Industrial Boulevard West Sacramento, CA 95961 DWR Antioch Office 6325 Bridgehead Road Antioch, CA 94509	13 employees, 6 vessels

IEP Program	Program Description	Field Work and Dock Location	Office Location	Number of Staff, Number of Vessels
San Joaquin River Dissolved Oxygen Monitoring	The Environmental Monitoring Program monitors dissolved oxygen concentrations in the Stockton Ship Channel during the late summer and fall to provide necessary information for compliance with the Central Valley Regional Water Quality Control Board Basin Plan and the SWRCB Water Quality Control Plan (Bay-Delta Plan). Dissolved oxygen concentrations have historically declined in the central and eastern portions of the ship channel during this period and the Environmental Monitoring Program monitors potential adverse impacts on fisheries and other beneficial uses of the waters within this area.	Field work location: Bay-Delta Docking location: N/A Total trips per year: 12-14 Field work time: Approximately 8 hours per day		
USFWS Programs				
Aquatic Invasive Species Program	This program provides technical expertise and support to activities focused on prevention and management of aquatic invasive species, working in collaboration with partners, stakeholders, and the public.	Field work location: Bay-Delta Docking location: N/A Total trips per year: N/A Field work time: Approximately 8 hours per day	USFWS Stockton Office 850 Guild Avenue, Suite 106 Lodi, CA 95240	72 employees, 14 vessels

IEP Program	Program Description	Field Work and Dock Location	Office Location	Number of Staff, Number of Vessels
Delta Juvenile Fish Monitoring Program	This program implements a suite of surveys throughout the Delta, including Sacramento trawling; Chipps Island trawling; Mossdale trawling; and beach seining throughout the lower Sacramento and San Joaquin Rivers, the Delta, the San Francisco Bay. The program addresses various goals and objectives related to relative abundance and distribution of juvenile fishes.	<u>Field work location</u>: Sacramento/ San Joaquin Rivers, Delta, and Bay <u>Docking location</u>: Pittsburg, Sacramento, South Delta <u>Total trips per year</u>: Daily to 2 per day each week, depending on gear, site, and season <u>Field work time</u>: Approximately 8 hour per day		
Administration and Support	USFWS administrative and support work	N/A		
Other Programs				
NMFS and Reclamation Programs	Various.	N/A		5 employees
			TOTAL	**145 staff, 48 vessels**

Notes: CDFW = California Department of Fish and Wildlife; mm = millimeters; N/A = not applicable; NMFS = National Marine Fisheries Service; USFWS = U.S. Fish and Wildlife Service.

Under the No Project Alternative, the IEP programs would continue be staffed by the 145 existing employees and 48 vessels; over time, these programs would be expanded to up to 165 people. Agency administrative and support staff would continue to work at the applicable offices listed in Table 3-1, above. Vessels used for IEP program activities launch from various locations in the Bay-Delta, including Lodi, Rio Vista, Antioch, Martinez, Pittsburg, Oakley, Knights Landing, and Vallejo. Similar to existing conditions, CDFW, DWR and USFWS would continue to store 38 vessels (16–24 feet in length) at the current facilities in West Sacramento, Lodi and Stockton and 10 vessels would be stored in leased wet slips in Antioch. On average, the boats used for IEP program activities would have one-way transit times and travel distances of 1–1.5 hours and 15–30 miles, respectively.

Under the No Project Alternative, the USFWS's Delta Smelt propagation program would continue to occur at the Livingston Stone National Fish Hatchery (LSNFH) near Redding. The LSNFH rears juvenile Delta Smelt received from the University of California, Davis Fish Conservation and Culture Lab (FCCL) near Byron. When fully staffed, the LSNFH also produces juveniles by spawning adults. These fish serve as a backup to the genetic refugial population held at the FCCL. The LSNFH Delta Smelt facility near Redding is a small building with water delivery systems, egg tubes, larval rearing, and juvenile and adult tanks. The work at the facility would continue to be shared by one full-time employee and one part-time employee.

3.2.2 Components Common to All Action Alternatives

The following is a description of Project components that are common to all action alternatives. Both the ERS and FTC facilities would be built to the standards of the U.S. Green Building Council's Leadership in Energy & Environmental Design (LEED) program at silver level or higher accreditation, although the Project proponents would probably not seek formal LEED certification. The ERS facility would be built to achieve the LEED standards as required by the State's Executive Order S-20-04 and the FTC facility would be built to achieve standards outlined in federal Executive Order 13514. **Table 3-2** summarizes the general characteristics of the ERS and FTC facilities for all action alternatives, and **Table 3-3** compares the number of employees associated with the No Project Alternative and each action alternative.

ESTUARINE RESEARCH STATION FACILITIES

<u>OFFICE SPACE</u>

Under all action alternatives, office space would be established to accommodate various IEP agencies attending meetings, conferences, and workshops at the DRS. This space is expected to serve as a hub for ongoing research activities and development focused on the Bay-Delta region. With approximately 165 USFWS, DWR, CDFW, NMFS and Reclamation employees working on 20–30 active IEP projects, the office building would consist of work space and multiple meeting rooms to accommodate concurrent agency meetings, and other IEP and project meetings. The office space would be in the range from 35,000 to 52,000 square feet and would include the following types of facilities:

Employee Work Space. The office building would have office and work space (i.e., cubicles) for approximately 165 employees.

Conference Room. The office building (or in the case of Alternative 3, one of the office buildings) would have a large conference room that could accommodate up to 100 people for large meetings and conferences. This room would have audio/video projection and teleconferencing equipment, public address systems, and wireless internet.

Small Meeting Rooms and Quiet Rooms. Four small staff meeting rooms (300–450 square feet each) and three quiet rooms (120 square feet each) would be dispersed throughout the building(s). The meeting rooms would be used to conduct day-to-day business and would include teleconferencing capabilities and wireless internet; one small meeting room would also have videoconferencing capabilities.

Reference Library. Scientific publications relevant to research activities throughout the Bay-Delta would be available to staff and visitors in the reference library. This library would have space for up to four employees.

Computer Room. A computer room would accommodate local servers, routers, and backup systems. The computer room would be used to store local database and email servers, routers, and switches. Secured storage for hardware and software would also be accommodated. This facility would accommodate both state and federal systems.

Mail/Copy Room. This room would house employee mailboxes, fax machines, copy machines, and a work table for document production.

Employee Lunch/Break Room. An employee lunch/break room would accommodate at least 60 employees.

Supply/Records Storage. An administrative supply/records storage room would be used to store records and office supplies. The facility would also include a records storage room for field data.

Locker Room and Shower. A small locker room and shower facility would be provided for men and women. A small laundry area would be located outside of the two locker rooms available for washing clothing used for IEP activities.

Restroom Facilities. Restroom facilities would be provided for employees and visitors.

1 **Table 3-2.** Characteristics Associated with Alternatives 2, 3, and 4

Project Component	Description	Square Footage (sq. ft.) or Acreage and Other Characteristics		
		Alternative 2	**Alternative 3**	**Alternative 4**
ERS Facilities				
Marina	23 boat slips	Partially excavated marina: approximately 1 acre	Excavated marina: 2.1 acres	Excavated marina: 2.2 acres
Office/Administrative Building/Laboratory	Work space, conference rooms, mailroom, and reception area Contains optical equipment, fume hoods, computer stations, and water tanks	Approximately 65,000 (one 2-story building) consisting of approximately 35,000 of office space and 30,000 of laboratory space.	41,000 (one 2-story building) for office space; 11,000 (reuse of existing warehouse; office building to be shared with lab); 12,000 (reuse of existing warehouse; one 2-story building for laboratory); 2,500 (reuse of existing warehouse; upper floor of 2-story shared office/lab building).	52,000 (one 2-story building) for office/administrative building; 14,500 (one 1-story building) for laboratory.
Dry-dock Boat Storage	Storage space for 29 boats	10,000-18,000 (one 1-story covered building)	18,000 (one 1-story covered building)	18,000 (one 1-story covered building)
Shop/ Storage Building(s)/Warehouse	Storage space for boat equipment, metal and woodwork shops, and net fabrication Storage space for field equipment, laboratory field samples, chemicals, batteries, and flammable items	Approximately 27,000 - 33,000 total	9,500, 3,000, 2,500, and 7,500 (four 1-story buildings) for boat equipment, metal and woodwork shops; 16,000 on both upper and lower floors (32,000 total) (one 2-story building) for storage.	22,500 (one 1-story building) for boat equipment, metal and woodwork shops; 32,000 (one 1-story building) for storage.

Project Component	Description	Square Footage (sq. ft.) or Acreage and Other Characteristics		
		Alternative 2	Alternative 3	Alternative 4
Open Dry-dock Boat Storage and Equipment	Open area for boat and equipment drying	30,000		
Open Field Experimental Yard	Open space accommodate a variety of field sampling equipment such as a tagging trailer, cylinder traps, rotary screw traps, ancillary vessel rigging, and a variety of tubs, troughs, tanks and containers used for sampling and fish transport devices.	35,000	30,000	30,000
Marina Restroom	Restroom facility near the marina	250	N/A	N/A
FTC Facilities				
Fish Study Buildings (three separate buildings)	Aquaculture and research components for three different fish species. The overall facility will include office space (conference rooms, mailroom, reception area) and a shop for storage of aquaculture equipment, fish tissue archives, metal and woodwork shops, and light mechanical maintenance area.	16,000 each (48,000 total), including 2,500 for office space and 6,000 for shop		
Evaporation Ponds/ Sedimentation Basin	Two 5,000 sq. ft. evaporation cells	10,800		
Water Treatment Facility	Sand filters for solids removal and either ultraviolet- or ozone-based disinfection technologies for pathogen control.	2,000		

Project Component	**Description**	**Square Footage (sq. ft.) or Acreage and Other Characteristics**		
		Alternative 2	**Alternative 3**	**Alternative 4**
Other				
Parking	Parking for secured state/federal vehicles, other vehicles, and visitors' vehicles	Employee parking spaces: 203 Visitor parking spaces: 70 Secured parking spaces: 17	Employee parking spaces: 182 Visitor parking: 54 Secured parking spaces: 58	Employee parking spaces: 208 Visitor parking spaces: 55 Secured parking spaces: 45
	Total Acreage	On-land: 14 acres On-water: approximately 1.2 acres **Total: 16 acres**	On-land: 18 acres On-water: 2.1 acres **Total: 20.1 acres**	On-land: 15 acres On-water: 2.2 acres **Total: 17.2 acres**

Table 3-3. Comparison of Staffing Levels Associated with Existing Conditions, No Project Alternative, and the Action Alternatives

Facility	Number of Employees		
	Existing Conditions	No Project Alternative	Alternatives 2, 3 and 4
ERS	145	165 (in the future)	165
FTC	0	0	15
DRS (Total of ERS and FTC)	145	165	180

BOAT STORAGE

Each action alternative would have boat storage facilities including wet slips, dry covered boat storage, an open dry-dock boat storage area, an open field experimental yard, as well as a boat launch, as follows:

Wet Slips. Under all action alternatives, a marina would be established to provide mooring for up to 23 power boats ranging from 21 to 60 feet in length. A pump-out station would be provided for the vessels. The marina would include a sampling pier or a platform for loading testing gear such as fish traps and water quality and weather monitoring equipment.

Dry Covered Boat Storage. The dry covered boat storage facility (approximately 10-18,000 square feet in size) would accommodate up to 30 vessels ranging from 14 to 25 feet in length. The covered storage facility would protect the vessels, prolonging the life of the vessels and related equipment.

Open Dry-Dock Boat Storage. An approximately 30,000-square-foot dry-land, open area would be used for state and federal vehicles, and boat and equipment storage. The area is expected to accommodate up to 20 vessels on trailers.

Open Field Experimental Yard. This area would accommodate a variety of field sampling equipment, such as a tagging trailer, cylinder traps, rotary screw traps, and ancillary vessel rigging, along with various tubs, troughs, tanks, and containers used for sampling and fish transport.

Boat Launch. A boat launch would be constructed to provide access to the Sacramento River and the Delta and provide an area in which to fix and repair any wet slip vessels.

BOAT/EQUIPMENT WASH-DOWN FACILITY

Each action alternative would have a boat/equipment wash-down facility in an approximately 800-square-foot area in the parking lot adjacent to the proposed boat repair shop. In the wash-down area, all drainage water would be collected and directed to a sump with a filtration and pressurization mechanism to recycle the water. This facility would have a covered work area.

Laboratory

The ERS laboratory would be approximately 14,500 to 30,000 square feet and consist of three main work areas, described below.

Wet Laboratory. The wet lab would be used by up to 40 employees for processing tens of thousands of field-collected samples. The wet lab would consist of sinks, fume hoods, computer stations, and optical equipment. If ethanol is used in the labs, the fume hoods would need to be non-sparking.

Vegetative material and fish/invertebrate tissues that are preserved in ethanol would be packaged and stored in a designated area for eventual pick-up by the local solid waste disposal company. Any hazardous waste generated at the wet lab would be properly contained and stored in the on-site chemical storage facility. Wastewater generated at the sample processing area would likely contain formalin solutions and ethanol, and altered pH. If lab wastewater contains trace amounts of formaldehyde and pending coordination with either the City of Rio Vista or City of Stockton, this wastewater may be treated and tested before being discharged into the facility's sewer line. In addition to 40 individual work stations, this facility would also have office space for three to four lab supervisors.

Aquaculture (Experimental) Laboratory. The aquaculture portion of the laboratory would be used by staff to study larval fish and invertebrate food habits, larval development, and other aspects of lower-trophic-level ecology. The lab would contain approximately 30 individual tanks (20–100 gallons); associated water treatment infrastructure (e.g., for cleansing, cooling, aeration, and lighting); 30 work stations for water testing and organism study; supervisor/manager office space; and space for maintenance equipment and supplies.

Dry Electrical Lab. The dry electrical lab, with capacity for up to seven employees, would house an array of electronic devices, including automated equipment for monitoring water quality, hydroacoustic current meters, and related telemetry equipment. These devices would be used during various field sampling and experimental activities that involve implanting fish with sonic tag devices. Employees would also use acoustic, hydroacoustic, and sonic receiver devices to identify, track, and monitor fish. The dry electrical lab would have 30–40 handheld computers for uploading and interpreting the telemetry data, which are ultimately downloaded to computer databases and the IEP website. The dry electrical lab would serve as a storage facility for these expensive and sensitive electronic devices.

Shop/Warehouse/Storage

Each action alternative would include a shop space that is approximately 33,000 to 54,500 square feet large. This space would consist of areas for boat maintenance/repair and parts storage, a metal fabrication shop, a woodwork shop, a net fabrication/maintenance area, and storage buildings for field equipment, laboratory field samples, chemicals, batteries, and flammable materials.

Boat Maintenance/Repair/Parts Storage Area. This area requires an entryway that is tall enough to accommodate large vessels and would be large enough to host two to three large vessels.

Metal Fabrication Shop and Woodwork Shop. The metal fabrication shop would have storage space for heavy equipment such as a table saw and band saw, which are commonly used by field employees to fabricate experimental traps; the shop would also contain other materials required to fabricate field equipment, such as sheet steel and aluminum, wire screens, and nets. Welding work may also occur in this area.

Net Fabrication/Maintenance Area. Field employees maintain fishing nets of various dimensions. The shared fabrication/maintenance shop would provide space for hanging these nets in an indoor facility with appropriate overhead winches and hangers.

Warehouse

Field Equipment. The field equipment storage area would accommodate a wide array of field sampling equipment including fish and wildlife traps, sampling equipment and supplies for the IEP.

Laboratory Field Sample Storage and Walk-in Freezers. The laboratory field sample storage area and walk-in freezer be in separate rooms. These facilities would be used to store tens of thousands of preserved and frozen biological samples before staff processes them. Formalin-preserved field specimens need to be climate controlled (around 70 degrees Fahrenheit), and ethanol-preserved specimens would need to be stored in an explosion proof area (e.g., non-sparking lights, fans, etc.).Both facilities would be arranged such that the high priority samples can be easily found and retrieved. Sufficient open space should be provided for safe walkways and operation of forklifts.

A larger walk-in freezer (approximately 400 square feet) would be used to store larger fish and wildlife samples. This would be a sub-zero freezer and would have liquid nitrogen as a back-up if the power were to go out.

Chemical Storage. The chemical storage area would be used to hold chemicals such as ethanol, formalin, formaldehyde and other formaldehyde derivatives, which are used in sample processing and as neutralizing agents for waste disposal. Any storage areas with high concentrations of ethanol or ethanol fumes will need to be non-sparking to prevent explosions. These chemicals would be held in 50-gallon drums.

Battery Storage and Maintenance. The battery storage and maintenance area would provide space for approximately 100 marine and heavy-duty vehicle batteries. Consistent with local and state fire codes and environmental regulations, the battery storage area would be located at a safe distance from any flammable materials and would be equipped with appropriate ventilation, explosion-proof lighting fixtures, and personnel wash-down facilities for emergency preparedness.

Flammable Materials Storage. Storage space would be set aside to store flammable items such as empty fuel tanks, outboard motors, engines, solvents, oil, and fuel in a safe manner consistent with all local and state regulatory requirements and environmental regulations.

Fish Technology Center

The FTC would operate as a stand-alone facility housing refugial populations of Delta Smelt and/or other imperiled fishes, and would serve as a central Delta location for propagation research, conservation, and study.

Species Aquaculture/Research Buildings

The FTC would consist of three 16,000 square-foot buildings; each would be devoted to the study of different fish species. Although USFWS has not determined which species would be studied at this facility, species that may be studied include Delta Smelt, Longfin Smelt, Green Sturgeon, and Sacramento Perch. Each facility would contain separate aquaculture and research components for individual study species and laboratory space to support water quality, genetic, and fish health analysis. The facility may also include archives to store samples of tissues from native fishes. Examples of tissues to be stored include fin clips and otoliths. The aquaculture and research buildings would be equipped with back-up generators to provide electricity in the event that power goes out.

Auxiliary Facilities

The FTC would have auxiliary facilities that would contribute to the center's research purpose. Since design of the FTC is in the early planning phase, the location of these auxiliary facilities, shop, and storage building has not yet been determined but may be co-located or built adjacent to the three fish study facilities.

Office/Administration Building. An office and administration building that can accommodate a staff of 10–15 full-time personnel (approximately 2,500 square feet), a small meeting room with capacity for 15 people, and restroom facilities.

Shop. Similar to the ERS, a shop and vehicle storage building would be established on-site. The shop would have areas for woodworking, metalworking, and general maintenance/upkeep of the overall site and landscaping.

Other potential facilities at the FTC include a lunch/break room for staff, locker/boot room, visitor reception area, and restroom facilities for visitors.

Tissue Archives

The FTC would include storage space for tissues from native fishes. Example tissues include fin clips, scales, and otolith tissues. These tissues would be used for multiple studies such as genetic management of the refugial fish populations, food web studies, stock origin, fish health, and rearing history. The storage techniques for each tissue varies, but includes samples stored in preservatives (e.g. ethanol and formalin), dried tissues in envelopes, and frozen material. The material would be used both on- and off-site by fish researchers. Chemical use and storage would be as indicated below in Table 3-8.

Water/Wastewater Infrastructure

All action alternatives would include water and wastewater facilities at the FTC site, including groundwater wells, a water treatment facility, and an effluent treatment system.

Groundwater wells. Groundwater would serve as the primary source of water for the FTC's operational needs as groundwater is generally cooler than surface water at the alternative sites and may be less prone to contamination and disease than surface water. Well water is expected to be used at any of the alternative sites. Although a groundwater study needs to be conducted (see Chapter 12, *Hydrology and Water Quality*, for details), each action alternative would require construction of onsite wells. The wells would include submersible pumps and pitless-type well heads.

Water Treatment Facility. Surface water may be needed to meet operational needs at the FTC. Small quantities of surface water would be used to blend with the well water for temperature adjustment or for acclimation of fish prior to release. The surface water intake would comply with state and federal regulations for fish protection. The FTC would require construction of an approximately 2,000-square-foot water treatment facility, which would potentially include filtration and disinfection systems.

Effluent Treatment System. An effluent treatment system would be constructed on-site. To minimize the size of the system, pond and rearing tank cleaning effluent would be captured and piped to the treatment system separately from normal wastewater discharge. The treatment system would consist of drum filters, an underground holding tank between the rearing tanks and drum filters, and evaporation ponds (approximately 10,800 square feet). The filters would be located in an approximately 1,500-square-foot building near the evaporation pond/sedimentation basin. If necessary, either a portable system (to treat the effluent from specific individual rearing tanks) or a centralized holding tank and activated carbon filtration system could be installed. If a centralized system is constructed, the carbon filtration tanks could be installed in the water treatment building.

Parking

Under each action alternative, parking would be established for employees (including secured parking for state vehicles) and visitors. Approximately 220 parking spaces would be set aside for visitors, employees, and agency needs, including approximately 45 secured parking spaces used for state and federal vehicles located in a fenced and secured area.

Ancillary Improvements

Other site improvements that would be established for each action alternative include the following:

Fencing. As shown in **Figures 3-1 through 3-3** below, secured fencing would surround some portions of the site. The type of fencing has not yet been determined.

Landscaping and Irrigation. Drought-tolerant landscaping requiring minimal maintenance and an automatic irrigation system would be installed around buildings and within parking areas.

Exterior Lighting. Exterior lighting would be installed throughout the site at parking areas and outside of buildings for security and safety purposes.

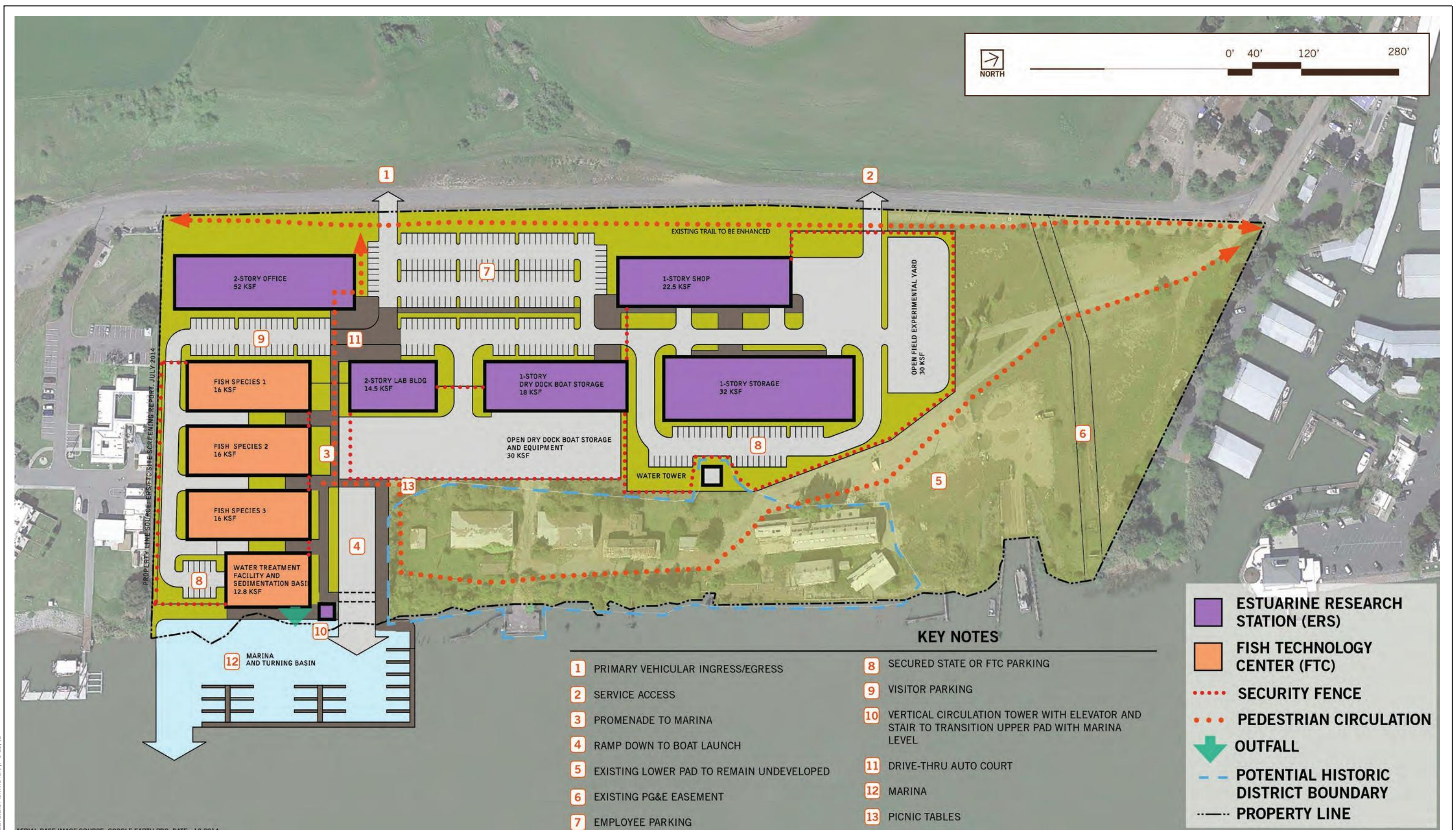
3.2.3 Alternative 2: Rio Vista Army Reserve Center, Configuration 1 (Preferred Alternative)

Figure 3-1 shows the conceptual site layout for Alternative 2 at the former Rio Vista Army Reserve Center (RVARC), which is located on the southern edge of Rio Vista at 800 Beach Drive. Alternative 2 is DWR's and USFWS's preferred alternative. The RVARC is not currently in use. Existing buildings and structures on the eastern portion of the site include deteriorated warehouses, barracks, a vehicle maintenance shop, a water tower, and other structures (see below, for a complete summary of the site's existing facilities). A Pacific Gas and Electric Company (PG&E) gas pipeline easement crosses east-west through the northern portion of the site. Land uses immediately adjacent to the RVARC site include a private marina to the north; a U.S. Coast Guard station to the south; agricultural land across Beach Drive to the west; and commercial and recreational uses on the Sacramento River to the east. A few single-family homes are also located on the west side of Beach Drive near the northwest and southwest corners of the site. A paved path follows the western border of the site along Beach Drive.

Table 3-2 summarizes the general characteristics of the ERS and FTC facilities. The Preferred Alternative would consist of all the project components described in Section 3.2.2, above. The FTC facilities, including the effluent treatment facility and sedimentation basins, would be clustered at the western end of the property. Each FTC building would be approximately 16,000 square feet. The ERS's two-story office building, laboratory building, dry-dock boat storage building, open dry-dock boat storage area, shop building, storage area, and open field experimental yard would be located on the upper terrace of the site. As shown in Figure 3-1, the marina would involve excavation along the shoreline and would be established in the Sacramento River at the southeastern end of the site. A fixed pier and gangway would be constructed alongside the boat launch, providing pedestrian access to the marina. As shown in Figure 3-1, the boat launch would be split and includes a vehicle turnaround area and connects with the open yard storage area. A small restroom facility would also be installed near the boat launch. To prevent floating debris from getting lodged under the marina docks, a debris deflector would be installed at the northern end of the marina. The configuration of the marina shown in the figure is preliminary and may be adjusted further into the design process. Most of the existing buildings on the RVARC's lower terrace would remain.

The site would have two entry points from Beach Drive: one near the southern end of the building envelope and another at the northern end of the building envelope. Paved internal roadways would be constructed to provide circulation and connectivity among the buildings. A promenade would also be established between the boat launch and the northern side of the FTC buildings, enabling pedestrians to walk from the visitor parking area towards the shoreline. Designated employee, visitor, and secured state/federal agency parking would be provided throughout the site; most of the employee parking would be clustered near Beach Drive.

Because construction of the two entry points would overlap the existing path along Beach Drive, portions of this path would be repaved. For discussion regarding temporary reduction in use of this path, refer to Chapter 17, *Recreation.* As shown in Figure 3-1, the Preferred Alternative would allow public access through some portions of the site; other portions of the site would be secured and open to employees only. In the event that the City of Rio Vista decides to develop a trail along the site's waterfront (as envisioned in the Rio Vista Redevelopment Plan), pedestrians could access the shoreline near the boat launch.



Source: WARE MALCOMB 2015.

Horizon WATER and ENVIRONMENT

Figure 3-1
Alternative 2 - RVARC, Configuration 1

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3.2.4 Alternative 3: Rio Vista Army Reserve Center, Configuration 2

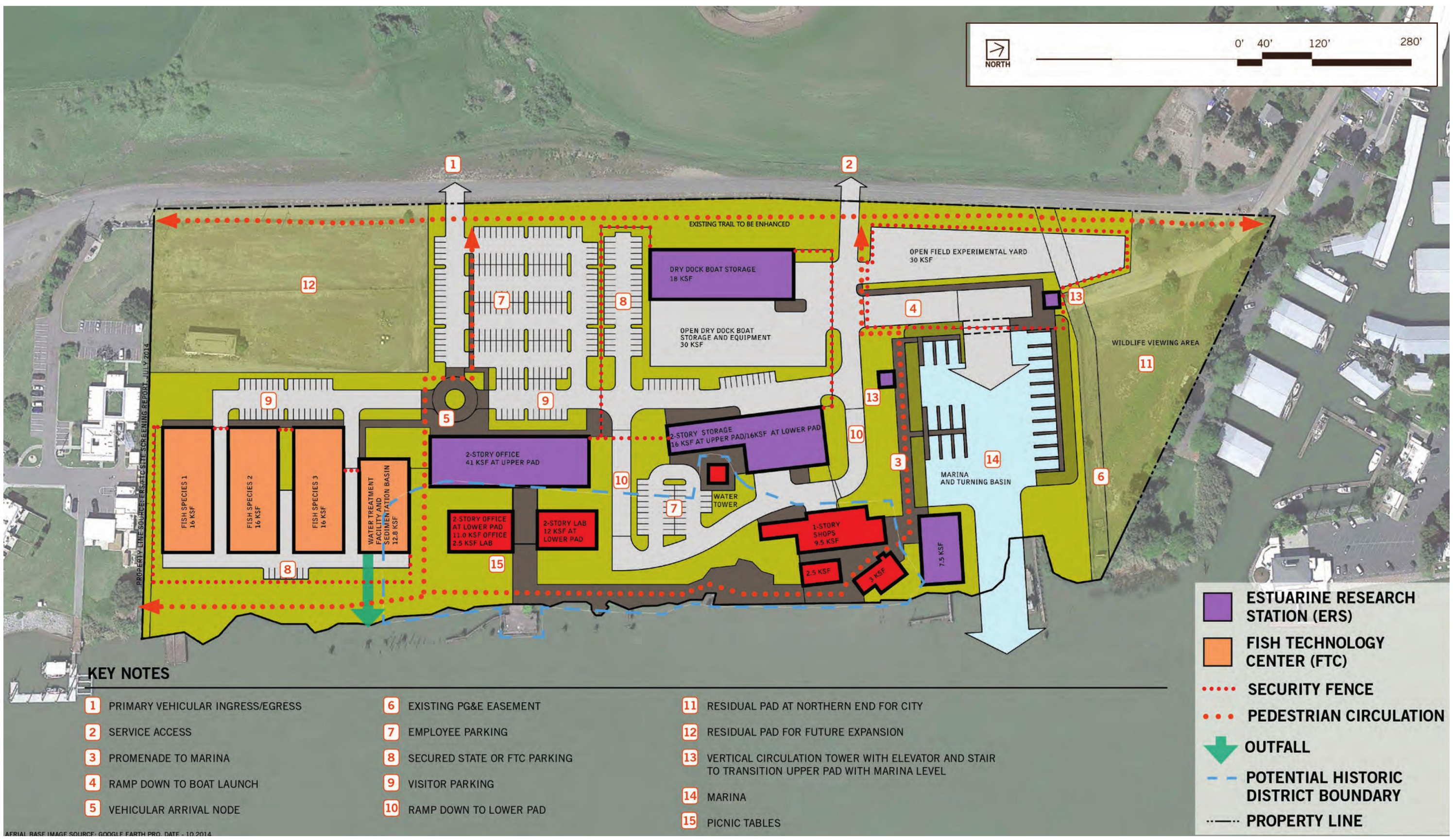
Similar to Alternative 2, Alternative 3 would utilize the existing RVARC site (at 800 Beach Drive) and would include the common project components described in Section 3.2.2. The site layout for Alternative 3 is presented in **Figure 3-2.** Unlike Alternative 2, Alternative 3 would repurpose some of the existing buildings at the RVARC site adjacent to the Sacramento River. Buildings that would be reused are former warehouses, a ship repair shop, an engineering and maintenance shop, and a carpenter shed/electrical shop/battery storage building. The existing water tower would remain in its existing condition. The marina and other ERS facilities would be constructed in the northern and northeastern portions of the site. Unlike Alternative 2, the marina would be excavated in the interior of the RVARC site. As shown in Figure 3-2, the FTC buildings and visitor parking spaces would be clustered at the southern end of the site.

Similar to Alternative 2, two entry and exit points would be established from Beach Drive. The portions of the path affected by construction of the entry points would be repaved. This alternative would accommodate public access through some portions of the site, and access along the waterfront. Secured areas where public access would be restricted are shown in Figure 3-2. Table 3-2 provides a summary of square footage and general characteristics of Alternative 3.

3.2.5 Alternative 4: Ryde Avenue Site in Stockton

Alternative 4 would be located at 845 Ryde Avenue in Stockton. The site layout for Alternative 4 is presented in **Figure 3-3**; this alternative includes all of the common components listed in Section 3.2.2, above. This site is currently vacant and is surrounded by the Stockton Deepwater Ship Channel and industrial uses (including the Port of Stockton) to the south, and residential uses to the north. Land uses to the west include the U.S. Navy Reserve Training Center and industrial uses to the east.

In general, the FTC buildings would be clustered at the western side of the site and ERS facilities would encompass the central and eastern portions of the site. Two access points would be established: one near the Ryde Avenue/West Fremont Street intersection, and another on West Fremont Street at the northeastern corner of the site. As shown in Figure 3-3, the marina, turning basin, and boat launch would be located in the central-southern portion of the site. As with Alternative 3, the marina would be excavated in the interior of the site. Parking and internal roadways would be established throughout the site. Unlike Alternatives 2 and 3, Alternative 4 would not allow public access through the Ryde Avenue site. Table 3-2 summarizes the square footage of these buildings.



Source: WARE MALCOMB 2015.

Horizon WATER and ENVIRONMENT

Figure 3-2
Alternative 3 - RVARC, Configuration 2

13.014, Task 2.2.1 AdminDraft (7-6-15) JD

Source: WARE MALCOMB 2015.

Figure 3-3
Alternative 4 - Ryde Avenue Site in Stockton

3.2.6 Project Construction

CONSTRUCTION METHODS

SITE PREPARATION AND EARTHWORK

Site preparation for construction of the DRS would involve demolition, clearing and grubbing, excavation, import and placement of fill, and compaction.

Alternative 2 would require demolition of three existing buildings: a hazardous materials storage building (T-22[1]), administration/barracks building (T-46), and vehicle maintenance shop (T-50). This alternative would also involve removal of one ship repair dock (S-105) and moorings situated near the southern end of the RVARC site. **Table 3-4** provides a complete list of facilities that would be removed. Figure 9 of Appendix I (Historical Architectural Evaluation for the Delta Research Station) shows where these facilities are located at the RVARC site. The area of buildings proposed for removal totals approximately 8,160 square feet. Materials from buildings to be demolished would be salvaged and reused on-site to the extent feasible.

Alternative 3 would also require demolition of the same buildings listed above for Alternative 2, except that the vehicle maintenance shop (T-50) would remain. In addition, seven other facilities and buildings would be demolished: a compressor shed (T-8), a garage/oil shed/paint shop (T-25), barracks (T-26), an office (T-41), a paint shop/storage building (T-43), the marine railway (S-100), a water well pump house (T-24). Three ship repair docks (S-103 to S-105) would either be rehabilitated or demolished. Table 3-4 provides a complete list of facilities that would be removed. In total, 14,536 square feet of existing buildings/facilities would be removed.

Under Alternative 3, five buildings would be reused: former warehouses (T-42 and T-27), a ship repair shop (T-11), a maintenance shop (T-9), and a carpenter shed (T-7). To reuse these facilities, remediation work would be necessary because many of these existing buildings have asbestos-containing building materials and lead-based paint, which could pose a hazard to human health and the environment if not removed.

Table 3-4. Disposition of Existing Buildings and Facilities at the RVARC Site under Alternatives 2 and 3

Facility/ Building	Use	Size (sq. ft.)	Disposition under Alternative 2	Disposition under Alternative 3
Buildings				
T-7	Carpenter Shop, Ship Repair Shop	3,146	Remain as is	To be rehabilitated/ reused
T-8	Compressor Shed	250	Remain as is	Demolish

[1] The numbers used to identify structures on the RVARC site are former Army facility numbers used in documents prepared for the Army and in base closure planning documents.

Facility/ Building	Use	Size (sq. ft.)	Disposition under Alternative 2	Disposition under Alternative 3
T-9	Welding Shop, Maintenance Shop, Carpenter Shop	2,489	Remain as is	To be rehabilitated/ reused
T-11	Machine Shop, Welding Shop, Blacksmith Shop, General Purpose Shop	11,148	Remain as is	To be rehabilitated/ reused
T-22	Hazardous materials storage	3,815	Demolish	Demolish
T-25	Garage/Oil Shed/Paint Shop	870	Remain as is	Demolish
T-26	Barracks	6,357	Remain as is	Demolish
T-27	Warehouse	10,290	Remain as is	To be rehabilitated/ reused
T-41	Office	1,148	Remain as is	Demolish
T-42	Warehouse	11,400	Remain as is	To be rehabilitated/ reused
T-43	Paint Shop, Storage	768	Remain as is	Demolish
T-46	Barracks, administration	1,232	Demolish	Demolish
T-50	Vehicle maintenance shop	3,113	Demolish	Remain as is
Other Facilities				
T-23	Water Tower	--	Remain as is	Remain as is
T-24	Water Well Pump House (Water Tower)	96	Remain as is	Demolish
S-100	Marine Railway	--	Remain as is	Demolish
S-102	Ship Repair Dock	--	Remain as is	Remain as is
S-103	Ship Repair Dock	--	Remain as is	Demolish or rehabilitate
S-104	Ship Repair Dock	--	Demolish	Demolish or remain as is
S-105	Ship Repair Dock	--	Demolish	Demolish or remain as is
203-215	Moorings (14)	--	Remove moorings near southern end of RVARC site as necessary to accommodate new marina	Remove moorings from site as necessary to accommodate new marina
Total square footage to be demolished:			**8,160**	**14,536**

Clearing and grubbing would be conducted with standard excavators, bulldozers, and other necessary equipment and hand labor. All demolished materials, debris, and non-hazardous waste would be transported to the Potrero Hills Landfill (approximately 18 miles west of Rio Vista), the Lovelace Materials Recovery Facility (approximately 11.5 miles south of the Ryde Avenue site), or the North County Recycling Center and Sanitary Landfill (approximately 21 miles northeast of the Ryde Avenue site), all of which are within approximately 30 minutes travel time from the alternative sites. Any hazardous waste encountered would be disposed of at appropriate hazardous waste facilities. The nearest landfill that accepts hazardous waste is located in Kettleman City, approximately 194 miles south of Rio Vista and 160 miles from Stockton.

Excavation is anticipated to extend to approximately 4–6 feet below ground surface in areas where buildings and structures would be located. **Table 3-5** summarizes the estimated area of ground disturbance, total cut and fill estimates, and the grading areas required for building pads and the remaining portions of the site plan. Most of the excavated soil would be reused as fill on-site. Any additional fill would be delivered to the building sites by conventional haul trucks (15-20 cubic yards [cy] per load). Fill material would be spread by a bulldozer and compacted by a vibratory compactor or roller.

Table 3-5. On-land Construction Characteristics

Work Activity	Alternative 2	Alternative 3	Alternative 4
Clearing and ground disturbance area	14 acres	18 acres	15 acres
Total excavation volume	35,000 cy	58,110 cy	22,198 cy
Total fill volume	35,000 cy	58,110 cy	22,073 cy
Total grading area	68,000 square yards (~ 14.0 acres)	45,225 square yards (~9.3 acres)	48,525 square yards (~10.0 acres)

Notes: cy = cubic yards

MARINA

Marina construction details are summarized in **Table 3-6**, below. Under Alternative 2, construction of the marina would require work within the Sacramento River and along the shoreline. Marina development would require demolition and removal of existing piles/moorings and a wooden pier, installation of 15–20 concrete piles, securing 8,000–13,000 square feet of floating docks, and installation of rock slope protection along the shoreline. Under Alternative 2, approximately 37,000 cy of excavation would be required for the marina. Some of the excavated soil and sediment could be reused on-site; wetter sediment could also be reused at a nearby upland area. Any excavated or dredged material not immediately removed from the work area would be covered or contained such that the storage piles do not result in any substantial odors. Because of the uncertainty of reuse options, for the purposes of this analysis, it is conservatively assumed that excavated soil and sediment would be off-hauled to a nearby landfill.

On the landward side of the marina, pile installation work would be conducted on land and the remaining pile installation work would be conducted on-water on a barge. The dock system would likely be fabricated off-site and delivered to the site by truck. A crane would then be used to offload the dock sections from the trucks and place them on a material barge to be towed to the specific location for each section. The sections would be assembled and installed in the appropriate place. As shown in Table 3-6, shoreline protection would also be installed on the landward side of the marina to absorb the energy of the waves. This effort would entail removing 3,200 cy of sediment across a 14,000-square-foot area and installing 2,000 cy of rock along the shoreline.

Under Alternatives 3 and 4, marina construction would involve land-based excavation, pile installation, and dock construction. Alternative 3 would require 71,000 cy of excavation and Alternative 4 would require up to 86,000 cy of excavation, both across an approximately 2-acre area. Similar to Alternative 2, any excavated or dredged material not immediately removed from the work area would be covered or contained such that the storage piles do not result in any substantial odors. It is conservatively assumed that excavated soil and sediment would be off-hauled to a nearby landfill.

Under Alternatives 3 and 4, pile-driving activities would be based on land. Depending on how the dock would be delivered to the site, the dock would be installed either from land or on barge. Other construction details, including equipment required for marina construction, are summarized in Table 3-6. The marina would likely be isolated from live waters (e.g., Sacramento or San Joaquin River) for most of the construction period by installation of an earthen barrier. A controlled breach of the earthen barrier between the river and marina would be conducted once the marina grades have been established.

Table 3-6. Marina Construction and Operation Characteristics

	Alternative 2	Alternative 3	Alternative 4
Demolition			
Existing Piles/Moorings to Be Removed	46	2	n/a
Existing Pier Removal (square feet)	4,350	7,800	n/a
Removal of Existing Piles Under Pier (square feet)	253		
Construction Equipment	Tug, crane barge, vibratory hammer, flat deck barge, and work skiff	Same as Alternative 2	n/a
Marina Construction			
Excavation Area (acres)	1.4	2.1	2.2
Excavation Volume (cy)	37,000	71,000	86,000
Dock Area (square feet)	12,700	8,000	8,000
Number of Piles	30-35	15–20	15–20
Rock Slope Protection (cy)	--	2,100	1,600
Construction equipment	For pile driving: crane barge, impact pile hammer, flat deck barge, tug, and work skiff For dock installation: crane, work skiff, generator, air compressor	For excavation: scrapers and dozers For pile driving: crane and impact pile hammer For dock installation: same as Alternative 2	Same as Alternative 3
Shoreline Protection			
Excavation Volume (cy)	3,200	--	--
Excavation Area (square feet)	14,000	--	--
Rock Volume (cy)	2,000	--	--

	Alternative 2	Alternative 3	Alternative 4
Rock Area (square feet)	14,000	--	--
Construction Equipment	Excavator, dozer, and work skiff	--	--
Maintenance Dredging			
Approximate Maintenance Dredge Volume (cy)[a]	7,000–11,000	10,000	11,000

Notes: cy = cubic yards

(a) Maintenance dredging for all action alternatives would occur every 10–15 years as needed.

BUILDINGS AND STRUCTURES

Construction of buildings and structures would include the following activities:

- forming, rebar installation, concrete delivery and placement;
- structural steel work (assembly, welding);
- electrical/instrumentation work;
- masonry construction; and
- installation of mechanical equipment and piping.

UNDERGROUND UTILITIES

Pipelines and underground utilities would be installed in open trenches by using conventional cut-and-cover construction techniques. This would involve clearing and grubbing, trenching and shoring, pipe installation, backfill, and surface restoration.

CONSTRUCTION EQUIPMENT

The main pieces of equipment that may be used during construction of the DRS are the following:

- track-mounted excavator
- loader
- small crane
- end dump truck
- ten-wheel dump truck
- paving equipment
- flat-bed delivery truck
- concrete truck

- bulldozer
- backhoe
- compactor
- front-end loader
- water truck
- forklift
- compressors/jack hammers
- grader
- mowing equipment (e.g., weed eaters, commercial lawnmowers)

Construction of the marina would involve use of the following pieces of equipment:

- tug
- crane barge
- vibratory hammer
- flat deck barge
- crane
- work skiff
- generator
- air compressor
- scraper and dozer (for off-channel marina)

CONSTRUCTION SCHEDULE

The exact dates and duration of construction are currently unknown. Construction activities would occur Monday through Friday between 7:00 a.m. and 5:00 p.m., consistent with City of Rio Vista and City of Stockton noise regulations. After-hours work and work on Saturdays, Sundays, and state-designated holidays may be necessary, and construction dates and hours may be adjusted to avoid or minimize impacts on sensitive wildlife species. Overall, DRS construction would occur over a 24- to 30-month period, although the ERS and FTC may be constructed at separate times.

CONSTRUCTION VEHICLE TRIPS AND ACCESS

Table 3-7 provides a summary of daily construction vehicle trips for each alternative. Construction activities would require up to approximately 141 workers with up to a maximum total of 131 trips per day. Primary access routes used for ingress/egress to the Rio Vista site could be on SR 12, Front Street, Second Street, and Beach Drive. Alternatively, access to the Rio Vista site could be on SR 12, Amerada Road, Emigh Road, Montezuma Hills Road, and Beach Drive. Primary access to the Ryde Avenue site would be on Interstate 5 (I-5) and Monte Diablo Avenue.

Table 3-7. Daily Construction Vehicles Associated with Construction Activities

Alternative	Construction Type	Maximum Daily Trips (one-way)			
		Construction Worker Trips	Vendor Trips	Hauling Trips	Total
Alternative 2	Land-based construction	134	56	74[a]	300
	Marina	10	0	26[b]	
Alternative 3	Land-based construction	148	62	121[a]	396
	Marina	10	0	86[c]	
Alternative 4	Land-based construction	150	63	46[a]	327
	Marina	10	0	81[d]	

Notes: The number of trips shown includes inbound and outbound vehicle trips.
[a] Hauling truck trips for all land-based construction work are expected to be spread out across 6 months.
[b] Under Alternative 2, marina construction is estimated to occur over 205 days.
[c] Under Alternative 3, marina construction is estimated to occur over 115 days.
[d] Under Alternative 4, marina construction is estimated to occur over 135 days.

3.2.7 Operation and Maintenance Activities

Marina

The boats stored at the ERS would operate at different times of the year and varying frequencies. Most IEP activities are seasonal, taking place exclusively during a particular period such as spring or fall. Vessels that require hull inspection or maintenance during a given season would be pulled out and stored in the open or covered dry-dock boat storage area. Otherwise, boats would remain in the marina throughout the year. Marina maintenance dredging volumes for each alternative are presented in Table 3-6, above. Maintenance dredging would occur every 10–15 years on an as-needed basis.

Aquaculture

The FTC would provide facilities for a range of fish culture activities, including spawning, incubation, juvenile rearing, and adult holding. Although facility operations would vary based on the needs of each fish species, Delta Smelt would likely be one species studied at the FTC. Operation of the aquaculture component of the Delta Smelt program would consist of a captive broodstock program initially using fish received from the FCCL. The fish are expected to serve as a backup to the genetic refugial population at the FCCL. Eggs would be incubated in vertical column-style incubators; once the hatched eggs rise to the surface of the incubators, the eggs would be collected in 5-gallon buckets. The larval and juvenile fish would be reared in 130-liter and 400-liter tanks on recirculating water. Once the fish are mature, they would be transferred to 1,100-liter tanks in which the fish would live as adults. These adults would then be spawned to become the next generation of the captive broodstock program.

WATER USE, WASTEWATER, AND MANAGEMENT

Potable water demands generated by the office buildings and other employee facilities are estimated at a maximum of approximately 0.08 million gallons per day (mgd). Sanitary sewer demands generated by these facilities would be approximately 0.06 mgd. Potable water would be provided by either the City of Rio Vista (Alternatives 2 and 3) or the City of Stockton (Alternative 4). Sanitary sewage generated by the ERS and FTC facilities would be directed to the City of Rio Vista's or the City of Stockton's sanitary sewer system and treated at the local wastewater treatment plant.

Based on preliminary estimates of facility operation and demand (MWH 2014), water demand for the FTC aquaculture operation could be as high as 3,000 gallons per minute. Until the specific fish species to be reared at the FTC have been determined, it is not possible to quantify the facility's exact water needs. A Delta Smelt program that is similar in size to the current program at the FCCL would require approximately 100 gallons per minute of water on a continuous basis and would discharge the same amount. During tank filling and cleaning activities, an additional 100–200 gallons per minute would be required to fill empty tanks or replace water lost during tank cleaning or filter backwashing. As previously described in Section 3.2.2, Components Common to All Action Alternatives, operation of the FTC aquaculture facilities would rely primarily on groundwater, but small quantities of surface water would be blended with the well water for temperature adjustment or for acclimation of the fish prior to release. Any surface water that is used would need to be filtered and disinfected to provide the same level of protection against pathogens as the well water provides. Because the quantity and timing of surface water diversion is not known at this time, it has not been evaluated in this EIR/EIS. The water treatment facility would use high-rate (i.e., high-pressure) sand filters for solids removal and either ultraviolet or ozone-based disinfection methods for pathogen removal.

National Pollutant Discharge Elimination System (NPDES) permits are usually required for effluent from aquaculture facilities that exceed an annual production of 20,000 pounds of fish or use more than 5,000 pounds of feed in a month. The FTC is not expected to exceed these amounts, and hence is likely exempt from NPDES permit requirements (MWH 2014). Because the FTC is a conservation and research facility, however, an on-site treatment system would be established. Effluent would pass through drum filters and the concentrated solids (sludge) from the filters would be stored in evaporation ponds (sedimentation basins). The underground holding tank would prevent the peak flow that typically occurs during tank cleaning from exceeding the capacity of the drum filters and causing them to overflow. After the sludge has dried in the evaporation pond, the material would be hauled off-site to a landfill for disposal. At this time, it is not anticipated that a processing system would be needed to remove aquaculture chemicals like formalin. After the process water is treated, the effluent would be discharged to either the Sacramento River (under Alternatives 2 and 3) or the Stockton Deepwater Ship Channel (under Alternative 4).

ELECTRICITY AND NATURAL GAS

PG&E would likely provide electricity and natural gas to the DRS at either the Rio Vista or Stockton site.

Chemical Use and Storage

Various chemicals would be stored on-site at the ERS laboratory and storage facility and the FTC buildings. Within these buildings, all chemicals would be stored in a designated chemical storage area and in accordance with manufacturer's safety and security protocols. This would include use of appropriate containers, secondary containment as appropriate, and best management practices.

A list of chemicals that would be stored on site is provided in **Table 3-8**. Large volumes of ethanol and formalin would be stored at the ERS and FTC, as both are used for preserving benthic samples. The shop and/or storage space would also store gasoline, coolant, and used oil; paint; sealant; engine enamel; lubricant; and other chemicals required for boat maintenance. Substantial quantities of these chemicals would be stored in 50-gallon drums to eliminate down time in the labs due to shortages. Operation and maintenance of the laboratory and storage facility would include preparation of a hazardous materials business plan; training for employees; use of proper storage containers and storage buildings; an inventory of the Proposed Project's hazardous materials; and an emergency response plan as required by the Certified Unified Program Agency.

Table 3-8. Chemicals Used for IEP Activities, Identified by Agency

Chemical	DWR	USFWS	CDFW
Acetic acid (10%)			X
Acetylene (gas)		X	
Alkaline iodine-azide powder pillows (solid)	X		
Argon (gas)		X	
Carbon dioxide (gas)		X	
Carbon dioxide (solid)			X
Ethanol (10%)		X	
Ethanol (70% and 95%)	X	X	X
ExterminOdor		X	
Finquel		X	
Formalin (5%)			X
Formalin (10%)	X	X	X
Formalin (37%)		X	
Formaldehyde (37%)			X
Formazin	X		
Hydrochloric acid			X
Iodine solution (5%)	X	X	
Magnesium carbonate, anhydrous	X		
Magnesium sulphate powder pillows	X		
Neutralex	X		X
Nitric acid ampules	X		

Chemical	DWR	USFWS	CDFW
Nitrogen (liquid)	X		X
Ovadine		X	
Oxygen (O_2)		X	
Poly Form F	X		
Potassium biphtahalate-4 pH buffer	X		
Potassium chloride			X
Potassium hydroxide			X
Rhodamine	X		
Rose Bengal	X	X	
Sodium bicarbonate (baking soda)	X		
Sodium phosphate dibasic			X
Sodium phosphate monobasic			X
Sodium sulfite			X
Sodium thiosulfate			X
Sulfamic acid powder pillows	X		
Sulfuric acid			
Trichloro trifluoreothane			X

SOLID WASTE DISPOSAL

Domestic waste generated at the DRS facilities and would be collected and disposed of by a local solid waste disposal company. As described above, once sludge from the on-site evaporation pond is dry, the material would be collected and disposed of at an off-site landfill. Hazardous waste chemicals generated in the laboratories would be stored in appropriate biohazard waste containers in the chemical storage area prior to disposal at an offsite hazardous waste facility.

VISITATION AND MAINTENANCE

Once the DRS is constructed, up to 180 workers would be employed at the ERS and FTC. Most of these workers would commute from various places throughout the Bay-Delta region. For the purposes of this Draft EIR/EIS analysis, it has been assumed that most employees live within one hour's travel time from the DRS. (See the analysis in Chapter 19, *Population and Housing*, for more information about these assumptions.)

As meetings and conferences would be held at the DRS for various IEP projects, it is expected that visitors would come and go intermittently throughout the work day. During monthly meetings, up to 20 visitors may be at the DRS.

The ERS and FTC facilities would be maintained by one to two employees with support from contractors to conduct janitorial, landscaping, and grounds maintenance activities.

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Chapter 4
Introduction to the Environmental Analysis

4.1 Overview

This chapter provides introductory information related to the evaluation of environmental impacts associated with the DRS alternatives. Specifically, the chapter introduces the overall approach to the environmental setting and impacts analysis; describes how the significance of environmental impacts is evaluated; and discusses resource topics eliminated from detailed analysis in this Draft EIR/EIS.

4.2 Resource Chapter Organization

Chapters 5 through 19 address the range of environmental resource topics identified in CEQA and NEPA. These chapters are organized as follows:

- **Environmental Setting**. This section includes a description of the environmental setting and background information related to the resource topic, to help the reader understand the types of resources that could be affected by the various alternatives for implementation of the Proposed Project.
- **Regulatory Setting**. This section describes the federal, state, and local laws, regulations, and policies that pertain to the resource or to the assessment of impacts on the specific resource.
- **Methods of Analysis and Significance Criteria**. These sections describe the methodology and significance criteria used to identify and evaluate the potential environmental impacts that may result from implementation of each alternative.
- **Environmental Impacts**. This section describes environmental impacts associated with each alternative, including the significance of each potential impact. In many instances, the environmental impact discussions are organized by the following components: ERS, FTC, and the DRS collectively. The purpose for organizing the impact analysis in this manner is to aid the reader in understanding the potential effects associated with each of the two main components of the DRS, as well as the impacts of the Proposed Project as a whole. In addition, this approach to the analysis provides clarity regarding the impact conclusions and mitigation measures, if any, that apply to a specific facility. In other instances, where the environmental effects for all three scenarios are the same, the impact discussion is combined.
- **Mitigation Measures**. As appropriate, mitigation measures are proposed following the discussion of potentially significant impacts. These would allow DWR and USFWS to avoid, minimize, rectify, reduce, eliminate, and/or compensate for potentially significant impacts.

4.3 Significance of Environmental Impacts

Chapters 5 through 19 include an evaluation of the direct and reasonably foreseeable indirect impacts associated with implementation of the various Proposed Project alternatives. Under CEQA, the significance of an individual impact needs to be described. Under NEPA, however, the purpose of an EIS is to describe and disclose impacts of each alternative. To facilitate both CEQA and NEPA reviews, the "Environmental Impacts" section in each resource chapter describes potential resource-specific impacts, including a threshold of significance, mitigation measure(s) to address significant impacts, and a statement of each impact's significance before and after mitigation. Below is a brief description of the baseline environmental conditions, CEQA and NEPA requirements, and the approach used for evaluating impacts in this Draft EIR/EIS.

4.3.1 Environmental Baseline of the Analysis

Both CEQA and NEPA have requirements regarding the establishment of baseline conditions against which environmental impacts are measured. Under CEQA, baseline conditions are typically defined as the physical conditions that exist in the project area at the time that the NOP is circulated (State CEQA Guidelines Section 15126.2[a]). NEPA does not provide specific guidance for using a baseline to determine an action's significant effects on the human environment. However, *Forty Most Asked Questions Concerning CEQ'S NEPA Regulations* (CEQ 1981) provides that the no-action alternative may be used as a "benchmark, enabling decision makers to compare the magnitude of environmental effects of the action alternatives."

For the purposes of this joint document, baseline conditions are considered to be represented by the existing conditions at the time the NOP was circulated. In addition, this Draft EIR/EIS compares the future effects of the action alternatives to the future conditions under the No Action Alternative (referred to in this EIR/EIS as the "No Project Alternative") in cases where the future conditions under the No Action Alternative would be different from existing baseline conditions.

4.3.2 CEQA Thresholds of Significance

CEQA requires that an EIR define a threshold of significance for each impact that may occur to the physical environment. A threshold of significance, or significance criterion, is an identifiable quantity, quality, or performance level of a particular environmental effect. In general, potential impacts are identified as either significant (exceeding the threshold) or less than significant (below the threshold).

Under CEQA, impacts of a proposed project are assessed relative to the environmental baseline. Impacts of a proposed project are limited to changes in the baseline physical conditions of the environment (State CEQA Guidelines Section 15125[a]) that would result directly, indirectly, or cumulatively from the proposed project or program. CEQA does not require the lead agency to consider impacts that are speculative (State CEQA Guidelines Section 15145); in cases where the impacts of the Proposed Project are considered speculative, this Draft EIR/EIS has concluded that there would be no impact.

4.3.3 NEPA Significance Requirements

In general, the issues that must be considered under NEPA are consistent with the analysis under CEQA. NEPA requires analysis of direct and indirect effects of a proposed project. However, the NEPA guidance for determining the significance of a proposed project's impacts is more general and requires that the overall significance of the project's impacts be described in terms of context and intensity. In addition, with regard to thresholds of significance, the CEQ NEPA guidelines use qualitative descriptions of the concepts and factors that should be taken into account in determining whether a project has significant impacts (40 CFR Section 1508.27).

4.3.4 Approach to the Environmental Analysis

For the purposes of this Draft EIR/EIS, significance criteria are drawn mostly from the State CEQA Guidelines Appendix G: Environmental Checklist Form. From the standpoint of NEPA, because this document is an EIS rather than an environmental assessment/finding of no significant impact, it is presumed that the Proposed Project would result in a significant impact; therefore, no further discussion as to significance pursuant to NEPA is provided.

Each environmental resource topic is evaluated in a separate chapter. Each chapter contains impact statements that identify the mechanism of impact of a specific Proposed Project activity on a specific environmental attribute. Each impact statement is tied to one or more significance criteria. Each impact statement is followed by an analysis that characterizes the potential physical change as a result of each alternative compared to the environmental baseline, relative to one or more significance criteria. If a significant impact is identified, mitigation measures are included that, if feasible, would be implemented to avoid, minimize, rectify, reduce, eliminate, and/or compensate for the significant environmental impact. In some cases, a significant impact may be identified as unavoidable if the impact would likely remain significant after application of all feasible mitigation measures or if no feasible mitigation measures exist.

Some resource topics, such as socioeconomics and environmental justice, require evaluation under NEPA but not under CEQA. As such, Chapter 18, *Socioeconomic Effects and Environmental Justice*, evaluates these issues in accordance with NEPA and also considers whether they would result in a physical effect on the environment (in compliance with CEQA).

4.4 Impact Terminology

This Draft EIR/EIS uses the following terminology to describe environmental effects of each alternative:

- A finding of ***no impact*** is made when the analysis concludes that an alternative would not affect a particular environmental resource or issue.
- A potential impact is considered ***less than significant*** if the analysis concludes that an alternative would not result in a substantial adverse change in the environment, and no mitigation is needed.

- A potential impact is considered ***less than significant with mitigation*** if the analysis concludes that an alternative could result in a substantial adverse effect on the environment, and mitigation is identified as described below.
- A potential impact is considered ***significant and unavoidable*** if the analysis concludes that an alternative could result in a substantial adverse effect on the environment and the impact would remain significant after application of all feasible mitigation measures.
- ***Mitigation*** refers to specific measures or activities that would be implemented by DWR and/or USFWS to avoid, minimize, rectify, reduce, eliminate, and/or compensate for an impact resulting from an alternative.
- A ***cumulative impact*** can result if a change in the environment results from the incremental impact of an alternative when added to similar impacts of other related past, present, or reasonably foreseeable future projects or programs. Significant cumulative impacts may result from individually minor but collectively significant interactions among projects. The cumulative impact analysis in this Draft EIR/EIS (provided in Chapter 20) focuses on whether the alternative's incremental contribution to identified cumulatively significant impacts caused by past, present, or probable future projects would be considerable (i.e., significant).

4.5 Sections Eliminated from Further Analysis

Two resource topics have been eliminated from further analysis based on the nature and scope of the Proposed Project activities. A brief summary and description of each of these resource topics is provided below.

4.5.1 Agricultural and Forestry Resources

Neither the RVARC site in Rio Vista nor the Ryde Avenue site in Stockton is used or zoned for agricultural activities. According to the California Department of Conservation (CDC), both the RVARC site and the Ryde Avenue site are located on land designated "urban and built-up land" (CDC 2013a, 2013b, 2014a, and 2014b). As a result, the Proposed Project would not alter land use designations or farmland/timberland classifications at either the local or state level. No Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, forest lands, or lands under a Williamson Act contract would be converted by or conflict with the Proposed Project. As such, no impact on agricultural or forestry uses would occur.

4.5.2 Mineral Resources

Neither the City of Rio Vista nor the City of Stockton has any designated mineral resources zones. Rio Vista contains substantial natural gas deposits, including the Rio Vista Gas Field, the largest natural gas field in California (City of Rio Vista 2011). Although none are present at the RVARC site, natural gas well reserve sites are located throughout Rio Vista on undeveloped or agricultural lands (City of Rio Vista 2002). Historically, other resources that were mined throughout San Joaquin County include placer gold, silver, coal, and manganese ore. Extraction of these minerals was focused in the southwestern portion of San Joaquin County in the vicinity of the San Joaquin River (City of Stockton 2007).

According to the CDC's Division of Mines and Geology (which became the California Geological Survey in 2006), both the RVARC site in Rio Vista and the Ryde Avenue site in Stockton are classified as MRZ-1, a mineral resource zone where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence (CDC 1999; California Geological Survey 2012). In addition, the Proposed Project would not involve any activities that could directly affect mineral production sites or prevent future availability of mineral resources. Therefore, no impact on mineral resources would result.

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Chapter 5
Aesthetics

This chapter describes the existing visual and aesthetic resources in the vicinity of the RVARC site in Rio Vista and the Ryde Avenue site in Stockton, as well as relevant state and local plans and policies pertaining to protection of visual and scenic resources. The potential impacts on scenic resources, public views of scenic vistas, visual character of the two sites, and nighttime views of and from the project site during construction and operation of the Proposed Project and alternatives are evaluated, and mitigation is proposed to address impacts found to be significant.

The term "aesthetics" refers to visual resources and the quality of what can be seen or the overall visual perception of the environment. Aesthetics may include such characteristics as building scale and mass, design character, and landscaping. Visual impacts are analyzed through an examination of views and/or viewsheds. Views refer to visual access and obstruction of prominent visual features, including specific visual landmarks and panoramic vistas. Viewsheds refer to the visual qualities of a geographic area, typically defined by the horizon, topography, and other natural features that give an area visual boundary and context. Viewshed impacts are typically characterized by the loss and/or obstruction of existing scenic vistas or other important views in the area of the site that are available to the general public. Sensitive viewers are individuals or groups that are particularly affected by changes to the aesthetics of the surrounding area. View analysis is based on relative visibility with regard to viewing location and proposed on-site development.

5.1 Environmental Setting

5.1.1 Rio Vista Army Reserve Center Site

The RVARC site is located east of Beach Drive in the southern part of Rio Vista (see Figure 3-1 in Chapter 3, *Description of Alternatives*). The site is composed of two relatively flat terraces running parallel to the Sacramento River, separated by a slightly steeper transition zone. The lower terrace lies a few feet above the river and the upper terrace is approximately 15 feet higher (City of Rio Vista 2011). A number of tall, mature trees and other ornamental shrubs and trees located between the two terraces form a backdrop to the historical waterfront buildings and wharves. Riparian vegetation lines the river, marsh vegetation occurs along the edges of a large boat ramp, and a few shrubs and trees cover the remainder of the site, along with weedy, mowed grasses. Chain-link fencing borders the site; some fencing also divides the interior portions of the site. A few large boats and barges are moored at the docks and in the river adjacent to the site.

Visual Character and Quality of the Rio Vista Army Reserve Center Site and Vicinity

Rio Vista's visual character is defined by the Sacramento River to the east, the Montezuma Hills to the west, the city's historical downtown to the north of the RVARC site, and maritime/industrial uses associated with the RVARC site itself and the U.S. Coast Guard station to the south. This river town is also defined by the State Route (SR) 12 drawbridge spanning the river, freighters and pleasure craft that travel up and down the river, and tugs and barges that tie up at the river's edge (MIG 2011). The rolling grasslands of the Montezuma Hills provide long views of the river and bridge, Mount Diablo, and surrounding Delta farmland. Rio Vista's historical downtown and traditional neighborhoods link the city to the waterfront and its past, providing a strong small-town charm and sense of community.

The lower terrace at the RVARC site contains the original historical waterfront complex of buildings and wharves, including a large repair shop and two large warehouses, several smaller buildings, an elevated water storage tank, a large boat ramp, four docks, and 14 moorings in the river. These facilities were built as early as 1919 and have been vacant for decades. Because of their height, scale, and visibility, the principal features at the site are the two large warehouses, main repair shop, and water tower. The elevated water storage tank, in particular, is a distinctive landmark visible from distant views (City of Rio Vista 2011). The buildings at the site show signs of deterioration and vandalism, such as broken windows, missing doors, and holes in walls and roofs. Although the buildings have not been maintained and are dilapidated, these unique waterfront facilities convey the site's original function.

Viewer Groups

Publicly accessible views of the RVARC site are primarily available from Beach Drive and the paved path parallel to the road. From these viewpoints, motorists on Beach Drive and recreationists (e.g., pedestrians and bicyclists) using the adjacent path have views of the upper terrace of the site, some of the historical structures, moored boats, and portions of the Sacramento River. Because of the road's proximity, the site's flat upper terrace is highly visible and the lower terrace is moderately visible in the northern portion of the site for viewers on Beach Drive and the adjacent path. At the southern end of the site, views of the lower terrace are somewhat obscured by mature trees, fencing, and U.S. Coast Guard buildings.

Residents near the site's northwest and southwest corners and at the top of the Montezuma Hills also have views of the site. The site's waterfront is visible to boaters traveling up and down the Sacramento River. Because of the site's high visibility to nearby residents and recreationists and its rural, relatively open, and historical character, the visual sensitivity of the site is considered moderate.

View Points

River Road (SR 160) is located approximately 0.5 mile east of the RVARC site across the Sacramento River, and views of the site are available from some portions of the highway.

From this state-designated scenic highway, primary views consist of the river to the west and rural open space and agricultural lands to the east. Because of the RVARC site's distance and the speed of travel on SR 160 (posted speed limit of 45 miles per hour [mph]), views are generally fleeting and viewer sensitivity is considered low.

Other waterfront portions of the site and the water tower are visible from the Point Waterfront Restaurant and the RV park at the end of Marina Drive, the Delta Marina and Yacht Harbor, residences along Edgewater Drive, and Sandy Beach County Park. More distant views of the waterfront portion of the site are also available from parts of the downtown waterfront and the SR 12 drawbridge entering Rio Vista (City of Rio Vista 2011).

Four key views of the RVARC site were identified during the inventory of existing conditions: View 1 from the entrance at the northwestern corner of the RVARC site at Beach Drive; View 2 from Beach Drive looking east toward the warehouse (Building T-11); View 3 from Beach Drive looking northeast toward the water tower; and View 4 from SR 160 looking west toward the site. **Figure 5-1** shows the location of these views and **Figure 5-2, Photos 1 through 4** present the views. Photographs were taken on February 17 and 19, 2015.

View 1: RVARC Site from Beach Drive Entrance

View 1 is from the northwestern corner of the RVARC site looking southeast from Beach Drive. The primary visual features at this location are trees and shrubs lining the fence line, overhead power lines, and foreground views of the RVARC site. As shown in **Figure 5-2, Photo 1**, the entrance road is visible in the foreground behind the fencing. Additionally, the warehouse (Building T-11) is partially visible from this road but screened by vegetation and mature trees along the road.

View 2: Warehouse (Building T-11) from Beach Drive

View 2 is from Beach Drive looking east toward the northern portion of the RVARC site. As shown in **Figure 5-2, Photo 2,** the paved path, chain-link fencing, and upper terrace of the site are visible in the foreground, similar to View 1. The upper terrace is primarily comprises ruderal, non-native grass and low-lying shrubs. Partially visible beyond the upper terrace are ornamental trees, wharf, marine railway, warehouses, and Sacramento Riverfront. Because the lower terrace slopes toward the river and due to the presence of intervening trees and vegetation, views of the buildings and structures along the waterfront are largely screened.

View 3: RVARC Site, Including Water Tower, from Beach Drive

View 3 is from Beach Drive looking northeast toward the southern portion of the RVARC site (see **Figure 5-2, Photo 3**). In the foreground, views consist of the paved path, overhead power lines, non-native grasses and shrubs, fencing, and trees. Mature trees and the water tower are clearly visible in the middle ground. Due to distance, intervening vegetation, and fencing, views of the historical waterfront complex are not visible from this viewpoint.

VIEW 4: RVARC SITE FROM SR 160

View 4 is from SR 160 looking west across the Sacramento River toward the RVARC site (**Figure 5-2, Photo 4**). From this state-designated scenic highway, westward views are predominantly of the Sacramento River, but distant views of the RVARC site are also available. Weather conditions were overcast when the photo of View 4 was captured, but mature trees, warehouses, and other historical waterfront structures (depicted in white) are slightly visible. From this viewpoint, the U.S. Coast Guard station and the Delta Marina Yacht Harbor Resort are also slightly visible (shown to the left and right, respectively, of the RVARC site).

NIGHTTIME LIGHT AND DAYTIME GLARE

Sources of nighttime light at the RVARC site include those typical of smaller communities such as outdoor street lighting, parking lot and storage yard lights, building lighting, signs, vehicle headlights, and interior lighting visible through windows. Windows, architectural coatings, and other reflective surfaces are sources of daytime glare.

In the vicinity of the RVARC site, sources of nighttime light include the Delta Marina Yacht Harbor Resort to the north and the U.S. Coast Guard station, Beach Drive Wastewater Treatment Plant, and Sandy Beach County Park to the south. The site itself is relatively dark at night, offering relatively clear night sky access for visitors and recreationists at Sandy Beach County Park, and this contributes to Rio Vista's small-town community character.

5.1.2 Ryde Avenue Site

The Ryde Avenue site is located at 845 Ryde Avenue in Stockton (see Figure 3-3 in Chapter 3) and is bounded by the Stockton Deep Water Ship Channel (DWSC) to the south, the U.S. Navy Reserve Training Center to the west, a mobile home park and single-family residences to the north, and large-scale warehouses to the east. The Port of Stockton is located across the Stockton DWSC from the Ryde Avenue site. The Ryde Avenue site is flat and undeveloped, and consists of gravel, bare ground, and ruderal vegetation. The site is bordered by chain-link fencing with screens and barbed wire. Mature trees and shrubs also border the site along West Fremont Street.

VISUAL CHARACTER AND QUALITY OF THE RYDE AVENUE SITE AND VICINITY

The Ryde Avenue site is situated in the south-central portion of Stockton. The area surrounding the Ryde Avenue site is characterized by a mix of industrial, warehousing, and waterfront uses; the Stockton DWSC; the Port of Stockton; and residential and commercial uses. Most of the site is not publicly visible because it is screened by fencing, trees, and shrubs along West Fremont Street. Because of the industrial character of the Ryde Avenue site and the site's limited visibility from the north, the site has low to moderate visual quality.

Horizon WATER and ENVIRONMENT

Figure 5-1

RVARC Site Photo Locations

Photo 1: Northwestern portion of RVARC site looking southeast from Beach Drive (near existing site entrance).	
Photo 2: Northern portion of RVARC site looking east from Beach Drive.	

Figure 5-2
Views of the RVARC Site

Horizon WATER and ENVIRONMENT

Photo 3: Southern portion of existing RVARC site looking east from Beach Drive.	
Photo 4: View from SR 160 looking west across the Sacramento River and towards the RVARC site.	

Figure 5-2
Views of the RVARC Site

VIEWER GROUPS

Views of the site's perimeter are available from residences along Monte Diablo Avenue, West Fremont Street, and Ryde Avenue and for motorists traveling on these roads. Views of the site from these residences to the north are primarily screened by mature trees, fencing, and a vegetated berm. Ships and barges traveling along the Stockton DWSC have close-up and intermittent views of the site. Because the setting surrounding the Ryde Avenue site is mostly industrial, the viewer sensitivity of boaters is considered moderate to low. Workers at the Port of Stockton (south of the site and Stockton DWSC) also have views of the site. Because this viewer group is accustomed to the ongoing operation of industrial activities, viewer sensitivity of this particular group is also considered low.

KEY VIEWS

Three key views of the Ryde Avenue site were identified during the inventory of existing conditions: View 5 from Ryde Avenue approximately 135 feet south of its intersection with Acacia Street looking south toward the site; View 6 from the corner of Ryde Avenue and West Fremont Street looking south toward the site; and View 7 from the intersection of West Fremont Street and Queen Avenue looking southwest toward the site. Photographs of the key views were taken during a site visit on February 18, 2015. Error! Reference source not found. shows the locations of these viewpoints and **Figure 5-4, Photos 5 through 7** present these three views of the Ryde Avenue site.

VIEW 5: RYDE AVENUE SITE FROM RYDE AVENUE

View 5 is from Ryde Avenue, approximately 200 feet north of its intersection with West Fremont Street (see Error! Reference source not found.**, Photo 5**). This viewpoint is looking south toward the Ryde Avenue site. From this viewpoint, the northern perimeter of the site is visible. As shown in the photo, the site itself sits at a higher elevation than Ryde Avenue. Views of the site are largely screened by fencing, mature trees, and the site's elevated topography. From this viewpoint, overhead electrical lines and wooden poles are also visible to the west and residential development can be seen to the east.

VIEW 6: RYDE AVENUE SITE FROM RYDE AVENUE/WEST FREMONT STREET CORNER

View 6 is from the corner of Ryde Avenue and West Fremont Street looking south toward the site (see Error! Reference source not found.**, Photo 6**). Primary views are of fencing, ruderal vegetation, and the site's paved entryway. With the exception of views available through the entrance gate, the site is largely screened by fencing and the site's elevated topography.

VIEW 7: RYDE AVENUE SITE FROM WEST FREMONT STREET/QUEEN AVENUE INTERSECTION

View 7 is from the West Fremont Street/Queen Avenue intersection looking southwest toward the site (see Error! Reference source not found.**, Photo 7**). Similar to Views 5 and 6, the view from this perspective includes mature trees, shrubs, and metal fencing with screening. The Ryde Avenue site sits at a higher elevation than West Fremont Street, which also contributes to the lack of site visibility.

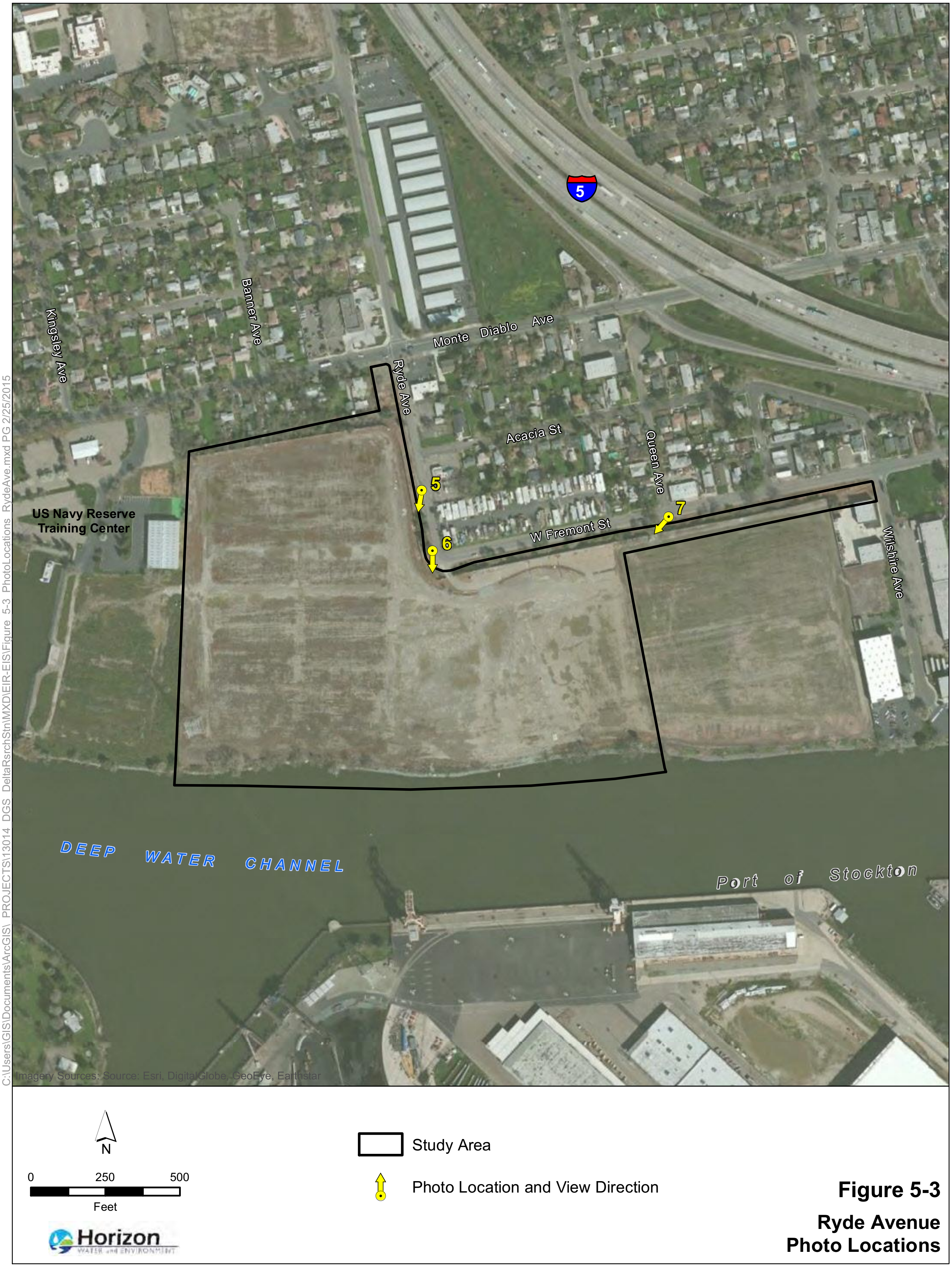

Figure 5-3

Ryde Avenue Photo Locations

View 5: Existing Ryde Avenue site from Ryde Avenue looking south.	
View 6: Existing Ryde Avenue site entryway from the corner of Ryde Avenue and West Fremont Street looking south.	

Figure 5-4
Views of the Ryde Avenue Site

Horizon WATER and ENVIRONMENT

View 7: Northern perimeter of Ryde Avenue site looking southwest from West Fremont Street.	

Figure 5-4
Views of the Ryde Avenue Site

NIGHTTIME LIGHT AND DAYTIME GLARE

No development is present within the Ryde Avenue site; therefore, no nighttime lighting exists on the site. Sources of nighttime lighting in the vicinity are nearby warehouses and industrial facilities, residential areas, and the Port of Stockton. Sources of daytime glare are reflective surfaces of adjacent warehouses, industrial facilities, and residential buildings (e.g., window glass, metal panels).

5.2 Regulatory Setting

No federal laws, regulations, or policies pertain to the visual resources associated with the Proposed Project alternatives. The following subsections describe applicable state and local laws, regulations, and policies regarding aesthetics.

5.2.1 State Laws, Regulations, and Policies

In 1963, the California State Legislature established the California Scenic Highway Program, a provision of the Streets and Highways Code, to preserve and enhance the natural beauty of California (California Department of Transportation [Caltrans] 2014). The program provides protection for designated scenic highways and highways that are eligible for designation as scenic highways.

SR 160 is an officially designated State Scenic Highway from the Contra Costa County line to the southern city limit of Sacramento. This highway meanders through the Delta's agricultural areas and small towns along the east bank of the Sacramento River. SR 160 is across the river, approximately 0.5 mile from the RVARC site's river edge.

5.2.2 Local Laws, Regulations, and Policies

CITY OF RIO VISTA GENERAL PLAN

The *City of Rio Vista General Plan*'s Resource Conservation and Management Element (City of Rio Vista 2002) includes the following goals and policies pertinent to visual resources:

Goal 10.11 To protect the visual and scenic resources of Rio Vista – recognizing their importance in the quality of life for City residents and in promoting recreation and tourism.

Policy 10.11.A The City shall require new development in scenic areas (e.g., river banks, Highway 12 corridor, Sacramento River waterfront, and hillsides) to use planning, design, construction, and maintenance techniques that: incorporate design and screening measures to minimize the visibility of structures and graded areas; maximize views in sensitive viewing areas and corridors; and maintain the character and visual quality of the area.

Policy 10.11.D The City shall require that development maximizes the amount of open space frontage accessible to public view.

Goals and policies from the General Plan's Community Character and Design Element (City of Rio Vista 2002) include the following:

Policy 5.15.B Where building orientation on the street is not feasible, the City shall require that businesses have landscaped setbacks from adjacent streets.

Policy 5.15.C The City shall ensure that new structures are complementary to (and not clash with) existing structures.

Policy 5.15.D The City shall require that all loading, delivery and storage areas, and mechanical and utility equipment are screened from views on public streets and pedestrian corridors.

Policy 5.15.F The City shall require that site design and architecture protects the privacy of adjacent developments.

Goal 5.19 To incorporate lighting and signage elements into a community design that retains the traditional character of Rio Vista.

Policy 5.19.B. The City shall ensure that corporate logos and images are designed into structural elements that related to the community as a place.

Policy 5.19.C. The City shall ensure that the view of onsite lighting is shielded from those outside the premises to the greatest extent feasible.

Goal 5.21 To ensure that reconstruction and new additions enhance rather than detract from the surrounding neighborhood.

Policy 5.21.A The City shall ensure that new buildings and additions are constructed to a height, massing, and scale that bear a reasonable relationship to adjacent buildings.

Goal 5.22 To ensure that the distinguishing qualities and original character of a building, structure, or site and its environment are not destroyed.

Policy 5.22.A The City shall ensure that remodeling and rehabilitation of existing structures preserve and enhance the historic character of the structure to the greatest extent feasible.

Policy 5.22.B The City shall discourage alterations with no historic basis or that seek to create an appearance from an earlier or later historic period.

Policy 5.22.D The City shall ensure that deteriorated architectural features are repaired, rather than replaced, whenever feasible.

Policy 5.22.E The City shall ensure that demolitions of historic structures are considered a "last-resort" remedy for buildings in such disrepair that they are beyond rescue and are creating blight and threatening public health and safety. Prior to any demolition, the City shall ensure that the neighborhood interest will be served best by removal and that demolition is the only reasonable course of action.

ARMY BASE DISTRICT DESIGN GUIDELINES

The *Army Base District (ABD) Design Guidelines* were developed to establish a planning and design framework leading to the redevelopment of the RVARC in the best interests of Rio Vista. The guidelines are intended to supplement design criteria contained in the General Plan Community Character and Design Element and the City of Rio Vista zoning requirements (MIG 2011).

CITY OF STOCKTON GENERAL PLAN

The *City of Stockton General Plan* (2007) indicates that the most important visual features in Stockton are open space, agricultural fields, and extensive riparian areas. Another important visual feature identified in the plan is the Stockton DWSC, which is just south of the Ryde Avenue site. General Plan goals and policies relevant to visual resources in the vicinity of the Ryde Avenue site include the following:

Policy NCR-2.18 *Minimize Lighting Impacts*. The City shall ensure that lighting associated with new development or facilities (including street lighting, recreational facilities, and parking) shall be designed to prevent artificial lighting from illuminating adjacent natural areas at a level greater than one foot candle above ambient conditions.

Goal NCR-6 To provide and maintain open space resources in Stockton and surrounding areas.

Goal RW-5 To preserve and enhance waterways for recreation and open space.

Goal CD-7 To convey and enforce expectations for higher quality design.

Policy CD-7.1 *Design Review Process*. The City shall ensure that public and private projects comply with City design policies, plans, and guidelines through a Citywide Design Review Process.

Policy CD-7.2 *Public Investment.* The City shall require that public investment, such as buildings and roadway projects, comply with City urban design policies.

STOCKTON CITYWIDE DESIGN GUIDELINES

As described in Policy CD-7.1, all new development in the City of Stockton is subject to a design review process that includes a review of architecture and site planning. Design review is based on a series of guidelines prepared by the City to assist those persons involved in the design, construction, review, and approval of development in Stockton. The *Stockton Citywide Design Guidelines* (2004) seek to provide a common understanding, based on development types and locations, of the minimum design standards the City expects of all new development. The design review process is used to evaluate projects for conformance with these guidelines and other relevant policies and ordinances, and for the inclusion of appropriate environmental mitigation. Specific design guidelines applicable to Alternative 4 include those for industrial and warehouse facilities and those for the

Stockton Channel area, which generally includes lands adjacent to the Stockton DWSC. Guidelines that pertain to the aesthetics of Alternative 4 include the following:

STOCKTON CHANNEL AREA DESIGN GUIDELINES

Building Orientation

- Buildings should be oriented toward the waterfront and public rights-of-way (i.e., streets and promenades) and placed close to pedestrian movement areas.
- Service and storage areas should not be placed adjacent to the street where they may be difficult to screen. Interesting street façades should be maintained.

Parking and Circulation

- Parking lots and/or parking structures should not front on the water's edge. The waterfront environment should be preserved and enhanced for the enjoyment of the public.

Landscaping and Amenities

- Landscaped buffers should be provided between residential neighborhoods and more intense commercial and light industrial uses.

Existing Architectural Character

- The architectural character of the Channel area is a mix of both industrial and maritime building styles, including materials and design details of brick, corrugated metal, wood, and heavy timbers. New construction and redevelopment should refer to and reinforce the importance of the waterfront along the Channel.

Building Scale, Massing, and Articulation

Maintaining the appropriate building scale, massing, and attention to simple details are important to creating a rich and vibrant waterfront environment. This can be accomplished as follows:

- Incorporate simple modulation of building elevations and roofscapes.
- Sloped or shed roofs are encouraged where appropriate.
- Architectural treatment should be consistent on all sides visible from the street, pedestrian ways, and the waterfront. There should be no blank walls facing any of these areas.
- Multiple buildings on a single site should be designed to create strong visual relationships. Waterfront development should take into account the relationship of adjacent buildings in terms of height, materials, scale, and architecture.
- The size and character of proposed projects should relate to the functions of adjacent streets and pedestrian linkages. Upper stories of buildings should step back from pedestrian areas.

BUILDING MATERIALS

Building materials that are consistent with the waterfront character of the Channel area are preferred. These include: brick, wood, masonry, and metal.

Design Details

Encourage design details consistent with a waterfront and conducive to pedestrian activity, such as the following:

- Details reminiscent of waterfront buildings should be encouraged (double-hung wood doors and windows, multi-paned windows, heavy timbers, ghost signs painted directly on building surfaces, external iron staircases, etc.)
- Roof-mounted equipment should be screened from view from adjacent streets, properties and pedestrian areas. Special attention should be given to buildings whose roofs are viewed from higher elevations. Integrate roof-mounted equipment into the design of the roof.

INDUSTRIAL AND WAREHOUSE DESIGN GUIDELINES

Buildings and Facilities Location

- Site elements such as buildings, parking, driveways, and outdoor activities should be arranged to emphasize the more aesthetically pleasing components of the site (e.g., landscaping and superior architectural features) and disguise less attractive elements (e.g., service facilities, outside storage, equipment areas, and trash enclosures) through proper placement and design of buildings, screen walls, and landscaping.
- Industrial and warehouse development shall be screened and buffered from any adjacent incompatible uses in compliance with the Development Code (Screening and Buffering). Intensified landscaping, increased setbacks, and appropriate building location should be utilized as a means of providing adequate separation between potentially incompatible land uses.

Walls and Fences

- The colors, materials, and appearances of walls and fences, including walls for screening purposes, should be compatible with the overall design character/style of the development.
- Masonry walls and solid fences should be treated with a graffiti resistant coating.
- When security fencing is required adjacent to streets, it should consist of wrought iron, tubular steel, or similar material supported by masonry piers. The use of chain-link fence material is strongly discouraged.

Mass and Scale

- The mass and scale of large, box-like industrial buildings should be reduced through the incorporation of varying building heights and setbacks along the front and street side building façades.

Building Façades

- Front and street side façades of large buildings visible from a public street should include architectural features such as reveals, windows and openings, changes in color, texture, and material to add interest to the building elevation and reduce its visual mass.
- Service and loading doors should not be located on front or street side façades adjacent to a public right-of-way.

Appropriate Use of Materials and Colors

- A comprehensive material and color scheme should be developed for each site. Material and color variations in multibuilding complexes should be complementary and compatible among buildings.
- Large expanses of smooth material (e.g., concrete) should be broken up with expansion joints, reveals, or changes in texture and color. Large expanses of highly reflective surfaces and mirror glass exterior walls are strongly discouraged as the glare from such surfaces can create hazards for motorists and airport aviation.

Use of Accessory Buildings

- The design of accessory buildings (e.g., security kiosks, maintenance buildings, and outdoor equipment enclosures) should be incorporated into and be compatible with the overall design of the project and the main buildings on the site.

Landscaping

- When industrial/warehouse uses are located adjacent to less intense uses (e.g., residential or retail commercial), additional landscaping in conjunction with appropriate decorative walls and setbacks should be provided to mitigate potential adverse impacts.

Parking and Circulation

- Ensure that parking lots do not visually dominate views of the project site and that they are designed, screened, and landscaped to be as aesthetically pleasing as possible.

5.3 Environmental Impacts

5.3.1 Methods of Analysis

This section evaluates potential impacts on visual resources that could occur during construction and operation of the Proposed Project. This analysis is based on field observations of the RVARC site and Ryde Avenue site and surrounding areas; evaluations of aerial and ground-level photographs of the alternative sites; and conceptual site plans provided by the design team.

Visual effects were assessed based on each alternative's potential to substantially alter scenic resources or to degrade the visual character of the site. The evaluation of temporary or short-term visual impacts considers whether construction activities could substantially degrade the existing visual character or quality of the site or surrounding area, as well as the duration over which any such changes would occur. Because of their short-term nature, construction activities occurring in an area for less than 1 year are typically considered to have a less-than-significant effect on visual quality. Construction activities occurring in an area for more than 1 year, however, have been evaluated for potentially significant visual impacts.

Actions with long-term visual effects, such as constructing new or altered structures, grading roads, removing trees, and introducing new sources of light and glare, can permanently alter the landscape in a manner that could affect the existing visual character or quality of the area, depending on the perspective of the viewer. In determining impact potential, the assessment considers the visual sensitivity of each alternative. In this analysis, the three criteria regarding the potential for damage to scenic vistas, scenic resources, and the potential for damage to the scenic character of the site were combined because the designated scenic resources (specifically, views from SR 160) and scenic vistas are directly related to the setting and visual character of the RVARC and Ryde Avenue sites.

5.3.2 Significance Criteria

An alternative would have a significant impact with regard to visual resources if it would:

- Have a substantial adverse effect on a scenic vista;
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historical buildings within a state scenic highway;
- Substantially degrade the existing visual character or quality of the site and its surroundings; or
- Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

This section assumes that no nighttime construction would be conducted; therefore, the discussion regarding new sources of substantial light or glare is focused on operational effects. For discussion regarding potential damage to historical buildings, refer to Chapter 9, *Cultural Resources.*

5.3.3 Environmental Impacts and Mitigation Measures

Impact AES-1: Adverse Effects on Scenic Vistas, Scenic Resources, and the Visual Character or Quality of the Site and its Surroundings during Construction.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, no construction would occur. Therefore, there would be **no impact** on the visual character or quality of either the RVARC or Ryde Avenue site.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Construction of the Preferred Alternative could result in temporary impacts on scenic resources and the visual character or quality of the RVARC site and immediate vicinity. From a distance, construction equipment and materials at the RVARC site could be visible from SR 160, a state-designated scenic highway. Because of the distance of the site from the highway (0.5 mile) and the speed of travel along this scenic highway (speed limit of 45 mph), however, views of construction activities would be fleeting, difficult to discern, and not substantially adverse.

Facility construction activities would also be visible from Beach Drive and from boats and other watercraft that travel on this portion of the Sacramento River. Residences along Beach Drive (near the northwestern and southwestern corners of the RVARC site), one residence at the top of Montezuma Hills, motorists using Beach Drive, and boaters along the Sacramento River would have close-up views of construction activities, including vegetation removal, grading and excavation, utility pipeline installation for water supply and sewers, backfilling, placement of concrete foundation, and building construction. Visible construction vehicles and equipment would include excavators, cranes, dump trucks, front-end loaders, backhoes, and concrete trucks. Although the exact location of staging areas has not yet been determined, it is anticipated that staging areas would be accommodated within the RVARC site for storage of equipment, piping, and other construction materials and that these areas would likewise be visible.

Motorists on Beach Drive would have views of facility construction activities of relatively moderate duration (speed limit of 15 mph). Pedestrians, cyclists, and boaters would have views of the construction work areas of a somewhat longer duration. Nearby residents situated northwest, west, and southwest of the site would have the longest duration views of construction equipment, vehicles, and activities. Although the construction period would be temporary, the duration is approximately 2–2.5 years if both the ERS and FTC are constructed concurrently, and longer if they are constructed sequentially. The presence of construction equipment and ongoing construction activities would alter the site's small-town character and historical waterfront complex. Because construction activities would be highly visible to sensitive viewers and could substantially degrade the visual character of the area, this impact is considered potentially significant. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure AES-1 (Maintain Site during Construction and Install Fencing)**, which requires that staging and construction work areas are kept clean and that fencing is installed to screen public views of staging areas. With implementation of Mitigation Measure AES-1, the visibility of construction activities and equipment at the RVARC site would be reduced for sensitive viewers to a level that would be **less than significant with mitigation**.

Mitigation Measure AES-1: Maintain Site during Construction and Install Fencing (Alternatives 2 and 3)

DWR and USFWS shall require the contractor(s) to ensure that construction-related activity is as clean and inconspicuous as practical by storing construction materials and equipment at proposed staging areas or in areas that are generally away from public view, and by removing construction debris promptly and at regular intervals. The contractor(s) shall install fencing around the northern, western, and southern portion of the site to screen construction materials, equipment, activities, and debris from views on Beach Drive.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Although construction of this alternative would occur on a different portion of the RVARC site than under Alternative 2, this would not meaningfully alter the aesthetic impacts of construction in comparison to Alternative 2. Therefore, construction-related impacts of Alternative 3 are considered potentially significant. Implementation of Mitigation Measure AES-1 would reduce this impact to a level that would be **less than significant with mitigation**. Refer to the Alternative 2 discussion above for details.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Because much of the Ryde Avenue site is gated and screened by mature trees, most construction activities would not be visible from residences north of the site (i.e., along Monte Diablo Avenue). Residents on Ryde Avenue and West Fremont Street would have immediate views of incoming and outgoing construction equipment and vehicles. These residents may also have views of large pieces of equipment (e.g., cranes), which would likely be visible above the existing fence. Nonetheless, because much of the site would be screened from these residences, construction-related effects on sensitive views and the site's visual character and quality would not be considered substantial.

Recreational boaters would have clear views of construction activities from the Stockton DWSC. Views of these activities could result in temporary degradation of views for boaters. Due to the industrial character of the Ryde Avenue site's surroundings, its low to moderate visual quality, and the short duration of such views, however, construction-related impacts on scenic resources and the site's visual character would not be substantially adverse. For these reasons, construction of the Proposed Project at the Ryde Avenue site would have a **less than significant** impact on scenic resources and the site's visual character and quality. No mitigation would be required.

Impact AES-2: Long-term Adverse Effects on Scenic Vistas, Scenic Resources, and the Visual Character or Quality of the Site and its Surroundings during Operation.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, the Proposed Project would not be built at either the RVARC site or the Ryde Avenue site. The Ryde Avenue site would most likely remain vacant. As described in "Environmental Setting" above, the existing buildings on the RVARC site are dilapidated and other portions of the site consist of unmaintained roadways and overgrown vegetation. Under the No Project Alternative, such visual conditions may remain and could worsen over time.

It is possible that both sites may be developed by another developer in the future, particularly the RVARC site, in light of the City of Rio Vista's plans to redevelop the site. Given the uncertainty of future conditions and the fact that no specific proposals for development at either site are ripe for implementation, however, it is considered speculative to reach a conclusion regarding the future visual conditions at either site. As such, the No Project Alternative would have **no impact** on scenic vistas, scenic resources, and visual character.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As shown in Figure 3-1 in Chapter 3, *Alternatives Description,* Alternative 2, Configuration 1 is proposed to have a two-story office and administration building, main parking lot, one-story shop building, and site entrances that would be located directly east of Beach Drive. The open boat storage and equipment, two-story laboratory building, and storage facility would be generally situated in the central portion of the RVARC site. The boat ramp and partially excavated marina would be located at the southern end of the site. The three FTC buildings and sedimentation basin would also be clustered at the southern end of the RVARC site. The FTC buildings may be up to two stories high. Most of the existing structures on the RVARC site would be left as is.

Viewers of these new buildings and structures may perceive them as a substantial visual change because these buildings would occupy a predominantly vacant area of the RVARC site. From the east of the site (along the river), existing Army Base buildings and trees along the waterfront would remain, partially screening views of some of the new buildings. Not all of the new buildings would be screened by existing buildings and trees, however, and some of the new buildings would be constructed on the upper terrace, which is topographically higher than the existing buildings; as a result, some of the DRS facilities would be visible from east of the site. The new marina would be similar in character to the neighboring U.S. Coast Guard marina.

From SR 160, on the opposite side of the Sacramento River (0.5 mile away), motorists' views of the marina, boat storage, and other facilities would be distant and fleeting. Due to distance and speed of travel, the impact on scenic views from SR 160 would be negligible. Boaters traveling on the Sacramento River would have more close-up, intermittent views of the new facilities, although existing buildings would partially obscure these views. From

Beach Drive, motorists would have close-up views of the office/administration building, employee parking lot, shop and boat storage buildings, experimental yard, and the site's entryways; pedestrians and bicyclists on Beach Drive would have longer duration views of these facilities. Additionally, nearby residents on Beach Drive and residents west on the Montezuma Hills would also have partial views of these facilities.

The new DRS facilities would decrease the amount of open space in the area and change the visual character of the site to an office park/campus character. New buildings with more contemporary architectural styles could potentially conflict with the aesthetic qualities associated with the historical structures on the site. It is anticipated that landscaping would be installed along the site's perimeter and within portions of the parking lot.

Given the dilapidated condition of existing structures on the site, development of the DRS may be perceived by some groups as an improvement in the site's aesthetic conditions. Nonetheless, Alternative 2 would result in a more developed condition; the new facilities would obscure views of the river and historical buildings from Beach Drive and would be clearly visible to boaters traveling on the Sacramento River. Alternative 2 is in the conceptual design phase and, if not designed with sensitivity to its surroundings, this alternative could adversely affect the small-town, historical character of the area that is defined by the waterfront's historical buildings and mature trees. This potential to degrade the existing aesthetic quality and character of the site is considered a potentially significant impact. Implementation of **Mitigation Measure AES-2a (Incorporate Army Base District Design Standards and Guidelines)** would require that specific ABD design standards and guidelines be incorporated into the design of new facilities where feasible. Implementation of this measure would ensure that design aspects of proposed office buildings, laboratories, storage facilities, and other associated facilities are sensitive to the small-town character of Rio Vista and are visually consistent with adjacent buildings and landscapes. By implementing this measure, the impact on scenic vistas and the site's visual character and quality would be reduced to a level that is **less than significant with mitigation**.

Mitigation Measure AES-2a: Incorporate Army Base District Design Standards and Guidelines (Alternatives 2 and 3)

DWR and USFWS shall incorporate the following design standards in the ERS and FTC facility design plans:

- Public uses shall be integrated into the ERS and FTC in a manner that creates an inviting, campus-like character rather than an exclusive, compound-like character.
- Historical or otherwise interesting artifacts remaining from previous activities on the site shall be retained or reused to the extent feasible.
- Materials from buildings to be demolished shall be salvaged and reused if feasible.
- Areas within the setback on Beach Drive shall be planted with low-growing material to visually enhance the site perimeter, but not block views. Trees shall be planted that, when mature, are large enough to allow views beneath the lowest branches.

- Landscaping screening or other visual buffers shall be installed in appropriate locations to provide screening of circulation and parking areas from public river access areas.

In addition, to the extent feasible, DWR and USFWS shall design the ERS and FTC buildings in accordance with the following Rio Vista ABD design guidelines:

Height/Massing/Roof Form

- Building size configuration should generally be similar to the scale and proportion of the existing structures. Buildings with large footprints should be articulated and broken up into smaller components to emulate a complex of smaller structures and create visual interest.
- Gable roof forms should be used primarily, with slopes similar to the roof forms of existing buildings on the site.
- Building roof forms should screen mechanical equipment and accommodate solar panels (if installed).

Materials and Colors

- Materials, colors, and textures should be compatible with the river setting and historical buildings and present a simple, practical character with elegant but common detailing. Materials such as wood and metal siding should be considered first in building design. Plain tilt-up concrete buildings should not be considered. Materials are subject to design review.

Service Areas and Mechanical Equipment

- Unsightly uses, activities, and equipment (such as large rooftop mechanical systems) should be screened from view.
- Service functions such as loading docks, trash receptacle areas, transformers, and other utility elements should be located where they will not compromise or visually detract from pedestrian entrances, paths, or open spaces.

Character and Style

- Building design should conform to the City General Plan guidance requiring that building character, scale, and massing be complementary to the waterfront and historical/wharf industrial character, and incorporate features that relate to, and are appropriate to, the site's history and character, with contemporary interpretations.
- The identity of the site should be enhanced through the use of, and reference to, features that evoke the identity, character, and history of the site, Rio Vista, and the Delta, potentially including trusses, timbers, and other character-defining features typical to working riverfront warehouses. Architectural design should reuse materials and incorporate structural forms of existing buildings to the greatest extent possible.

- The architectural character should complement but not copy historical architectural styles. The design and character of new development should be differentiated from the existing historical buildings on the site, yet should still be compatible with the historical materials, features, size, scale and proportion, and massing to protect the integrity of the historical properties and their setting.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The aesthetic effects of Alternative 3 would be similar to those of Alternative 2, with several important differences. First, as depicted in Figure 3-2 in Chapter 3, the overall footprint of the alternative would be greater because moving the marina inland further would cause it to occupy more of the currently undeveloped portion of the site and involve demolition of additional structures compared to Alternative 2. This alternative would involve the rehabilitation and reuse of a number of existing structures on the site. Redeveloping the historical portion of the waterfront would cause the area to be altered and possibly aesthetically degraded, depending on the nature of the redevelopment and the perceptions of viewers.

Overall, this alternative's potential to degrade the existing aesthetic quality and character of the site is considered a potentially significant impact. Implementation of Mitigation Measure AES-2a would reduce the impact on scenic vistas and the site's visual character and quality to a level that would be **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

As presented in Figure 3-3 in Chapter 3, the employee parking, two-story office building, boat storage facility, and open dry-dock boat storage area would be located in the northern portion of the Ryde Avenue site. The laboratory building would be located in the central portion, and the one-story storage facility and one-story shop would be clustered in the eastern area of the site. An inland marina and boat launch would be established at the southern end of the site adjacent to the Stockton DWSC. The FTC facilities and sedimentation basin would be located in the central portion of the Ryde Avenue site.

Most of the buildings would be screened from view by fencing along the site's perimeter. Residents on West Fremont Street, Ryde Avenue, and Monte Diablo Avenue would have partial views of the two-story office building. From Ryde Avenue and West Fremont Street, residents would also have partial views of the primary entrance and may have partial views of the dry-dock boat storage. A few residences at the corner of Ryde Avenue and West Fremont Street may have partial views of the FTC facilities. Boaters along the Stockton DWSC would have clear and close-up views of other DRS facilities, including the inland marina, open field experimental yard, shop, and storage facilities.

Given that the Ryde Avenue site is currently vacant, development of the DRS facilities would substantially alter the site's visual character to a more office park/campus character. If not designed with sensitivity to its surroundings, construction of the DRS could adversely affect the character of the surrounding area, as well as views of nearby residents. This impact is considered potentially significant. Implementation of **Mitigation Measure AES-2b (Incorporate Stockton Citywide Design Guidelines)**, which requires adherence to the

City of Stockton's design guidelines for the Stockton DWSC area, would ensure that the DRS facilities are designed and constructed to be aesthetically compatible with the character of surrounding land uses. Implementation of Mitigation Measure AES-2b would reduce impacts on scenic vistas and the site's visual character and quality to a level that would be **less than significant with mitigation.**

Mitigation Measure AES-2b: Incorporate Stockton Citywide Design Guidelines (Alternative 4)

DWR and USFWS shall design the ERS and FTC facilities in accordance with relevant portions of the following Stockton Citywide Design Guidelines:

<u>Building Orientation</u>

- Service and storage areas should not be placed adjacent to the street where they may be difficult to screen.

<u>Buildings and Facilities Location</u>

- Industrial and warehouse development shall be screened and buffered from any adjacent incompatible uses in compliance with the Development Code (Screening and Buffering). Intensified landscaping, increased setbacks, and appropriate building location should be utilized as a means of providing adequate separation between potentially incompatible land uses.

<u>Landscaping and Amenities</u>

- When industrial/warehouse uses are located adjacent to less intense uses (e.g., residential or retail commercial), additional landscaping in conjunction with appropriate decorative walls and setbacks should be provided to mitigate potential adverse impacts.

<u>Walls and Fences</u>

- The colors, materials, and appearances of walls and fences, including walls for screening purposes, should be compatible with the overall design character/style of the development.
- When security fencing is required adjacent to streets, it should consist of wrought iron, tubular steel, or similar material supported by masonry piers. The use of chain-link fence material is strongly discouraged.

<u>Building Scale, Massing, and Articulation</u>

- Sloped or shed roofs are encouraged where appropriate.
- Architectural treatment should be consistent on all sides visible from the street, pedestrian ways, and the waterfront. There should be no blank walls facing any of these areas.

- Multiple buildings on a single site should be designed to create strong visual relationships. Waterfront development should take into account the relationship of adjacent buildings in terms of height, materials, scale, and architecture.
- The size and character of proposed projects should relate to the functions of adjacent streets and pedestrian linkages. Upper stories of buildings should step back from pedestrian areas.
- The mass and scale of large, box-like industrial buildings should be reduced through the incorporation of varying building heights and setbacks along the front and street side building façades.

Building Materials

- DWR and USFWS shall require that contractor(s) will use building materials that are consistent with the waterfront character of the Channel area, including brick, wood, masonry, and metal.

Design Details

- Use of special materials and unique details (canvas awnings, metal brow canopies, and lights attached to buildings) should be encouraged at a height that defines the first floor.
- Details reminiscent of waterfront buildings should be encouraged (double-hung wood doors and windows, multi-paned windows, heavy timbers, ghost signs painted directly on building surfaces, external iron staircases, etc.).
- Roof-mounted equipment should be screened from view from adjacent streets, properties, and pedestrian areas. Special attention should be given to buildings whose roofs are viewed from higher elevations. Integrate roof-mounted equipment into the design of the roof.

Parking and Circulation

- Ensure that parking lots do not visually dominate views of the project site and that they are designed, screened, and landscaped to be as aesthetically pleasing as possible.

Impact AES-3: Permanent Source of Substantial Light or Glare.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, no new lighting would be installed. As such, no new permanent sources of light and glare would be created; **no impact** would occur.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

New lighting would be installed in the parking areas and outside the buildings. Some of the outdoor lighting would be similar to existing lighting in Rio Vista. This lighting could increase levels of nighttime light and glare and adversely affect nighttime views enjoyed by nearby residents and recreationists at Sandy Beach County Park.

In addition, daytime glare caused by light reflections from building materials such as reflective glass and polished surfaces could create hazards for motorists and nuisances for pedestrians and other viewers, resulting in a potentially significant impact. Implementation of **Mitigation Measures AES-3a (Implement Army Base District Design Standards and Guidelines Related to Site Lighting)** and **AES-3b (Implement Nighttime Lighting and Daytime Glare Reduction Measures)** would minimize nighttime light and daytime glare effects at the DRS facilities and reduce this impact to a level that would be **less than significant with mitigation**.

Mitigation Measure AES-3a: Implement Army Base District Design Standards and Guidelines Related to Site Lighting (Alternatives 2 and 3)

DWR and USFWS shall require that contractor(s) shall incorporate the following ABD guidelines into the ERS and FTC facilities design plans:

- State Title 24 Building Energy Efficient Standards for LZ1 (i.e., darker and rural areas), including maximum power and brightness, shielding, and sensor control, should be applied to reduce spill light, glare, and sky glow, avoid nuisance impacts on adjacent residential properties, and protect nighttime views and night sky access for visitors to the site and others in the vicinity.
- All permanently installed exterior lighting will use photocells, astronomical time switches or motion detectors. Continuous all-night outdoor lighting will be prohibited unless required for security reasons.
- Energy-efficient lighting alternatives, such as light-emitting diodes (LEDs), will be used.
- Lighting should be used to highlight landmarks, iconic features, signs, and site and building entries. Up-lighting is prohibited to preserve dark sky access.

Mitigation Measure AES-3b: Implement Nighttime Lighting and Daytime Glare Reduction Measures (Alternatives 2 and 3)

DWR and USFWS shall require contractor(s) to incorporate the following measures into the design plans to reduce glare effects of the ERS and FTC facilities:

- Avoid use of highly reflective building materials and/or glass finishes for proposed structures, including fencing and light poles.
- As part of the landscaping plan, select and place vegetation in areas to minimize off-site glare effects. For instance, landscaping should be incorporated in parking areas and around buildings to minimize glare.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Although the configuration of the ERS and FTC facilities would differ from that described for Alternative 2, Alternative 3 would require similar building materials and permanent outdoor lighting. Refer to the discussion for Alternative 2 for details regarding permanent light and glare effects.

Overall, this alternative would have similar potential as Alternative 2 to increase levels of nighttime light and glare and adversely affect nighttime views enjoyed by nearby residents and recreationists at Sandy Beach County Park, and to create daytime glare that could create hazards for motorists and nuisances for pedestrians and other viewers; this is considered a potentially significant impact. Implementation of Mitigation Measure AES-3a and AES-3b would reduce the impact of the Proposed Project with regard to light and glare to a level that would be **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Similar to Alternative 2, the ERS facilities at the Ryde Avenue site would involve installation of new outdoor lighting and building features that may cause nuisance glare for nearby Stockton residents. Given that views of the northern portion of the site are screened by the presence of mature trees and fencing, light and glare effects generated by outdoor lighting and buildings in the middle and southern portions of the site would be unlikely to be noticeable at nearby residences. Nighttime lighting and glare effects generated by buildings in the northern portion of the site, however, may be a nuisance to viewers at residences along West Fremont Street and boaters traveling on the Stockton DWSC, a potentially significant impact. Implementation of **Mitigation Measure AES-3c (Implement Nighttime Lighting and Daytime Glare Reduction Measures)** would reduce potential light and glare impacts to a level that would be **less than significant with mitigation**.

Mitigation Measure AES-3c: Implement Nighttime Lighting and Daytime Glare Reduction Measures (Alternative 4)

DWR and USFWS shall require contractor(s) to incorporate the following guidelines from the *Stockton Citywide Design Guidelines* in the design of outdoor lighting and building façades:

- The design and location of outdoor lighting fixtures will preclude direct glare onto adjoining property and streets in compliance with the Development Code (Light and Glare). Illumination devices will be installed, directed, and shielded to confine light rays within the property.
- Outdoor lighting should be designed (e.g., location, height, and number) to foster security. Site and building entries should have enhanced illumination to increase visibility and safety.
- Large expanses of smooth material (e.g., concrete) should be broken up with expansion joints, reveals, or changes in texture and color. Large expanses of highly reflective surfaces and mirror glass exterior walls are strongly discouraged as the glare from such surfaces can create hazards for motorists and airport aviation.

Chapter 6
Air Quality and Greenhouse Gas Emissions

This chapter describes the existing setting for air quality and greenhouse gas (GHG) emissions within the study area, which includes the RVARC site, Ryde Avenue site, Sacramento Valley Air Basin (SVAB), San Joaquin Valley Air Basin (SJVAB), San Francisco Bay Area Air Basin (SFBAAB), and the state of California. This chapter also describes federal, state, and local laws, regulations, and policies relevant to protection of air quality and GHG emissions and the Proposed Project. The potential impacts on air quality and GHG emissions as a result of construction and operation of the Proposed Project are evaluated, and mitigation is proposed to reduce impacts found to be significant.

6.1 Environmental Setting

6.1.1 Study Area

The study area for the DRS consists of the locations where physical actions associated with the Proposed Project would take place. This is primarily the area surrounding the footprint of the DRS, where construction and operational activities would occur. Under the No Project Alternative, activities would continue to take place at several locations throughout the Bay-Delta region. Under Alternatives 2 and 3, the project site would be located in Rio Vista, Solano County, in the SVAB. Under Alternative 4, the project site would be located in Stockton, San Joaquin County, in the SJVAB. In addition, boats would be used as part of project operations throughout Bay-Delta waterways under all alternatives. These waterways are located within the SVAB, SJVAB, and SFBAAB.

The study area for air quality at the local scale involves evaluation of local "hot spots," areas of potentially higher concentrations of pollutants in the area adjacent to construction and operation activities from pollutants of local concern. These types of pollutants, which tend to have air quality impacts at a local scale, include carbon monoxide (CO), particulate matter (PM), and toxic air contaminants (TACs). Air quality at the regional scale involves evaluation of air pollutants that are of regional concern due to secondary formation of pollutants over longer time and distance scales, such as ozone, ozone precursors, and PM.

Climate change is a global issue, and planning surrounding it has been conducted at the state level. Accordingly, the GHG emissions analysis considers global GHG emissions in the context of statewide GHG emission reduction targets. These targets were established to assure that California is doing its share in reducing GHG emissions globally.

6.1.2 Regional Setting

The California Air Resources Board (CARB) has divided California into regional air basins according to topographic and drainage features. As mentioned above, the three air basins relevant to the Proposed Project are the SVAB, SJVAB, and SFBAAB. The following section discusses climatic and meteorological information associated with these three air basins.

Sacramento Valley Air Basin

The RVARC site is located within the boundaries of the SVAB. The SVAB encompasses eleven counties: all of Shasta, Tehama, Glenn, Colusa, Butte, Sutter, Yuba, Sacramento, and Yolo Counties, the westernmost portion of Placer County and the northeastern portion of Solano County. The SVAB is bounded by the North Coast Ranges on the west and the northern Sierra Nevada on the east. The intervening terrain is relatively flat.

Hot, dry summers and mild, rainy winters characterize the Mediterranean climate of the SVAB. During the year, the temperature may range from 20 to 115 degrees Fahrenheit (ºF), with summer highs usually in the 90s and winter lows occasionally below freezing. Average annual rainfall is about 20 inches, and the rainy season generally occurs from November through March. The prevailing winds are moderate in strength and vary from moist, clean breezes from the south to dryland flows from the north.

The mountains surrounding the SVAB create a barrier to airflow, which can trap air pollutants under certain meteorological conditions. The highest frequency of air stagnation occurs in the autumn and early winter, when large high-pressure cells collect over the Sacramento Valley. The lack of surface wind during these periods and the reduced vertical flow caused by less surface heating reduces the influx of outside air and allows air pollutants to become concentrated in a stable volume of air. The surface concentrations of pollutants are highest when these conditions are combined with temperature inversions that trap pollutants near the ground. Due to differences in air density, the air above and below the inversion do not mix. Air pollutants tend to collect under an inversion, leading to higher concentrations of emitted pollutants.

The ozone season (May through October) in the Sacramento Valley is characterized by stagnant morning air or light winds, with the Delta sea breeze arriving in the afternoon from the southwest. Usually the evening breeze transports the airborne pollutants northward out of the Sacramento Valley. During about half of the days from July to September, however, a phenomenon called the "Schultz Eddy" prevents this clearing wind pattern from occurring. Instead of allowing for the prevailing wind patterns to move north, carrying the pollutants away, the Schultz Eddy causes the wind pattern to circle back to the south. Essentially, this phenomenon causes the air pollutants to be blown south back into the SVAB. This recirculation wind pattern can result in higher air pollution concentrations until the eddy dissipates around noon and the southwesterly Delta sea-breeze arrives. This phenomenon has the effect of exacerbating the pollution levels in the area and increases the likelihood of violating federal or state standards. (Yolo-Solano Air Quality Management District [YSAQMD] 2007).

San Joaquin Valley Air Basin

The Ryde Avenue site is located within the SJVAB. The SJVAB is bounded by the Sierra Nevada to the east, the Coast Ranges to the west, and the Tehachapi Mountains to the south. The SJVAB contains all of San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, and Tulare Counties, as well as a portion of Kern County.

The area has an inland Mediterranean climate that is characterized by warm, dry summers and cool winters. Summer high temperatures often exceed 100°F, averaging in the low 90s in the northern valley and the high 90s in the southern portion.

Although marine air generally flows into the basin from the Bay-Delta region, the surrounding mountain ranges restrict air movement through and out of the valley. Wind speed and direction influence the dispersion and transportation of pollutants; the greater the wind flow, the lower the accumulation. As in the SVAB, the vertical dispersion of air pollutants in the SJVAB is limited by the presence of persistent temperature inversion, leading to higher concentrations of emitted pollutants.

Precipitation and fog tend to reduce pollutant concentrations. Ozone (O_3) is formed when chemical compounds such as volatile organic compounds (VOCs), and nitrogen oxides (NO_X) (collectively known as ozone precursors) react with sunlight. Clouds and fog block the solar radiation for the ozone forming reaction. Annual precipitation in the San Joaquin Valley decreases from north to south, averaging approximately 20 inches in the north, 10 inches in the central portion, and less than 6 inches in the south (San Joaquin Valley Air Pollution Control District [SJVAPCD] 2002).

San Francisco Bay Area Air Basin

The SFBAAB comprises all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara Counties, as well as portions of Solano and Yolo Counties. Air quality in this area is determined by natural factors such as climate, topography, and meteorology, in addition to the presence of existing air pollution sources and ambient conditions. The SFBAAB is characterized by complex terrain, consisting of coastal mountain ranges, inland valleys, and bays that distort normal wind flow patterns. The Coast Ranges split, resulting in a western coastal gap, the Golden Gate, and an eastern coastal gap, Carquinez Strait; these gaps allow air to flow into and out of the SFBAAB and the Central Valley.

Climate within the SFBAAB is characterized by moderately wet winters and dry summers. Winter rains, which occur in December through March, account for about 75 percent of the average annual rainfall. The amount of annual precipitation can vary greatly from one part of the SFBAAB to another, even within short distances. In general, total annual rainfall can reach 40 inches in the mountains, but it is often less than 16 inches in sheltered valleys.

Climate is affected by marine air flow and the basin's proximity to the San Francisco Bay. Bay breezes push air onshore during the daytime and draw air offshore at night. During the summer months, the Bay helps to cool the warm onshore flows, while it warms the air during the winter months. Summertime temperatures in the SFBAAB are determined in large part by the effect of differential heating between land and water surfaces. Because land tends to heat up and cool off more quickly than water, a large-scale gradient (or differential) in temperature is often created between the Pacific coast and the Central Valley, and small-scale local gradients are often produced along the shorelines of the ocean and bays. The temperature gradient near the ocean is also exaggerated, especially in summer, because of the upwelling of cold water from the ocean bottom along the coast. On summer afternoons, the temperatures at the coast can be 35°F cooler than temperatures 15–20 miles inland. At night, this contrast usually decreases to less than 10°F. In the winter, the relationship of minimum and maximum temperatures is reversed: during the daytime, the temperature contrast between the coast and inland areas is small, whereas at night the variation in temperature is large.

During the summer, winds flowing from the northwest are drawn inland through the Golden Gate and over the lower portions of the San Francisco Peninsula. Immediately south of Mount Tamalpais, the northwesterly winds accelerate considerably and come more directly from the west as they stream through the Golden Gate. The air flowing in from the coast to the Central Valley, the Delta sea breeze, begins developing at or near ground level along the coast in late morning or early afternoon. As the day progresses, the sea breeze layer deepens and increases in velocity while spreading inland. The depth of the sea breeze depends in large part on the height and strength of an inversion, where the differences in air temperatures cause the low sea breeze layer and the warmer upper layer to flow independently. If the inversion is low and strong, and hence stable, the flow of the sea breeze will be inhibited and stagnant conditions are likely to result. In the winter, the SFBAAB frequently experiences stormy conditions with moderate to strong winds, as well as periods of stagnation with very light winds. Winter stagnation episodes are characterized by nighttime drainage flows in coastal valleys. Drainage is a reversal of the usual daytime air-flow patterns; air moves from the Central Valley toward the coast and back down toward the Bay from the smaller valleys within the SFBAAB (Bay Area Qir Quality Management District [BAAQMD] 2010).

6.1.3 Rio Vista Army Reserve Center Site

The RVARC site is located within the jurisdiction of the YSAQMD. Land uses immediately adjacent to the RVARC are a public marina and residences to the north, a U.S. Coast Guard station to the south, agricultural land on the west side of Beach Drive to the west, and agricultural land across the Sacramento River to the east. Campgrounds are located south of the site and an RV park is located across the Sacramento River to the east. Riverview Middle School is less than 0.25 mile from the RVARC site.

6.1.4 Ryde Avenue Site in Stockton

The Ryde Avenue site is within the jurisdiction of the SJVAPCD. This site is surrounded by low- and medium-density residential uses, the shoreline, and the Stockton Deep Water Ship Channel (DWSC) to the south, and commercial uses to the east and west. The Port of Stockton is across the Stockton DWSC. Several schools, day-care facilities, senior facilities, and medical facilities are located near the site.

6.1.5 Air Pollutants

Carbon Monoxide

CO is an odorless, colorless gas that is highly toxic. CO is formed by the incomplete combustion of fuels and is emitted directly into the air. Ambient CO concentrations normally are considered a localized effect and typically correspond closely to the spatial and temporal distributions of vehicular traffic, forming pollutant "hot spots." CO concentrations are also influenced by wind speed and atmospheric mixing. Under inversion conditions, CO concentrations may be distributed more uniformly over an area to some distance from vehicular sources. CO binds with hemoglobin, the oxygen-carrying protein in blood, and reduces the blood's capacity for carrying oxygen to the heart, brain, and other parts of the body. At high concentrations, CO can cause heart difficulties in people with chronic diseases, impair mental abilities, and cause death.

Nitrogen Oxides

NO_X are a family of gaseous nitrogen compounds and are precursors to the formation of ozone and PM. The major component of NO_X, nitrogen dioxide (NO_2), is a reddish-brown gas that is toxic at high concentrations. NO_X results primarily from the combustion of fossil fuels under high temperature and pressure. Fuel combustion, primarily from on-road and off-road motor vehicles and industrial sources are the major sources of this air pollutant.

Volatile Organic Compounds

VOCs are hydrocarbon compounds that exist in the ambient air. VOCs contribute to the formation of smog and/or may themselves be toxic. VOC emissions are a major precursor to the formation of ozone.

Ozone

Ozone (O_3) is a reactive gas consisting of three oxygen atoms. In the troposphere (the lowest region of the atmosphere), it is produced by a photochemical process involving the sun's energy. It is a secondary pollutant that is formed when NO_X and VOC react in the presence of sunlight. Ozone at the earth's surface causes numerous adverse health effects and is a pollutant regulated by state and federal air quality agencies. It is a major component of smog. In the stratosphere, however, ozone exists naturally and shields the Earth from harmful incoming ultraviolet radiation. High concentrations of ground-level ozone can adversely affect the human respiratory system and aggravate cardiovascular disease and many respiratory ailments. Ozone also damages natural ecosystems such as forests and foothill communities, agricultural crops, and some human-made materials, such as rubber and plastics.

Particulate Matter

PM is a complex mixture of extremely small particles and liquid droplets. PM is made up of multiple components, including acids, organic chemicals, metals, and soil or dust particles.

The size of particles is directly linked to the potential for causing health problems. Particles that are smaller than 10 micrometers in diameter (PM_{10}) are of concern because these particles pass through the throat and nose and are deposited in the thoracic region of the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. PM_{10} is typically found near roadways and around dusty industrial sites. Fine particles ($PM_{2.5}$) are less than 2.5 micrometers in diameter and are found in smoke and haze. $PM_{2.5}$ penetrates even more deeply into the thoracic and alveolar regions of the lungs.

Sulfur Dioxide

Sulfur dioxide is a colorless, irritating gas with a "rotten egg" smell formed primarily by the combustion of sulfur-containing fossil fuels. Suspended SO_2 particles contribute to the poor visibility that occurs in the SFBAAB and are a component of PM_{10}.

Lead

Lead (Pb) is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. The health effects of lead poisoning include loss of appetite, weakness, apathy, and miscarriage. Lead poisoning can also cause lesions of the neuromuscular system, circulatory system, brain, and gastrointestinal tract.

In the past, gasoline-powered automobile engines were a major source of airborne lead through the use of leaded fuels. Because the use of leaded fuel has been mostly phased out, ambient concentrations of lead have decreased dramatically.

Hydrogen Sulfide

Hydrogen sulfide (H_2S) is associated with geothermal activity, oil and gas production, refining, sewage treatment plants, and confined animal feeding operations. H_2S is extremely hazardous in high concentrations and can cause death.

Sulfates

Sulfates are the fully oxidized, ionic form of sulfur. Sulfates occur in combination with metal and/or hydrogen ions. In California, emissions of sulfur compounds result primarily from the combustion of petroleum-derived fuels (e.g., gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to SO_2 during the combustion process and subsequently converted to sulfate compounds in the atmosphere. The conversion of SO_2 to sulfates is comparatively rapid and complete in urban areas of California due to regional meteorological features.

CARB's sulfate standard is designed to prevent aggravation of respiratory symptoms. Effects of sulfate exposure at levels that exceed the standard include decreased ventilatory function, aggravation of asthmatic symptoms, and increased risk of cardiopulmonary disease. Sulfates are particularly effective in degrading visibility, and, because they are usually acidic, can harm ecosystems and damage materials and property.

Vinyl Chloride

Vinyl chloride is a colorless gas that does not occur naturally; it is formed when substances such as trichloroethane, trichloroethylene, and tetrachloroethylene are broken down. Vinyl chloride is used to make PVC, which is used in plastic products such as pipes, wire and cable coatings, and packaging materials.

Toxic Air Contaminants

TACs are air pollutants that may lead to serious illness or increased mortality, even when present in relatively low concentrations. Hundreds of different types of TACs exist, with varying degrees of toxicity. Many TACs are confirmed or suspected carcinogens or are known or suspected to cause birth defects or neurological damage. For some chemicals, such as carcinogens, no thresholds exist below which exposure can be considered risk free. Examples of TAC sources associated with the Proposed Project are fossil fuel combustion sources and chemicals used in laboratory activities and the FTC.

Sources of TACs include stationary sources, area-wide sources, and mobile sources. USEPA maintains a list of 187 TACs, also known as hazardous air pollutants. These hazardous air pollutants are included on CARB's list of TACs along with additional chemicals identified as TACs in California (CARB 2015a). According to the California Almanac of Emissions and Air Quality (CARB 2013a), many researchers consider diesel PM (DPM) to be a primary contributor to health risk from TACs because particles in the exhaust carry many harmful organics and metals, rather than being a single substance, as are other TACs. Unlike many TACs, outdoor DPM is not monitored by CARB because no routine measurement method exists. Using the CARB emission inventory's PM_{10} database, ambient PM_{10} monitoring data, and results from several studies, however, CARB has made preliminary estimates of DPM concentrations throughout the state ([California] Office of Environmental Health Hazard Assessment [OEHHA] 2001).

Ozone-Depleting Substances

The ozone layer in the stratosphere protects life on earth from exposure to dangerous levels of ultraviolet light by filtering out harmful ultraviolet radiation from the sun. When chlorofluorocarbons (CFCs) and other O_3-degrading chemicals are emitted, they mix with the atmosphere and eventually rise to the stratosphere. There, the chlorine and bromine they contain catalyze the destruction of O_3. This destruction is occurring more rapidly than O_3 can be created through natural processes. The degradation of the ozone layer leads to higher levels of ultraviolet radiation reaching the Earth's surface. This, in turn, can lead to a greater incidence of skin cancer, cataracts, and impaired immune systems and is expected also to reduce crop yields, diminish the productivity of the oceans, and possibly contribute to the decline of amphibious populations that is occurring around the world (USEPA 2015a).

The chemicals most responsible for the destruction of the ozone layer are CFCs, carbon tetrachloride, methyl bromide, methyl chloroform, and halons. Ozone-depleting substances (ODSs) are typically found in older refrigeration and air conditioning systems. U.S.

production of ODSs has declined substantially since 1988 and has now reached levels (measured by O_3 depletion potential) comparable to those of 30 years ago. Because of the international agreements to decrease and ultimately phase out production of CFCs and halons, total equivalent chlorine (total chlorine and bromine, with adjustments to account for bromine's higher O_3 depletion potential) in the troposphere peaked between 1992 and 1994 and has since decreased. Total chlorine abundance in the stratosphere is at or near peak; stratospheric bromine likely is still increasing. Increasing O_3 losses are predicted for the remainder of the decade, with gradual recovery by the mid-21st century (USEPA 2015a).

The Montreal Protocol and its Amendments and Adjustments have successfully controlled the global production and consumption of ODS over the last two decades, and the atmospheric abundances of nearly all major ODS that were initially controlled are declining. As a result of the Montreal Protocol, the O_3 layer is expected to recover from the effect of ODS as their abundances decline in the coming decades (World Meteorological Organization [WMO] 2011).

6.1.6 Climate Change and GHG Emissions

Global warming and *global climate change* are terms that describe changes in the Earth's climate. Global climate change is broadly used to describe any worldwide, long-term change in the Earth's climate. This change could be, for example, an increase or decrease in temperatures, the start or end of an ice age, or a shift in precipitation patterns. Global warming more specifically refers to a general increase in average temperatures across the Earth. Although global warming is characterized by rising average temperatures, it can cause other climatic changes as well, such as a shift in the frequency and intensity of rainfall or hurricanes. Global warming does not necessarily imply that all locations will be warmer; some locations may be cooler even though the Earth, on average, is warmer. All of these changes fit under the umbrella of global climate change.

Because GHGs persist and mix in the atmosphere, they have impacts on a global scale, rather than locally or regionally like most air pollutants. Consequently, GHG emissions that contribute to global climate change result in a worldwide cumulative impact (global warming) rather than a local or regional, project-specific impact as typically associated with criteria pollutants. Impacts related to GHG emissions are discussed in the context of the Proposed Project's contribution to statewide and global GHG emissions.

Although natural processes can cause global warming, general scientific consensus concurs that present-day global warming is the result of human activity on the planet (Intergovernmental Panel on Climate Change [IPCC] 2007, 2013). This human-made, or anthropogenic, warming is caused primarily by increased GHG emissions that keep the Earth's surface warm, known as "the greenhouse effect."

Greenhouse Effect and Other Climate Change Effects

The Earth's atmosphere functions like a greenhouse, allowing sunlight in and trapping some of the heat that reaches the Earth's surface. When solar radiation from the sun enters the

Earth's atmosphere, a small portion is reflected back toward space, although most of it is absorbed by the Earth's surface. The solar radiation that is absorbed by the Earth's surface is then re-emitted as heat, in the form of low-frequency infrared radiation. Although GHGs in the atmosphere do not absorb solar radiation, they do absorb the low-frequency infrared radiation, thereby trapping it within the Earth's atmosphere and resulting in the warming of the Earth's surface.

The Earth's greenhouse effect has existed far longer than humans have, and it has played a key role in the development of life. Concentrations of major GHGs (discussed in detail under "Greenhouse Gases and their Emissions," below) such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and water vapor (H_2O) have been naturally present at relatively stable levels in the atmosphere adequate to keep temperatures on the Earth hospitable. Without these GHGs, the Earth's temperature would be too cold for life to exist. As human industrial activity has increased, however, atmospheric concentrations of certain GHGs have grown dramatically. Anthropogenic sources are responsible for GHG emissions in excess of naturally occurring concentrations, thereby intensifying the greenhouse effect and resulting in global climate change.

The IPCC's Fourth and Fifth Assessment Reports state that scientific consensus concurs that the global increases in atmospheric concentrations of GHGs since 1750 have resulted mainly from human activities such as fossil fuel combustion, land use changes (e.g., deforestation), and agriculture (IPCC 2007, 2013). In addition, the reports state that these changes in GHG concentrations have likely contributed to global warming.

Global climate change is a particularly important factor when discussing water resources and wildlife. Changes in the climate are expected to cause more severe droughts and changes in annual rainfall and snowpack. In addition, there may be increases in water temperature and changes in water salinity in areas such as the Bay-Delta due to climate change.

Greenhouse Gases and Their Emissions

The term *greenhouse gases* includes gases that contribute to the natural greenhouse effect as well as gases that are anthropogenic and are emitted by modern industrial products, such as hydrofluorocarbons, chlorinated fluorocarbons, and sulfur hexafluoride. These last two families of gases, although not present naturally, have properties that also cause them to trap infrared radiation when they are present in the atmosphere, thus making them GHGs. The effect each of these gases has on global warming is a combination of the mass of their emissions and their global warming potential (GWP). GWP indicates, on a pound for pound basis, how much a gas will contribute to global warming (its potential to trap heat) relative to how much warming would be caused by the same mass of carbon dioxide (i.e., 1 pound of methane has the same atmospheric effect as 21 pounds of CO_2, so it has a GWP of 21). **Table 6-1** shows the six GHGs and their respective GWPs.

Table 6-1. Greenhouse Gas Overview and Global Warming Potential

Greenhouse Gas	Global Warming Potential over 100 years (in IPCC 2013/ SAR)[a]	Description
Carbon Dioxide (CO_2)	1/1	Released into the atmosphere through burning of fossil fuels (coal, natural gas and oil), solid waste, trees, and wood products, and also because of certain chemical reactions; removed from the atmosphere when it is absorbed by plants and oceans; remains in the atmosphere for 50 to more than 100,000 years.
Methane (CH_4)	28/21	Emitted during the production and transport of coal, natural gas, and oil; methane emissions also result from livestock and other agricultural practices and from the decay of organic waste, notably in municipal solid waste landfills; remains in the atmosphere for about 10 years.
Nitrous Oxide (N_2O)	265/310	Emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste; remains in the atmosphere for about 100 years.
Hydrofluoro-carbons (HFCs)	4-12,400/650–11,700	Typically used in refrigeration and air conditioning equipment, as well as in solvents; emissions are generated primarily from use in air conditioning systems in buildings and vehicles; remain in the atmosphere from 10 to 270 years.
Perfluoro-carbons (PFCs)	6,630-11,100/6,500–9,200	Emitted as by-products of industrial and manufacturing sources; remain in the atmosphere from 800 to 50,000 years.
Sulfur Hexa-fluoride (SF_6)	23,500/23,900	Used in electrical transmission and distribution; remain in the atmosphere approximately 3,200 years.

Notes: [a] As scientific understanding of the GWP of various GHGs improves over time, GWP values are updated in the IPCC scientific assessment reports. For regulatory consistency, however, the Kyoto Protocol fixed the use of GWP values to those published in the IPCC's 1996 Second Assessment Report (SAR). The table shows GWP values for 100 years from IPCC 2013 and SAR.

Sources: USEPA 2013; IPCC 2013

These six gases are the major GHGs that were recognized by the Kyoto Accords. Other GHGs were not recognized by the Kyoto Accords, chiefly because of the smaller role that they play in global climate change or the uncertainties surrounding their effects. One GHG not recognized by the Kyoto Accords is atmospheric H_2O because no obvious correlation exists between H_2O and specific human activities. H_2O appears to act in a feedback manner; higher temperatures lead to higher H_2O concentrations, which in turn cause more global warming (IPCC 2003). Nitrogen trifluoride was not recognized in the initial Kyoto Accords but was subsequently included by the United Nations Framework Convention on Climate Change and recognized in California as a GHG.

The most important GHG in human-induced global warming is CO_2. Although many gases have much higher GWPs than the naturally occurring GHGs, CO_2 is emitted in such vastly higher quantities that it accounts for about 84 percent of the GWP of all GHGs emitted by the United States (USEPA 2013). Fossil fuel combustion, especially for the generation of electricity and powering of motor vehicles, has led to substantial increases in CO_2 emissions over time and, thus, substantial increases in atmospheric CO_2 concentrations. In 2005, atmospheric CO_2 concentrations were about 379 ppm, more than 35 percent higher than the pre-industrial concentrations of about 280 ppm (IPCC 2007). In addition to the sheer increase in the volume of its emissions, CO_2 is a major factor in human-induced global warming because of its long lifespan in the atmosphere (50,000–100,000 years).

California Climate Impacts

Global temperature increases and other climate changes may have substantial adverse effects on the health of California residents and California's economy. These effects include changing precipitation, reducing snow pack levels, and potentially reducing water supply; degraded air quality; higher risk of infestations by pests and pathogens in agricultural and forest environments; increased wildfire risk; alterations in the coastline and coastal habitats; and increased flood risk (California Climate Action Team 2006). With respect to compromised air quality, warmer temperatures can cause higher concentrations of ground-level ozone, a pollutant that causes eye irritation and respiratory problems. With regard to water supply, snowmelt provides an important source of water during the summer. Global warming could alter, and is already altering, the seasonal pattern of snow accumulation and snowmelt and thereby reducing the overall snow pack, affecting water supplies.

California GHG Emission Inventory

In 2012, total California GHG emissions were 459 million metric tons of carbon dioxide equivalents (MT CO_2e). This represents a 1.7 percent increase in total annual GHG emissions from 2011 and the first annual emissions increase since 2007. This increase was driven primarily by strong economic growth in the state, the unexpected closure of the San Onofre Nuclear Generating Station, and drought conditions that limited in-state hydropower generation. From 2000 to 2012, annual GHG emissions decreased by 1.6 percent; the peak year for annual emissions was 2004.

In 2012, the transportation sector was the largest source of emissions, accounting for approximately 37 percent of total emissions. On-road vehicles accounted for more than 90 percent of emissions in the transportation sector. The industrial sector accounted for approximately 22 percent of total emissions. Emissions from electricity generation were about 21 percent of total emissions.

Per capita emissions in California decreased by 12 percent from 2000 to 2012, even though population increased by 11.4 percent during this period. Per capita emissions from in-state electricity generation declined by 22 percent from 2000 to 2012. (CARB 2014).

Climate Change Adaptation

As described above, global climate change is already affecting ecosystems and society throughout the world. Climate change adaptation refers to the efforts undertaken by societies and ecosystems to adjust to and prepare for current and future climate change, thereby reducing vulnerability to those changes. Human adaptation has occurred naturally over history; people move to more suitable living locations, adjust food sources, and more recently, change energy sources. Similarly, plant and animal species adapt over time to changing conditions; they migrate or change behaviors in accordance with changing climates, food sources, and predators.

Many national, as well as local and regional, governments are implementing adaptive practices to address changes in climate, as well as planning for expected future impacts from climate change. Some examples of adaptations that are already in practice or under consideration are conserving water and minimizing runoff with climate-appropriate landscaping; capturing excess rainfall to minimize flooding and maintain a constant water supply through dry spells; protecting valuable resources and infrastructure from flood damage; developing new water supply strategies such as water reuse, aquifer storage and recovery, and desalination; and using water-efficient appliances. Managed water resources can assist with minimizing the effects of changes in streamflow, water temperature changes, and changes in salinity (USEPA 2015b).

6.1.7 Existing Air Quality Conditions

Air Monitoring Data

USEPA, CARB, and local air districts operate an extensive air monitoring network to measure progress toward attainment of the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS). The closest air monitoring stations to the study area are the Elk Grove-Bruceville Road, Bethel Island Road, and Stockton-Hazelton stations. **Table 6-2** shows the most recent 3 years of available data.

Table 6-2. Air Monitoring Data for 2011-2013

Monitoring Station	Pollutant Standard		2013		2012		2011	
			No. Exceed	Maximum Concentration	No. Exceed	Maximum Concentration	No. Exceed	Maximum Concentration
Bethel Island Road	Ozone	1-hour	0/0	0.082 ppm	1/0	0.98 ppm	0/0	0.091 ppm
Stockton-Hazelton			0/0	0.080 ppm	1/0	0.097 ppm	0/0	0.089 ppm
Elk Grove-Bruceville			0/0	0.086 ppm	0/0	0.093 ppm	1/0	0.097 ppm
Bethel Island Road	Ozone	8-hour	0/1	0.076 ppm	2/4	0.088 ppm	2/4	0.078 ppm
Stockton-Hazelton			0/0	0.067 ppm	2/6	0.083 ppm	0/0	0.068 ppm
Elk Grove-Bruceville			0/0	0.069 ppm	5/11	0.087 ppm	1/6	0.081 ppm
Bethel Island Road	CO	8-hour	0/0	N/A	0/0	0.89 ppm	0/0	0.95 ppm
Stockton-Hazelton			0/0	N/A	0/0	1.78 ppm	0/0	2.13 ppm
Bethel Island Road	SO_2	24-hour	0	0.001 ppm	0	0.002 ppm	0	0.002 ppm
Bethel Island Road	PM_{10}	24-hour	0/1	50.7 μg/m^3	0/1	52.3 μg/m^3	0/0	49.5 μg/m^3
Stockton-Hazelton			0/10	95.5 μg/m^3	0/3	70.0 μg/m^3	0/4	70.1 μg/m^3
Bethel Island Road	PM_{10}	Annual		N/A		14.1 μg/m^3		17.9 μg/m^3
Stockton-Hazelton				32.0 μg/m^3		22.8 μg/m^3		24.1 μg/m^3
Stockton-Hazelton	$PM_{2.5}$	24-hour	27	66.5 μg/m^3	6	60.4 μg/m^3	11	65.5 μg/m^3
Elk Grove-Bruceville			N/A	45.6 μg/m^3	NA	37.2 μg/m^3	NA	38.0 μg/m^3
Stockton-Hazelton	$PM_{2.5}$	Annual		14 μg/m^3		14 μg/m^3		14 μg/m^3

Monitoring Station	Pollutant Standard		2013		2012		2011	
			No. Exceed	Maximum Concentration	No. Exceed	Maximum Concentration	No. Exceed	Maximum Concentration
Elk Grove-Bruceville			0	8.2 $\mu g/m^3$		N/A	0	10.8 $\mu g/m^3$

Notes:

The first value represents the number of days on which the federal standard was exceeded. The second number represents the number of days on which the state standard was exceeded.

ppb = parts per billion

ppm = parts per million

$\mu g/m^3$ = micrograms per cubic meter

N/A = not available

Source: CARB 2015c

TACs in the Study Area

TACs in the study area result primarily from combustion of fossil fuels, in particular gasoline and diesel fuel, from both on-road and off-road vehicles and boat traffic. The Ryde Avenue site would also be affected by TACs associated with the Port of Stockton, located across the river. In addition to the diesel emissions associated with the Port of Stockton, tenants of the port and nearby industrial areas may emit a variety of unknown TACs.

Attainment Status

CARB and USEPA have established CAAQS and NAAQS, respectively, in an effort to protect human health and welfare. Geographic areas are deemed to be in attainment if these standards are met or in nonattainment if they are not met. “Unclassified” areas are any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant. Nonattainment status is classified by the severity of the nonattainment problem. For ozone, these classifications are marginal, moderate, serious, severe, and extreme nonattainment classifications. Nonattainment classifications for PM range from marginal to serious. **Table 6-3** shows the attainment status for the SFBAAB, SVAB, and SJVAB.

Table 6-3. Attainment Status of State and Federal Ambient Air Quality Standards

Contaminant	Averaging Time	Concentration	SFBAAB		SVAB		SJVAB	
			State Standards Attainment Status[1]	Federal Standards Attainment Status[2]	State Standards Attainment Status[1]	Federal Standards Attainment Status[2]	State Standards Attainment Status[1]	Federal Standards Attainment Status[2]
Ozone	1-hour	0.09 ppm	N	See footnote 3	N	See footnote 3	N	See footnote 3
	8-hour	0.070 ppm	N		N		N	
		0.075 ppm		N (See footnote 3)		N (See footnote 3)		N (See footnote 3)
Carbon Monoxide	1-hour	20 ppm	A		A		U/A	
		35 ppm		A		A		U/A
	8-hour	9.0 ppm	A	A	A	A	U/A	U/A
Nitrogen Dioxide	1-hour	0.18 ppm	A		A		A	
		0.100 ppm[7]		U		U/A		U/A
	Annual arithmetic mean	0.030 ppm	A		A		A	
		0.053 ppm		A		U/A		U/A
Sulfur Dioxide	1-hour	0.25 ppm	A		A		A	
		0.075 ppm		A		U/A		U/A
	24-hour	0.04 ppm	A		A		A	
		0.14 ppm		A		A		U/A

Contaminant	Averaging Time	Concentration	SFBAAB		SVAB		SJVAB	
			State Standards Attainment Status[1]	Federal Standards Attainment Status[2]	State Standards Attainment Status[1]	Federal Standards Attainment Status[2]	State Standards Attainment Status[1]	Federal Standards Attainment Status[2]
	Annual arithmetic mean	0.030 ppm		A		A		U/A
Particulate Matter (PM_{10})	24-hour	50 µg/m^3	N		N		N	
		150 µg/m^3		U		A		A
	Annual arithmetic mean	20 µg/m^3	N		N		N	
Fine Particulate Matter ($PM_{2.5}$)	24-hour	35 µg/m^3		N		N		N
	Annual arithmetic mean	12 µg/m^3	N	U/A	U/A	U/A	N	N
Sulfates	24-hour	25 µg/m^3	A		A		A	
Lead[8]	30-day average	1.5 µg/m^3	A		A		A	
	Calendar quarter	1.5 µg/m^3		U/A		U/A		U/A
	Rolling 3-month average	0.15 µg/m^3		U/A		U/A		U/A
Hydrogen Sulfide	1-hour	0.03 ppm	U		U		U	

Contaminant	Averaging Time	Concentration	SFBAAB		SVAB		SJVAB	
			State Standards Attainment Status[1]	Federal Standards Attainment Status[2]	State Standards Attainment Status[1]	Federal Standards Attainment Status[2]	State Standards Attainment Status[1]	Federal Standards Attainment Status[2]
Vinyl Chloride[8] (chloroethene)	24-hour	0.010 ppm	U		U		A	
Visibility Reducing Particles	8 hour (10:00 to 18:00 PST)	See footnote 5	U		U		U	

Notes:

A = attainment

N = non-attainment

U = unclassified

ppm = parts per million

$\mu g/m^3$ – micrograms per cubic meter

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, suspended particulate matter - PM10, and visibility reducing particles are values that are not to be exceeded. The standards for sulfates, Lake Tahoe carbon monoxide, lead, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded. If the standard is for a 1-hour, 8-hour or 24-hour average (i.e., all standards except for lead and the PM10 annual standard), then some measurements may be excluded. In particular, measurements are excluded that CARB determines would occur less than once per year on the average. The Lake Tahoe CO standard is 6.0 ppm, a level one-half the national standard and two-thirds the state standard.
2. National standards shown are the "primary standards" designed to protect public health. National air quality standards are set by USEPA at levels determined to be protective of public health with an adequate margin of safety. National standards other than for ozone, particulates and those based on annual averages are not to be exceeded more than once a year. The 1-hour ozone standard is attained if, during the most recent three-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than one. The 8-hour ozone standard is attained when the 3-year average of the 4th highest daily concentrations is 0.075 ppm (75 ppb) or less. The 24-hour PM10 standard is attained when the 3-year average of the 99th percentile of monitored concentrations is less than 150 μg/m3. The 24-hour PM2.5 standard is attained when the 3-year average of 98th percentiles is less than 35 μg/m3. Except for the national particulate standards, annual standards are met if the annual average falls below the standard at every site. The national annual particulate standard for PM10 is met if the 3-year average falls below the standard at every site. The annual PM2.5 standard is met if the 3-year average of annual averages spatially-averaged across officially designed clusters of sites falls below the standard.
3. The national 1-hour ozone standard was revoked by USEPA on June 15, 2005. On October 1, 2015, the EPA issued a final ruling to change the federal ozone (8-hour) standard from 0.075 ppm to 0.070 ppm. The attainment status provided in this table for the NAAQS ozone standard is based on the 2008 8-hour NAAQS standard of 0.075 ppm since there are not yet available attainment status determinations for the 2015 standard.

4. In April 1998, the Bay Area was redesignated to attainment for the national 8-hour carbon monoxide standard.
5. Statewide VRP Standard (except Lake Tahoe Air Basin): Particles in sufficient amount to produce an extinction coefficient of 0.23 per kilometer when the relative humidity is less than 70 percent. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range.
6. On January 9, 2013, USEPA issued a final rule to determine that the Bay Area attains the 24-hour PM2.5 standard. This USEPA rule suspends key SIP requirements as long as monitoring data continues to show that the Bay Area attains the standard. Despite this USEPA action, the Bay Area will continue to be designated as “non-attainment” for the national 24-hour PM2.5 standard until such time as the BAAQMD submits a “redesignation request” and a “maintenance plan” to USEPA, and USEPA approves the proposed redesignation.
7. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).
8. CARB has identified lead and vinyl chloride as TACs with no threshold level of exposure below which there are no adverse health effects determined.

Source: USEPA2015c; CARB 2015b

6.1.8 Sensitive Receptors

Sensitive receptors are those segments of the population most susceptible to poor air quality: children, the elderly, and individuals with pre-existing serious health problems affected by air quality (e.g., asthma) (CARB 2005). Examples of locations that contains sensitive receptors are residences, schools and school yards, parks and playgrounds, daycare centers, nursing homes, and medical facilities. Residences include houses, apartments, and senior living complexes. Medical facilities can include hospitals, convalescent homes, and health clinics. Playgrounds include play areas associated with parks or community centers.

Sensitive receptors immediately adjacent to the RVARC site are users of the public marina and residents to the north, workers at the U.S. Coast Guard station to the south, and workers on agricultural land on the opposite side of Beach Drive to the west. There are also campgrounds located to the south of the site. Riverview Middle School is located less than 0.25 mile from the RVARC site.

The Ryde Avenue site is surrounded by low- and medium-density residences. Several schools, daycare centers, senior facilities, and medical facilities are located near the site: Tender Loving Care Guest Home (1,558 feet [475 meters]), Fun and Care Day Care (1,640 feet [500 meters]), San Joaquin Building Futures Academy (2,297 feet [700 meters]), Victory Elementary School (3,199 feet [975 meters]), and One Charter School (4,921 feet [1,500 meters]).

6.2 Regulatory Setting

The Proposed Project is subject to air quality and GHG regulations developed and implemented at the federal, state, and local levels. At the federal level, USEPA is responsible for implementation of the Clean Air Act (CAA). Responsibility for attaining and maintaining air quality in California is divided between CARB and regional air quality districts. Areas of control for the regional districts are set by CARB, which divides the state into air basins. Plans, policies, and regulations that pertain to air quality and GHG emissions relevant to the alternatives are discussed in this section.

6.2.1 Federal Laws, Regulations, and Policies

Clean Air Act

The CAA governs air quality in the United States and is administered by USEPA. USEPA is responsible for setting and enforcing the NAAQS for atmospheric pollutants. It regulates emission sources that are under the exclusive authority of the federal government, such as aircraft, ships, and certain types of locomotives. USEPA also has jurisdiction over emissions sources outside state water (outer continental shelf) and establishes various emissions standards for vehicles sold in states other than California (California has received a waiver to establish emission standards lower than the federal standards). As part of its enforcement responsibilities, USEPA requires each state with nonattainment areas to prepare and submit a state implementation plan (SIP) that demonstrates the means to attain the federal standards. The SIP must integrate federal, state, and local plan components and regulations and identify specific measures to reduce pollution, using a combination of performance standards and market-based programs, within the timeframe identified in the SIP. A maintenance plan must be prepared for each former nonattainment area that subsequently demonstrates compliance with the standards.

Section 112 of the CAA addresses emissions of hazardous air pollutants. Before 1990, CAA established a risk-based program under which only a few standards were developed. The 1990 Clean Air Act Amendments revised Section 112 to require issuance of technology-based standards for major sources and certain area sources. For major sources, Section 112 requires that USEPA establish emission standards that require the maximum degree of reduction in emissions of hazardous air pollutants. These emission standards are commonly referred to as maximum achievable control technology (MACT) standards. Eight years after the technology-based MACT standards are issued for a source category, USEPA is required to review those standards to determine whether any residual risk exists for that source category and, if necessary, revise the standards to address such risk.

The CAA contains regulations dealing with operating permits for large industrial and commercial sources that release pollutants into the air. Operating permits contain information on which pollutants are being released, how much may be released, and what kinds of steps the source's owner or operator must take to reduce pollution. Permits must include plans to measure and report the air pollution emitted. Other sections of the CAA address regulations that reduce acid rain and protect the stratospheric ozone layer.

General Conformity Rule

Section 176(c) of the CAA provides that federal agencies cannot engage, support, or provide financial assistance for licensing, permitting, or approving any project unless the project conforms to the applicable SIP. Under CAA Section 176(c) requirements, USEPA promulgated 40 CFR Part 51, Subpart W, and 40 CFR Part 93, Subpart B, "Determining Conformity of General Federal Actions to State or Federal Implementation Plans" (see 58 FR 63214 [November 30, 1993], as amended; 75 FR 17253 [April 5, 2010]). These regulations, commonly referred to as the General Conformity Rule, apply to all federal actions, including those by USFWS, except for those federal actions that are specifically excluded from review (e.g., stationary-source emissions) or are related to transportation plans, programs, and projects under Title 23 USC or the Federal Transit Act, which are subject to Transportation Conformity.

In states that have an approved SIP revision adopting General Conformity regulations, 40 CFR Part 51, Subpart W, applies; in states that do not have an approved SIP revision adopting General Conformity regulations, 40 CFR Part 93, Subpart B, applies. The RCARC and Ryde Avenue sites are located in areas of California with approved SIPs adopting General Conformity regulations.

The General Conformity Rule is used to determine if federal actions meet the requirements of the CAA and the applicable SIP by ensuring that air emissions related to the action do not:

- Cause or contribute to new violations of a NAAQS;
- Increase the frequency or severity of any existing violation of a NAAQS; or
- Delay timely attainment of a NAAQS or interim emission reduction.

A conformity determination under the General Conformity Rule is required if the federal agency determines that the action would occur in a nonattainment or maintenance area; no specific exemptions apply to the action; the action is not included in the federal agency's "presumed to conform" list; emissions from the proposed action are not within the approved emissions budget for an applicable facility; and the total direct and indirect emissions of a pollutant (or its precursors) are at or above the *de minimis* levels established in the General Conformity Rule (75 FR 17255). *De minimis* levels are shown in **Table 6-4.**

Table 6-4. General Conformity *De Minimis* Levels

Pollutant	Area Designation	Tons/Year
Ozone (VOC or NO_X)	Serious nonattainment	50
	Severe nonattainment	25
	Extreme nonattainment	10
	Other areas outside an ozone transport region	100
Ozone (NO_X)	Marginal and moderate nonattainment inside an ozone transport region	100
	Maintenance	100
Ozone (VOC)	Marginal and moderate nonattainment inside an ozone transport region	50
	Maintenance outside an ozone transport region	100
PM_{10}	Serious nonattainment	70
	Moderate nonattainment and maintenance	100
$PM_{2.5}$ (direct emissions, SO_2, NO_X, VOC, or ammonia)	All nonattainment and maintenance	100
Lead	All nonattainment and maintenance	25

Source: 75 FR 17255

Six methods are available for demonstrating conformity:

- Document that the emissions from the action are identified and accounted for in the SIP;

- Obtain a statement from the applicable state or local air quality agency indicating that the emissions from the action, along with all other emissions in the area, would not exceed the budget for those emissions in the SIP;
- Obtain from the local Metropolitan Planning Organization a statement indicating that the emissions are included in transportation plan modeling;
- Obtain agreement from the state to include the emissions in the SIP;
- Conduct air quality modeling to demonstrate that the emissions would not cause or contribute to a violation of the NAAQS; this modeling option is not available for areas in nonattainment for ozone or NO_2 and some $PM_{2.5}$ areas; or
- Mitigate or offset the increase in emissions; offset emissions must be offset to zero, not to the *de minimis* levels.

In addition, federal activities may not cause or contribute to new violations of air quality standards, exacerbate existing violations, or interfere with timely attainment or required interim emissions reductions toward attainment. The Proposed Project is subject to review under the General Conformity Rule.

Corporate Average Fuel Economy Standards

The Corporate Average Fuel Economy (CAFE) standards, first enacted by Congress in 1975, require vehicle manufacturers to comply with gas mileage or fuel economy standards. These standards are set and regulated by the National Highway Traffic Safety Administration (NHTSA), with testing and data support from USEPA.

The issued rules include fuel economy standards for light- and heavy-duty vehicles. On September 15, 2011, USEPA and NHTSA issued a final rule on GHG standards and fuel efficiency standards for medium- and heavy-duty engines and vehicle model years 2014–2018 (76 FR 57106). On August 28, 2012, USEPA and NHTSA issued a joint final rulemaking to establish 2017–2025 GHG emissions and CAFE standards for light-duty vehicles (77 FR 62624). More fuel-efficient vehicles result in lower air pollutant emissions.

Non-road Emission Regulations

USEPA has adopted emissions standards for different types of non-road engines, equipment, and vehicles. For non-road diesel engines, USEPA has adopted multiple tiers of emission standards.

USEPA signed a final rule on May 11, 2004, introducing the Tier 4 emission standards, to be phased in between 2008 and 2015 (69 CFR 38957–39273, June 29, 2004). The Tier 4 standards require that emissions of PM and NO_X be further reduced by about 90 percent. Such emission reductions can be achieved through the use of control technologies, including advanced exhaust gas after-treatment. To enable sulfur-sensitive control technologies in Tier 4 engines, such as catalytic particulate filters and NO_X absorbers, USEPA also mandated reductions in sulfur content in non-road diesel fuels. In most cases, federal non-road regulations also apply in California, which has only limited authority to set emission standards for new non-road engines. The CAA preempts California's authority to control emissions from new farm and construction equipment less than 175 horsepower (CAA Section 209[e][1][A]) and requires California to receive authorization from USEPA for controls over other off-road sources (CAA Section 209[e][2][A]).

Mandatory Reporting Rule for GHG Emissions

On September 22, 2009, USEPA published the final Mandatory Reporting Rule that requires mandatory reporting of GHG emissions from large sources in the United States (USEPA 2010). The gases covered by the final rule are CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, and other fluorinated gases, including nitrogen trifluoride (NF_3) and hydrofluorinated ethers (HFEs). Currently, this is not a transportation-related regulation.

Endangerment Finding

On December 7, 2009, the Final Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the CAA was signed by the USEPA Administrator. The endangerment finding states that current and projected concentrations of the six-key well-mixed GHGs in the atmosphere—CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6—threaten the public health and welfare of current and future generations. Furthermore, it states that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare.

Vehicle Emission Standards

USEPA is revising vehicle emission standards under the endangerment finding of the CAA. USEPA and the NHTSA updated the CAFE fuel standards on May 7, 2010 (75 FR 25324), requiring substantial improvements in fuel economy for all vehicles sold in the United States. The new standards apply to new passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012–2016. USEPA's GHG standards require these vehicles to meet an estimated combined average emissions limit of 250 grams of CO_2 per mile in model year 2016, which would be equivalent to 35.5 miles per gallon if the automotive industry were to meet this CO_2 level entirely through fuel economy improvements.

On September 15, 2011, USEPA and NHTSA issued a final rule for Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles (76 FR 57106). This final rule is tailored to each of three regulatory categories of heavy-duty vehicles: combination tractors; heavy-duty pickup trucks and vans; and vocational vehicles. USEPA and NHTSA estimated that the new standards in this rule will reduce CO_2 emissions by approximately 270 million metric tons (MMT) and save 530 million barrels of oil over the life of vehicles sold during the 2014–2018 model years.

In January 2012, CARB approved a vehicle emission control program for model years 2017–2025. This is called the Advanced Clean Cars Program. On August 28, 2012, USEPA and NHTSA issued a joint final rulemaking to establish 2017–2025 GHG emissions and café standards. To further California's support of the national program to regulate emissions, CARB submitted a proposal that would allow automobile manufacturer compliance with

USEPA's requirements to show compliance with California's requirements for the same model years. The final rulemaking package was filed on December 6, 2012, and the final rulemaking became effective December 31, 2012.

Council on Environmental Quality

On October 5, 2009, Executive Order (EO) 13514, Federal Leadership in Environmental, Energy, and Economic Performance, was issued by the CEQ. The EO required federal agencies to set a 2020 GHG emissions reduction target within 90 days, increase energy efficiency, reduce fleet petroleum consumption, conserve water, reduce waste, support sustainable communities, and leverage federal purchasing power to promote environmentally responsible products and technologies.

On December 18, 2014, the CEQ released revised draft guidance on the consideration of GHG emissions and climate change in NEPA review (CEQ 2014). This is an update to guidance issued in draft form in February 2010. The guidance encourages agencies to include a quantitative assessment of GHG emissions for projects expected to have direct GHG emissions of 25,000 metric tons (MT) or more on an annual basis. The guidance states that the assessment of direct and indirect climate change effects should account for upstream and downstream emissions and includes guidance on biogenic sources of GHG emissions from land management actions. The guidance provides recommendations that projects conducting a cost-benefit analysis is should include the federal social cost of carbon estimates.

U.S. Fish and Wildlife Service Climate Change Strategy

USFWS climate change strategic plan, titled *Rising to the Urgent Challenge: Strategic Plan for Responding to Accelerating Climate Change* (USFWS 2010), establishes a basic framework within which USFWS will work as part of the larger conservation community to help ensure the sustainability of fish, wildlife, plants, and habitats in the face of accelerating climate change. The strategy is implemented through a dynamic action plan that details specific steps USFWS will take to implement the strategic plan. This includes a goal of achieving carbon neutrality by 2020. The plan employs three key strategies to address climate change:

- **Adaptation** is the planned, science-based management actions that USFWS takes to help reduce the impacts of climate change on fish, wildlife, and their habitats. Adaptation forms the core of the USFWS response to climate change and is the centerpiece of the agency's strategic plan. This adaptive response to climate change involves strategic conservation of terrestrial, freshwater, and marine habitats within sustainable landscapes.
- **Mitigation** is achieved through biological carbon sequestration, the process in which CO_2 from the atmosphere is taken up by plants through photosynthesis and stored as carbon in tree trunks, branches, and roots. Sequestering carbon in vegetation, such as bottomland hardwood forests or native prairie grasses, can often restore or improve habitat and directly benefit fish and wildlife.

- **Engagement** involves reaching out to USFWS employees; local, national, and international partners in the public and private sectors; key constituencies and stakeholders; and the general public to join forces and seek solutions to the challenges to fish and wildlife conservation posed by climate change.

6.2.2 State Laws, Regulations, and Policies

California Clean Air Act

The California Clean Air Act (CCAA) requires nonattainment areas to achieve and maintain the health-based CAAQS by the earliest practicable date. The act is administered by CARB at the state level and by local air quality management districts at the regional level; the air districts are required to develop plans and control programs for attaining the state standards. Unlike the federal CAA, the CCAA does not set precise attainment deadlines. Instead, the CCAA establishes increasingly stringent requirements for areas that will require more time to achieve the standards.

CARB is responsible for ensuring implementation of the CCAA, meeting state requirements of the federal CAA, and establishing the CAAQS. CAAQS are generally more stringent than the NAAQS and incorporate additional standards for SO_4, H_2S, vinyl chloride, and visibility-reducing particles. CARB is also responsible for setting emission standards for vehicles sold in California and for other emission sources, such as consumer products and certain off-road equipment. CARB also establishes passenger vehicle fuel specifications.

Statewide Truck and Bus Regulation

On December 12, 2008, CARB approved a new regulation to substantially reduce emissions of DPM, NO_X, and other pollutants from existing on-road diesel vehicles operating in California. The regulation requires affected trucks and buses to meet performance standards and requirements between 2011 and 2023. Affected vehicles included on-road, heavy-duty, diesel-fueled vehicles with a gross vehicle weight rating greater than 14,000 pounds. The regulation was updated in 2011 with revisions that provide more compliance flexibility and reflect the impact of the economic recession on vehicle activity and emissions. Heavy-duty trucks used in Proposed Project activities would be required to comply with this regulation.

In-use Off-road Diesel Vehicle Regulation

In 2007, CARB adopted a regulation to reduce DPM and NO_X emissions from in-use off-road heavy-duty diesel vehicles in California. The regulation imposes limits on vehicle idling and requires fleets to reduce emissions by retiring, replacing, repowering, or installing exhaust retrofits to older engines. In December 2010, major amendments were made to the regulation, including a delay of the first performance standards compliance date to no earlier than January 1, 2014.

Heavy-duty Vehicle Inspection Program

The heavy-duty vehicle inspection program requires heavy-duty trucks and buses to be inspected for excessive smoke and tampering and for engine certification label compliance. Any heavy-duty vehicle (i.e., vehicles with a gross vehicle weight rating greater than 6,000 pounds) traveling in California, including vehicles registered in other states and foreign countries, may be tested. Tests are performed by CARB inspection teams at border crossings, California Highway Patrol weigh stations, fleet facilities, and randomly selected roadside locations. Owners of trucks and buses found to be in violation are subject to penalties starting at $300 per violation. Heavy-duty trucks used for Proposed Project activities would be subject to the inspection program.

Heavy-duty On-board Diagnostic System Regulation

In 2004, CARB adopted a regulation requiring on-board diagnostic (OBD) systems on all 2007 and later model year heavy-duty engines and vehicles (i.e., vehicles with a gross vehicle weight rating greater than 14,000 pounds) in California. CARB subsequently adopted a comprehensive OBD regulation for heavy-duty vehicles model years 2010 and beyond. The heavy-duty OBD regulation was updated in 2010 and 2013 with revisions to enforcement requirements, testing requirements, and implementation schedules. Heavy-duty trucks used for Proposed Project activities would be required to comply with the heavy-duty OBD regulatory requirements.

California Standards for Diesel Fuel Regulations

State regulations require diesel fuel with sulfur content of 15 ppm or less (by weight) to be used for all diesel-fueled vehicles that are operated in California. The standard also applies to non-vehicular diesel fuel, except for diesel fuel used solely in locomotives or marine vessels. The regulations also contain standards for the aromatic hydrocarbon content and lubricity of diesel fuels.

Airborne Toxic Control Measures

CARB regulates TACs by requiring implementation of various airborne toxic control measures (ATCMs), which are intended to reduce emissions associated with toxic substances.

ATCM to Limit Diesel-fueled Commercial Motor Vehicle Idling

On October 20, 2005, CARB approved the ACTM to limit diesel-fueled commercial motor vehicle idling. This regulation was a followup to previous idling ATCMs and consists of new engine and in-use truck requirements, as well as idling emission performance standards. The regulation requires 2008 and newer model year heavy-duty diesel engines to be equipped with a nonprogrammable engine shutdown system that automatically shuts down the engine after 5 minutes of idling or, optionally, meets a stringent NO_X idling emission standard (30 grams per hour). The regulation also is applicable to the operation of in-use trucks, requiring operators of both in-state and out-of-state registered, sleeper berth–equipped trucks to shut down their engines manually when idling more than 5 minutes at any location within California, beginning in 2008. Vehicles subject to this regulation are diesel-fueled commercial vehicles with a gross vehicle weight rating greater than 10,000 pounds. There are exceptions to this regulation; for example, equipment such as ready-mix concrete trucks, which require the engine to be on in order to operate, is not required to comply with this regulation. Trucks used for vendor delivery of materials for Proposed Project activities would be required to comply with the commercial vehicle idling regulatory requirements.

Portable Engine ATCM

The California Portable Engine ATCM is designed to reduce the PM emissions from portable diesel-fueled engines rated at 50 brake horsepower or larger. This regulation requires that an owner's fleet of portable engines meet emission standards that reduce the amount of PM emissions over time.

Portable Equipment Registration Program

The statewide PERP establishes a system to uniformly regulate portable engines and portable engine-driven equipment units. After being registered in this program, engines and equipment units may operate throughout the state without the need to obtain permits from individual air districts. Owners or operators of portable engines and certain types of equipment can voluntarily register their units under this program. Operation of registered portable engines may still be subject to certain district requirements for reporting and notification. Engines with less than 50 brake horsepower are exempt from this program. Some of the engines used for the Proposed Project would be exempt from PERP.

TAC Regulations

In addition to ATCMs, TACs are controlled under several different regulations in California including the Tanner Air Toxics Act, Air Toxics Hot Spots Information Act, and AB 2588: Air Toxics "Hot Spots" Information and Assessment Act. In addition, Proposition 65 (the Safe Water and Toxic Enforcement Act of 1996) requires the state to publish a list of chemicals known to cause cancer or birth defects or other reproductive harm. Proposition 65 requires businesses to notify Californians about substantial amounts of chemicals in the products they purchase or that are released into the environment.

Executive Orders S-03-05 and B-16-2012

In 2005, EO S-03-05 was issued, calling for statewide GHG reductions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. The EO also called for the creation of a "Climate Action Team," which was to report to the Governor every 2 years on progress toward meeting the targets and the effects of GHG emissions on the state. The latest of these Climate Action Team Biennial Reports was published in December 2010 (California Environmental Protection Agency 2010). In March 2012, EO B-16-2012 was issued, affirming the long-range climate goal for California to reduce greenhouse gases to 80 percent below 1990 levels by 2050.

Executive Order B-18-12

On April 25, 2012, Governor Brown issued EO B-18-12, directing California state agencies and departments to take immediate steps to "green" the state's buildings, reduce greenhouse gas emissions and improve energy efficiency.

Under the Executive Order, state agencies and departments will be required to:

- Reduce greenhouse gas emissions by at least 10 percent by 2015 and 20 percent by 2020 as measured against a 2010 baseline.
- Reduce water use by 10 percent by 2015 and 20 percent by 2020 as measured against a 2010 baseline.
- Reduce grid-based energy purchases by 20 percent by 2018 as compared to a 2003 baseline.

The EO also includes specific requirements for new and existing state buildings:

- New state buildings and existing state buildings undergoing major renovations (and beginning design after 2025) will be required to be constructed as Zero Net Energy facilities with an interim target for 50 percent of new facilities beginning design after 2020 to be Zero Net Energy and existing facilities achieving Zero Net Energy for 50 percent of their square footage by 2025.
- New state buildings and existing state buildings undergoing major renovations, and which are larger than 10,000 square feet, use on-site power generation such as solar photovoltaic, solar thermal or wind power generation if economically feasible.
- New state buildings and existing state buildings undergoing major renovations, and which are larger than 10,000 square feet, obtain LEED Silver certification or higher.
- New and existing state buildings incorporate building commissioning to facilitate improved building efficiency and operations.
- Implementation of voluntary measures from Division A4.5 and A5.5 of the California Green Building Standards Code.

Executive Order B-30-15

In April 2015, Governor Brown issued EO B-30-15, setting an interim target to cut California's greenhouse gas emissions to 40 percent below 1990 levels by 2030, in order to help the state meet the 80 percent emissions reduction goal for 2050 set in Executive Order S-03-05. EO B-30-15 requires the Air Resources Board to update the Climate Change Scoping Plan to express the 2030 target in terms of million metric tons of carbon dioxide equivalent. In addition, the Natural Resources Agency is to update the state's climate adaptation strategy, *Safeguarding California*, every three years and ensure that its provisions are fully implemented. The order also requires state agencies to take climate change into account of their planning and investment decisions, and employ full life-cycle cost accounting to evaluate investments and alternatives.

Assembly Bill 32 Global Warming Solutions Act of 2006

AB 32, the California Global Warming Solutions Act was adopted by the California State Legislature in 2006. AB 32 designates CARB as the lead agency to implement the law, with the following specific requirements:

- Prepare and approve a Scoping Plan for achieving the maximum technologically feasible and cost-effective reductions in GHG emissions from sources or categories of sources of GHGs by 2020, and update the Scoping Plan every 5 years.
- Maintain and continue reductions in emissions of GHG beyond 2020.
- Identify the statewide level of GHG emissions in 1990 to serve as the emissions limit to be achieved by 2020.
- Identify and adopt regulations for discrete early actions that could be enforceable on or before January 1, 2010.
- Adopt a regulation that establishes a system of market-based declining annual aggregate emission limits for sources or categories of sources that emit GHG emissions.
- Convene an Environmental Justice Advisory Committee to advise CARB in developing and updating the Scoping Plan and any other pertinent matter in implementing AB 32.
- Appoint an Economic and Technology Advancement Advisory Committee to provide recommendations for technologies, research and GHG emission reduction measures.

AB 32 required CARB to prepare a Scoping Plan containing the main strategies that would be used to achieve reductions in GHG emissions in California. CARB released the Climate Change Scoping Plan in October 2008 and adopted the plan on December 12, 2008. This plan contains an outline of the proposed State strategies to achieve the 2020 GHG emission limits. Key elements of the Scoping Plan include the following recommendations:

- Expand and strengthen existing energy efficiency programs as well as building and appliance standards.
- Achieve a statewide renewables energy mix of 33 percent.
- Develop a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system.
- Establish targets for transportation-related GHG emissions for regions throughout California and pursue policies and incentives to achieve those targets.
- Adopt and implement measures under existing State laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel standard.
- Create targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the state's long-term commitment to AB 32 implementation.

Under the Scoping Plan, approximately 85 percent of the state's emissions are subject to a cap-and-trade program in which covered sectors are placed under a declining emissions cap. Emissions reductions will be achieved through regulatory requirements and the option to reduce emissions further or purchase allowances to cover compliance obligations. It is expected that emissions reduction from this cap-and trade program will account for a large portion of the reductions required by AB 32.

CARB released the First Update to the Scoping Plan (Update) in May 2014. The Update builds on the initial Scoping Plan with new strategies and recommendations. It identifies opportunities to leverage existing and new funds to further drive GHG emission reductions through strategic planning and targeted low-carbon investments. The Update defines CARB's climate change priorities for the next 5 years and sets the groundwork to reach California's long-term climate goals, as set forth in EO S-3-05 and EO B-16-2012. The Update highlights California's progress toward meeting the near-term 2020 GHG emission reduction goals defined in the initial Scoping Plan. These efforts put California on course to achieve the near-term 2020 goal, and have created a framework for ongoing climate action that can be built upon to maintain and continue economic sector-specific reductions beyond 2020, as required by AB 32. The Update focuses on nine key areas: energy, transportation, agriculture, water, waste management, natural and working lands, short-lived climate pollutants, green buildings, and the cap-and-trade programs. The key focus areas have overlapping and complementary interests that require carful coordination in California's future climate and energy policies, and they were chosen because they address issues that underlie multiple sectors of the economy.

Low Carbon Fuel Standard

EO S-1-07, the LCFS, was issued in January 2007. The order called for a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020. The LCFS was approved by CARB in 2009, and it became effective in April 2010. The regulation established annual performance standards for fuel producers and importers, applicable to all fuels used for transportation in California (CARB 2011).

Assembly Bill 1493

With the passage of AB 1493 in 2002, California launched an innovative and pro-active approach for dealing with GHG emissions and climate change at the state level. AB 1493 required CARB to develop and implement regulations to reduce automobile and light-truck GHG emissions (CARB 2013b). These stricter emissions standards apply to automobiles and light trucks beginning with the 2009 model year. Although litigation was filed, challenging these regulations; USEPA initially denied California's related request for a waiver, but a waiver was subsequently granted (CARB 2013b).

Renewable Portfolio Standard

California's Renewables Portfolio Standard was originally established by legislation enacted in 2002. Subsequent amendments to the law have resulted in a requirement for California's electric utilities to have 33 percent of their retail sales derived from eligible renewable energy resources in 2020 and all subsequent years. The law established interim targets for the utilities as shown below. Publicly Owned Municipal Utilities are not regulated by the California Public Utilities Commission (CPUC) but are affected by the law nonetheless, and their governing boards are charged with establishing procurement requirements based on the interim goals below:

- 20 percent of retail sales by December 31, 2013;
- 25 percent of retail sales by December 31, 2016; and
- 33 percent of retail sales by December 31, 2020.

AB 327 (approved in 2013) allows the CPUC to establish procurement requirements in excess of the percentages stated above.

Stationary Equipment Refrigerant Management Program

The Stationary Equipment Refrigerant Management Program regulation reduces emissions of high-GWP refrigerants resulting from the installation, use, servicing, and dismantling of larger refrigeration systems. The Refrigerant Management Program regulation requires facilities with refrigeration systems with more than 50 pounds of high-GWP refrigerant to conduct periodic leak inspections, repair leaks promptly, and keep service records on site; additionally, such facilities must register their systems and submit annual refrigerant use reports. The regulation also applies to any person who installs, services, or disposes of any appliance that utilizes a high-GWP refrigerant, as well as refrigerant wholesalers, distributors, and reclaimers. The Proposed Project would be subject to this regulation if its refrigeration systems use more than 50 pounds of high-GWP refrigerants.

EO S-13-08 Adaptation to Climate Change

EO S-13-08, issued November 14, 2008, directs the California Natural Resources Agency, DWR, Governor's Office of Planning and Research, California Energy Commission, State Water Resources Control Board, California Department of Parks and Recreation, and California's coastal management agencies to participate in planning and research activities to advance California's ability to adapt to the impacts of climate change. The EO specifically directed agencies to work with the National Academy of Sciences to initiate the first California Sea Level Rise Assessment and to review and update the assessment every 2 years; immediately assess the vulnerability of the California transportation system to sea level rise; and develop a California Climate Change Adaptation Strategy.

California Climate Change Adaptation Strategy

In 2009, California adopted a statewide Climate Adaptation Strategy that summarizes climate change impacts and recommends adaptation strategies across seven sectors: public health, biodiversity and habitat, oceans and coastal resources, water, agriculture, forestry, and transportation and energy. The California Natural Resources Agency, in coordination with other state agencies, has updated the 2009 *California Climate Change Adaptation Strategy*. The new Safeguarding California Plan augments previously identified strategies in light of advances in climate science and risk management options. The Safeguarding

California Plan highlights climate risks in nine sectors (increased from the original seven) in California, discusses progress to date, and makes realistic sector-specific recommendations. New sectors include: Agriculture, Emergency Management, Forestry, Ocean and Coastal Ecosystems and Resources. For the Proposed Project, measures relating to biodiversity and habitat and water are most relevant. These measures are needed to reduce the Bay-Delta's vulnerability to climate change, in particular salinity intrusion, impaired water quality, changes in precipitation and stream flows, and thermal changes in water that affect aquatic habitats.

DWR Climate Change Policies

DWR adopted the *Climate Action Plan – Phase I: Greenhouse Gas Emissions Reduction Plan* (GGERP) in May 2012 (DWR 2012). The GGERP portion of the Climate Action Plan (CAP) considers GHG emissions from all DWR activities and details DWR's progress and future plans for reducing GHG emissions, consistent with the GHG emissions reduction targets established in AB 32, EO S-3-05, EO B-30-15, and DWR's own policies. In the near term, DWR has the goal of reducing emissions by 50 percent below 1990 levels by 2020 and the long-term goal of reducing emissions by 80 percent below 1990 levels by 2050. To meet these goals, DWR has identified 11 GHG emission reduction measures that it has, is, or will implement. These include DWR's termination of its interest in and associated delivery of electricity from a coal-fired power plant, efficiency improvements to existing facilities, purchase and development of renewable and high-efficiency electricity supplies, comprehensive improvements to DWR's construction practices, and improvements to DWR's business activities that will reduce GHG emissions. The GGERP constitutes DWR's analysis for forecasted GHG emissions and GHG emissions reductions associated with certain future DWR projects and activities. Because the plan underwent environmental review, DWR project-specific environmental documents, under certain circumstances, may rely upon that analysis in cumulative impacts analyses for GHGs (CEQA Guidelines Section 15183.5[a]-[b]). Thus, CEQA analyses can use consistency with the GGERP portion of the CAP as a significance threshold for evaluating GHG emissions. DWR has developed Implementation Procedures for demonstrating consistency with the GGERP portion of the CAP (DWR 2014b).

DWR has also created guidance for CEQA analysis in *GHG Assessment for CEQA Purposes – Informal Guidance for Water Related Issues* (DWR 2014a). This guidance is meant for non-DWR projects, and provides a general overview of options for complying with CEQA and GHG analysis requirements.

6.2.3 Regional and Local Laws, Regulations, and Policies

At the local level, responsibilities of air quality districts include overseeing stationary-source emissions, approving permits, maintaining emissions inventories, maintaining air quality monitoring stations, overseeing agricultural burning permits, and reviewing air quality–related sections of environmental documents under CEQA. The air quality districts are also responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and state air quality laws, as well as for ensuring that the NAAQS and CAAQS are met.

Local governments are essential partners in the effort to reduce air pollutant and GHG emissions. The local governments have influence through their planning and permitting processes, local ordinances, outreach and education efforts, and municipal operations.

The air quality study area for the Proposed Project is within the jurisdiction of four air districts: YSAQMD, Sacramento Metropolitan Air Quality Management District (SMAQMD), BAAQMD, and SJVAPCD. The following local policies related to air quality may apply to implementation of some aspects of the Delta Research Station and operational activities.

Yolo-Solano Air Quality Management District

YSAQMD has local air quality jurisdiction over the components of the Proposed Project located in Yolo and Solano Counties. YSAQMD has adopted CEQA emission thresholds in the *Handbook for Assessing and Mitigation Air Quality Impacts* (YSAQMD 2007) to assist lead agencies in determining the level of significance of project-related emissions. According to the YSAQMD handbook, emissions that exceed the recommended threshold levels are considered potentially significant and should be mitigated where feasible.

YSAQMD is required to develop an air quality plan for nonattainment criteria pollutants in the air district. The most recent ozone plan was prepared for the 1997 ozone standard, which contained an emissions inventory and a plan for achieving attainment through implementation of control measures. While the area is designated in nonattainment for PM emissions, it has submitted documentation showing that it has met the standard during three consecutive years and has developed a maintenance plan to demonstrate that the standard will continue to be met in future years.

All activities within YSAQMD jurisdiction are subject to the YSAQMD regulation in effect at the time of construction. Specific regulations applicable to the alternatives may involve diesel construction equipment emissions, fugitive dust, on-road haul truck emissions, and general permit requirements. The following YSAQMD rules may apply to the Proposed Project:

- **Rule 2.5** – Nuisance prohibits dust emissions from creating nuisance to surrounding properties.
- **Rule 2.11** – Particulate Matter Concentration restricts emissions of PM.
- **Rules 2.28** – Cutback and Emulsified Asphalt Paving Materials limits the application of cutback and emulsified asphalt.
- **Rule 2.32** – Stationary Internal Combustion Engines limits the emission of NO_X and CO from stationary internal combustion engines. This rule applies to portable equipment greater than 50 horsepower, other than vehicles that would be registered with either the PERP or YSAQMD.

San Joaquin Valley Air Pollution Control District

SJVAPCD has local air quality jurisdiction over the Ryde Avenue site in Stockton and in other counties under its jurisdiction. SJVAPCD's recommended CEQA thresholds are outlined in its *Guide for Assessing and Mitigation Air Quality Impacts* (SJVAPCD 2002). SJVAPCD has adopted attainment plans to address ozone, PM, and CO.

1-Hour Ozone

Although USEPA revoked its 1979 1-hour ozone standard in June 2005, many planning requirements remain in place, and the SJVAB must still attain this standard before CAA Section 185 fees which are required when attainment is not reached can be rescinded. SJVAPCD's most recent 1-hour ozone plan, the 2013 Plan for the Revoked 1-hour Ozone Standard, demonstrated attainment of the 1-hour ozone standard by 2017. SJVAPCD is requesting a USEPA finding of attainment based on 2011-2013 ozone data and will continue working closely with CARB and USEPA on this issue.

8-Hour Ozone

SJVAPCD's far-reaching 2007 Ozone Plan demonstrates attainment of USEPA's 1997 8-hour ozone standard by 2023. USEPA approved the 2007 Ozone Plan effective April 30, 2012. The district is now in the process of developing the 2016 Ozone Plan to address USEPA's 2008 8-hour ozone standard, which the SJVAB must attain by 2032. This extremely stringent standard is nearing the SJVAB's naturally occurring background concentrations of ozone. Attainment may not be possible without the virtual elimination of fossil fuel combustion.

PM_{10}

Based on PM_{10} measurements from 2003-2006, USEPA found that the SJVAB has reached attainment of federal PM_{10} standards. On September 21, 2007, SJVAPCD Governing Board adopted the 2007 *PM_{10} Maintenance Plan and Request for Redesignation*, which demonstrates that the SJVAB will continue to meet the PM_{10} standard. USEPA approved the document and, on September 25, 2008, the SJVAB was redesignated to attainment/ maintenance.

$PM_{2.5}$

The SJVAPCD's 2008 $PM_{2.5}$ Plan demonstrated 2014 attainment of USEPA's first $PM_{2.5}$ standard, set in 1997. USEPA lowered the $PM_{2.5}$ standard in 2006, and SJVAPCD's 2012 $PM_{2.5}$ Plan showed attainment of this standard by 2019, with most of the SJVAB achieving attainment much sooner. SJVAPCD continues to work with USEPA on issues surrounding these plans, including USEPA implementation updates. USEPA lowered the $PM_{2.5}$ standard again in 2012 and is in the process of completing attainment designations.

The Proposed Project alternatives may be subject to the following district rules. This list may not be complete, as additional SJVAPCD rules may apply to the alternatives as specific components are identified. These rules have been adopted by SJVAPCD to reduce emissions throughout the SJVAB:

- **Rule 2201 – New and Modified Stationary-Source Review 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** 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 4101 – Visible Emissions** 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** 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 of this rule and subject to SJVAPCD enforcement action.
- **Rule 4641 – Cutback, Slow-Cure, and Emulsified Asphalt, Paving, and Maintenance Operations** 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** limits the emissions of NO_X, CO, and VOC 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** limits the emissions of NO_X, CO, and VOC from spark-ignited internal combustion engines.
- **Regulation VIII – Fugitive PM_{10} Prohibitions** is a series of rules (Rules 8011–8081) designed to reduce PM_{10} emissions (predominantly dust/dirt) generated by human activity, including construction, road construction, bulk materials storage, landfill operations, and other activities.
- **Rule 9510 – Indirect Source Review** is intended to reduce a project's impact from indirect sources such as on-road and off-road vehicles on air quality through project design elements or mitigation by payments of applicable off-site mitigation fees. Compliance with Rule 9510 will reduce construction exhaust NO_X and PM_{10} emissions by 20 percent and 45 percent, respectively. Compliance with Rule 9510 will reduce operational emissions of NO_X and PM_{10} emissions by 33.3 percent and 50 percent, respectively.
- **Rule 9410 – Employer-Based Trip Reduction** requires larger employers to establish an Employer Trip Reduction Implementation Plan, which is a set of measures that encourages employees to use alternative transportation and ridesharing for their commutes.

Sacramento Metropolitan Air Quality Management District

SMAQMD has local air quality jurisdiction over the Proposed Project components located in Sacramento County. Similar to YSAQMD, SMAQMD has adopted the 1994 Sacramento Area Regional Ozone Attainment Plan, the Sacramento Regional 8-Hour Attainment and Reasonable Further Progress Plan (currently under revision), the 2009 Plan, and advisory CEQA emission thresholds to assist CEQA lead agencies in determining the level of significance of project-related emissions (SMAQMD 2009). SMAQMD's recommended CEQA thresholds are outlined in its *Guide to Air Quality Assessment in Sacramento County*. The air district has also established rules and regulations, some of which may apply to the Proposed Project alternatives. This list may not be complete, as additional SMAQMD rules may apply to the alternatives as specific components are identified.

- **Rule 2020 – Nuisance** prohibits criteria pollutants from creating a nuisance to surrounding properties.
- **Rule 403 – Fugitive Dust** controls fugitive dust emissions through implementation of BMPs.
- **Rule 404 – Particulate Matter** restricts emissions of PM greater than 0.23 grams per cubic meter.
- **Rule 412 – Stationary Internal Combustion Engines** 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** limits the application of cutback and emulsified asphalt.

Bay Area Air Quality Management District

BAAQMD has local air quality jurisdiction over the Proposed Project action components located in Contra Costa and Alameda Counties. Similar to YSAQMD and SMAQMD, BAAQMD has adopted advisory emission thresholds to assist CEQA lead agencies in determining the level of significance of a project's emissions, which are outlined in its *CEQA Air Quality Guidelines* (BAAQMD 2010). BAAQMD has also adopted air quality plans to improve air quality, protect public health, and protect the climate. The Bay Area 2001 Ozone Attainment Plan was adopted to reduce ozone and achieve the NAAQS ozone standard. BAAQMD also adopted a redesignation plan for CO in 1994, which includes strategies to ensure the continuing attainment of the NAAQS for CO in the SFBAAB.

BAAQMD also supports incentive programs to reduce criteria pollutant emissions within the district. BAAQMD's Carl Moyer Program funds control projects for off-road and on-road emission sources. The Transportation Fund for Clean Air (TFCA) Program likewise provides financial incentives for on-road vehicle retrofits.

Alternatives 2 and 3 may be subject to the following BAAQMD rules. This list may not be complete, as additional BAAQMD rules may apply to the alternatives as specific components are identified.

- **Regulation 2, Rule 5 – New Source Review of Toxic Air Contaminates** outlines guidance for evaluating TAC emissions and their potential health threats.
- **Regulation 6, Rule 1 – Particulate Matter** restricts emissions of PM.
- Regulation 8, Rule 15 – Emulsified and Liquid Asphalts limits emissions of VOCs caused by paving materials.
- **Regulation 9, Rule 8 – Stationary Internal Combustion Engines** limits emissions of NO_X and CO from stationary internal combustion engines of more than 50 horsepower.

Rio Vista General Plan

The City of Rio Vista General Plan (2002) includes the following policies that relate to air quality and the Proposed Project:

Policy 10.6.A The City shall require that site preparation and construction activities incorporate effective measures to minimize dust emissions and pollutant emissions from motorized construction equipment and vehicles.

Policy 10.6.B The City shall ensure that development projects facilitate non-motorized travel through the use of connecting streets, alleys, and connecting pathways.

Policy 10.6.C The City shall ensure that street design within new developments provides multiple access points within neighborhoods as much as possible, in order to avoid long, circuitous routes for motor vehicles.

Policy 10.6.D The City shall ensure that existing trees and vegetation are retained and incorporated into the project design wherever feasible.

Policy 10.6.E The City shall ensure that new development pays its fair share of the cost to provide alternative transportation systems, including bikeways, pedestrian paths, and public transit facilities.

Policy 10.6.H The City shall plan for a multi-modal transfer site that incorporates automobile parking areas, bike parking, transit, pedestrian paths, and park-and-ride pick-up points.

Policy 10.6.M The City shall require application of the analysis methods and significance thresholds recommended by the YSAQMD, as needed, to determine a project's air quality impacts.

Rio Vista Climate Action Plan

The City of Rio Vista approved a CAP in November 18, 2014. The plan outlines the GHG emissions from the City of Rio Vista and makes recommendations of measures to implement to reduce GHG emissions consistent with the goals of AB 32. The measures applicable to Alternatives 2 and 3 include the following:

- **New Construction Energy Efficiency**, which encourages energy-efficient new construction by promoting energy-efficient mortgages and technical assistance programs for developers.
- **Energy Star Appliances**, which promotes voluntary installation of Energy Star and other high-efficiency appliances.
- **Building Shade Trees**, which promotes adopting a shade tree ordinance for new construction, and development of a shade tree outreach campaign to encourage existing property owners to voluntarily plant shade trees.
- **Solar water heaters**, which promote voluntary installation of solar water heaters in new construction and building retrofits through outreach campaigning.
- **Solar Photovoltaic Systems**, which facilitates the voluntary installation of solar PV systems on residential and nonresidential buildings.
- **Building Lighting**, which encourages voluntary adoption of efficient indoor and outdoor lighting technologies in residential and nonresidential buildings.

Rio Vista Army Reserve Center Redevelopment Plan

The Redevelopment Agency of the City of Rio Vista prepared a Redevelopment Plan and EIR for the RVARC (City of Rio Vista 2011). Potential air quality impacts and mitigation were described in the EIR. Mitigation measures required a suite of measures related to fugitive dust emissions, including minimizing idling time; maintaining equipment in good working order; ensuring that recreation areas are at least 300 feet from sources of DPM or other TACs; using alternative-fueled construction vehicles and equipment; using locally sourced building materials; recycling construction and demolition waste; considering on-site bike or multi-use paths and connections to other paths; implementing a Transportation Demand Management program; requiring that at least 15 percent of fleet vehicles and boats use alternative fuels; providing shore power (cold-ironing) connections for boats; limiting boat idling time when not in use; considering on-site renewable energy systems; adhering to California Green Building Code standards; requiring that new construction achieve LEED New Construction Certification or equivalent; using roofing and paving materials with a high solar reflective index; providing shade for paved areas near buildings; and using high-efficiency lighting design and equipment. To the extent feasible and as applicable to the Proposed Project, these measures have been incorporated in this analysis.

City of Stockton General Plan

The City of Stockton General Plan (2007) includes the following policies that are relevant to the Proposed Project:

> **Policy HS-4.3** *Regional Air Quality Project Review*. The City shall consult with the SJVAPCD during CEQA review for projects that require air quality impact analysis and ensure that the SJVAPCD is on the distribution list for all CEQA documents.

Policy HS-4.4 *Support Regional Air Quality Attainment Plans*. The City shall support recommendations to reduce air pollutants found in the SJVAPCD local attainment plans and use its regulatory authority to mitigate "point" sources of air pollution (e.g., factories, power plants, etc.).

Policy HS-4.5 *City Review of Development Proposals*. The City shall use the SJVAPCD Guide for Assessing and Mitigating Air Quality Impacts (GAMAQI) for determining and mitigating project air quality impacts and related thresholds of significance for use in environmental documents. The City shall continue to cooperate with the SJVAPCD in the review of development proposals.

Policy HS-4.6 *CEQA Compliance and Air Quality Mitigation*. The City shall ensure that air quality impacts identified during the CEQA review process are fairly and consistently mitigated. The City shall require projects to comply with the City's adopted air quality impact assessment and mitigation process, and to provide specific mitigation measures as outlined in policies of Chapter 8, Transportation and Circulation.

Policy HS-4.7 *Air Quality Mitigation Fees*. The City shall continue the program for assessing air quality mitigation fees for all new development, with the fees to be used to fund air quality programs.

Policy HS-4.8 *Transportation Demand Management Programs*. The City shall coordinate City Transportation Demand Management programs with other public and private agencies, including programs developed by the San Joaquin Council of Governments and the SJVAPCD.

Policy HS-4.9 *Dust Suppression Measures*. The City shall require contractors to implement dust suppression measures during excavation, grading, and site preparation activities. Techniques may include, but are not limited to, the following:

a. Site watering or application of dust suppressants,

b. Phasing or extension of grading operations,

c. Covering of stockpiles,

d. Suspension of grading activities during high wind periods (typically winds greater than 25 miles per hour), and

e. Revegetation of graded areas.

Policy HS-4.10 *Travel Demand Measures*. Coordinating with the SJVAPCD, the City shall require large development projects to mitigate air quality impacts. Mitigation measures may include, but are not limited to, the following: providing bicycle access and parking facilities, providing preferential parking for high occupancy vehicles, car pools, or alternative fuels vehicles, and establishing telecommuting programs or satellite work centers.

Policy HS-4.12 *Employment-Intensive Development*. The City shall encourage employment-intensive development with a high floor area ratio where adequate transit service is planned, and discourage such development where adequate transit service is not planned.

Policy HS-4.17 *Street Design*. The City shall promote street design that provides an environment which encourages transit use, biking and walking.

Policy HS-4.18 *Design for Transportation Alternatives*. The City shall encourage all new development to be designed to promote pedestrian and bicycle access and circulation, to the greatest extent feasible.

Policy HS-4.20 *Develop Policies Requiring Minimizing of Greenhouse Gas Emissions*. The City shall adopt new policies, in the form of a new ordinance, resolution, or other type of policy document, that will require new development to reduce its greenhouse gas emissions to the extent feasible in a manner consistent with state legislative policy as set forth in Assembly Bill (AB) 32 (Health & Safety Code, § 38500 et seq.) and with specific mitigation strategies developed by the California Air Resources Board (CARB) pursuant to AB 32. In furtherance of this effort, the City shall monitor the process by which CARB promulgates rules, regulations, limits, plans, and reduction measures pursuant to AB 32 to determine whether they result in recommended or mandatory principles or strategies by which greenhouse gas emissions reductions or minimization can be achieved through the land use planning process. If CARB does formulate any such principles or strategies, the City's own greenhouse gas emission reduction and minimization strategies shall be consistent with those promulgated by CARB. If CARB's efforts pursuant to AB 32 do not result in recommended or mandatory principles or strategies by which greenhouse gas emissions reductions or minimization can be achieved through the land use planning process, the City shall develop its own such principles and strategies. In doing so, the City shall consider the following potential mitigation strategies:

a. Increased density or intensity of land use, as a means of reducing per capita vehicle miles traveled by increasing pedestrian activities, bicycle usage, and public or private transit usage;

b. Increased energy conservation through means such as those described in Appendix F of the State Guidelines for the California Environmental Quality Act;

c. Greenhouse gas sequestration measures, such as increasing the effectiveness of carbon dioxide sinks through tree-planting, for example;

d. The payment of fair share fees, or participation in fair share measures, that are imposed pursuant to a reasonable mitigation plan under which the fair share payment or fair share participation will foreseeably result in actual, enforceable mitigation that will offset some or all of the greenhouse gas emissions of development projects (e.g., through energy conservation, greenhouse gas sequestration, or increased usage of energy sources that do not contribute, or contribute only minimally, to global warming). In order to help achieve the maximum technologically feasible and cost effective greenhouse gas emissions reductions, and in furtherance of the inter-agency coordination objectives of AB 32, such a reasonable mitigation plan may include a multiple-agency program by which City imposed fees are used to fund mitigation strategies implemented in whole or in part by regional or state agencies (e.g., the Air Resources Board, the Public Utilities Commission, or the State Energy Resources Conservation and Development Commission).

e. Public education measures intended to instruct future landowners, tenants, and users with respect to means by which they can reduce their own greenhouse gas emissions.

For purposes of this policy, "feasible" shall have the same meaning as that set forth in Section 15364 of Title 14 of the California Code of Regulations and in case law interpreting the California Environmental Quality Act (Pub. Resources Code, § 21000 et seq.).

Policy HS-4.21 *Support SJVAPCD Air Quality Guidance and Recommendations*. The City shall continue to review, support, and require implementation (as applicable) of SJVAPCD guidance and recommendations (including those identified in the GAMAQI) in regards to several key issues including:

- Environmental Assessment;
- Air Quality Mitigation Agreements;
- Integrated Planning;
- Air Quality Education;
- Congestion Management/Transportation Control Measures;
- Toxic and Hazardous Pollutant Emissions;
- Fugitive Dust and PM10 Emissions; and
- Energy Conservation and Alternative Fuels.

Stockton Climate Action Plan

The City of Stockton approved a CAP in December 2014. The plan outlines the GHG emissions from the City of Stockton and makes recommendations of measures to implement to reduce GHG emissions consistent with the goals of AB 32. The measures applicable to the Proposed Project include the following:

- Implement existing green building ordinance
- Consider outdoor lighting upgrades at project site

- Consider implementing solar powered parking
- Consider implementing non-residential rooftop solar
- Reduce barriers for non-motorized travel
- Implement TDM
- Increase waste diversion
- Encourage an urban tree planting program
- Consider use of electric powered construction equipment
- Reduced idling times for construction equipment
- Consider using electric landscaping equipment

6.3 Environmental Impacts

6.3.1 Methods of Analysis

Construction Emissions

Construction emissions were estimated using the California Emission Estimator Model (CalEEMod), version 2013.2.2. CalEEMod is an emissions model that estimates criteria pollutant and GHG emissions for land use development projects. It contains reasonable default assumptions that can be replaced if site-specific information is available. CalEEMod incorporates CARB's emission factor model for on-road vehicles (EMFAC) and current off-road in-use engine emissions model for construction equipment. The on-land construction emissions for each Proposed Project alternative were determined by using the default construction estimates in CalEEMod, which are based on the total acreage that would be developed for each alternative. Emissions generated by marina construction were based on an estimated equipment list and phase duration. At this time, the timing, phasing, and potential overlap of the various on-land and in-water construction activities are unknown. Thus, it was conservatively assumed that project construction could start at the beginning of 2016. All marina emissions conservatively assumed a start date in 2016 because emissions would generally decrease in future years. Potential overlap in construction phases was considered if it was relevant to making a specific significance determination such as comparison of construction mass emission thresholds.

Each action alternative had a separate CalEEMod run for the land-based construction activities and marina construction activities. The results of these separate runs were combined to calculate the total construction emissions associated with each action alternative. **Appendix D** includes detailed CalEEMod output and relevant input parameters for each action alternative.

Emissions were compared to applicable thresholds of significance for construction emissions, as detailed by the specific air district that has jurisdiction over each alternative sites. In addition, construction emissions were compared to the conformity *de minimis* emissions thresholds for each applicable air basin, which vary depending on the nonattainment status and severity of different pollutants.

The use of equipment and materials such as concrete and steel require energy and generate indirect GHG emissions. These indirect GHG emissions associated with building materials are referred to as "embodied energy" and are based on life-cycle GHG emission analyses of individual materials. The embodied energy from building materials has not been estimated for the Proposed Project because detailed specifications and estimates of building materials are not available. For a typical building construction project, the materials with the largest embodied energy are cement and steel. DWR's CCAP has acknowledged this embodied energy and requires DWR, to the extent feasible, to design the Proposed Project and use materials in ways that minimize the embodied energy.

Operational Emissions

Operational emissions associated with the No Project Alternative and each action alternative was calculated using CalEEMod, CARB's California Commercial Harbor Craft Emissions Model, and water pump GHG emissions based on estimated energy use. CalEEmod allocated the various types of building activities into default land use types and assigned appropriate square footage. Default energy, water, and wastewater use and solid waste generation rates were used for all assigned land uses. Vehicle trips were based on the trip generation rate determined in the traffic analysis of 797 daily trips (see Chapter 15, *Transportation and Traffic*). The No Project Alternative used calculated two conditions. The first No Project Alternative calculated existing conditions adjusting the trip rate based on the current number of workers (145) compared to the 180 workers that the 797 daily trip rate was based on. The second No Project Alternative calculated future conditions adjusting the trip rate based on an increased number of workers (165) compared to the 180 workers. Trip lengths used the CalEEMod default and the default trip type was selected for research and development facility. It was assumed that a forklift would be used on-site, conservatively estimated to be for 8 hours per day. The No Project Alternative assumed that existing building energy use was based on historical Title 24 building standards and, thus, would not be as energy efficient as the newly built buildings.

Vessel emissions were determined based on CARB's California Commercial Harbor Craft Emissions Model. It was assumed that the No Project Alternative and action alternatives would use 42 vessels. Because no annual estimates of hours of use were available, the default annual hours for worker boats was used. It was assumed that the main engine was 400 horsepower and the auxiliary engine was 200 horsepower. The default load factors from the model were used. Emissions estimates conservatively assumed the maximum deterioration of emissions for the vessels because information on vessel and engine age were not available.

The FTC would require extensive use of water pumps to extract water from the ground and recirculate it in tanks. It was assumed that there would be approximately 30 7.5-horsepower pumps, on average, used for recirculation and three pumps of 40-50 horsepower for groundwater well pumping, for a total of 280 kilowatts, on average, of pumping activity at all times. The total kilowatt-hours of energy used by the pumps was multiplied by the carbon intensity factors used in CalEEMod for CO_2, CH_4, and N_2O. Each individual GHG type was multiplied by the appropriate GWP to arrive at CO_2e.

The Proposed Project alternatives would require maintenance dredging of the marina. This is estimated to occur once every 10-15 years. The emissions from maintenance dredging were estimated using CalEEMod assuming the use of a 400-horsepower vessel, generators, and dredging equipment similar to a dozer for 2 weeks. These emissions were estimated to be less than 1 ton for all criteria air pollutants and less than 25 MT of GHG emissions. Because these activities would occur infrequently, they are not discussed further as they would not alter the significance conclusions of the operational emissions. Details of the emissions estimates can be found in Appendix D.

Emissions were initially compared to applicable thresholds of significance for operational emissions, as detailed by the specific air district containing the main project site for each alternative. In addition, emissions estimates were compared to the conformity *de minimis* emissions thresholds for that air basin, which vary depending on the non-attainment status and severity of different pollutants.

Because under the No Project Alternative activities would continue that are currently occurring under baseline conditions, it is important to consider the net change in emissions. This is presented for both the existing number of employees as well as the projected growth in employees from 145 to 165 that would be expected to occur under the No Project Alternative. The analysis of existing conditions is the appropriate CEQA baseline while the future conditions under the No Project Alternative were evaluated for the NEPA comparison of alternatives. For instance, no substantial change in boat emissions is anticipated under the No Project Alternative compared to the action alternatives. Similar levels of boat emissions would occur in the same air basins and local areas as they currently occur. Small variations may be attributable to the initial location where a vessel may launch, but this variation is not anticipated to result in a substantial or noticeable change in total or local emissions in any location except at the main project site for each alternative. Similarly, all current employees and trips associated with current activities are assumed to emit vehicle emissions at the same level, but the specific roadways and locations where these emissions occur may change, resulting in small local emissions decreases in some locations and small local emissions increases near the Proposed Project sites. All action alternatives would result in increased emissions associated with new employees and increased building square footage. In particular, emissions associated with the FTC portion of each action alternative is considered a net increase in emissions because it would be a new, rather than a replacement, facility.

Where it is appropriate to address specific impact criteria, emission changes overall were considered; for other specific impact criteria, the local changes in emissions were considered. The local changes are of particular importance for emissions of PM_{10}, $PM_{2.5}$, CO, and TACs.

Fugitive Dust

Fugitive dust emissions were estimated using CalEEMod for both construction and operation. Fugitive dust emissions would be generated during construction activities (in particular, ground-disturbing activities) and during material hauling. Travel along roadways during construction and operation would also generate fugitive dust. In general, fugitive dust emissions are best controlled with implementation of BMPs for fugitive dust and other specific fugitive dust control requirements specified by local air districts. The impact of fugitive dust emissions was evaluated in the context of implementation of BMPs for the Proposed Project.

Exposure of Sensitive Receptors

In terms of exposure to TACs, DPM would be emitted from construction vehicles. Also, during the Proposed Project's demolition phase, some of the old buildings on the RVARC site may contain asbestos, which is a known carcinogen. See Chapter 11, *Hazards and Hazardous Materials*, for a discussion of asbestos on the RVARC site.

During operation of the DRS, off-road vehicles and boats would emit DPM. In addition, research and maintenance activities would use or generate a variety of TACs. Typical chemicals that may be used are shown in Chapter 3, Table 3-6. While most of these chemicals would be used in small quantities, formalin (which contains formaldehyde) would be used in larger quantities for tissue sample preservation. Formaldehyde is a colorless gas with a pungent odor, and elevated levels of formaldehyde in the air are highly irritating to the eyes, nose, and lungs. Formaldehyde is recognized as a known human carcinogen.

Exposure of sensitive receptors to TACs such as DPM were evaluated qualitatively based on the type of TACs that could be emitted, location of sensitive receptors, and BMPs that would be implemented to minimize the concentrations of TACs in the ambient air.

Principal GHG Emissions Generated by the Proposed Project

The primary GHGs that would be generated by the Proposed Project are CO_2, CH_4, N_2O, and refrigerants with high GWP. These emissions result directly from combustion of fossil fuels such as gasoline and diesel, as well as from equipment leaks in refrigeration and air conditioning systems. In addition to the direct emissions that would occur on-site, indirect emissions would be associated with electricity and water use, and a one-time change in carbon sequestration would be associated with land use changes at the main project site under each alternative.

Odors

The odor impact evaluation for construction and operation was conducted qualitatively, based primarily on whether existing facilities operated by DWR and USFWS, or other similar facilities (e.g., other aquaculture facilities), had reports of any odor or nuisance complaints. In addition, pertinent information regarding odor sources (i.e., frequency of emissions, type of sources) and proximity to sensitive receptors was considered. Finally, the analysis relied on BMPs used by existing facilities that would be implemented at the new facilities to minimize odors, in particular those from chemicals and biological samples.

Consistency with Plans and Policies

To determine whether the Project is consistent with existing air quality plans, the analysis examines whether the Project is consistent with relevant general or specific plans upon which the air quality plans are based. To demonstrate consistency with DWR's GGERP portion of its CAP, a GGERP Consistency Determination Checklist has been completed and included as **Appendix L** of this Draft EIR. This checklist reports the GHG emissions from construction and determines whether construction emissions from the Proposed Project would exceed the levels of construction emissions analyzed in the GGERP. In addition the Proposed Project must ensure implementation of construction BMPs in a binding and enforceable manner. In addition, the Proposed Project cannot conflict with DWR's ability to implement any Specific Action GHG emission reduction measures identified in the GGERP portion of the CAP. If the Proposed Project is consistent with all of these items, then the Proposed Project would be consistent with the GGERP portion of the CAP and can tier from the GGERP's cumulative CEQA analysis concluding that the project's contribution of GHG emissions is not cumulatively considerable.

6.3.2 Significance Criteria

The Proposed Project would have a significant impact with regard to air quality and GHG emissions if it would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard established by USEPA or CARB, or contribute substantially to an existing or projected air quality violation;
- Expose sensitive receptors to substantial air pollutant concentrations;
- Create objectionable odors affecting a substantial number of people;
- Generate substantial GHG emissions, either directly or indirectly; or
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing emissions of GHGs.

SJVAPCD Thresholds of Significance

SJVAPCD has developed thresholds of significance for criteria pollutants based on the mass emissions generated during construction, operation of stationary sources, and operation of non-stationary sources. **Table 6-5** shows the mass emission thresholds applicable to activities in the SJVAB. In particular, they would apply to the activities that occur at the Ryde Avenue site under Alternative 4.

Table 6-5. SJVAPCD CEQA Significance Thresholds

Pollutant	Construction Emissions	Operational Emissions	
		Permitted Equipment and Activities	Non-Permitted Equipment and Activities
	Emissions (tons per year)		
CO	100	100	100
NO_X	10	10	10
VOC	10	10	10
SO_X	27	27	27
PM_{10}	15	15	15
$PM_{2.5}$	15	15	15

Source: SJVAPCD 2014.

According to SJVAPCD's guidance, impacts of operational and construction emissions are considered to be less than significant if fugitive dust (PM_{10} and $PM_{2.5}$) emissions are below the significance levels listed above. In addition, SJVAPCD Regulation VIII requires all projects that involve earthmoving or travel on unpaved roads to implement fugitive dust control measures. Implementation of these control measures would be sufficient to reduce PM_{10} and $PM_{2.5}$ impacts to a level considered less than significant.

The following quantitative TAC thresholds of significance are identified in the Guidance for Assessing and Mitigating Air Quality Impacts (GAMAQI) (SJVAPCD 2014):

- Probability of contracting cancer for the Maximally Exposed Individual (MEI) exceeds 10 in 1 million, or
- Ground-level concentrations of non-carcinogenic TACs result in a Hazard Index greater than 1 for the MEI.

Because location and emission source details regarding many of the Proposed Project's elements are not available at this time, a qualitative analysis was performed to determine the impact of potential TAC emissions. For construction and operation, health risks from TACs were evaluated by identifying the Proposed Project's potential to generate TAC emissions and by determining whether sensitive receptors could be affected by those emissions.

YSAQMD Thresholds of Significance

YSAQMD has developed thresholds of significance for criteria pollutants based on the mass emission generated during construction and operation. **Table 6-6** shows these mass emission thresholds applicable to activities that occur in the Yolo and Solano County portions of the SVAB. In particular, this applies to the activities that occur at the RVARC site under Alternatives 2 and 3.

Table 6-6. YSAQMD CEQA Thresholds of Significance

Pollutant	Threshold of Significance
ROG	10 tons per year
NO_x	10 tons per year
PM_{10}	80 pounds per day
CO	Violation of CAAQS

Source: YSAQMD 2007

The YSAQMD *CEQA Handbook* has the same thresholds of significance for TAC emissions as those described above for SJVAPCD, and the same approach to analysis has been used.

Other Air District Thresholds of Significance

While some operational activities, in particular field-based monitoring and research activities, may take place within the jurisdictional boundaries of other air districts, including BAAQMD and SMAQMD, no comparison to these air districts' mass emission thresholds of significance was conducted. Because specific locational information for these types of future operational activities is not known, it was not feasible to divide emissions across air districts or air basins, nor would these activities be anticipated to deviate substantially from baseline conditions. Thus, emissions estimates focused on those which would occur at the DRS itself and were compared to the thresholds of significance for the relevant air district in which the DRS would be located for each alternative.

6.3.3 Environmental Effects and Mitigation Measures

Impact AQ/GHG-1: Potential for Construction to Conflict With or Obstruct Implementation of the Applicable Air Quality Plan.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, no new facility construction would occur. Only existing facilities and activities associated with the IEP would be used. Therefore, no conflict with implementation of an applicable air quality plan would occur. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2 (the Preferred Alternative), construction activities associated with the DRS would occur at the RVARC site, which is under the jurisdiction of the YSAQMD. Construction activities that would generate criteria air pollutants consist of use of construction equipment, workers driving to work, and material hauling trucks importing and exporting soil and other materials to the site. Construction activities, in particular ground-disturbing activities, would generate fugitive dust. Construction would take place in an area that is in nonattainment for ozone, PM_{10}, and $PM_{2.5}$. YSAQMD has established mass emission thresholds of significance for small projects. Those projects with mass emissions less than the thresholds of significance would not create additional violations of pollutants and are considered to be consistent with the applicable air quality plans. As discussed in further detail under Impact AQ/GHG-2, construction of the DRS would follow all applicable YSAQMD regulations, including those related to fugitive dust and after mitigation would be below the mass emission thresholds of significance. The Preferred Alternative would also be consistent with all applicable state regulations for mobile sources and construction equipment, and would not conflict with any City of Rio Vista General Plan policies. Therefore, because emissions would not contribute to further air quality violations and would be consistent with all applicable plans and policies, this impact would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

This alternative would result in similar air quality impacts as those described for Alternative 2. Because the Proposed Project's construction mass emissions would be less than the thresholds of significance, construction of the DRS would not create additional violations of air quality standards. Project construction activities would follow all applicable YSAQMD, local, state, and federal regulations relating to air quality. Therefore, because emissions would not contribute to further air quality violations and would be consistent with all applicable plans and policies, this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Under Alternative 4, DRS construction would result in similar air quality impacts to those described for Alternatives 2 and 3, with the primary difference being that the facilities would be constructed at the Ryde Avenue site in Stockton, instead of the RVARC site. The Ryde Avenue site is within the jurisdiction of SJVAPCD, and this alternative would occur in an area designated in nonattainment for ozone, PM_{10}, and $PM_{2.5}$. Similar to YSAQMD, SJVAPCD has established mass emission thresholds of significance for small projects. Projects with mass emissions less than SJVAPCD's thresholds of significance would not create additional violations of pollutants and are considered to be consistent with the applicable air quality plans. Under Alternative 4, project construction would follow all applicable SJVAPCD regulations, including those related to fugitive dust and indirect source review, which requires project proponents to detail construction emissions and ensure that they are meeting specific reductions in NO_X and PM from construction equipment. The Proposed Project would be consistent with all applicable state regulations for mobile sources and construction equipment. Project construction would not conflict with any of the general plan policies for the City of Stockton. Therefore, because emissions would not contribute to further air quality violations and would be consistent will all applicable plans and policies, this impact would be **less than significant**.

Impact AQ/GHG- 2: Potential for Project Construction to Violate Any Air Quality Standard Established by USEPA or CARB, or Contribute Substantially to an Existing or Projected Air Quality Violation.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, no facility construction would occur. Existing facilities associated with the IEP would continue to be used. Therefore, no new emissions that could contribute to any air quality violations from construction would occur. Thus, there would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2 (the Preferred Alternative), construction activities associated with the DRS would generate criteria air pollutants that could potentially cause or contribute to existing or projected air quality violations. The RVARC site is located in an area that is designated in nonattainment for ozone, PM_{10}, and $PM_{2.5}$, and is under YSAQMD's jurisdiction. YSAQMD has established mass emission thresholds for small projects. Projects with emissions less than the established thresholds of significance would not cause or contribute to an existing or projected air quality violation. As shown in **Table 6-7**, under Alternative 2, the construction emissions for the DRS were estimated using CalEEMod to result in mass emissions below the significance thresholds for all criteria pollutants.

Mitigation Measure AQ/GHG-2a (Implement Fugitive Dust Best Management Practices and Emission Tracking) would be implemented to minimize fugitive dust emissions and track emissions to ensure they remain below the thresholds through final project design and construction. Should emission tracking under Mitigation Measure AQ/GHG-2a indicate that emissions would exceed a threshold, DWR and USFWS would implement some combination of **Mitigation Measures AQ/GHG-2b (Implement Construction Emission Reductions)** and **AG/GHG-2c (Implement Construction Phasing)** in a manner that would result in emissions below the conformity *de minimis* thresholds for NO_X. If Mitigation Measures AQ/GHG-2b and AQ/GHG-2c do not reduce emissions below applicable thresholds of significance and/or below the conformity *de minimis* thresholds, General Conformity applies and **Mitigation Measure AQ/GHG-2d (Complete General Conformity Determination and, if necessary, Enter into a Voluntary Emission Reduction Agreement if Emissions Remain Above De Minimis Conformity Thresholds for Project Portions Subject to General Conformity or above Local Air District Mass Emission Significance Thresholds)** would be implemented. Mitigation Measure AQ/GHG-2d would ensure that NO_x emissions are offset to net zero and ensure that emissions are below_any other thresholds of significance for any criteria pollutant established by the applicable air district. These mitigation measures would ensure this through a combination of emission reduction measures and construction phase scheduling. These mitigation measures include a combination of strategies including the use of newer construction equipment and material hauling vehicles, use of alternative fuels, and use of after-market emission control devices.

With implementation of Mitigation Measures AQ/GHG-2a, and as needed, a combination of AQ/GHG-2b through AQ/GHG-2d, emissions from project construction would be reduced to a level that is **less than significant with mitigation**.

Mitigation Measure AQ/GHG-2a: Implement Fugitive Dust Best Management Practices and Emission Tracking (Alternatives 2, 3, and 4)

DWR's and USFWS's contractor(s) shall implement BMPs to reduce fugitive dust emissions to ensure compliance with applicable fugitive dust regulations required by the local air district or city. The following measures shall be implemented by the construction contractor(s):

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
4. All vehicle speeds on unpaved roads shall be limited to 15 mph.
5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
6. A publicly visible sign shall be posted with the telephone number and name of the person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The air district's phone number shall also be identified to ensure compliance with applicable regulations.
7. DWR's and USFWS's contractor(s) shall present equivalent emission calculations as required by SJVAPCD Indirect Source Review (ISR) Rule or by using other methodologies recommended by the local air district to track emissions to ensure they remain below applicable thresholds. If emissions are estimated to approach the thresholds, the Project may implement **Mitigation Measures AQ/GHG-2b, -2c, or -2d.**

Mitigation Measure AQ/GHG-2b: Implement Construction Emission Reductions (Alternatives 2, 3 and 4)

DWR and USFWS or the contractor(s) developing the site shall develop a plan demonstrating that off-road equipment (greater than 50 horsepower) and material hauling vehicles used during Proposed Project construction (i.e., owned, leased, and subcontracted vehicles) achieve emission reductions to the maximum extent feasible. Equipment and material hauling vehicles shall achieve at least a Project-wide fleet average of 20 percent NO_X reduction and 45 percent DPM reduction compared to the most recent CARB fleet average up to a Tier IV–equivalent engine.

Acceptable options for reducing emissions include the use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filters, and/or other options as such become available. The Proposed Project shall demonstrate that Project-wide fleet average reductions are achieved by presenting equivalent emission calculations as required for SJVAPCD Indirect Source Review (ISR) Rule or by using other methodologies recommended by the local air district. Annual and final project reports shall be prepared and shall be verified by local air district staff.

Mitigation Measure AQ/GHG-2c: Implement Construction Phasing (Alternatives 2, 3 and 4)

DWR and USFWS or the contractor(s) developing the site shall develop a plan that requires phasing of construction activities in a manner that reduces the daily and annual emissions generated from the Proposed Project, for instance by building the ERS and FTC at separate times. Annual equipment usage hours and calculation of emissions shall be compiled in a report and submitted to the local air district, consistent with requirements stated in Mitigation Measure AQ/GHG-2b.

Mitigation Measure AQ/GHG-2d: Complete General Conformity Determination and, if necessary, enter into a Voluntary Emission Reduction Agreement if Emissions Remain Above *De Minimis* Conformity Thresholds for Project Portions Subject to General Conformity or above Local Air District Mass Emission Significance Thresholds (Alternatives 2, 3 and 4).

DWR and USFWS or the contractor(s) developing the site shall complete a general conformity determination and, if necessary, enter into a voluntary emission reduction agreement (VERA) with the local air district if implementation of a combination of Mitigation Measures AQ/GHG-2b and AQ/GHG-2c would not reduce emissions below applicable thresholds of significance and /or below the General Conformity De Minimis Thresholds. The VERA would mitigate project-specific emissions by requiring that DWR and USFWS (or the site developer) provide funds to the local air district to offset emissions to net zero for portions of the Proposed Project subject to General Conformity and below the local air district mass emission threshold of significance for the Proposed Project as a whole. The local air district would administer implementation of the VERA by collecting funds, identifying emission reductions projects, funding those projects, and verifying that emission reductions have been successfully achieved. The funds will be disbursed by the air district in the form of grants. Types of emission reduction projects that could be funded may include electrification of stationary internal combustion engines, replacing old heavy-duty trucks, and/or replacing old farm tractors. The final amount of mitigation required shall be based on actual emissions generated by the Proposed Project as determined by actual equipment used and hours of operation.

Table 6-7. Construction Emissions for Alternatives 2, 3, and 4

Alternative	Construction Type	Worker Trips	Vendor Trips	Hauling Trips	Year	Emissions								
		Maximum Daily Trips		Total Trips		ROG	NO_x	CO	SO_2	Fugitive PM_{10}	Exhaust PM_{10}	Fugitive $PM_{2.5}$	Exhaust $PM_{2.5}$	CO_2e
						tons								MT
2	Land-based	134	56	8,787	2017	0.637	5.384	5.278	0.0097	0.0402	0.2660	0.148	0.249	852
					2018	2.742	0.4725	0.4767	8.2E-04	0.0175	0.0266	4.7E-03	0.025	70
	Marina	10	0	5,295		0.3289	3.7769	2.500	5.5-03	0.239	0.141	0.115	0.130	503
	Total					3.708	9.633	8.255	0.011	0.297	0.434	0.268	0.404	1,425
3	Land-based	148	62	14,594	2017	0.71	6.12	6.183	0.012	0.48	0.277	0.167	0.285	1,069
					2018	3.11	0.478	0.491	8.5E-04	0.019	0.046	5.2E-03	0.025	72
	Marina	10	0	9,171		0.44	5.095	3.72	7.2E-03	0.503	0.182	0.222	0.17	667
	Total					4.260	***11.70***	10.394	0.020	1.002	0.505	0.394	0.480	1,808
4	Land-based	150	63	5,534	2017	0.683	5.603	5.362	8.9E-03	0.390	0.29	0.145	0.272	789
					2018	1.589	0.537	0.504	8.3E-04	0.019	0.031	5.1E-03	2.9E-02	72
	Marina	10	0	10,950		0.447	5.161	3.926	7.6E-03	0.585	0.183	0.260	0.17	699
	Total					2.719	***11.30***	9.792	0.017	0.994	0.504	0.410	0.471	1,560
CEQA Threshold (tons per year unless otherwise noted)														
SJVAPCD						10	10	100	27	15		15		
YSAQMD						10	10	< AAQS		80 lb/day				

Note:

1. Any pollutant with the potential to exceed the applicable CEQA threshold is shown in the total row with ***bold, italic type and underlining***.

Table 6-8. Construction Emissions of CO_2e for the ERS and FTC under Alternatives 2, 3, and 4

Alternative	Construction Type	Worker Trips	Vendor Trips	Hauling Trips	Year	Emissions of CO_2e (MT)
		Maximum Daily Trips		Total Trips		
2	Land-based – ERS	134	56	8,787	2017	654
					2018	54
	Land-based – FTC				2017	198
					2018	16
	Marina	10	0	5,295		503
	Total					1,427
3	Land-based – ERS	148	62	14,594	2017	819
					2018	55
	Land-based – FTC				2017	250
					2018	17
	Marina	10	0	9,171		667
	Total					1,814
4	Land-based – ERS	150	63	5,534	2017	604
					2018	55
	Land-based – FTC				2017	185
					2018	17
	Marina	10	0	10,950		699
	Total					1,560

Note:

1. Numbers may not total due to rounding.
2. The emissions associated with land-based construction were calculated for the DRS as a whole, and then prorated based on square feet of the ERS and FTC to determine the relative emissions for each facility.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, construction of the DRS would result in similar air quality impacts as those described for Alternative 2. As shown in Table 6-7, however, the construction emissions for Alternative 3 were estimated using CalEEMod to result in mass emissions potentially exceeding the threshold of significance for NO_X.

This analysis conservatively assumes that construction of all land-based facilities and marina would overlap. These mass emissions depend, however, on how the land and marina construction work would be phased. Thus, to ensure Proposed Project emissions are below the thresholds of significance or offset to net zero if General Conformity is applicable, DWR and USFWS would implement some combination of Mitigation Measures AQ/GHG-2b **(**Implement Construction Emission Reductions) **and** AG/GHG-2c (Implement Construction Phasing) in a manner that would result in emissions below the conformity *de minimis* thresholds for NO_X. If Mitigation Measures AQ/GHG-2b and AQ/GHG-2c do not reduce emissions below applicable thresholds of significance and/or below the conformity *de minimis* thresholds, General Conformity applies and Mitigation Measure AQ/GHG-2d (Complete General Conformity Determination and, if necessary, Enter into a Voluntary Emission Reduction Agreement if Emissions Remain Above De Minimis Conformity Thresholds for Project Portions Subject to General Conformity or above Local Air District Mass Emission Significance Thresholds) would be implemented. Mitigation Measure AQ/GHG-2d would ensure that NO_x emissions are offset to net zero and ensure that emissions are below_any other thresholds of significance for any criteria pollutant established by the applicable air district. These mitigation measures would ensure this through a combination of emission reduction measures and construction phase scheduling. These mitigation measures include a combination of strategies including the use of newer construction equipment and material hauling vehicles, use of alternative fuels, and use of after-market emission control devices.

Fugitive dust emissions would be managed by implementing BMPs, which are specified in Mitigation Measure AQ/GHG-2a, as well as compliance with local air district fugitive dust regulations.

With implementation of Mitigation Measures AQ/GHG-2a, and a combination of AQ/GHG-2b through AQ/GHG-2d, emissions from project construction would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would result in similar air quality impacts as those described for Alternative 3. As shown in Table 6-7, the construction emissions for Alternative 4 estimated using CalEEMod show mass emissions that potentially exceed the thresholds of significance for NO_X. Actual emissions generated by Proposed Project construction would depend on how the land-based and marina construction phases are scheduled. Implementation of Mitigation Measure AQ/GHG-2a and a combination of Mitigation Measures AQ/GHG-2b through AQ/GHG-2d would ensure that emissions do not exceed the mass emission thresholds from construction through a combination of dust control BMPs, emission reductions and construction phase scheduling. With implementation of these mitigation measures, this impact would be reduced to a level that is **less than significant with mitigation**.

Impact AQ/GHG-3: Potential for Project Construction to Expose Sensitive Receptors to Substantial Air Pollutant Concentrations.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, no construction of DRS facilities would occur. Existing facilities currently used by the IEP would continue to be used. Therefore, no new emissions would expose sensitive receptors to substantial air pollutant concentrations from construction. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2 (the Preferred Alternative), the closest sensitive receptors to the RVARC site would be the occupants of residences located approximately 440 feet from the site. The pollutants of concern that would affect sensitive receptors are particulates, specifically PM_{10} and $PM_{2.5}$ contained in fugitive dust, and DPM from construction equipment. As discussed in Impact AQ/GHG-2, implementation of Mitigation Measure AQ/GHG-2a would reduce fugitive dust. In addition, given that the construction period for the DRS would be approximately 24-30 months, project construction would not emit substantial quantities of DPM. DPM exposure for short durations is generally not quantified, as cancer potency factors are based on lifetime exposure and there is considerable uncertainty in trying to evaluate the cancer risk from project activities that would only last a small fraction of a lifetime (OEHHA 2015).

Thus, with implementation of Mitigation Measure AQ/GHG-2a, the Proposed Project under Alternative 2 would not pose long-term or substantial health risks to nearby residents and workers in the vicinity of the RVARC site. The impact on sensitive receptors from fugitive dust and other TACs would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, construction of the DRS would result in similar air quality impacts on nearby sensitive receptors as those described for Alternative 2. Implementation of Mitigation Measure AQ/GHG-2a would reduce fugitive dust. In addition, given the Proposed Project's relatively short construction duration (24-30 months), the construction phase would not emit substantial quantities of DPM. With implementation of the above-referenced mitigation measure, and considering the Proposed Project's short construction duration, this alternative would not pose long-term or substantial health risks to nearby residents and workers in the vicinity of the RVARC site. The impact on sensitive receptors from fugitive dust and other TACs would be reduced to a level that is **less than significant with mitigation.**

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Under Alternative 4, construction of the DRS would result in similar air quality impacts on nearby sensitive receptors as those described for Alternatives 2 and 3. The closest sensitive receptors to the Ryde Avenue site would be the occupants of residences located across the street from the Project site less than 100 feet away. With implementation of Mitigation Measure AQ/GHG-2a, the impact on sensitive receptors would be reduced to a level that is **less than significant with mitigation.**

Impact AQ/GHG-4: Potential for Project Construction to Create Objectionable Odors Affecting a Substantial Number of People.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, there would be no new facility construction. Therefore, there would be no new emissions that could potentially create objectionable odors from construction. Thus, there would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2 (the Preferred Alternative), construction activities associated with the Proposed Project would not generate permanent or long-term objectionable odors. Odors associated with the intermittent operation of gasoline- and diesel-powered equipment and with paint and coatings might be detected by nearby sensitive receptors, but these odors would be of short duration and would not affect a substantial number of people. There may also be odors associated with decaying organic material contained in excavated or dredge material; any excavated or dredged material not immediately removed from the Proposed Project site would be covered or contained such that the storage piles do not result in substantial odors. Therefore, this impact would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would result in similar odor impacts as those described for Alternative 2. Alternative 3 would not result in the generation of permanent or long-term objectionable odors. Therefore, this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would result in similar odor impacts as those described for Alternative 2. Alternative 4 would not result in the generation of permanent or long-term objectionable odors. Therefore, this impact would be **less than significant**.

Impact AQ/GHG-5: Potential for Project Construction to Generate Substantial GHG Emissions, Either Directly or Indirectly.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, there would be no new facility construction. Existing facilities currently used by the IEP would continue to be used. Therefore, this alternative would not generate new construction-related GHG emissions. Thus, there would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2 (the Preferred Alternative), construction of the DRS would involve activities that would emit GHGs. As shown in Tables 6-7 and 6-8, combined GHG emissions associated with construction of Alternative 2 would be 1,425 MT CO_2e, of which 1,210 MT CO_2e would be attributable to the ERS, and 215 MT CO_2e attributable to the FTC. The emissions from construction activities are one-time emissions and would not continue to occur once the construction is complete.

In DWR's GGERP portion of the CAP, construction projects are covered under the plan for projects that would emit less than 25,000 MT CO_2e. In addition, as discussed under Impact AQ/GHG-6, implementation of DWR's GHG emissions reduction measures (Mitigation Measure AQ/GHG-6) and the GGERP would ensure that construction emissions generated by the ERS under Alternative 2 are offset. In other words, under Alternative 2, the ERS would not result in an increase in GHG emissions from a DWR programmatic level.

With respect to the FTC, YSAQMD, the local air district for the RVARC site, has not established numerical significance thresholds for GHG emissions. The CEQ guidance on climate change and GHG emissions in NEPA documents requires an analysis of GHG emissions but suggests that emissions less than 25,000 MT CO_2e are not a substantial contribution to a cumulative effect. As shown in Table 6-8, the FTC's construction emissions would be much less than this.

Because: (1) the construction for Alternative 2 would be short in duration, (2) emissions associated with the ERS have already been considered and would be offset by DWR's GHG emissions reduction strategies outlined in the DWR GGERP, and (3) the remaining emissions associated with the FTC would not be considered substantial, the GHG emissions associated with project construction would be **less than significant.**

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, construction of the DRS would result in similar types of GHG emissions from project construction as those described for Alternative 2. As shown in Tables 6-7 and 6-8, combined GHG emissions for the construction of Alternative 3 would be 1,808 MT CO_2e, of which 1,541 MT CO_2e would be attributable to the ERS, and 267 MT CO_2e attributable to the FTC. For the same reasons as under Alternative 2, the GHG emissions associated with project construction under Alternative 3 would be **less than significant.**

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Under Alternative 4, construction of the DRS would result in similar types of GHG emissions from project construction as those described for Alternative 2. As shown in Tables 6-7 and 6-8, combined GHG emissions for the construction of Alternative 4 would be 1,560 MT CO_2e, of which 1,358 MT CO_2e would be attributable to the ERS, and 202 MT CO_2e attributable to the FTC. SJVAPCD, the local air district for the Ryde Avenue site, has determined that GHG emissions are best controlled through implementation of BMPs or demonstration of a 29 percent reduction from 2002-2004 conditions. This is consistent with the list of BMPs, described in DWR's GGERP portion of the CAP. Implementation of **Mitigation Measure AQ/GHG-6 (Implement DWR Climate Action Plan BMPs and Mitigation for Construction)**, described below for Impact AQ/GHG-6, requires DWR and USFWS to implement BMPs from DWR's GGERP portion of the CAP. This mitigation measure would ensure consistency with SJVAPCD requirements. Because: (1) the construction for Alternative 4 would be short in duration, (2) emissions associated with the ERS have already been considered and would be offset by DWR's GHG emissions reduction strategies outlined in the DWR GGERP, and (3) the remaining emissions associated with the FTC would not be considered substantial, and with implementation of Mitigation Measure AQ/GHG-6, the GHG emissions associated with project construction under Alternative 4 would be **less than significant with mitigation.**

Impact AQ/GHG-6: Potential for Project Construction to Conflict with an Applicable Plan, Policy, or Regulation Adopted for the Purpose of Reducing Emissions of GHGs.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, there would be no new facility construction. Existing facilities associated with the IEP program would continue to be used. Therefore, this alternative would not generate new construction-related GHG emissions. Thus, there would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Estuarine Research Station

Construction of the ERS would be carried out in part by DWR and thus is subject to California state regulations and policies. DWR's GGERP portion of the CAP requires implementation of construction BMPs and construction mitigation measures to ensure that project proponents contribute a fair share to reducing GHG emissions over time. All DWR projects that rely on the GGERP must incorporate into the design and implementation plan for the project all Project Level GHG emissions reduction measures or explain why measures that have not been incorporated do not apply to the project. These Construction Best Management Practice have been incorporated as Mitigation Measures AQ/GHG-6. The Proposed Project would not conflict with DWR's ability to implement any of the Specific Action GHG emissions reduction measures identified in the GGERP portion of the CAP. In addition. DWR has set goals for GHG emission reductions more aggressive than the goals of AB 32 by setting a target of 50 percent below 1990 levels by 2020 (instead of simply reaching 1990 levels by 2020).

Under Alternative 2 (the Preferred Alternative), the ERS would not be subject to any early action measures or cap-and-trade compliance requirements; thus, it would be consistent with AB 32. In addition, implementation of **Mitigation Measure AQ/GHG-6** would ensure that Proposed Project construction activities are conducted in a manner consistent with DWR's GGERP portion of the CAP and that the ERS contributes its fair share to reduce GHG emissions. The ERS would also be consistent with federal policies regarding GHG emissions. Thus, with implementation of Mitigation Measure AQ/GHG-6, the ERS would not conflict with any applicable plan, policy, or regulation adopted to reduce GHG emissions. This impact would be reduced to a level that would be less than significant with mitigation.

Mitigation Measure AQ/GHG-6: Implement DWR Climate Action Plan BMPs and Mitigation for Construction (Alternatives 2, 3, and 4 - ERS)

DWR and USFWS or the Proposed Project's contractor(s) shall implement all applicable BMPs and mitigation measures for construction that are listed in DWR's GGERP portion of the CAP. If a BMP or mitigation measure is deemed infeasible or not applicable, a justification shall be provided and approved by the DWR CEQA Climate Change Committee that failing to implement that BMP or mitigation measure would not be detrimental to the Proposed Project's consistency with the GGERP. BMPs and mitigation measures from DWR's GGERP portion of the CAP that shall be implemented include the following:

1. Evaluate project characteristics, including location, project work flow, site conditions, and equipment performance requirements, to determine whether specification of the use of equipment with repowered engines, electric drive trains, or other high-efficiency technologies are appropriate and feasible for the project or specific elements of the project.
2. Evaluate the feasibility and efficacy of performing on-site material hauling with trucks equipped with on-road engines.
3. Ensure that all feasible avenues have been explored for providing an electrical service drop to the construction site for temporary construction power. When generators must be used, use alternative fuels, such as propane or solar, to power generators to the maximum extent feasible.
4. Evaluate the feasibility and efficacy of producing concrete on-site and specify that batch plants be set up on-site or as close to the site as possible.
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. Limit deliveries of materials and equipment to the site to off-peak traffic congestion hours.
7. Minimize idling time by requiring that equipment be shut down after 5 minutes when not in use. 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.
8. Maintain all construction equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer's recommendations, proper upkeep and

replacement of filters and mufflers, and maintenance of all engine and emissions systems in proper operating condition. Maintenance schedules shall be detailed in an Air Quality Control Plan prior to commencement of construction.

9. Implement a tire inflation program on the project site to ensure that equipment tires are correctly inflated. Check tire inflation when equipment arrives on-site and every 2 weeks for equipment that remains on-site. Check vehicles used for hauling materials off-site weekly for correct tire inflation. Procedures for the tire inflation program shall be documented in an Air Quality Management Plan prior to commencement of construction.

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

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.

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 certified truck will be used to the maximum extent feasible.

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.

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

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

Fish Technology Center

USFWS, as a federal agency, is not subject to DWR's GGERP portion of the CAP. Therefore, because construction of the FTC would be solely carried out by USFWS, it would not need to comply with this plan. Furthermore, the FTC would be consistent with federal policies regarding GHG emissions. Thus, this impact would be less than significant.

Delta Research Station

Impacts would be as described above for the ERS and FTC. With implementation of Mitigation Measure AQ/GHG-6 for the ERS, Alternative 2 would be consistent with applicable policies regarding GHG emissions. Thus, this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Impacts would be as described above for Alternative 2. With implementation of Mitigation Measure AQ/GHG-6 for the ERS, Alternative 3 would be consistent applicable policies regarding GHG emissions. Thus, this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Impacts would be as described above for Alternative 2. With implementation of Mitigation Measure AQ/GHG-6 for the ERS, Alternative 4 would be consistent applicable policies regarding GHG emissions. Thus, this impact would be reduced to a level that is **less than significant with mitigation**.

Impact AQ/GHG-7: Potential for Project Operations to Conflict With or Obstruct Implementation of the Applicable Air Quality Plan.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, air emissions from existing IEP activities would continue to occur. These activities would take place throughout the Bay-Delta region, which includes several air basins (SVAB, SJVAB, and SFBAAB) and air districts (YSAQMD, SJVAPCD, SMAQMD, and BAAQMD). Similar to baseline conditions, operational emissions would include emissions from boats used to conduct monitoring activities, motor vehicles used for commuting purposes, and building energy use. These emissions are consistent with current applicable air quality plans in all air districts and do not conflict with or obstruct implementation of the air quality plans.

Emissions from boats, however, are a large source of the total NO_X emissions associated with the No Project Alternative. Currently, all air basins in which the boats operate are designated in nonattainment for ozone, and NO_X is a precursor to ozone formation. Over time, compliance with current federal and state regulations would result in reductions in NO_X emissions due to fleet turnover and cleaner engine replacements.

Because the emissions generated under the No Project Alternative are not anticipated to change substantially from baseline conditions and are expected to be lowered over time due to fleet turnover and through compliance with existing regulations, there would be **no impact.**

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2 (the Preferred Alternative), air emissions from IEP activities would continue to occur similar to existing conditions. There would be minor local changes in emissions attributable to relocating boats at the RVARC site. Similar to baseline conditions, most operational boat emissions would occur in the same general locations and at similar levels in individual air basins. Other operational emissions would be associated with motor vehicle travel to the DRS, conducting IEP activities, and building energy use. In most cases, operational emissions would be similar to existing emissions but would be closer to the RVARC site. In addition, motor vehicle travel would increase due to an overall increase in employees associated with the FTC and ERS. A substantial increase in energy usage would be primarily associated with pumping at the FTC.

Operation of the DRS would be generally consistent with applicable air quality plans, state and federal regulations, the City of Rio Vista General Plan, and the RVARC Redevelopment Plan. YSAQMD has determined that, if operational emissions at the project level do not exceed the mass emissions thresholds, then emissions are considered to be consistent with its air quality plans. The Proposed Project would comply with all applicable YSAQMD regulations. By complying with YSAQMD's emission reduction requirements, USFWS and DWR would reduce emissions from motor vehicles and boats over time as the fleets turn over. Because the Proposed Project would be consistent with all applicable air quality plans and policies, the impact would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would result in the same operational air quality impacts described for Alternative 2, above. Under this alternative, the Proposed Project would comply with all applicable YSAQMD regulations. By complying with YSAQMD's emission reduction requirements, USFWS and DWR would reduce emissions from motor vehicles and boats over time as the fleets turn over and are replaced with cleaner burning engines. Because the Proposed Project would be consistent with all applicable air quality plans and policies, the impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would result in similar operational air quality impacts described for Alternative 2, except that operational emissions would occur closer to Stockton and within the jurisdiction of SJVAPCD. Operation of the DRS would be consistent with applicable air quality plans, state and federal regulations, and the City of Stockton General Plan. According to SJVAPCD, operational emissions at the project level are considered to be consistent with its air quality plans if they do not exceed the mass emissions thresholds. Under Alternative 4, the Proposed Project would comply with all applicable SJVAPCD regulations, including the ISR, fugitive dust, and source-specific regulations. Additionally, over time, complying with existing emission reduction requirements would reduce emissions from motor vehicles and boats as the fleets turn over. Because the Proposed Project would be consistent with all applicable air quality plans and policies, the impact would be **less than significant**.

Impact AQ/GHG-8: Potential for Operations to Violate Any Air Quality Standard Established by USEPA or CARB, or Contribute Substantially to an Existing or Projected Air Quality Violation.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

As described in Impact AQ/GHG-7, under the No Project Alternative, air emissions generated by IEP activities would continue similar to baseline conditions. These activities would take place throughout the Bay-Delta region, which includes several air basins and air districts. Existing emissions generated by the IEP were estimated using CalEEMod and are shown in **Table 6-9**. The baseline emissions include large quantities of NO_X spread throughout the Bay-Delta region, in which all of the counties are designated as nonattainment areas for ozone. These emissions have been accounted for in air quality plans and would be reduced over time through normal fleet turnover and through compliance with existing regulations aimed at reducing engine emissions. Current IEP operations occur at several facilities, which limit the effectiveness of Transportation Demand Management programs aimed at reducing worker commute emissions compared to a more consolidated facility location. Because air pollutant emissions generated by the No Project Alternative would be the same as under existing conditions and have been accounted for in current air quality plans, this alternative would be unlikely to contribute to any new air quality violations. Thus, there would be **no impact**.

Table 6-9. Operational Emissions from Alternative 1, 2, 3 and 4

Alternative	Source Type	Emissions								
		ROG	NO_X	CO	SO_2	Fugitive PM_{10}	Exhaust PM_{10}	Fugitive $PM_{2.5}$	Exhaust $PM_{2.5}$	CO_2e
		tons/year								MT/year
Alternative 1 (future)	Area	1.33	0.00	0.00			0.00		0.00	0
	Energy	0.02	0.14	0.12	8.60E-04		0.01		0.01	527
	Energy – pumps									0
	Mobile – vehicles	0.55	1.51	5.83	8.89E-03	0.59	0.02	0.16	0.02	749
	Mobile – boats	9.27	46.56	44.74	5.44E-02		1.79		1.79	1,812
	Off-road	0.03	0.28	0.17	2.00E-04		0.02		0.02	19
	Waste									48
	Water									220
	Total	***<u>11.19</u>***	***<u>48.49</u>***	***<u>50.86</u>***	6.43E-02	0.59	1.85	0.16	1.85	3,376
Alternative 1 (existing)	Area	1.33	0.00	0.00			0.00		0.00	0
	Energy	0.02	0.14	0.12	8.60E-04		0.01		0.01	527
	Energy – pumps									0
	Mobile – vehicles	0.48	1.32	5.12	7.82E-03	0.52	0.02	0.14	0.02	659
	Mobile – boats	9.27	46.56	44.74	5.44E-02		1.79		1.79	1,812
	Off-road	0.03	0.28	0.17	2.00E-04		0.02		0.02	19
	Waste									48
	Water									220
	Total	***<u>11.12</u>***	***<u>48.31</u>***	***<u>50.16</u>***	6.33E-02	0.52	1.85	0.14	1.85	3,285
Alternative 2	Area	1.61	0.00	0.00			0.00		0.00	0

Alternative	Source Type	ROG	NO_X	CO	SO_2	Fugitive PM_{10}	Exhaust PM_{10}	Fugitive $PM_{2.5}$	Exhaust $PM_{2.5}$	CO_2e
		tons/year								MT/year
	Energy	0.02	0.21	0.18	1.27E-03		0.02		0.02	797
	Energy – pumps									0
	Mobile – vehicles	0.49	1.32	5.19	9.92E-03	0.64	0.02	0.02	0.02	770
	Mobile – boats	9.27	46.56	44.74	5.44E-02		1.79		1.79	1,812
	Off-road	0.03	0.24	0.16	2.00E-04		0.02		0.02	19
	Waste									63
	Water									226
	Total	11.42	48.32	50.28	6.58E-02	0.64	1.85	0.02	1.84	3,686
	Net Change in Comparison to Alternative 1 (future)	0.22	-0.16	-0.58	0.00	0.05	0.01	0.01	0.00	311
	Net Change in Comparison to Alternative 1 (existing)	0.29	0.03	0.13	0.00	0.12	0.01	0.03	0.00	401
Alternative 3	Area	1.78	0.00	0.01	0.00E+00		0.00		0.00	0
Alternative 3	Energy	0.03	0.26	0.22	1.54E-03		0.02		0.02	887
Alternative 3	Energy – pumps									716
Alternative 3	Mobile – vehicles	0.49	1.32	5.19	9.92E-03	0.64	0.02	0.17	0.02	770
Alternative 3	Mobile – boats	9.27	46.56	44.74	5.44E-02		1.79		1.79	1,812
Alternative 3	Off-road	0.03	0.24	0.16	2.00E-04		0.02		0.02	19

Alternative	Source Type	Emissions								
		ROG	NO_X	CO	SO_2	Fugitive PM_{10}	Exhaust PM_{10}	Fugitive $PM_{2.5}$	Exhaust $PM_{2.5}$	CO_2e
		tons/year								MT/year
	Waste									79
	Water									247
	Total	11.59	48.38	50.32	6.60E-02	0.64	1.85	0.17	1.85	4,531
	Net Change in Comparison to Alternative 1	0.39	-0.11	-0.54	0.00	0.05	0.01	0.01	0.01	1,156
	Net Change in Comparison to Alternative 1 (existing)	0.46	0.08	0.17	0.00	0.12	0.01	0.03	0.01	1,246
Alternative 4	Area	1.66	0.00	0.01	0.00E+00		0.00		0.00	0
	Energy	0.02	0.20	0.17	1.190E-03		0.02		0.02	857
	Energy – pumps									716
	Mobile – vehicles	0.58	1.98	6.63	1.16E-02	0.65	0.03	0.18	0.02	926
	Mobile – boats	9.27	46.56	44.74	5.44E-02		1.79		1.79	1,812
	Off-road	0.03	0.24	0.16	2.00E-04		0.02		0.02	19
	Waste									54
	Water									218
	Total	11.56	48.98	51.71	6.74E-02	0.65	1.86	0.18	1.85	4,603
	Net Change in Comparison to Alternative 1	0.36	0.49	0.85	0.00	0.06	0.02	0.02	0.01	1,228

Alternative	Source Type	Emissions								
		ROG	NO_X	CO	SO_2	Fugitive PM_{10}	Exhaust PM_{10}	Fugitive $PM_{2.5}$	Exhaust $PM_{2.5}$	CO_2e
		tons/year								MT/year
	Net Change in Comparison to Alternative 1 (existing)	0.43	0.68	1.56	0.00	0.13	0.02	0.04	0.01	1,318

Notes:

The underlined and italicized data for the No Action Alternative 1 indicate that had these been a new project and not part of baseline conditions they would exceed a CEQA threshold of significance.

The definition of source categories can be found in the CalEEMod User's Guide (CAPCOA 2013).

1 **Table 6-10.** Operational Emissions from the ERS and FTC under Alternatives 2, 3, and 4

Alternative	Source Type	CO2e Emissions (MT/year)	
		ERS	FTC
Alternative 2	Area	0	0
	Energy	611	186
	Energy – pumps	0	0
	Mobile – vehicles	591	179
	Mobile – boats	1390	422
	Off-road	14	4
	Waste	48	15
	Water	173	53
	Total	2827	859
	Net Change in Comparison to Alternative 1 Attributable to ERS versus FTC (future)	239	73
	Net Change in Comparison to Alternative 1 Attributable to ERS versus FTC (existing)	308	94
Alternative 3	Area	0	0
	Energy	680	207
	Energy – pumps	549	167
	Mobile – vehicles	591	179
	Mobile – boats	1390	422
	Off-road	14	4
	Waste	61	19
	Water	190	58
	Total	3475	1056
	Net Change in Comparison to Alternative 1 Attributable to ERS versus FTC (future)	886	269
	Net Change in Comparison to Alternative 1 Attributable to ERS versus FTC (existing)	955	290
Alternative 4	Area	0	0
	Energy	657	200

Alternative	Source Type	CO2e Emissions (MT/year)	
		ERS	FTC
	Energy – pumps	549	167
	Mobile – vehicles	710	216
	Mobile – boats	1390	422
	Off-road	14	4
	Waste	42	13
	Water	167	51
	Total	3530	1072
	Net Change in Comparison to Alternative 1 Attributable to ERS versus FTC (future)	942	286
	Net Change in Comparison to Alternative 1 Attributable to ERS versus FTC (existing)	1011	307

Note: Emissions associated with the FTC and ERS were prorated based on square footage of the facilities.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2 (the Preferred Alternative) and as described in Impact AQ/GHG-7, air emissions generated from existing IEP activities would continue. Overall, emissions generated by Alternative 2 would be greater when compared to existing conditions and the No Project Alternative because of the increased number of employees at the site and operation of the FTC. Locally, there would be an increase in emissions near the RVARC site because of increased vehicle traffic on nearby roadways and localized use of boats in the marina. The total estimated emissions associated with operation of the DRS are shown in Tables 6-9 and 6-10. In addition, the total net change compared to the No Project Alternative is shown, considering the increase in workers and emissions from the FTC. As shown in Table 6-9, the net emission increase is below the YSAQMD thresholds of significance and the General Conformity Rule *de minimis* thresholds, and would represent a reduction in emissions for several pollutants for which thresholds are exceeded under baseline conditions.

This alternative would result in an increase in localized emissions at the RVARC site, particularly PM and CO emissions. YSAQMD indicates that a project is unlikely to cause a violation of the CO standard if the LOS of the intersections in the project vicinity are better than LOS E or if a project would not substantially worsen an already existing peak-hour condition of LOS F for intersections in the project vicinity. Based on the traffic analysis (see Chapter 15, *Transportation and Traffic*), the amount of traffic at nearby intersections during Proposed Project operation would be unlikely to reach levels that cause a violation of the CO standard. Although the SR 12/North Front Street/River Road intersection would degrade to LOS F, the traffic volume on this roadway is below the threshold (44,000 vehicles) that other air districts (BAAQMD 2010) use as a screening threshold for determining CO violations of the standard. Thus, even though the SR 12/North Front Street/River Road intersection could degrade to LOS F, it is unlikely that the Proposed Project would result in a violation of the CO standard.

Localized emission increases of PM would result from motor vehicles and boats operating in the marina. Over time, however, compliance with existing emission reduction requirements would reduce PM emissions from motor vehicles and boats as the fleets turn over.

Overall, Alternative 2 would not result in a substantial change in emissions; changes would be several orders of magnitude below applicable mass emissions significance thresholds and would not be anticipated to contribute substantially to an existing or projected air quality violation. There would be no substantial increases in any criteria air pollutant compared to either the existing baseline or the future No Action Alternative which has a small increase in the number of employees. Therefore, this impact would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would result in similar air quality impacts as those described for Alternative 2. The total emissions associated with project operation under Alternative 3 are shown in Table 6-9. Overall, Alternative 3 would not result in a substantial change in emissions; changes would be several orders of magnitude below applicable mass emissions significance thresholds and would not be anticipated to contribute substantially to an existing or projected air quality violation. There would be no substantial increases in any criteria air pollutant compared to either the existing baseline or the future No Action Alternative which has a small increase in the number of employees. Therefore, this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would result in similar air quality impacts as those described for Alternative 2, except that operational emissions would occur at the Ryde Avenue site in Stockton, instead of the RVARC site. Table 6-9 shows the total emissions associated with Proposed Project operations and the net change in emissions under Alternative 4 compared to the baseline condition. As shown in Table 6-9, the net emission increase would be below the SJVAPCD thresholds of significance and the General Conformity Rule *de minimis* thresholds.

Similar to Alternatives 2 and 3, Alternative 4 would result in an increase in localized emissions at the Ryde Avenue site in Stockton. SJVAPCD has indicated that a project is unlikely to cause a violation of the CO standard if the LOS of the intersections in the project vicinity are better than LOS E or if the project would not substantially worsen an already existing peak-hour condition of LOS F for intersections in the project vicinity. Based on the traffic analysis (see Chapter 15, *Transportation and Traffic*), the amount of traffic at nearby intersections during Proposed Project operation is unlikely to reach levels that would cause a violation of the CO standard. Similar to Alternatives 2 and 3, localized emissions of PM would increase primarily due to motor vehicles traveling to and from the site and boats operating in the marina.

Overall, Alternative 4 would not result in a substantial change in emissions; changes would be several orders of magnitude below applicable mass emissions significance thresholds and would not be anticipated to contribute substantially to an existing or projected air quality violation. There would be no substantial increases in any criteria air pollutant compared to either the existing baseline or the future No Action Alternative which has a small increase in the number of employees. Therefore, this impact would be **less than significant**.

Impact AQ/GHG-9: Potential for Operations to Expose Sensitive Receptors to Substantial Air Pollutant Concentrations.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, there would be no change in existing operations. Existing facilities used by the IEP program would continue to be used. There would be no new emissions of air pollutants and TACs from project operation. Therefore, this alternative would not result in new exposure of sensitive receptors to substantial air pollutant concentrations. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2 (the Preferred Alternative), operation of the DRS would result in emissions of various TACs associated with research activities conducted in the laboratories, boat usage, and the FTC. Research activities conducted at the DRS would involve use of a variety of TACs, particularly large amounts of chemicals containing formaldehyde, a known carcinogen. The formaldehyde-containing chemicals are used for preservation of biological tissue samples. Other solvents containing various TACs would also be used to conduct routine research activities. Standard laboratory and research practices would be followed that pertain to the use of fume hoods, proper storage and containment of chemicals, and proper disposal procedures for chemicals and biological tissue samples. Additionally, chemicals would be used for routine repair and maintenance of equipment and boats.

Project operations would also result in emissions of DPM from off-road equipment and boats in the marina, which could expose sensitive receptors to DPM emissions. Only a small portion of the exhaust DPM emissions from boats would occur in any one location for a substantial amount of time. Residents situated near the RVARC site could be exposed to DPM emissions generated from boats; however, as described in the environmental setting, the predominant wind direction at the RVARC site is away from the nearest sensitive receptors. Thus, DPM emissions would mostly be dispersed before reaching sensitive receptors and would be unlikely to cause substantial exposure to nearby sensitive receptors.

At the FTC, a variety of chemicals would likely be used to manage the aquatic environment for fish. It is assumed that some or possibly all of the fish tanks would be open to the ambient air. The chemicals would be used in accordance with manufacturer's recommendations and standard practices. In addition, chemicals used at the FTC would substantially disperse into the ambient air before reaching any sensitive receptors. Because the predominant wind direction at the RVARC site is from west to east, air emissions would likely be transported across the Sacramento River rather than toward nearby residences, which are located generally northwest and southwest of the Proposed Project site. Land uses across the river are farmland, rural residences, and the Duck Island RV Park. It is not anticipated that any of the chemicals would be used in large enough quantities to affect these receptors. Implementation of standard best practices for handling, use, and disposal of these materials would ensure that exposure of nearby sensitive receptors to these chemicals would be less than significant. In summary, with implementation of standard best practices for use, storage, and disposal of research chemicals, along with dispersion of emissions in the ambient air, the impact from air pollutants on sensitive receptors would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would result in similar air pollutant emissions as those described for Alternative 2 and would release TACs associated with research activities, maintenance activities, and operation of off-road equipment and boats. As described for Alternative 2, most emissions would be dispersed in the ambient air and, because of the wind direction at the RVARC site, most DPM emissions would be transported eastward, away from the nearest sensitive receptors. Implementation of standard best practices for use, storage, and disposal of chemicals would ensure that the impact on sensitive receptors from air pollutants would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would result in similar air pollutant emissions to those described for Alternatives 2 and 3, and would release TACs associated with research activities, maintenance activities, and operation of off-road equipment and boats. Similar to Alternatives 2 and 3, most of the pollutants in chemicals used at the Ryde Avenue site would disperse into the ambient air before reaching any sensitive receptors. Because the predominant wind direction at the Stockton site is from west to northwest, air emissions would likely be transported across the Stockton DWSC rather than toward nearby residences located immediately north of the Ryde Avenue site. Land uses across the Stockton DWSC are industrial and include the Port of Stockton facilities. Local emissions of DPM generated by the Proposed Project would be substantially less than existing emissions associated with nearby industrial and Port of Stockton operations and would not be large enough to result in a cumulatively considerable increase in health effects. As described in Alternative 2, implementation of standard best practices for use, storage, and disposal of chemicals and dispersion of emissions in the ambient air away from the closest receptors would minimize this impact and ensure that this impact would be **less than significant**.

Impact AQ/GHG-10: Potential for Operation to Create Objectionable Odors Affecting a Substantial Number of People.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, there would be no change in existing operations. Existing facilities used by the IEP would continue to be used. Therefore, no new sources of odor emissions would result from operation. Similar to existing conditions, the No Project Alternative would generate temporary odors associated with diesel and gasoline exhaust generated while conducting research and monitoring activities from boats and vehicles used to transport samples. These odors are short in duration and dissipate quickly in the ambient air. Operation of the IEP's research activities have the potential to generate objectionable odors, particularly from disposal of decaying biological tissue samples. Existing BMPs related to odor control would continue to be employed. Such measures include placing potentially odorous samples in bags, freezing samples, and/or placing large samples in covered outside receptacles. The latter would be timed with waste collection services to ensure that large samples are transported off-site for proper waste disposal. No known complaints have been received regarding odors at the existing IEP facilities. For this reason, and because this alternative would not result in additional exposure of sensitive receptors to substantial air pollutant concentrations, this impact would be **less than significant**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2 (the Preferred Alternative), operation of the DRS, particularly the research and development activities and the FTC, would involve activities similar to those currently underway at other DWR and USFWS research facilities and other aquaculture facilities. As described above for Alternative 1, odor has not been an issue for these existing activities, and DWR and USFWS would follow standard practices for odor control. Therefore, this impact would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would result in similar odor effects on nearby sensitive receptors as those described for Alternatives 1 and 2. This impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would result in similar odor effects on nearby sensitive receptors as those described for Alternatives 2 and 3. This impact would be **less than significant**.

Impact AQ/GHG-11: Potential for Project Operations to Generate Substantial GHG Emissions, and Potential for Conflicts with Applicable Plans, Policies or Regulations Adopted for the Purpose of Reducing Emissions of GHGs.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, GHG emissions generated from existing IEP activities would continue. These activities would continue to occur throughout the Bay-Delta region, which includes several air basins and air districts. These emissions would be generated from boats used to conduct monitoring activities, motor vehicles for commuting purposes and to conduct IEP activities, and building energy usage. The GHG emissions from current operations are shown in Table 6-9. Over time, the GHG emissions associated with the No Project Alternative would decrease as a result of existing regulations and commitments to GHG reductions under DWR's GGERP portion of the CAP. These existing regulations include a reduction in indirect GHG emissions from electricity use through implementation of the Renewable Portfolio Standard, reduction in direct GHG emission from mobile sources due to improved vehicle emissions standards as a result of fleet turnover, and implementation of the LCFS. The GHG emissions that would be associated with ongoing activities under the No Project Alternative are necessary to improve the understanding of climate change effects on the San Francisco Bay-Delta region. Because these emissions are accounted for in DWR's GGERP portion of the CAP, which ensures that emissions associated with DWR operations are consistent with the reductions under AB 32 and other statewide GHG emission policies, the emissions for operation of the No Project Alternative would be **less than significant**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2 (the Preferred Alternative), GHG emissions from existing IEP activities would continue to occur throughout the San Francisco Bay-Delta region, which includes multiple air basins and air districts. In comparison to existing conditions and the No Project Alternative, Alternative 2 would result in an overall increase in GHG emissions as the Proposed Project would accommodate more employees at the RVARC site. The total GHG emissions and the total net change in GHG emissions associated with Alternative 2 are shown in Tables 6-9 and 6-10.

Estuarine Research Station

YSAQMD, the local air district, has not established numerical GHG emission significance thresholds. The CEQ guidance on climate change and GHG emissions in NEPA documents requires an analysis of GHG emissions but suggests that emissions less than 25,000 MT CO_2e are not a substantial contribution to a cumulative effect. As shown in Table 6-10, the ERS' operational GHG emissions would be substantially less than 25,000 MT CO_2e. DWR has implemented the GGERP portion of the CAP that demonstrates DWR's reduction in GHG emissions from operations to 50 percent below 1990 levels by 2020, which is stricter than the goal of AB 32. The GGERP portion of the CAP identifies several operational measures that should be implemented by projects to ensure that they are reducing GHG emissions consistent with DWR's GGERP portion of the CAP. The Proposed Project would not conflict with DWR's ability to implement any of the Specific Action GHG emissions reduction measures identified in the GGERP portion of the CAP. In addition, the Proposed Project would not add any electricity demands to the State Water Project system. Implementation of **Mitigation Measure AQ/GHG-11 (Implement DWR Greenhouse Gas Emission Reduction Plan portion of the Climate Action Plan BMPs and Mitigation Measures for Operation)** would ensure that the ERS is consistent with DWR's GGERP portion of the CAP and the GHG emission reduction goals of AB 32. With implementation of this mitigation measure, and because the ERS' operational emissions would be below levels considered by the CEQ to be a substantial contribution to a cumulative effect, the impacts associated with the ERS' operational GHG emissions and potential conflicts with applicable plans and policies regarding GHG emissions would be less than significant with mitigation.

Mitigation Measure AQ/GHG-11: Implement DWR Greenhouse Gas Emission Reduction Plan portion of the Climate Action Plan BMPs and Mitigation Measures for Operation (Alternatives 2, 3, and 4 - ERS).

During ERS operation, DWR and USFWS shall implement all applicable BMPs and mitigation measures for operation that are listed in DWR's GGERP portion of the CAP. If a BMP or mitigation measure is deemed infeasible or not applicable, a justification shall be provided and approved by the DWR CEQA Climate Change Committee that failing to implement that BMP or mitigation measure would not be detrimental to the Proposed Project's consistency with the Greenhouse Gas Reduction Plan. The BMPs and mitigation measures that should be included in the plan include the following:

1. Implement energy efficiency improvements of pumps through design, construction and refurbishment methods.
2. Investigate and implement, if feasible, opportunities for renewable energy development at the facilities subject to safety, emergency, and environmental considerations.
3. Consider and implement, if feasible, opportunities for environmental restoration activities that will increase the sequestration of carbon at the project site.
4. Implement DWR's Sustainability Policy, which includes tracking GHG emissions; incorporating recycled wastewater into facilities when technically feasible and cost effective; maximizing opportunities to reduce, reuse, and recycle materials; developing sustainable business practices for facilities, fleet, workplace, procedures, and management decisions; utilizing purchasing power to meet sustainability objectives; incorporating energy and water efficiency and conservation in all capital and renovation projects, as well as operation activities, within budgetary constraints and programmatic requirements; providing electric vehicle charging stations in employee parking areas of all new or renovated buildings, when feasible; and ensuring Energy Star® purchasing to reduce energy use of appliances.

5. Implement BMPs for vegetation management activities, which include using fuel-efficient landscaping equipment; shutting down equipment when not in use after 5 minutes; using spot application of herbicides; controlling nonnative weed species as soon as populations are found; planning and scheduling vegetation maintenance activities to minimize driving time and return trips to the site; using native or drought-resistant landscaping around facilities; and encouraging landscaping contracts to use manual techniques to the extent possible to reduce use of gas powered equipment.

Fish Technology Center

YSAQMD, the local air district, has not established numerical GHG emission significance thresholds. The CEQ guidance on climate change and GHG emissions in NEPA documents requires an analysis of GHG emissions but suggests that emissions less than 25,000 MT CO_2e are not a substantial contribution to a cumulative effect. The FTC would be operated by USFWS, which, as a federal agency, would not be required to comply with DWR's GGERP portion of the CAP. However, because the FTC's operational emissions would be below levels considered by the CEQ (as presented in Table 6-10) to be a substantial contribution to a cumulative effect, the operational impacts associated with the FTC's GHG emissions and potential conflicts with applicable plans and policies regarding GHG emissions would be less than significant**.**

Delta Research Station

Impacts of operations at the DRS under Alternative 2 would be as described above for the ERS and FTC. With implementation of Mitigation Measure AQ/GHG-11 for the ERS, Alternative 2 would be consistent with applicable policies regarding GHG emissions and would not generate substantial GHG emissions. Thus, this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Impacts of DRS operations under Alternative 3 would be as described above for Alternative 2. With implementation of Mitigation Measure AQ/GHG-11 for the ERS, Alternative 2 would be consistent with applicable policies regarding GHG emissions and would not generate substantial GHG emissions. Thus, this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Impacts of operations at the DRS under Alternative 4 would be as described above for Alternative 2. SJVAPCD, the local air district, has determined that GHG emissions are best controlled through implementation of best management practices or demonstration of a 29 percent reduction from 2002-2004 conditions. This is consistent with the BMPs detailed in DWR's GGERP portion of the CAP. Therefore, with implementation of Mitigation Measure AQ/GHG-11 for the ERS , Alternative 4 would be consistent with applicable policies regarding GHG emissions. Thus, this impact would be reduced to a level that is **less than significant with mitigation**.

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Chapter 7
Biological Resources – Terrestrial

This chapter discusses the potential for the Proposed Project to affect wetland, riparian, and upland habitats, and the special-status plant and wildlife species that may use these habitats. Specifically, this chapter describes the existing environmental setting in the Project Area, discusses federal, state, and local regulations relevant to vegetation and wildlife resources that may be affected by the Proposed Project, identifies plant and wildlife species potentially affected by the Proposed Project, and proposes mitigation measures to avoid or reduce the potentially significant impacts.

The following appendix supports this chapter:

- Appendix E, *Biological Resources Technical Appendix*

7.1 Environmental Setting

7.1.1 Rio Vista Army Reserve Center Site

This section describes existing biological resources at RVARC. For the purposes of this chapter, the "study area", as shown in **Figure 7-1**, includes the entire RVARC and a portion of the Sacramento River adjacent to RVARC property. Reconnaissance-level biological surveys and wetland delineations were conducted in the RVARC study area on May 7 and September 16, 2014. A bat habitat assessment and survey of abandoned buildings at the RVARC was conducted in May 2015. The methods and results of the bat survey are provided in Appendix E. Representative photographs of the study area are provided in **Appendix E**.

Developed/Ruderal

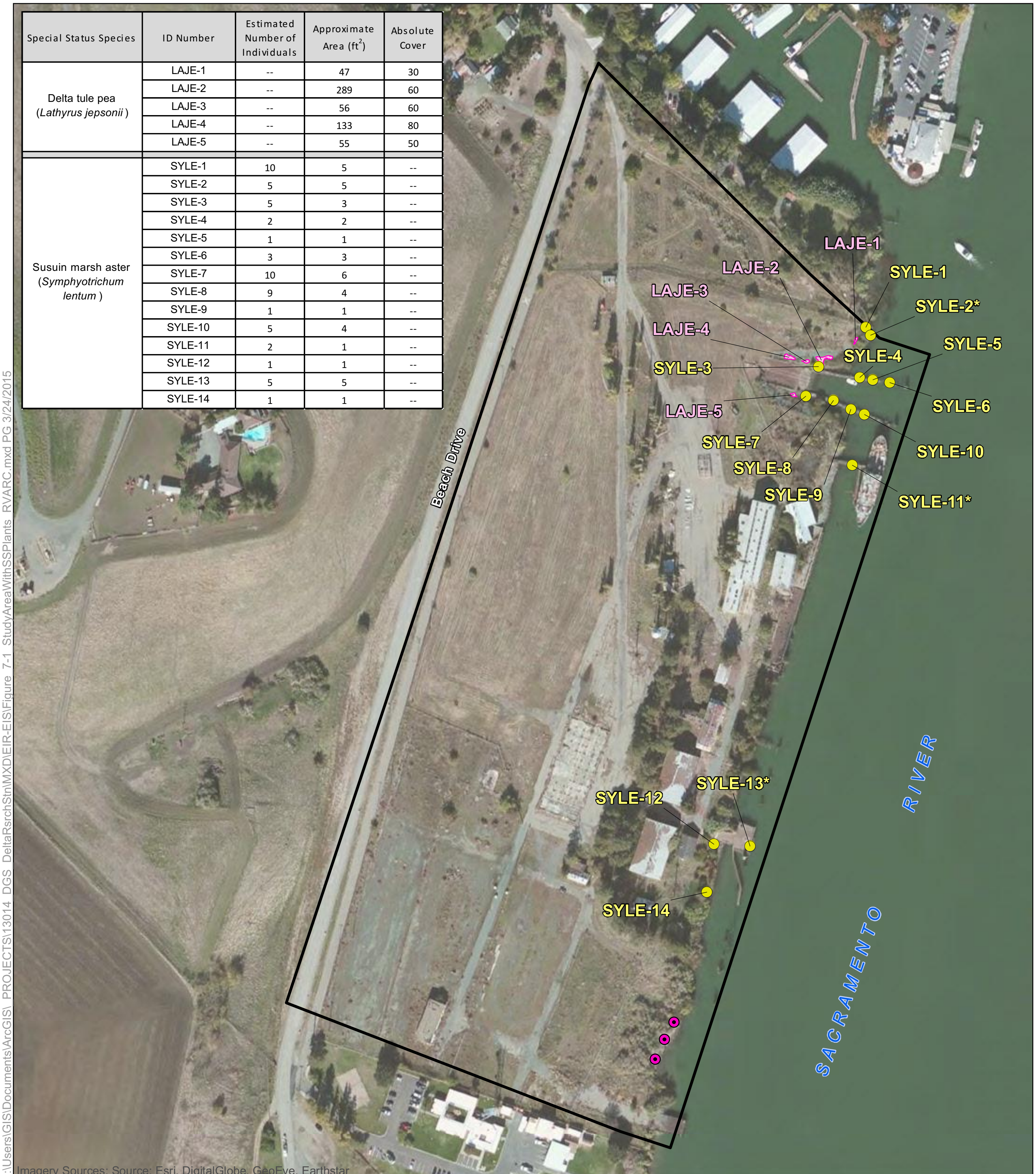
The study area is predominantly characterized by developed or disturbed upland habitat. The developed areas have numerous vacant buildings, such as warehouses, offices, storage facilities, and a ship repair shop. Other structures in the study area include wharfs, building pads, a well, a water storage tank, water drainage pump stations, moorings in the river, and a marine railway for boat repair. Existing vacant buildings and other facilities are mostly clustered on the lower terrace adjacent to the river. Numerous sheoaks (*Casuarina* sp.) and other ornamental shrubs and trees are interspersed throughout the upland areas but are more common adjacent to the abandoned buildings and structures on the lower terrace. Vegetation in the ruderal/developed areas is primarily herbaceous, ruderal, non-native grasses and forbs, such as rip-gut brome (*Bromus diandrus*), wild oat (*Avena fatua*), Bermuda grass (*Cynodon dactylon*), rose clover (*Trifolium hirtum*), common groundsel (*Senecio vulgaris*), and broadleaf filaree (*Erodium botrys*). Yellow star-thistle (*Centaurea* *solstitialis*), an invasive ruderal species, is abundant in some portions of the study area. Ruderal habitat in the study area supports few native grasses and forbs. Native forbs in this habitat include species that are adapted to disturbance, such as telegraph weed (*Heterotheca grandiflora*), Spanish clover (*Acmispon americanus* var. *americanus*), and salt heliotrope (*Heliotropium curassavicum* var. *oculatum*). A small patch of creeping wild rye (*Leymus triticoides*), a native grass, is also present in the study area. This habitat also consists of some barren or graveled areas.

Developed/ruderal habitat in the study area provides relatively limited habitat value for special-status wildlife. Common species that are adapted to urban settings are likely to be present. Rock Pigeon[1] (*Columba livia*), Western Scrub Jay (*Aphelocoma californica*), American Crow (*Corvus brachyrhynchos*), Mourning Dove (*Zenaida macroura*),Cliff Swallows (*Petrochelidon pyrrhonota*) and Barn Swallows (*Hirundo rustica*), gull (*Larus* sp.), southern alligator *lizard (Elgaria multicarinata),* California ground squirrel *(Otospermophilus beecheyi*), and black-tailed jackrabbit (*Lepus californicus*) were observed in the study area during reconnaissance-level surveys conducted in September 2014 (Horizon 2015a). Other birds that have been observed onsite include Barn Owl (*Tyto alba*), Northern Mockingbird (*Mimus polyglottos*), European Starling (*Sturnus vulgaris*), Western Meadowlark (*Sturnella neglecta*), Belted Kingfisher (*Megaceryle alcyon*), Western Bluebird (*Sialia mexicana*), American Kestrel (*Falco sparverius*), Osprey (*Pandion haliaetus*), and Northern Harrier (*Circus cyaneus*) (USACE 2000). Mammals observed on the site in previous assessments include western brush rabbit (*Sylvilagus bachmani*), house mouse (*Mus musculus*), deer mouse (*Peromyscus maniculatus*), pocket gopher (*Thomomys bottae*), and squirrel (*Citellus* spp.) (USACE 2000). Mature trees in the study area provide perches and nesting habitat for raptors, such as the Red-Tailed Hawk (*Buteo jamaicensis*).

A bat habitat assessment and survey of abandoned buildings at the RVARC was conducted in May 2015. The methods and results of the survey are provided in Appendix E. The survey found evidence of past or present use by bats in seven abandoned buildings on the site, including two active maternity colonies of Brazilian free-tailed bats (*Tadarida brasiliensis*). Several abandoned structures provide suitable roost features for Townsend's big-eared bat (*Corynorhinus townsendii*), a species that is proposed for listing under the California Endangered Species Act (CESA).

Mature trees in the study area provide suitable habitat for solitary tree-roosting bats such as western red bat (*Lasiurus blossevillii*), a California Species of Special Concern, and hoary bat (*Lasiurus cinereus*).

[1] Common names of birds and fish mentioned in this document are capitalized per International Ornithological Union and American Fisheries Society guidelines.



Special Status Species	ID Number	Estimated Number of Individuals	Approximate Area (ft^2)	Absolute Cover
Delta tule pea (*Lathyrus jepsonii*)	LAJE-1	--	47	30
	LAJE-2	--	289	60
	LAJE-3	--	56	60
	LAJE-4	--	133	80
	LAJE-5	--	55	50
Susuin marsh aster (*Symphyotrichum lentum*)	SYLE-1	10	5	--
	SYLE-2	5	5	--
	SYLE-3	5	3	--
	SYLE-4	2	2	--
	SYLE-5	1	1	--
	SYLE-6	3	3	--
	SYLE-7	10	6	--
	SYLE-8	9	4	--
	SYLE-9	1	1	--
	SYLE-10	5	4	--
	SYLE-11	2	1	--
	SYLE-12	1	1	--
	SYLE-13	5	5	--
	SYLE-14	1	1	--

N

0 200 400

Feet

Horizon Water and Environment

Suisun Marsh aster *(Symphyotrichum lentum)*

Delta tule pea *(Lathyrus jepsonii)*

Delta tule pea occurrences per USACE 2000, City of Rio Vista 2010

Study Area

* Approximate location, site inaxxessible

Figure 7-1

Study Area with Special-status Plant Observations

Freshwater Marsh

Freshwater marsh is found sporadically along the banks of the Sacramento River within the study area, and in some areas, it is contiguous with riparian woodlands (Figure 7-1). The larger patches of freshwater marsh are located in the northeastern corner of the study area adjacent to the marine railway (Figure 7-1). Freshwater marsh in the study area is characterized by aquatic and emergent vegetation that is below the mean high tide. Intertidal banks and open water support invasive water hyacinth (*Eichhornia crassipes*). Some areas support patches of hardstem bulrush (*Schoenoplectus acutus* var. *occidentalis*) and California bulrush (*S. californicus*). Other emergent herbaceous vegetation includes the common scouring rush (*Equisetum hyemale* ssp. *affine*), soft rush (*Juncus effusus*), sedge (*Carex* sp.), and tall flat sedge (*Cyperus eragrostis*). Purpletop vervain (*Verbena bonariensis*), Himalayan blackberry (*Rubus armeniacus*), and dallisgrass (*Paspalum dilatatum*) are non-native species that occupy the middle to upper freshwater marsh zones, along with an uncommon native annual species, Devil's beggartick (*Bidens frondosa*). Freshwater marsh in the study area also supports two California Rare Plant Rank (CRPR) 1B species—Suisun Marsh aster (*Symphyotrichum lentum*) and Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*). These species are concentrated in the northeastern portion of the study area near the marine railway. Suisun Marsh aster was also observed sporadically along the shoreline (Figure 7-1).

A broad range of avian, mammalian, and herpetofauna (amphibians and reptiles) species use freshwater marsh habitat for nesting, denning, and overwintering. Several avian species common for this region of California include blackbirds (*Agelaius tricolor*; *A. phoeniceus*; and *Euphagus cyanocephalus*), Song Sparrow (*Melospiza melodia*), Marsh Wren (*Cistothorus palustris*), and Northern Harrier (*Circus cyaneus*).

Riparian Woodland

Riparian woodland occurs on the banks of the Sacramento River along most of the eastern edge of the study area (Figure 7-1). Historical disturbances, riprapped banks, and structures, such as wharfs, have limited the establishment and succession of riparian woodlands in the study area. This habitat is characterized by a mix of riparian trees and shrubs and is contiguous with freshwater marsh in some parts of the study area. White alder (*Alnus rhombifolia*), a native riparian tree that is generally a pioneer species, is dominant in the tree layer. Other native trees occuring in the riparian area include valley oak (*Quercus lobata*), Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), Oregon ash (*Fraxinus latifolia*), walnut (*Juglans* sp.), and box elder (*Acer negudno*). Non-native common fig (*Ficus carica*) and invasive tamarisk (*Tamarix* sp.) were also observed in this habitat, but are not abundant. Shrubs in the understory include the native arroyo willow (*Salix lasiolepis*), narrowleaf willow (*S. exigua*), California buttonbush (*Cephalanthus occidentalis*), and California rose (*Rosa californica*). Non-native, invasive species in the riparian area include giant reed (*Arundo donax*) and Himalayan blackberry. Sensitive natural communities, as identified by CDFW (CDFG 2010), that potentially occur in the riparian woodland include:

- *Acer negundo* (Box-elder forest) Alliance (Alliance code 61.440.00)

- *Alnus rhombifolia/Salix exigua* (Rosa californica) (Association code 61.420.18)
- *Cephalanthus occidentalis* (Button willow thickets) Alliance (Alliance code 61.420.18)
- *Fraxinus latifolia* (Oregon ash groves) Alliance (Alliance code 61.960.00)
- *Populus fremontii* (Fremont cottonwood forest) Alliance (Alliance code 61.130.00)
- *Quercus lobata* (Valley oak woodland) Alliance (Alliance code 71.040.00)
- *Quercus lobata* (Sacramento River) (Association code 71.040.14)
- Quercus lobata–Alnus rhombifolia (Association code 71.040.11)
- *Quercus lobata/Rubus armeniacus* (Association code 71.040.10)
- *Quercus lobata–Salix lasiolepis* (Association code 71.040.20)

The riparian woodland habitat in the study area is very narrow (typically less than 50 feet wide) and disconnected from large tracts of this habitat type. Consequently, habitat for wildlife is somewhat limited. Nevertheless, these riparian woodlands provide cover, food, and potential nesting habitat for a variety of wildlife species. Raptor species, such as the Great Horned Owl (*Bubo virginianus*), Red-tailed Hawk, Red-shouldered Hawk (*B. lineatus*), and American Kestrel, might nest and forage in riparian woodland. Long-legged wading birds such as the Great Blue Heron (*Ardea herodias*) and Egrets, might establish rookeries in riparian trees. Belted Kingfisher, Downy Woodpecker (*Picoides pubescens*), and Northern Flicker (*Colaptes auratus*) along with passerine species, such as Ash-Throated Flycatcher (*Myiarchus cinerascens*), Oak Titmouse (*Baeolophus inornatus*), Black Phoebe (*Sayornis nigricans*), Bushtit (*Psaltriparus minimus*), Bewick's Wren (*Thryomanes bewickii*), Lazuli Bunting (*Passerina amoena*), Blue Grosbeak (*Passerina caerulea*), and species of goldfinches (*Carduelis* spp.), are also common in this habitat. Riparian habitat and freshwater marsh provide habitat for western pond turtle (*Actinemys marmorata*), a California species of special concern that has been reported in the study area (USACE 2000). Mammals, such as river otter (*Lontra canadensis*), nutria (*Myocastor coypus*), American beaver (*Castor canadensis*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and coyote (*Canis latrans*), are common in riparian woodlands. The mature trees also potentially provide roosting sites for some bat species.

Riverine

Riverine habitat in the study area consists of the Sacramento River channel. See Chapter 8, *Biological Resources – Aquatic* for a description of this habitat.

7.1.2 Ryde Avenue Site in Stockton

This section describes existing biological resources at the Ryde Avenue site. For the purposes of this chapter, the study area, as shown in **Figure 7-2**, includes the entire Ryde Avenue site and a portion of the San Joaquin River adjacent to the properties. Reconnaissance-level biological surveys and wetland delineations were conducted at the

Ryde Avenue site on May 7 and September 30, 2014. Representative photographs of the study area are provided in Appendix E.

Barren/Disturbed/Ruderal

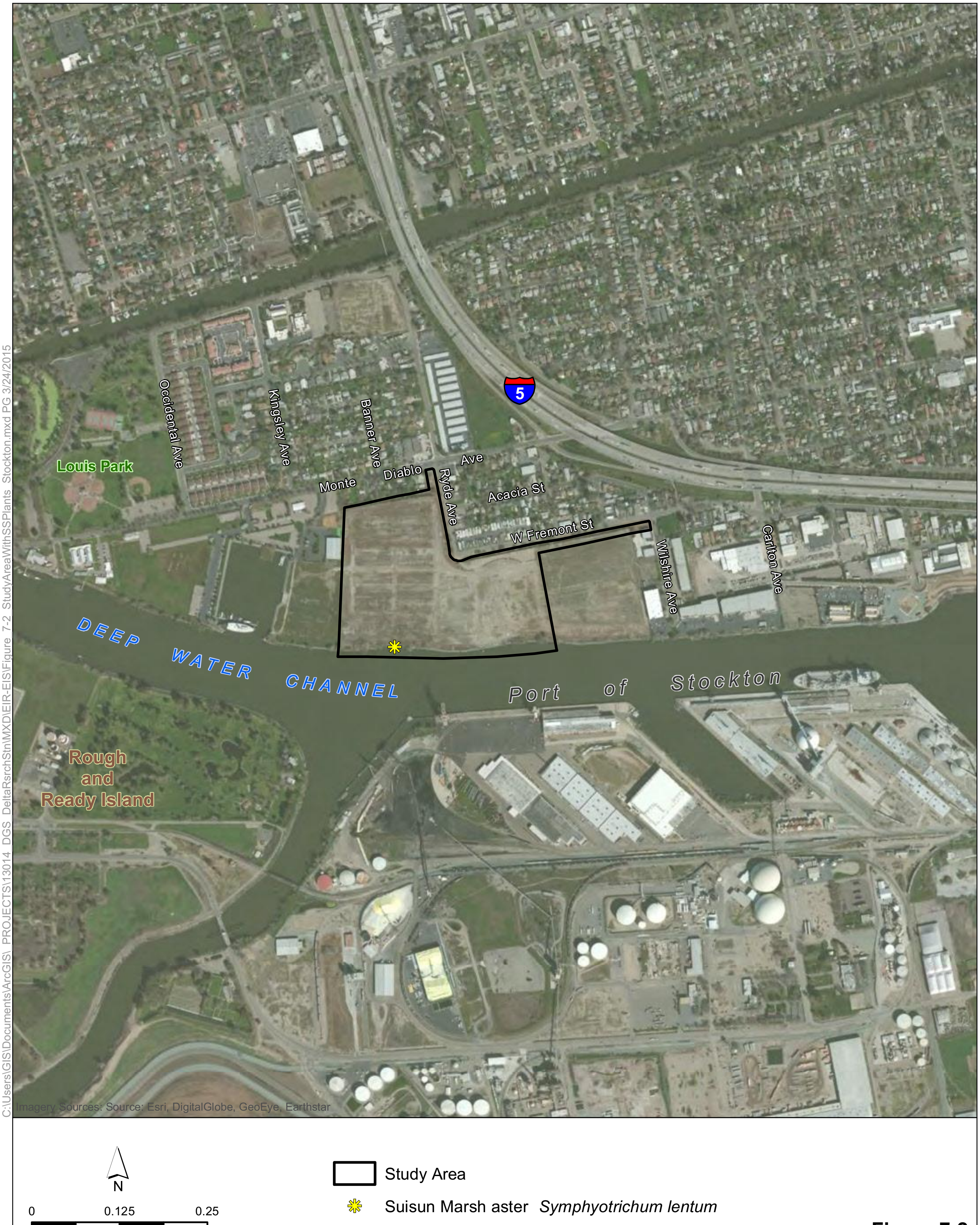
The study area is predominantly characterized by barren or recently disturbed lands that are sparsely colonized by ruderal vegetation. Barren areas are covered with gravel and/or sparse vegetation; a few areas near the northern boundary are paved. Ruderal vegetation in the study area is dominated by non-native grasses and forbs. Non-native grasses include Italian ryegrass (*Festuca perennis*), wild oat, Bermuda grass, and foxtail barley (*Hordeum murinum* ssp. *Leporinum*). Non-native forbs include ruderal species such as bindweed (*Convolvulus arvensis*), Russian thistle (*Salsola tragus*), and milk thistle (*Silybum marianum*). Yellow star-thistle is abundant in some portions of the study area. Horseweed (*Erigeron canadensis*) was the only native forb observed in this habitat. The ruderal habitat lacks shrubs, with the exception of an occasional native Great Valley gumplant (*Grindelia camporum*).

Because of the lack of cover and food resources, barren and ruderal areas provide limited value to wildlife. Common species that are adapted to urban settings are likely to be present. Gulls, House Sparrows (*Passer domesticus*), and western fence lizards (*Sceloporus occidentalis*) were observed in the study area during a September 2014 reconnaissance survey (Horizon 2015b). Other birds and mammals that are commonly found in this type of habitat include American Crow, European Starling, Western Meadowlark, black-tailed jackrabbit, and house mouse.

Native and Ornamental Trees

Trees are generally absent from the interior portion of the study area; they are predominantly located along the periphery of the site. Ornamental trees and shrubs, such as oleander (*Nerium oleander*), are located along the northern boundary adjacent to West Fremont Street. Native interior live oak (*Quercus wislizeni*,), valley oak, and planted walnut trees are located along Ryde Avenue and the northern boundary, where they form a fairly dense canopy over a drainage ditch. The parcel in the northernmost portion of the study area also has several walnut trees, although most of that parcel is graveled and covered with debris.

There is a single, mature native Fremont cottonwood tree along a drainage ditch in the northern portion of the site. Trees in the study area may provide nesting habitat for various passerines and possibly some urban-adapted raptors.



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Horizon WATER and ENVIRONMENT

Figure 7-2

Study Area with Special-status Plant Observation

Riparian

Occasional individual riparian trees or small clusters of trees occur were found in the study area on the banks of the San Joaquin River/Stockton DWSC. Walnut, Fremont cottonwood, western sycamore (*Platanus racemosa*), and willow (*S. gooddingii*) are native riparian trees found occasionally along the shoreline of the study area, but they are uncommon. These riparian trees are not characterized as riparian woodlands because they occur as small, isolated patches or individual trees. Non-native fruit trees (*Prunus* sp.) are also present along the shoreline, but are also uncommon. These trees provide potential nesting habitat for migratory passerines and roosting habitat for a range of bird species, and possible some solitary, obligate tree-roosting bats such as western red bat.

Freshwater Marsh

Freshwater marsh in the study area is characterized by aquatic and emergent vegetation that grow in narrow fringes or sporadic patches in the intertidal zone along the San Joaquin River/Stockton DWSC. Riprap that typically extends from the intertidal slopes to the upper banks limits the establishment of emergent and aquatic vegetation in the study area. Consequently, much of the lower portion of the shoreline is unvegetated (see photographs in Appendix E).

The water hyacinth was the most common vegetation observed along intertidal banks and adjacent open-water areas. Only a few very small patches of hardstem bulrush and California bulrush were observed. Other herbaceous vegetation found were dallisgrass, soft rush, purpletop vervain, dotted smartweed (*Persicaria punctata*), and tall flat sedge. Riparian shrubs and vines found were California buttonbush and Himalayan blackberry. A small population of Suisun Marsh aster, a CRPR 1B species, was found in the study area along the shoreline in September 2014.

A broad range of fish, herpetofauna (amphibians and reptiles), avian, and mammalian species use freshwater marsh habitat as a source for nesting, denning, and overwintering, but the value of this habitat in the study area is limited by its small spatial extent and fragmentation.

Riverine

Riverine habitat in the study area includes the San Joaquin River/Stockton DWSC. See Chapter 8, *Biological Resources – Aquatic,* for a description of this habitat.

7.1.3 Special Status Species

Definitions and Methods of Assessment

Special-status plant and wildlife species refers to those species that meet one or more of the following criteria:

- Species that are listed as threatened or endangered under the federal Endangered Species Act (ESA) (50 CFR 17.12 for listed plants, 50 CFR 17.11 for listed animals);

- Species that are candidates for possible future listing as threatened or endangered under the ESA (76 FR 66370);
- Species that are listed or proposed for listing by the State of California as threatened or endangered under the CESA (14 California Code of Regulations [CCR] 670.5);
- Plants listed as rare under the California Native Plant Protection Act of 1977 (California Fish & Game Code, Section 1900 *et seq*.);
- CRPR List 1 and 2 species;
- Species that meet the definitions of rare or endangered under CEQA (CEQA Guidelines, Section 15380); or
- Animals fully protected in California (California Fish & Game Code, Section 3511 [birds], 4700 [mammals], and 5050 [reptiles and amphibians]).

Background information on special-status plant and wildlife species with the potential to occur on the RVARC and Ryde Avenue site was compiled from numerous sources, including, but not limited to, the following:

- USFWS Information for Planning and Conservation (IPaC) Trust Resources Report for the RVARC site (USFWS 2015a).
- USFWS IPaC Trust Resources Report for the Ryde Avenue site (USFWS 2015b).
- California Natural Diversity Database (CNDDB) queries for the USGS 7.5-minute quadrangles covering and surrounding the sites (CDFW 2015).
- Rio Vista Army Reserve Center Redevelopment Plan, Final Environmental Impact Report (City of Rio Vista 2011).
- Final Environmental Assessment (EA) for Disposal and Reuse of the Rio Vista Army Reserve Center, California, October (USACE 2000).

Tables 7-1 and 7-2 list the special-status plant and wildlife species known to occur in the vicinity of the study areas, and **Figures 7-3 through 7-6** show the CNDDB occurrences of special-status plants and animals within a 5-mile radius of the study areas. **Figures 7-7 and 7-8** shows designated critical habitat within a 5-mile radius of the study areas.

The potential for special-status species to occur in the vicinity of the study areas was evaluated according to the following criteria:

None: the area contains a complete lack of suitable habitat, the local range for the species is restricted, and/or the species is extirpated in this region.

Not Expected: suitable habitat or key habitat elements may be present but may be of poor quality or isolated from the nearest extant occurrences. Habitat suitability refers to factors such as elevation, soil chemistry and type, vegetation communities, microhabitats, and degraded/significantly altered habitats.

Possible: the presence of suitable habitat or key habitat elements that potentially support the species.

Present: the species was either observed directly or its presence was confirmed by diagnostic signs (e.g., tracks, scat, burrows, carcasses, castings, prey remains) during field investigations or in previous studies in the area.

Brief summaries of the life history for special-status species with the potential to be affected by the Proposed Project are provided in Appendix E.

Special-status Plants

RVARC SITE

Two rare plant species, the Delta tule pea and Suisun Marsh aster, were identified in the RVARC study area during May and September 2014 reconnaissance surveys. The locations where these two plant species were observed are shown on Figure 7-1. For the Delta tule pea, aerial coverage was mapped with a global positioning system (GPS) and absolute cover was estimated. Five patches of Delta tule pea were mapped ranging in size from approximately 55 to 289 square feet with cover values that ranged from 30 to 80 percent (Figure 7-1). The Delta tule pea was also documented in the study area in the RVARC EA (Figure 7-1, USACE 2000). For the Suisun Marsh aster, data collection included an estimate of aerial coverage in square feet and the number of individual plants. Clusters of Suisun Marsh aster ranged from approximately 1 square foot to 6 square feet with 1–10 individual plants in each cluster (Figure 7-1). Some clusters of Suisun Marsh aster were observed on wood piles associated with non-functional piers or wharfs.

Table 7-1. Special-Status Plants and Terrestrial Wildlife with the Potential to Occur in the Vicinity of the RVARC Site

Scientific Name **Common Name**	**Federal/State/ CRPR Status**	**Habitat Characteristics**	**Potential to Occur at Site**
PLANTS			
Astragalus tener var. ferrisiae Ferris'milk vetch	-/-/1B	Subalkaline flats within valley and foothill grassland. Also found in vernally mesic meadows and seeps. 2-75 meters. Blooms April through May.	**None.** The site lacks suitable habitat for this species.
Astragalus tener var. tener Alkali milk vetch	-/-/1B	Grows in low, alkaline areas within valley and grassland, alkaline playas, and alkaline vernal pools. 1-170 meters. Blooms March through June.	**None.** The site lacks suitable habitat for this species.
Atriplex cordulata var. *cordulata* Heartscale	-/-/1B	In fine clay, saline or alkaline soils within chenopod scrub, meadows and seeps, or sandy valley and foothill grassland. 0-560 meters. Blooms April through October.	**None.** The site lacks suitable habitat for this species.
Atriplex depressa Bitterscale	-/-/1B	Alkali and clayey soils chenopod scrub, meadows and seeps, valley and foothill grassland, playas, or vernal pools. Rarely associated with riparian areas or marshes. 1-320 meters. Blooms April through October.	**None.** The site lacks suitable habitat for this species.
Atriplex joaquinana San Joaquin spearscale	-/-/1B	In seasonal alkali wetlands or alkali sink scrub within chenopod scrub, alkali meadows, alkali playas, and grassland habitats. 1-835 meters. Blooms April through October	**None.** The site lacks suitable habitat for this species.
Atriplex persistens Vernal pool smallscale	-/-/1B	Found in alkaline vernal pools. 10-115 meters. Blooms June through October.	**None.** The site lacks suitable habitat for this species.
Blepharizonia plumosa Big tarplant	-/-/1B	Typically found on the slopes of valley and grasslands with clay soils. Often found in burned areas. 30-505 meters. Blooms July through October.	**None.** The site lacks suitable habitat for this species and is not within the species' known elevation range.

Scientific Name Common Name	Federal/State/ CRPR Status	Habitat Characteristics	Potential to Occur at Site
Brasenia schreberi watershield	-/-/2B	Found in freshwater marshes and swamps, and artificial waterways. Blooms June through September.	**Not expected**. Species is not associated with tidal habitats.
California macrophylla Round-leaved filaree	-/-/1B	In valley and foothill grassland and cismontane woodland with clay soils. 15-1,200 meters. Blooms March through May.	**None.** The site lacks suitable habitat for this species.
Carex comosa bristly sedge	-/-/2B	Marshes and swamps. Lake margins, wet places; site below sea level is on a Delta island. -5-1005 meters. Blooms May through September.	**Not Expected.** Known occurrences are within nontidal freshwater wetlands. There are no CNDDB records within the vicinity of the site.
Centromadia parryi ssp. *Parryi* Pappose tarplant	-/-/1B	In chaparral, coastal prairie, meadows and seeps, coastal salt marshes and swamps, and vernally mesic valley and grassland. 2-420 meters. Blooms May through November.	**None.** The site lacks suitable habitat for this species
Chloropyron molle ssp. *molle* [=*Cordylanthus mollis* ssp. *mollis*] Soft bird's-beak	FE/SR/1B	In coastal salt marsh with *Distichlis*, *Salicornia*, and *Frankenia*. 0-3 meters. Blooms July through November.	**None.** The site lacks suitable habitat for this species.
Cicuta maculata L. var. *bolanderi* Bolander's water-hemlock	-/-/2B	Marshes and swamps Coastal, fresh or brackish water. Blooms July through September	**Possible.** Tidal freshwater marsh in the site provides potentially suitable habitat. There are no CNDDB records within the vicinity of the site.
Downingia pusilla Dwarf downingia	-/-/2B	Found along the margins of vernal pools and mesic valley and foothill grassland below 445 meters. Blooms March through May.	**None.** The site lacks suitable habitat for this species
Eriogonum nudum var. *psychicola* Antioch buckwheat	-/-/1B	Grows in inland dunes with *Lupinus albifrons, Gutierrezia californica,* and non-native weeds. 3-20 meters. Blooms July through October.	**None.** The site lacks suitable habitat for this species.

Scientific Name **Common Name**	**Federal/State/ CRPR Status**	**Habitat Characteristics**	**Potential to Occur at Site**
Eriogonum truncatum Mt. Diablo buckwheat	-/-/1B	Found in exposed clay or sandy soils throughout chaparral, coastal scrub, and valley and foothill grassland. 3-350 meters. Blooms April through December.	**None.** The site is not within species known geographic range.
Erysimum capitatum var. angustatum Contra Costa wallflower	FE/SE/1B	Stabilized dunes of sand and clay near Antioch along the San Joaquin River. 3-20 meters. Blooms March through July.	**None.** The site lacks suitable habitat for this species.
Eschscholzia rhombipetala Diamond-petaled California poppy	-/-/1B	Valley and foothill grassland with alkaline, clayey soils. 0-975 meters. Blooms March through April.	**None.** The site lacks suitable habitat for this species.
Fritillaria liliacea Fragrant fritillary	-/-/1B	In cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grassland. Often associated with serpentine soils. 3-410 meters. Blooms February through April.	**None.** The site lacks suitable habitat for this species.
Gratiola heterosepala Boggs Lake hedge-hyssop	-/SE/1B	In freshwater marshes and swamps along lake margins. Also found in vernal pools with clay soils. 10-2,375 meters. Blooms April through August.	**None.** The site lacks suitable habitat for this species. Known occurrences are within nontidal freshwater wetlands.
Hibiscus lasiocarpos var. *occidentalis* woolly rose-mallow	-/-/1B	Moist, freshwater-soaked river banks and low peat islands in sloughs; can also occur on riprap and levees. In California, known from the Delta watershed. 0-120 meters. Blooms June through September.	**Possible.** The shoreline of the site provides potentially suitable habitat. CNDDB record overlaps with the site, but this record may or may not have been located in the site.
Isocoma arguta Carquinez goldenbush	-/-/1B	In alkaline valley and grassland. 1-20 meters. Blooms August through December.	**None.** The site lacks suitable habitat for this species.

Scientific Name **Common Name**	**Federal/State/ CRPR Status**	**Habitat Characteristics**	**Potential to Occur at Site**
Juglans hindsii Northern California black walnut	-/-/1B	Riparian forest and riparian woodland in deep alluvial soils. Few extant native stands remain; widely naturalized. Hybridizes with non-native *Juglans regia*. 0-440 meters. Blooms April through May.	**Not expected**. Species is reported in previous assessments but documentation for identification as the rare, native *Juglans hindsii* was not provided. CNDDB reports the occurrence of *Juglans hindsii* that overlaps with the site as extirpated. The individual trees within the site would be considered naturalized, rather than belong to native stands.
Lasthenia conjugens Contra Costa goldfields	FE/-/1B	Vernal pools, swales, low depressions, in open grassy areas. 1-470 meters. Blooms March through June.	**None.** The site lacks suitable habitat for this species.
Lathyrus jepsonii var. *jepsonii* Delta tule pea	-/-/1B	Freshwater and brackish marshes, usually on marsh and slough edges. Often found with *Typha* spp., *Symphyotrichum lentum*, *Rosa californica*, *Juncus* spp., and *Schoenoplectus* spp.. 0-5 meters. Blooms May through September.	**Present.** Delta tule pea occurs in the tidal freshwater marshes near the marine railway, and is potentially present in other locations along the shoreline.
Legenere limosa legenere	-/-/1B	Vernal pools below 880 meters. Blooms April through June.	**None.** The site lacks suitable habitat for this species.
Lepidium latipes var. *heckardii* Heckard's pepper-grass	-/-/1B	In alkaline flats of valley and foothill grassland. 2-200 meters. Blooms March through May.	**None.** The site lacks suitable habitat for this species.

Scientific Name **Common Name**	**Federal/State/ CRPR Status**	**Habitat Characteristics**	**Potential to Occur at Site**
Lilaeopsis masonii Mason's lilaeopsis	-/SR/1B	Freshwater and brackish marshes, and riparian scrub. Tidal zones, in muddy or silty soil formed through river deposition or river bank erosion. 0-10 meters. Blooms April through November.	**Possible**. Riprap along the shoreline that extends from the upper banks to the intertidal slope limits suitable habitat, but small depositional zones may support this species. Species was not observed during reconnaissance surveys. There are several CNDDB occurrences of this species within 5 miles of the site.
Limosella australis Delta mudwort	-/-/2B	In the Delta in riparian scrub, freshwater marsh, brackish marsh, usually on mud banks; often with *Lilaeopsis masonii*. Probably the rarest of the suite of Delta rare plants.0-3 meters. Blooms May through August.	**Possible**. Riprap along the shoreline that extends from the upper banks to the intertidal slope limits suitable habitat, but small depositional zones may support this species. Species was not observed during reconnaissance surveys. There are several CNDDB occurrences of this species within 5 miles of the site.
Navarretia leucocephala ssp. *Bakeri* Baker's navarretia	-/-/1B	Throughout mesic environments: lower montane coniferous forest, cismontane woodland, meadows and seeps, valley and foothill grassland, and vernal pools. 5-1,740 meters. Blooms April through July.	**None.** The site lacks suitable habitat for this species.
Neostapfia colusana Colusa grass	FT/SE/1B	Usually in large, or deep vernal pool bottoms; adobe soils. 5-200 meters. Blooms May through August.	**None**. The site lacks suitable habitat for this species.
Oenothera deltoides ssp. *howellii* Antioch Dunes evening primrose	FE/SE/1B	Inlands dunes on remnant river bluffs and sand dunes east of Antioch. 0-30 meters. Blooms March through September.	**None**. The site lacks suitable habitat for this species.
Plagiobothrys hystriculus Bearded popcornflower	-/-/1B	Most often found in vernal swales or vernal pool margins. Also in mesic valley and foothill grassland. 0-274 meters. Blooms April through May.	**None.** The site lacks suitable habitat for this species.

Scientific Name Common Name	Federal/State/ CRPR Status	Habitat Characteristics	Potential to Occur at Site
Potamogeton zosteriformis eel-grass pondweed	-/-/2B	Marshes, ponds, lakes, and streams. 0-1,860 meters. Blooms June through July.	**Not expected**. Species is typically associated with nontidal freshwater aquatic and wetland habitats, which do not occur in the site.
Sagittaria sanfordii Sanford's arrowhead	-/-/1B	In standing or slow-moving, shallow freshwater ponds, marshes, canals, sloughs, ditches, creeks, vernal pools and lakes, and rivers. 0-650 meters. Blooms May through October.	**Possible.** Tidal freshwater marsh in the site provides potentially suitable habitat for this species. There is a CNDDB occurrence along the Sacramento River, approximately 2.5 miles northeast of the site.
Scutellaria galericulata marsh skullcap	-/-/2B	Marshes and swamps, lower montane coniferous forest, meadows and seeps. 0-2,100 meters. Blooms June through September.	**Not expected**. Few documented occurrences in the Delta.
Scutellaria lateriflora side-flowering skullcap	-/-/2B	Wet meadows and marshes. In the Delta, often found on logs. -3-500 meters. Blooms May through July.	**Possible.** Tidal freshwater marsh in the site provides potentially suitable habitat.
Sidalcea keckii Keck's checker-mallow	FE/-/1B	Grassy slopes in blue oak woodland. 180-425 meters. Blooms April through May.	**None**. The site lacks suitable habitat for this species.
Symphyotrichum lentum Suisun Marsh aster	-/-/1B	Brackish and freshwater marshes. Most often seen along sloughs, ponds and ditches with *Phragmites australis*, *Schoenoplectus* spp., *Rubus armeniacus*, *Typha* spp. 0-3 meters. Blooms May through November.	**Present.** Suisun Marsh aster occurs in the site in brackish marshes along the river, especially at the marine railway in the northeastern corner.
Trifolium hydrophilum Saline cover	-/-/1B	Found in freshwater marshes, depressions, and vernal pools. Also in mesic, alkaline valley and foothill grassland below 300 meters. Blooms April through June.	**Not expected**. Species is not associated with tidal freshwater marsh.
Tuctoria mucronata Solano grass	FE/SE/1B	Clay bottoms of drying vernal pools and lakes in valley grassland. 5-10 meters. Blooms April through August.	**None**. The site lacks suitable habitat for this species.

Scientific Name Common Name	Federal/State/ CRPR Status	Habitat Characteristics	Potential to Occur at Site
INVERTEBRATES			
Apodemia mormo langei Lange's metalmark butterfly	FE/--	Inhabits stabilized dunes along the San Joaquin River. Endemic to Antioch Dunes, Contra Costa County.	**None**. The site lacks suitable habitat for this species.
Branchinecta conservatio Conservancy fairy shrimp	FE/SE	Inhabit astatic pools located in swales formed by old, braided alluvium; filled by winter/spring rains, last until June	**None**. The site lacks suitable habitat for this species.
Branchinecta lynchi vernal pool fairy shrimp	FT/--	Inhabit small, clear-water sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	**None**. The site lacks suitable habitat for this species.
Desmocerus californicus dimorphus Valley elderberry longhorn beetle	FT/--	Occurs only in the central valley of California, in association with blue elderberry (*Sambucus mexicana*).	**None**. Host plant is not present in the site.
Elaphrus viridis Delta green ground beetle	FT/--	Restricted to the margins of vernal pools in the grassland area between Jepson Prairie and Travis AFB.	**None**. The site lacks suitable habitat for this species.
Lepidurus packardi vernal pool tadpole shrimp	FE/--	Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water.	**None**. The site lacks suitable habitat for this species.
AMPHIBIANS & REPTILES			
Actinemys marmorata western pond turtle	-/CSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams & irrigation ditches, usually with aquatic vegetation, below 6000 ft. elevation. Need basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	**Present**. The RVARC EA states that this species is present in the site in marsh and riparian habitats (USACE 2000). There are no CNDDB occurrences within 5 miles of the site.

Scientific Name **Common Name**	**Federal/State/ CRPR Status**	**Habitat Characteristics**	**Potential to Occur at Site**
Ambystoma californiense California tiger salamander (Central Valley DPS)	FT/ST	Need underground refuges, especially ground squirrel burrows & vernal pools or other seasonal water sources for breeding.	**Not Expected.** A very small portion of the site provides potentially suitable upland habitat. The site lacks aquatic habitat and the closest known occurrence is more than 10 miles to the southwest.
Anniella pulchra pulchra silvery legless lizard	-/CSC	Found in chaparral, coastal dunes, and coastal scrub areas with sandy or loose loamy soils under sparse vegetation. Prefer soils with a high moisture content.	**Not Expected.** The site lacks suitable habitat for this species.
Rana draytonii California red-legged frog	FT/SCC	Lowlands & foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation.	**Not Expected.** Riparian areas along the shoreline of the site provide potentially suitable non-breeding habitat, but this species is not known to occur in the vicinity of the site. The closest known occurrence is more than 13 miles to the southwest.
Thamnophis gigas giant garter snake	FT/ST	Marshes, streams, wetlands, and riparian scrub, and agricultural wetlands, and rice fields. Prefers freshwater marsh and low gradient streams. Has adapted to drainage canals and irrigation ditches. Habitat consists of (1) adequate water during the snake's active season, (2) emergent herbaceous wetland vegetation for escape and foraging habitat, (3) grassy banks and openings in waterside vegetation for basking, and (4) higher elevation upland habitat for cover and refuge from flooding (USFWS 2012).	**Not Expected**. The suitability of freshwater tidal marshes for giant garter snake is unknown, and surveys in freshwater tidal marshes of southeastern Solano County failed to detect the species (Wylie et al. 2012). Species is considered to be extremely rare or extirpated from Solano County (SCWA 2012).

Scientific Name Common Name	Federal/State/ CRPR Status	Habitat Characteristics	Potential to Occur at Site
BIRDS			
Agelaius tricolor tricolored blackbird	-/Emergency Protection Status as of 12/3/14 per FGC 2076.5, CSC	Highly colonial species, most numerous in Central Valley and vicinity. Largely endemic to California. Requires open water, protected nesting substrate, and foraging area with insect prey within a few kilometers of the colony. Nests in dense thickets of cattails (*Typha* spp.), bulrush (*Schoenoplectus* spp.), willow (*Salix* spp.), blackberry (*Rubus* spp.), wild rose (*Rosa californica*), and other tall vegetation near fresh water.	**Possible**. The RVARC EA states that this species is present in the site (USACE 2000). Nesting is not expected. There are no CNDDB occurrences within 5 miles of the site.
Athene cunicularia burrowing owl	--/CSC	Yearlong resident of open, dry grassland and desert habitats, as well as in grass, forb and open shrub stages of pinyon-juniper and ponderosa pine habitats. Open, dry annual or perennial grasslands, deserts & scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel (*Spermophilus beecheyi*).	**Possible.** The site lacks suitable habitat for this species. Some burrows were observed in the site, but no signs of this species were observed. Ruderal habitat in the site is marginally suitable for this species. There are eight CNDDB occurrences of this species within a 5-mile radius of the site.
Buteo swainsoni Swainson's hawk	--/ST	Breeds in stands with few trees in juniper-sage flats, riparian areas, and oak savannah. Requires adjacent suitable foraging areas such as grasslands, alfalfa, or grain fields supporting rodent populations. Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, and agricultural or ranch lands with groves or lines of trees. Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	**Possible**. Riparian trees and mature ornamental trees provide marginally suitable nesting sites for this species. Ruderal habitats in the site provide low quality foraging habitat. There are eleven CNDDB occurrences of this species within a 5-mile radius of the site.

Scientific Name Common Name	Federal/State/ CRPR Status	Habitat Characteristics	Potential to Occur at Site
Charadrius montanus mountain plover	FPT/CSC	Chenopod scrub and grassland. Short grasslands, freshly plowed fields, newly sprouting grain fields, & sometimes sod farms. Short vegetation, bare ground and flat topography. Prefers grazed areas and areas with burrowing rodents.	**None**. The site lacks suitable habitat for this species.
Circus cyaneus northern harrier	--/CSC	Rolling foothills and valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	**Possible**. Reported in RVARC EA to be observed onsite (USACE 2000). Nesting is not expected. Ruderal habitats in the site also provide low quality foraging habitat.
Elanus leucurus white-tailed kite	--/FP	Nests in rolling foothills/valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	**Possible**. Riparian trees and mature ornamental trees provide suitable nesting sites for this species. Marshes and ruderal habitats in the site also provide foraging habitat.
Geothlypis trichas sinuosa Saltmarsh common yellowthroat	--/CSC	Resident of fresh and salt water marsh and swamps throughout San Francisco Bay. Requires thick, continuous cover down to water surface for foraging, and tall grasses, tule patches, and/or willows for nesting.	**None**. Site is not within subspecies geographic range.
Lanius ludovicianus loggerhead shrike	--/CSC	Broken woodlands, savannah, pinyon-juniper, Joshua tree, riparian woodlands, desert oases, scrub and washes. Prefers open country for hunting, with perches for scanning, and fairly dense shrubs and brush for nesting.	**Not Expected**. Species is more commonly associated with grasslands, shrub/scrub habitats, and agricultural areas. Riparian trees along the Sacramento River provide marginally suitable nesting habitat for this species.

Scientific Name **Common Name**	**Federal/State/ CRPR Status**	**Habitat Characteristics**	**Potential to Occur at Site**
Laterallus jamaicensis coturniculus California black rail	--/SE, FP	Inhabits freshwater marshes, wetland meadows, and the shallow margins of saltwater marshes bordering larger bays. Needs water depths of about 1 inch that do not fluctuate during the year & dense vegetation for nesting habitat.	**None**. The site lacks suitable habitat for this species.
Melospiza melodia (Modesto population) song sparrow	--/CSC	Emergent freshwater marshes, riparian willow thickets, riparian forests, and vegetated irrigation. Inhabits cattails (*Typha* spp.), bulrush (*Schoenoplectus* spp.) and other sedges; also known to frequent tangles bordering sloughs.	**Possible**. Riparian woodlands and freshwater marsh in the site provide suitable nesting and foraging sites for this species.
Rallus longirostris obsoletus California clapper rail	FE/SE, FP	Saltwater and brackish marshes traversed by tidal sloughs in the vicinity of San Francisco Bay. Associated with abundant growths of pickleweed, but feeds away from cover on invertebrates from mud-bottomed sloughs.	**None**. The site lacks suitable habitat for this species.
Riparia riparia bank swallow	--/ST	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	**None**. The site lacks suitable habitat for this species.
Sternula antillarum browni California least tern	FE/SE, FP	Nests along the coast from San Francisco Bay south to northern Baja California. Colonial breeder on bare or sparsely vegetated, flat substrates: sand beaches, alkali flats, landfills, or paved areas.	**None**. The site is outside the species breeding range.

Scientific Name Common Name	Federal/State/ CRPR Status	Habitat Characteristics	Potential to Occur at Site
MAMMALS			
Antrozous pallidus pallid bat	--/CSC	Deserts, grasslands, shrublands, woodlands & forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	**Possible**. Abandoned buildings and trees potentially provide suitable roosting habitat. Riverine, riparian, and marsh habitats, and to some extent the adjacent ruderal habitats, provide foraging habitat.
Corynorhinus townsendii Townsend's big-eared bat	--/CSC, SC	Found throughout California in a wide variety of habitats, including woodlands, forests, chaparral, scrubs, and grasslands. Most common in mesic sites. Roosts on open surfaces in caves, abandoned mines, and buildings. Also uses bridges, rock crevices and hollow trees as roost sites. Roosting sites are limiting. This species is extremely sensitive to human disturbance.	**Possible**. Abandoned buildings and trees potentially provide suitable roosting habitat. Riverine, riparian, and marsh habitats, and to some extent the adjacent ruderal habitats, provide foraging habitat.
Lasiurus blossevillii Western red bat	--/CSC	Cismontane woodland, lower montane coniferous forest, riparian forest and woodlands. Roosts primarily in trees, 2-40 feet above ground, from sea level up through mixed conifer forests. Prefers habitat edges and mosaics with trees that are protected from above and open below with open areas for foraging.	**Possible.** Riparian and riverine habitat in the site along the Sacramento River provides suitable roosting and foraging habitat for this species, and adjacent ruderal habitats with trees also provides limited roosting and foraging habitat. There are several CNNDB records of this species within the 5-mile radius of the site.
Reithrodontomys raviventris salt marsh harvest mouse	FE/SE, FP	Saline emergent wetlands of San Francisco Bay and its tributaries.	**None**. The site lacks suitable habitat for this species.
Taxidea taxus American badger	--/CSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	**Not Expected**. A small patch of potentially suitable habitat occurs in the southeastern portion of the site but this species is not expected to occur because the habitat is disconnect from large range.

Scientific Name Common Name	Federal/State/ CRPR Status	Habitat Characteristics	Potential to Occur at Site
Vulpes macrotis mutica San Joaquin kit fox	FE/ST	Annual grasslands or grassy open stages with scattered shrubby vegetation. Need loose-textured sandy soils for burrowing, and suitable prey base.	**None**. The site largely lacks suitable habitat and is outside the species current range.

Status Legend

Federal:

FE = federally listed as endangered
FT = federally listed as threatened
FPE = federally proposed as endangered
FPT = federally proposed as threatened
FC = federal candidate for listing as threatened or endangered
FSC = federal species of concern

State:

SE = state listed as endangered
ST = state listed as threatened
SR = state listed as rare
SC = state candidate for listing as threatened or endangered
CSC = California species of special concern
FP = California fully protected

CRPR (California Rare Plant Rank):

1A = Plants Presumed Extirpated in California and Either Rare or Extinct Elsewhere
1B = Plants Rare, Threatened, or Endangered in California and Elsewhere
2A = Plants Presumed Extirpated in California, But More Common Elsewhere
2B = Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere

Note: DPS = Distinct Population Segment

1 **Table 7-2.** Special-Status Plants and Terrestrial Wildlife with the Potential to Occur in the Vicinity of the Ryde Avenue Site

Scientific Name Common Name	Federal/State/ CRPR Status	Habitat Characteristics	Potential to Occur at Site
PLANTS			
Astragalus tener var. *tener* alkali milk-vetch	-/-/1B	Alkaline soils in alkaline playas, alkali flats, mesic grasslands, vernal pools, and seasonal wetlands. 1-60 meters. March-June	**None**. The site lacks suitable habitat for this species.
Atriplex cordulata var. *cordulata* heartscale	-/-/1B	Alkaline soils in alkaline flats, scalds, and alkali seasonal wetlands within chenopod scrub, valley and foothill grassland, and meadow habitats. 1- 560 meters. April- October.	**None**. The site lacks suitable habitat for this species.
Atriplex joaquinana San Joaquin spearscale	-/-/1B	In seasonal alkali wetlands or alkali sink scrub within chenopod scrub, alkali meadows, alkali playas, and grassland habitats. 1-835 meters. April-October	**None**. The site lacks suitable habitat for this species.
Blepharizonia plumosa big tarplant	-/-/1B	Dry slopes in annual grassland. Clay to clay loam soils; usually on slopes and often in burned areas. 30-505 meters. July-October	**None**. The site lacks suitable habitat for this species.
Brasenia schreberi watershield	-/-/2B	Aquatic plant found in natural and artificial freshwater marshes in lakes, ponds, and reservoirs. June-September	**Not Expected**. Species is associated with nontidal habitats. There is one CNDDB occurrence within 5 miles of the site from 1925; it is broadly mapped in the vicinity of Stockton 1.1 miles east of the site.
California macrophylla round-leaved filaree	-/-/1B	Clay soils in cismontane woodland and valley and foothill grassland. 15–1200 meters. March-May.	**None**. The site lacks suitable habitat for this species.
Carex comosa bristly sedge	-/-/2B	Freshwater wetlands along lake margins and sloughs. (Site below sea level is on a Delta island.) -5-1005 meters. May-September	**Not Expected**. The site lacks suitable habitat for this species. Known occurrences are within nontidal freshwater wetlands.

Scientific Name **Common Name**	**Federal/State/ CRPR Status**	**Habitat Characteristics**	**Potential to Occur at Site**
Castilleja campestris ssp. *succulenta* succulent owl's-clover	FE/SE/1B	Vernal pools, valley and foothill grassland. Moist places, often in acidic soils. 25-750m. April-May.	**None.** The site lacks suitable habitat for this species.
Chloropyron palmatum [=Cordylanthus palmatus] palmate-bracted salty bird's-beak	FE/SE/1B	Alkaline soils in seasonal wetlands and flats within chenopod scrub and valley and foothill grasslands. Usually on Pescadero silty clay with *Distichlis spicata*, *Frankenia salina,* etc. 5-155 meters. May-October	**None**. The site lacks suitable habitat for this species.
Cirsium crassicaule slough thistle	-/-/1B	In chenopod scrub, freshwater marshes and swamps, margins of sloughs, riparian scrub. 3-100 meters. Blooms May through August.	**Not Expected.** The site lacks suitable habitat for this species. Species typically occurs in clay and alkaline soils in nontidal habitats.
Delphinium recurvatum recurved larkspur	-/-/1B	On alkaline soils in valley saltbush, valley chenopod scrub, or Cismontane woodland. 3-790 meters. Blooms March through June.	**None**. The site lacks suitable habitat for this species.
Eryngium racemosum Delta button-celery	-/SE/1B	Found in seasonally inundated clay depressions within riparian scrub. 3-30 meters. Blooms June through October.	**None**. The site lacks suitable habitat for this species.
Hibiscus lasiocarpos var. *occidentalis* woolly rose-mallow	-/-/1B	Moist, freshwater-soaked river banks and low peat islands in sloughs; can also occur on riprap and levees. In California, known from the Delta watershed. 0-120 meters. June-September	**Possible**. Patches of freshwater marshes along the Deep Water Ship Channel (DWSC) provide potentially suitable habitat. There are two CNDDB records within 5 miles of the site.

Scientific Name **Common Name**	**Federal/State/ CRPR Status**	**Habitat Characteristics**	**Potential to Occur at Site**
Lathyrus jepsonii var. *jepsonii* Delta tule pea	-/-/1B	Freshwater and brackish marshes, usually on marsh and slough edges. Often found with *Typha* spp., *Symphyotrichum lentum*, *Rosa californica*, *Juncus* spp., and *Schoenoplectus* spp.. 0-5 meters. May-September	**Possible**. Patches of freshwater marshes along the DWSC provide suitable habitat for this species. There is one CNDDB record within 5 miles of the site on the opposite bank of the DWSC on Rough and Ready Island. This record is from 1903 and possibly extirpated.
Lilaeopsis masonii Mason's lilaeopsis	-/SR/1B	Freshwater and brackish marshes, and riparian scrub. Tidal zones, in muddy or silty soil formed through river deposition or river bank erosion. 0-10 meters. April-November	**Not expected**. The site provides marginally suitable habitat. Riprap that extends from the upper banks to the subtidal zone in the DWSC limits suitable habitat. There are four CNDDB occurrences of this species within 5 miles of the site but none are in the DWSC/San Joaquin River.
Limosella australis Delta mudwort	-/-/2B	In the Delta in riparian scrub, freshwater marsh, brackish marsh, usually on mud banks; often with *Lilaeopsis masonii*. Probably the rarest of the suite of Delta rare plants. 0-3 meters. May-August	**Not expected**. The site provides marginally suitable habitat for this species. Riprap that extends from the upper banks to the subtidal zone in of the DWSC limits suitable habitat. There are no CNDDB occurrences of this species within 5 miles of the site.
Sagittaria sanfordii Sanford's arrowhead	-/-/1B	In standing or slow-moving, shallow freshwater ponds, marshes, canals, sloughs, ditches, creeks, vernal pools and lakes, and rivers. 0-650 meters. May-October	**Possible**. Tidal freshwater marsh in the site provides potentially suitable habitat for this species. There is only one CNDDB occurrence within 5 miles of the site from 1901 along a slough; it's broadly mapped in the vicinity of Stockton 1.1 miles east of the site.

Scientific Name Common Name	Federal/State/ CRPR Status	Habitat Characteristics	Potential to Occur at Site
Scutellaria lateriflora side-flowering skullcap	-/-/2B	Freshwater marshes and swamps, and mesic meadows and seeps. 0-500 meters. Blooms July through September.	**Possible.** Tidal freshwater marsh in the project site provides potentially suitable habitat.
Symphyotrichum lentum Suisun Marsh aster	-/-/1B	Brackish and freshwater marshes. Most often seen along sloughs, ponds and ditches with *Phragmites australis*, *Schoenoplectus* spp., *Rubus armeniacus*, and *Typha* spp. 0-3 meters. May-November.	**Present**. A small (5'x 8') colony was observed along the shoreline of the DWSC in September 2014.
Trichocoronis wrightii var. *wrightii* Wright's trichocoronis	-/-/2B	Often in mudflats of vernal lakes, drying river beds, riparian forest, and alkali meadows and seeps. 5-435 meters. Blooms May through September.	**None**. The site lacks suitable alkaline habitat for this species.
Trifolium hydrophilum saline clover	-/-/1B	Alkaline soils in vernal pools, seasonal wetlands, mesic grasslands, and marshes. 0-300 meters. April-June	**None**. The site lacks suitable alkaline habitat for this species.
Tropidocarpum capparideum caper-fruited tropidocarpum	-/-/1B	Found in alkaline clay hills of valley and foothill grassland. 1-455 meters. Blooms March through April.	**None**. The site lacks suitable alkaline habitat for this species.
INVERTEBRATES			
Branchinecta lynchi vernal pool fairy shrimp	FT/--	Inhabit small, clear-water sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	**None**. The site lacks suitable habitat for this species.
Desmocerus californicus dimorphus Valley elderberry longhorn beetle	FT/--	Occurs only in the central valley of California, in association with blue elderberry (*Sambucus mexicana*).	**None**. Host plant is not present in the site.
Lepidurus packardi vernal pool tadpole shrimp	FE/--	Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water.	**None**. The site lacks suitable habitat for this species.

Scientific Name Common Name	Federal/State/ CRPR Status	Habitat Characteristics	Potential to Occur at Site
AMPHIBIANS & REPTILES			
Actinemys marmorata western pond turtle	-/CSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams & irrigation ditches, usually with aquatic vegetation, below 6000 ft. elevation. Need basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	**Not Expected.** Armored shoreline, lack of basking sites, and overall habitat conditions in this portion of the DWSC makes it unlikely that this species would occur in the site
Ambystoma californiense California tiger salamander	FT/ST	Need underground refuges, especially ground squirrel burrows and vernal pools or other seasonal water sources for breeding.	**None.** The site lacks suitable breeding habitat, is isolated from potential breeding outside of the site, and the upland habitat is generally unsuitable for this species.
Rana draytonii California red-legged frog	FT/SCC	Lowlands & foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation.	**None.** The site lacks suitable breeding habitat, is isolated from potential breeding outside of the site, and the riparian habitat is generally unsuitable for this species.
Thamnophis gigas giant garter snake	FT/ST	Marshes, streams, wetlands, and riparian scrub, and agricultural wetlands, and rice fields. Prefers freshwater marsh and low gradient streams. Has adapted to drainage canals and irrigation ditches. Habitat consists of (1) adequate water during the snake's active season, (2) emergent herbaceous wetland vegetation for escape and foraging habitat, (3) grassy banks and openings in waterside vegetation for basking, and (4) higher elevation upland habitat for cover and refuge from flooding (USFWS 2012).	**None**. The site does not provide suitable freshwater marsh habitat for this species. This species is not known to occur in this area of the San Joaquin River.

Scientific Name **Common Name**	**Federal/State/ CRPR Status**	**Habitat Characteristics**	**Potential to Occur at Site**
BIRDS			
Agelaius tricolor tricolored blackbird	--/ Emergency Protection Status as of 12/3/14 per FGC 2076.5, CSC	Highly colonial species, most numerous in Central Valley and vicinity. Largely endemic to California. Requires open water, protected nesting substrate, and foraging area with insect prey within a few kilometers of the colony. Nests in dense thickets of cattails (*Typha* spp.), bulrush (*Schoenoplectus* spp.), willow (*Salix* spp.), blackberry (*Rubus* spp.), wild rose (*Rosa californica*), and other tall vegetation near fresh water.	**Not Expected**. The site lacks suitable breeding habitat for this species. Existing vegetation is not extensive or dense enough to support a breeding colony.
Athene cunicularia burrowing owl	--/CSC	Yearlong resident of open, dry grassland and desert habitats, as well as in grass, forb and open shrub stages of pinyon-juniper and ponderosa pine habitats. Open, dry annual or perennial grasslands, deserts & scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel (*Spermophilus beecheyi*).	**Possible**. Species may occasionally visit the site, but a population is unlikely to become established in the site because of lack of burrows and compacted soils.
Buteo swainsoni Swainson's hawk	--/ST	Breeds in stands with few trees in juniper-sage flats, riparian areas, and oak savannah. Requires adjacent suitable foraging areas such as grasslands, alfalfa, or grain fields supporting rodent populations. Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, and agricultural or ranch lands with groves or lines of trees. Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	**Possible**. The site provides low quality foraging habitat for this species, but lacks suitable/preferred breeding habitat. There are numerous CNDDB records of Swainson's Hawk within 5 miles of the Site.

Scientific Name **Common Name**	**Federal/State/ CRPR Status**	**Habitat Characteristics**	**Potential to Occur at Site**
Circus cyaneus northern harrier	--/CSC	Rolling foothills and valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	**Possible**. The site provides potentially suitable foraging habitat for this species, but lacks suitable breeding habitat.
Elanus leucurus white-tailed kite	--/CFP	Nests in rolling foothills/valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	**Possible**. The site provides potentially suitable foraging habitat for this species, but lacks suitable breeding habitat.
Lanius ludovicianus loggerhead shrike	--/CSC	Broken woodlands, savannah, pinyon-juniper, Joshua tree, riparian woodlands, desert oases, scrub and washes. Prefers open country for hunting, with perches for scanning, and fairly dense shrubs and brush for nesting.	**Possible.** The site provides potentially suitable foraging habitat for this species, but lacks suitable breeding habitat.
Laterallus jamaicensis coturniculus California black rail	--/SE, FP	Inhabits freshwater marshes, wetland meadows, and the shallow margins of saltwater marshes bordering larger bays. Needs water depths of about 1 inch that do not fluctuate during the year & dense vegetation for nesting habitat.	**None.** The site lacks suitable habitat for this species.
Melospiza melodia (Modesto population) song sparrow	--/CSC	Emergent freshwater marshes, riparian willow thickets, riparian forests, and vegetated irrigation. Inhabits cattails (*Typha* spp.), bulrush (*Schoenoplectus* spp.) and other sedges; also known to frequent tangles bordering sloughs.	**Possible.** The site provides potentially suitable foraging habitat for this species, but lacks suitable breeding habitat.

Scientific Name Common Name	Federal/State/ CRPR Status	Habitat Characteristics	Potential to Occur at Site
Xanthocephalus xanthocephalus yellow-headed blackbird	--/CSC	Nests in freshwater emergent wetlands with dense vegetation and deep water, often along lakes or pond margins. Can be found in artificial wetlands as well. Nesting timed with maximum emergence of aquatic insects, especially Odonata.	**Not Expected**. The site lacks suitable breeding habitat for this species. Existing vegetation is not extensive or dense enough to support a breeding colony.
MAMMALS			
Sylvilagus bachmani riparius riparian brush rabbit	SE/FE	Riparian areas on the San Joaquin River in northern Stanislaus County. Dense thickets of wild rose, willows, and blackberries.	**None.** The site lacks suitable habitat for this species.
Corynorhinus townsendii Townsend's big-eared bat	--/CSC, SC	Found throughout California in a wide variety of habitats, including woodlands, forests, chaparral, scrubs, and grasslands. Most common in mesic sites. Roosts on open surfaces in caves, abandoned mines, and buildings. Also uses bridges, rock crevices and hollow trees as roost sites. Roosting sites are limiting. This species is extremely sensitive to human disturbance.	**None**. Suitable roosting habitat is not present.
Lasiurus blossevillii western red bat	--/CSC	Cismontane woodland, lower montane coniferous forest, riparian forest and woodlands. Roosts primarily in trees, 2-40 feet above ground, from sea level up through mixed conifer forests. Prefers habitat edges and mosaics with trees that are protected from above and open below with open areas for foraging.	**Not Expected**. Low quality roosting habitat is present along the margins of the site. The site does not support preferred habitat types (e.g., wide riparian cooridor).
Taxidea taxus American badger	--/CSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	**None**. The site lacks suitable habitat.

Status Legend

Federal:

FE = federally listed as endangered
FT = federally listed as threatened
FPE = federally proposed as endangered
FPT = federally proposed as threatened
FC = federal candidate for listing as threatened or endangered
FSC = federal species of concern

State:

SE = state listed as endangered
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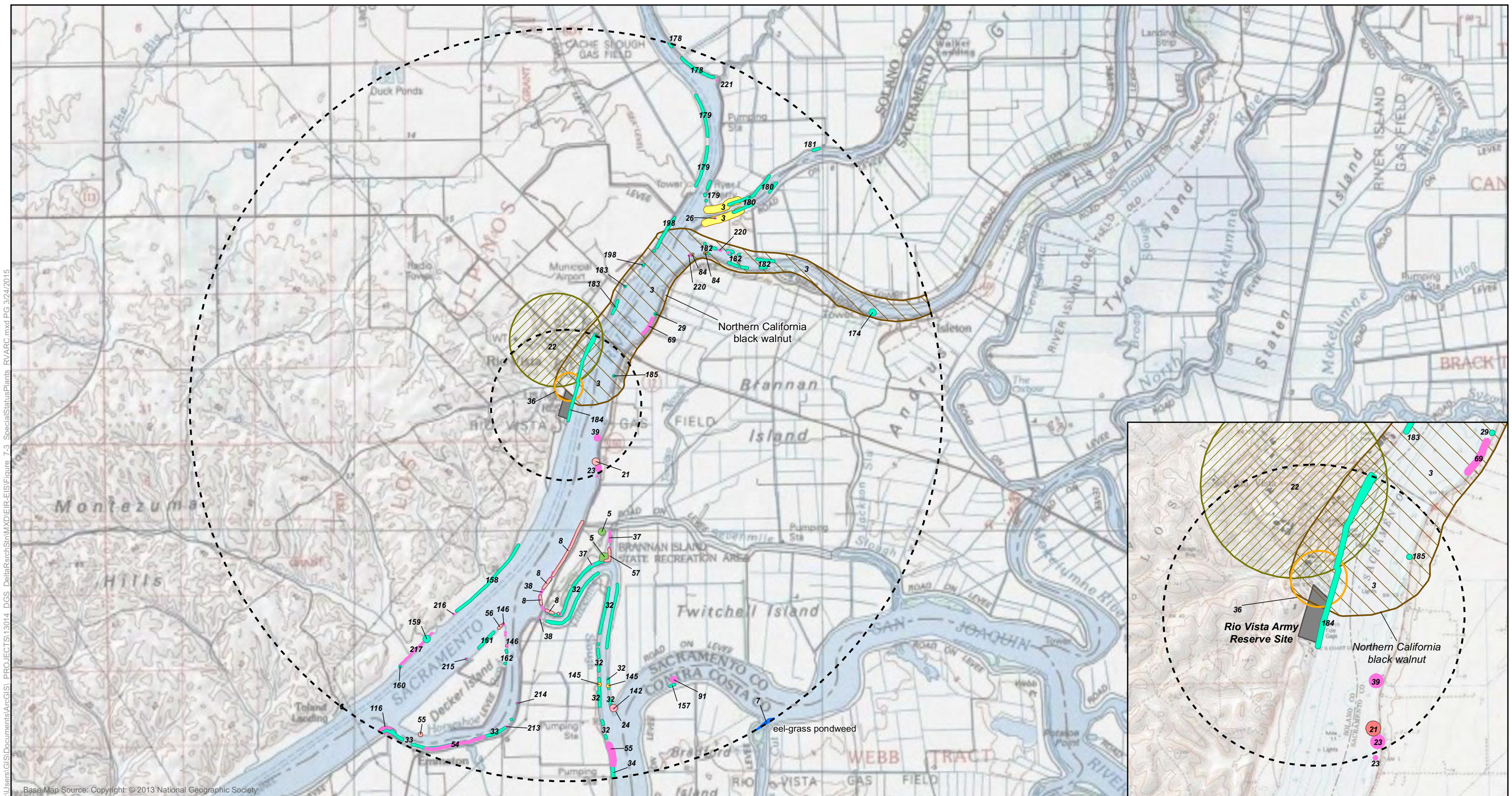
SC = state candidate for listing as threatened or endangered
CSC = California species of special concern
FP = California fully protected

CRPR (California Rare Plant Rank):

1A = Plants Presumed Extirpated in California and Either Rare or Extinct Elsewhere
1B = Plants Rare, Threatened, or Endangered in California and Elsewhere
2A = Plants Presumed Extirpated in California, But More Common Elsewhere
2B = Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere

Note: DPS = Distinct Population Segment



Special-status Plant Species

- Antioch Dunes evening-primrose
- Delta mudwort
- Delta tule pea
- Mason's lilaeopsis
- Northern California black walnut
- San Joaquin spearscale
- Sanford's arrowhead
- Suisun Marsh aster
- eel-grass pondweed
- woolly rose-mallow
- Site Parcels
- 1-Mile and 5-Mile site radii
- *123* CNDDB Occurrence Number

N

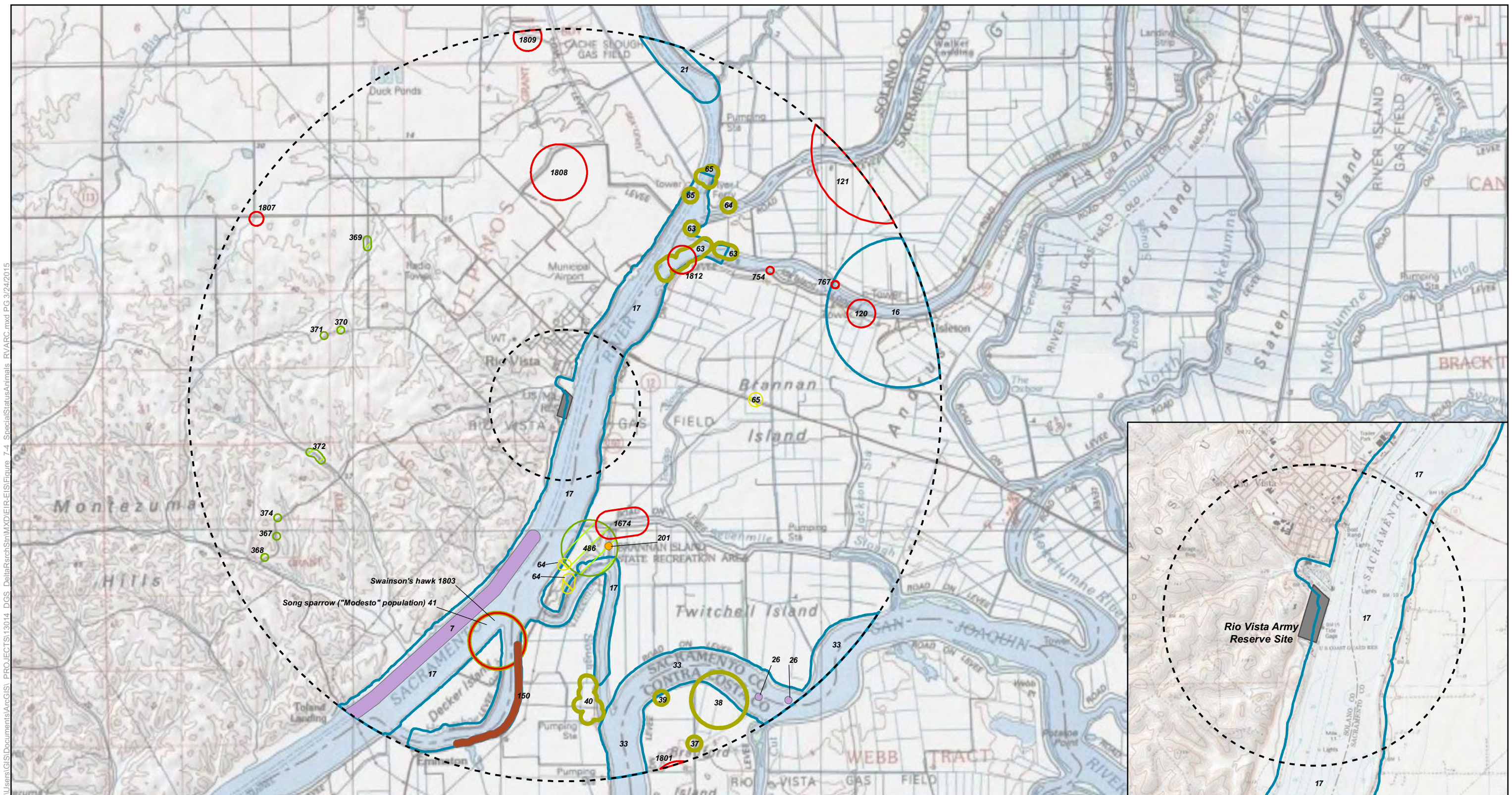
0 1 2

Miles

Source: California Dept. of Fish & Game, California Natural Diversity Database, Feb. 2015

Figure 7-3

Special-status Plants Within a 5-Mile Radius of the Study Area



Special-status Animal Species

- Delta smelt
- Swainson's hawk
- bank swallow
- burrowing owl
- giant garter snake
- longfin smelt
- mountain plover
- song sparrow ("Modesto" population)
- western red bat
- Site Parcels
- 1-Mile and 5-Mile site radii
- 123 CNDDB Occurrence Number

N

0 1 2

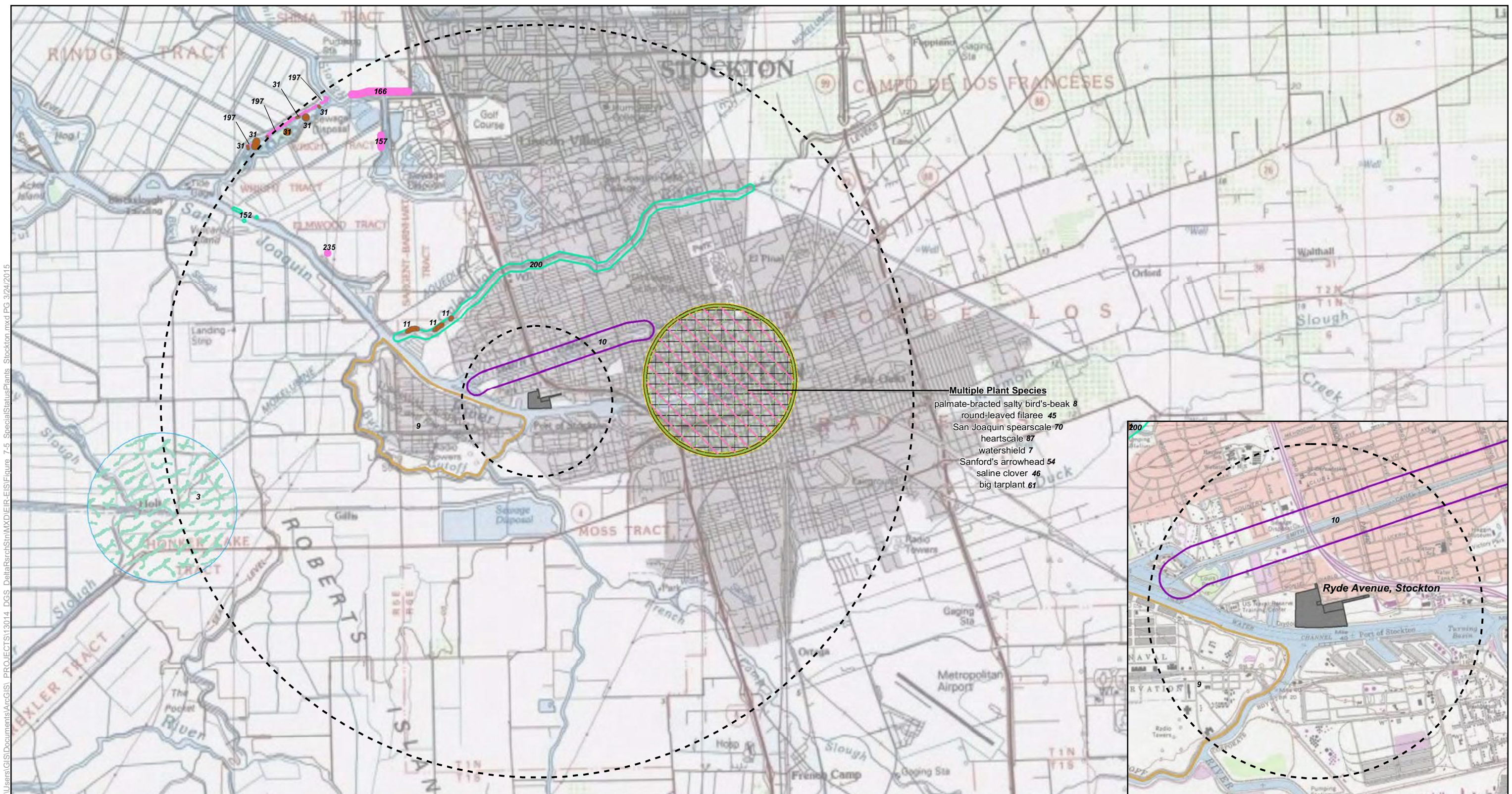
Miles

Horizon WATER and ENVIRONMENT

Source: California Dept. of Fish & Game, California Natural Diversity Database, Feb. 2015

Figure 7-4

Special-status Animals Within a 5-Mile Radius of the Study Area



N

0 1 2
Miles

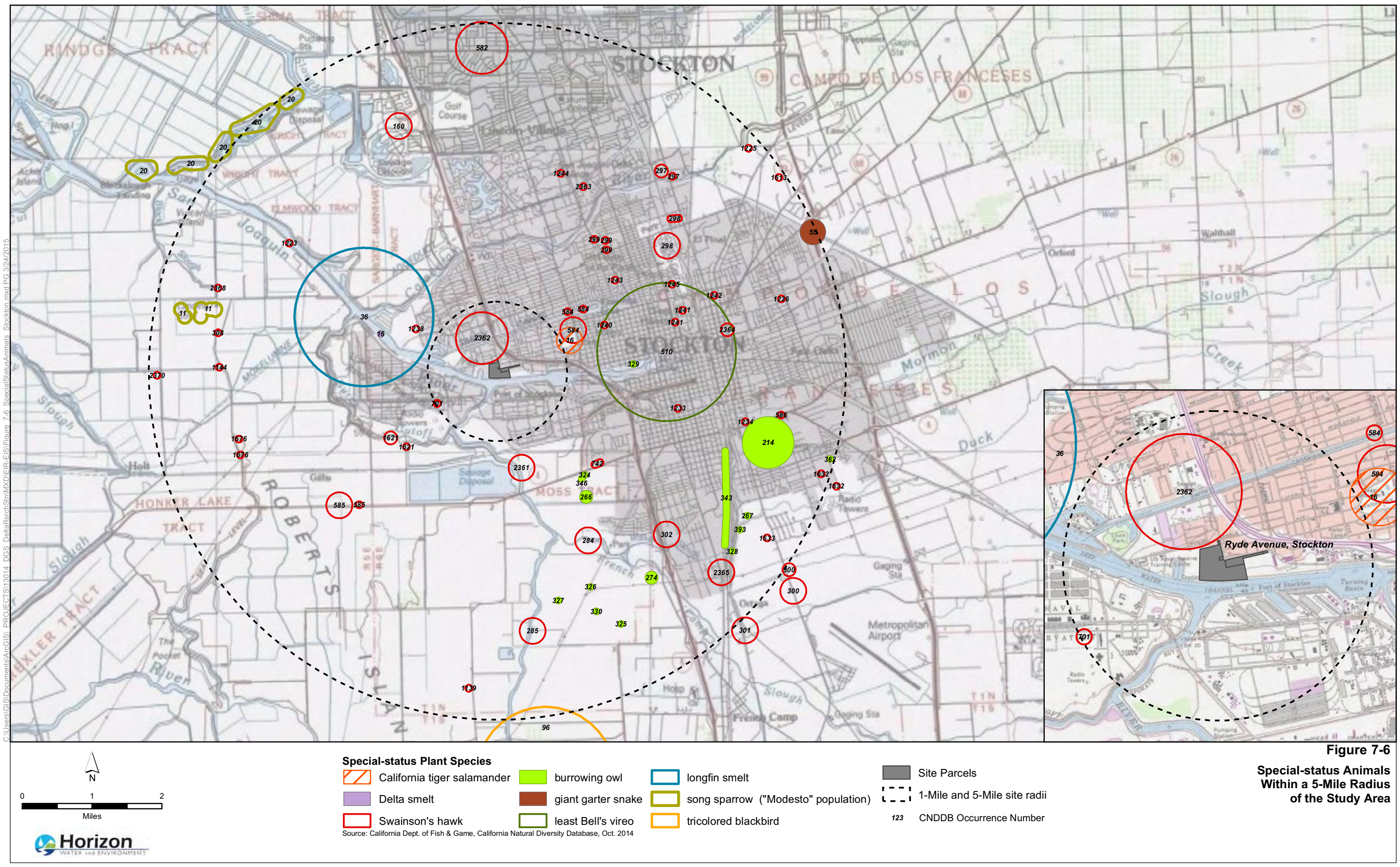
Horizon
WATER and ENVIRONMENT

Special-status Plant Species

- Delta tule pea
- Mason's lilaeopsis
- San Joaquin spearscale
- Sanford's arrowhead
- Suisun Marsh aster
- alkali milk-vetch
- big tarplant
- bristly sedge
- heartscale
- palmate-bracted salty bird's-beak
- round-leaved filaree
- saline clover
- watershield
- woolly rose-mallow
- Site Parcels
- 1-Mile and 5-Mile site radii
- *123* CNDDB Occurrence Number

Source: California Dept. of Fish & Game, California Natural Diversity Database, Oct. 2014

Figure 7-5
Special-status Plants Within a 5-Mile Radius of the Study Area



Special-status Plant Species

California tiger salamander

Delta smelt

Swainson's hawk

burrowing owl

giant garter snake

least Bell's vireo

longfin smelt

song sparrow ("Modesto" population)

tricolored blackbird

Site Parcels

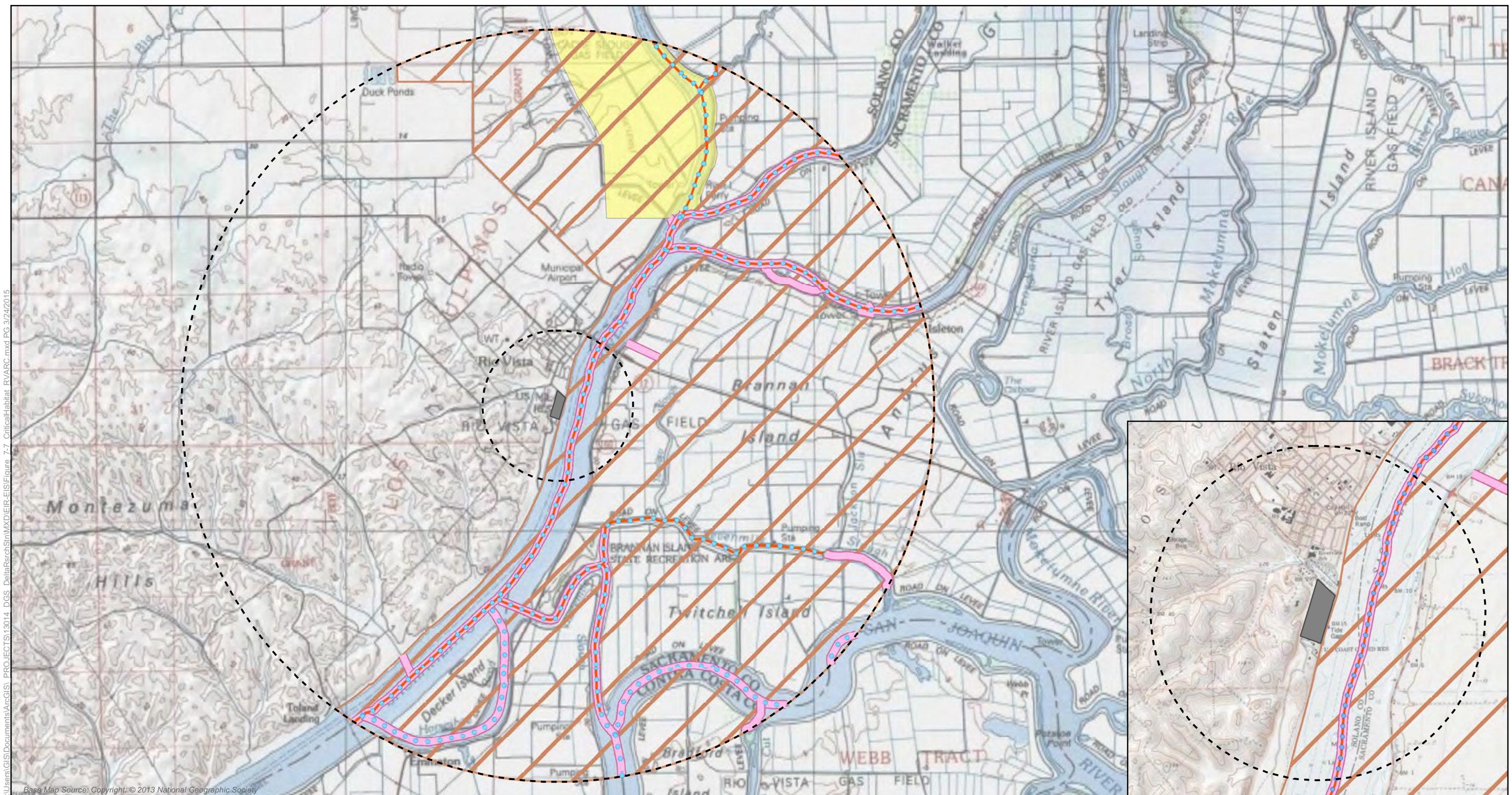
1-Mile and 5-Mile site radii

123 CNDDB Occurrence Number

Source: California Dept. of Fish & Game, California Natural Diversity Database, Oct. 2014

Figure 7-6

Special-status Animals Within a 5-Mile Radius of the Study Area



N

0 1 2

Miles

Horizon WATER AND ENVIRONMENT

Critical Habitat

- Delta smelt
- Green Sturgeon Bypass Areas
- Steelhead, California Central Valley
- Chinook, Central Valley Spring Run
- Green Sturgeon Streams
- Site Parcels
- 1-Mile and 5-Mile site radii

Note: Critical Habitat for winter run Chinook salmon is defined as the main stem of the Sacramento River. Mapping data for winter run Chinook is not currently available.

Sources: U.S. Fish & Wildlife Service, 2014. NOAA, National Marine Fisheries Service, 2014.

Figure 7-7

Critical Habitat Within a 5-Mile Radius of the Study Area

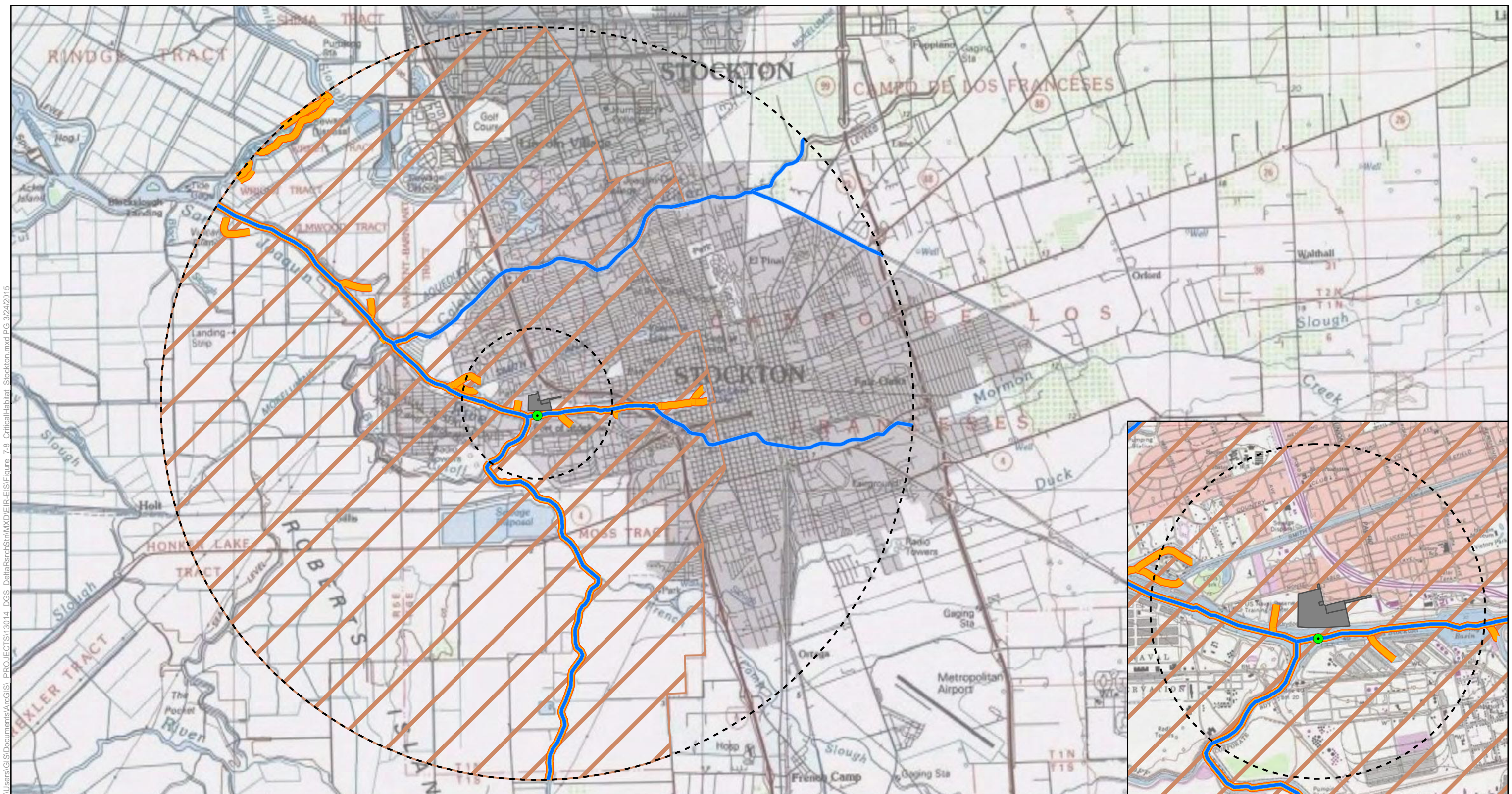


Figure 7-8
Critical Habitat Within a 5-Mile Radius of the Study Area

In addition to the Delta tule pea and Suisun Marsh aster, several other rare plants are considered to be potentially present in the freshwater tidal marsh and riparian areas along the shoreline of the study area. These species are as follow: Bolander's water-hemlock (*Cicuta maculata L. var. bolanderi*), woolly rose-mallow (*Hibiscus lasiocarpos var. occidentalis*), Mason's lilaeopsis (*Lilaeopsis masonii*), Delta mudwort (*Limosella australis*), Sanford's arrowhead (*Sagittaria sanfordii*), and side-flowering skullcap (*Scutellaria lateriflora*) (Table 7-1). Riprap along the shoreline limits the extent of suitable habitat, but small depositional zones and interstices within riprap could support these species. None of these species were observed during reconnaissance surveys conducted for the Proposed Project, and none are listed under the ESA or CESA.

There is a CNDDB occurrence of northern California black walnut (*J. hindsii*) that overlaps the study area (Figure 7-3). The CNDDB record (occurrence number 3) notes northern California black walnut along both banks of the Sacramento River, between Freeport and Rio Vista (and mostly at Walnut Grove) (CDFW 2014). The CNDDB notes that this stand of native walnut trees was reportedly cut down in 1949 and was confirmed as extirpated in 2002. This species was reported on-site in the RVARC EA (USACE 2000), but documentation for identification as the special-status native California black walnut is not provided. Walnut trees were observed in riparian woodlands in the study area in September 2014, but it is unlikely these are "native" occurrences based on their size and location (i.e., growing on fill material). Northern California black walnut is used as rootstock for growing non-native English walnut (*J. regia*) and they easily hybridize and naturalize (CNPS 2014). The individual trees within the study area would be considered naturalized, rather than belonging to native stands.

Ryde Avenue Site

Table 7-2 lists special-status plant species known to occur in the vicinity of the Ryde Avenue study area. One cluster of Suisun Marsh aster was identified during the September 2014 site survey in a fringe of freshwater marsh along the shoreline in the southwestern portion of the study area (Figure 7-2). It was roughly estimated that there were 20 individual plants in a 5- by 8-foot cluster.

In addition to Suisun Marsh aster, other rare plants that have the potential to be present along the shoreline of the study area include Delta tule pea, Bolander's water-hemlock, woolly rose-mallow, Sanford's arrowhead, and side-flowering skullcap (Table 7-2). Patches of freshwater marsh along the Stockton DWSC also provide marginally suitable habitat for these species. Riprap that extends from the upper banks to the subtidal zone greatly reduces the quality and extent of habitat available for these species.

Mason's lilaeopsis and Delta mudwort, which can occur together in tidal areas on muddy or silty soil formed through deposition or bank erosion, are not expected to occur in the study area. There are four CNDDB occurrences of Mason's lilaeopsis within 5-miles of the study area; none of which are in the Stockton DWSC or San Joaquin River. There are no CNDDB occurrences of Delta mudwort within a 5-mile radius of the study area (Figure 7-5).

Special-status Wildlife

RVARC SITE

The RVARC provides potentially suitable day and night roosting habitat for special-status colonial bat species such as Townsend's big-eared bat and pallid bat (*Antrozous pallidus*), as well as solitary, obligate tree-roosting bats such as western red bat. The Townsend's big-eared bat, a species proposed for listing under the CESA, is most commonly associated with caves or cave-like structures (e.g., abandoned mines), as well as bridges and buildings, but might also roost in large tree hollows and other human-made structures such as culverts (CDFW 2013). Buildings, such as the abandoned buildings in the study area provide suitable potential day and or night roost habitat for this species. Pallid bats use a variety of roosts including rock outcrops, mines, caves, tree hollows, buildings, and bridges. Western red bats are most typically associated with wide, mature stands of riparian forest, but may also inhabit less-dense riparian habitat (Pierson et al. 2006). Both species could forage in the study area along the river over open water or freshwater marshes, nearby grassland areas, and over buildings, pavement and trees. There are no known occurrences of Townsend's big-eared bat or pallid bat recorded in the CNDDB within 5 miles of the study area. Western red bat has been detected at Brannan Island State Recreation Area, which is less than 2 miles south of the study area (Figure 7-4).

RYDE AVENUE SITE

Several special-status bird species have the potential to occur at the Ryde Avenue site, as described in Table 7-2. None of these species are known to occur at the site, however, and none are expected to nest at the site.

7.2 Regulatory Setting

7.2.1 Federal Laws, Regulations, and Policies

Clean Water Act

The Clean Water Act (CWA) is the primary federal law that protects the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. CWA Sections 401 and 404 are the key sections that pertain to biological resources.

SECTION 401

Section 401 of the CWA allows for evaluation of water quality when a proposed activity requiring a federal license or permit could result in a discharge to waters of the United States (waters of the U.S.). In California, the State Water Resources Control Board (SWRCB) and its nine Regional Water Quality Control Boards (RWQCBs) issue water quality certifications. Each RWQCB is responsible for implementing Section 401 in compliance with CWA and its water quality control plan (also known as a Basin Plan). Applicants for a federal license or permit to conduct activities that might result in the discharge to waters of the U.S. (including wetlands) must also obtain a Section 401 water quality certification to ensure that any such discharge will comply with the applicable provisions of the CWA. Compliance with Section 401 is required for all projects that have a federal component and may affect state water quality.

SECTION 404

CWA Section 404 regulates the discharge of dredged and fill materials into waters of the U.S., which include all navigable waters, their tributaries, and some isolated waters, as well as some wetlands adjacent to the aforementioned waters (33 CFR Section 328.3). Areas typically not considered to be jurisdictional waters include non-tidal drainage and irrigation ditches excavated on dry land, artificially irrigated areas, artificial lakes or ponds used for irrigation or stock watering, small artificial waterbodies such as swimming pools, and water-filled depressions (33 CFR Part 328). Areas meeting the regulatory definition of waters of the U.S. are subject to the jurisdiction of USACE under the provisions of the CWA Section 404. Construction activities involving placement of fill into jurisdictional waters of the U.S. are regulated by USACE through permit requirements. No USACE permit is effective in the absence of state water quality certification pursuant to Section 401 of the CWA.

Rivers and Harbors Act, Section 10

Section 10 of the Rivers and Harbors Act (RHA) (33 USC Section 401 *et seq*.) requires authorization from USACE for construction of any structure over, in, or under navigable waters of the U.S. The Sacramento and San Joaquin rivers in the vicinity of the Proposed Project are considered navigable waters.

Endangered Species Act

The federal ESA (16 USC Section 1531 *et seq*.; 50 CFR Parts 17 and 222) provides for conservation of species that are endangered or threatened throughout all or a significant portion of their range, as well as the protection of habitats on which they depend. USFWS and the National Marine Fisheries Service (NMFS) share responsibility for implementing the ESA. In general, USFWS manages land and freshwater species, whereas NMFS has jurisdiction over most marine and anadromous species. The ESA and subsequent amendments provide guidance for projects that may affect the continued existence of federally listed species or adversely affect their designated critical habitat.

SECTION 7 (INTERAGENCY CONSULTATION AND BIOLOGICAL ASSESSMENTS)

Section 7 of the ESA (16 USC Section 1531 *et seq*.) outlines the procedures for federal interagency cooperation to conserve federally listed species and designated critical habitats. Section 7(a)(1) directs the Secretary of the Interior and Secretary of Commerce to review other programs administered by them and use such programs to further the purposes of the ESA. It also directs all other federal agencies to use their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of species listed under the ESA. Section 7(a)(2) states that each federal agency shall, in consultation with the Secretary, ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. In fulfilling these requirements, each agency must use the best scientific and commercial data available. This section of the ESA defines the consultation process, which is further developed in regulations promulgated by 50 CFR Section 402.

SECTION 9 (PROHIBITED ACTS)

Section 9 of the ESA 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 ESA defines the term "take" to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (16 USC Section 1532)." USFWS has interpreted the definition of harm to include habitat modification. Section 9 prohibits a number of specified activities with respect to endangered and threatened plants as well as adverse modifications to critical habitat.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 USC, Chapter 7, Subchapter II) protects migratory birds. The original 1918 statute implemented the convention between the U.S. and Great Britain (for Canada), and later amendments implemented treaties between the U.S. and Mexico, the U.S. and Japan, and the U.S. and the Soviet Union (now Russia) (USFWS n.d.). Most actions that result in the take of, or the permanent or temporary possession of, a migratory bird constitute violations of MBTA. MBTA also prohibits destruction of occupied nests. The Migratory Bird Permit Memorandum dated April 15, 2003, clarifies that destruction of most unoccupied bird nests (without eggs or nestlings) is permissible under MBTA; exceptions include nests of federally threatened or endangered migratory birds, bald eagles (*Haliaeetus leucocephalus*), and golden eagles (*Aquila chrysaetos*). USFWS is responsible for overseeing compliance with MBTA. On December 8, 2004, the U.S. Congress passed the Migratory Bird Treaty Reform Act (Division E, Title I, Section 143 of the Consolidated Appropriations Act, 2005, Public Law 108–447), which excludes all migratory birds non-native or human-introduced to the U.S. or its territories. It defines a native migratory bird as a species present within the U.S. and its territories as a result of natural biological or ecological processes. USFWS published a list of the bird species excluded from MBTA on March 15, 2005 (70 FR 12710).

Executive Order 11990, Protection of Wetlands

EO 11990 provides for protection of wetlands from federal or federally approved projects when a practicable alternative is available. If impacts on wetlands cannot be avoided, all practicable measures to minimize harm must be included. USACE is the administering agency.

Executive Order 13112, Invasive Species

EO 13112 directs all federal agencies to prevent and control introductions of invasive non-native species in a cost-effective and environmentally sound manner to minimize their impacts on economics, ecology, and human health. As directed by this EO, a national invasive species management plan guides federal actions to prevent, control, and minimize invasive species and their impacts (National Invasive Species Council 2008). To support implementation of this plan, USACE released a memorandum describing the *U.S. Army Corps of Engineers Invasive Species Policy* (USACE 2009). This policy includes addressing invasive species effects in the impact analyses for civil works projects.

7.2.2 State Laws, Regulations, and Policies

California Environmental Quality Act, Sections 15065 and 15380

Section 15065 of the CEQA Guidelines (14 CCR) requires that a lead agency shall determine whether a project may have a significant effect on the environment and require an EIR to be prepared for the project if there is substantial evidence, in light of the entire record, that the project has the potential to substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, and/or substantially reduce the number or restrict the range of an endangered, rare, or threatened species.

CEQA Guidelines Section 15380 defines the terms “species”, “endangered”, “rare”, and “threatened” as they pertain to CEQA. Section 15380 also provides a greater level of consideration for state-listed or federally listed species, and for any species that can be shown to meet the criteria for listing, but that has not yet been listed. In summary, the criteria for considering a species endangered, rare, or threatened under CEQA are as follows:

- when its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors; or
- although not presently threatened with extinction, the species is existing in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens; or
- the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and may be considered “threatened” as defined in the ESA.

Species that meet the criteria listed above are often considered “Species of Special Concern” by CDFW. Species of Special Concern is an administrative designation and carries no formal legal status. Generally, Species of Special Concern should be included in an analysis of project impacts if they can be shown to meet the criteria of sensitivity outlined in Section 15380 of the CEQA Guidelines; however, some older lists of Species of Special Concern were not developed using criteria relevant to CEQA, and the information used in generating those lists is out of date. Therefore, the current circumstances of each unlisted Species of Special Concern must be considered in the context of Section 15380 criteria and not automatically presumed to be rare, threatened, or endangered.

California Fish and Game Code

Sections 700 and Others—Species Protection

The Fish and Game Code established CDFW (Fish & Game Code Section 700) and states that the fish and wildlife resources of the state are held in trust for the people of the state by and through CDFW (Fish & Game Code Section 711.7[a]). Fish & Game Code Section 1802 states that CDFW has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. All licenses, permits, tag reservations, and other entitlements for the take of fish and game authorized by the Fish and Game Code are prepared and issued by CDFW (Fish & Game Code Section 1050[a]). Provisions of the Fish and Game Code establish special protection to certain enumerated species, such as Section 5515, which lists fully protected fish species.

Section 1602—Lake or Streambed Alteration

Fish & Game Code Section 1602 states that "an entity may not substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake" unless CDFW receives written notification regarding the activity and the entity pays the applicable fee. If CDFW determines that the activity may substantially adversely affect an existing fish or wildlife resource, an agreement is issued to the entity that includes reasonable measures necessary to protect the resource.

Sections 1900–1913 (Native Plant Protection Act)

The Native Plant Protection Act (NPPA) of 1977 (California Fish & Game Code Sections 1900–1913) directs CDFW to carry out the California State Legislature's intent to "preserve, protect and enhance rare and endangered plants in this state." NPPA authorizes CDFW to designate plants as endangered or rare and prohibits take of any such plants, except as authorized in limited circumstances.

CDFW and the California Native Plant Society (CNPS), a non-governmental organization, jointly maintain CRPR lists. These lists include plant species of concern in California. Vascular plants included on these lists are defined as follows:

List 1A: Plants considered extinct or extirpated in California.

List 1B: Plants that are rare, threatened, or endangered in California and elsewhere.

List 2: Plants that are rare, threatened, or endangered in California, but more common elsewhere.

List 3: Plants about which more information is needed—review list.

List 4: Plants of limited distribution—watch list.

Plants appearing on Lists 1 and 2 are, in general, considered to meet CEQA Guidelines Section 15380(b) criteria (see Chapter 6, *Biological Resources – Aquatic*), and adverse effects to these species may be considered significant. Impacts to plants that are on Lists 3 and 4 are also considered during CEQA review, although because these species are typically not as rare as those on Lists 1 and 2, impacts on them are less frequently considered potentially significant.

Sections 2050-2098 (California Endangered Species Act)

The CESA (Fish & Game Code Sections 2050–2098) prohibits State agencies from approving a project that would jeopardize the continued existence of a species listed under the CESA as endangered or threatened, or would result in the destruction or adverse modification of habitat essential to the continued existence of those species, if reasonable and prudent alternatives are available that would avoid a jeopardy finding.

Section 2080 of the Fish & Game Code prohibits the take of any species that is state listed as endangered or threatened, or designated as a candidate for such listing. "take" is defined by Section 86 of the Fish and Game Code as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" an individual of a listed species. Under the CESA, CDFW may issue an incidental take permit authorizing the take of listed and candidate species that is incidental to an otherwise lawful activity, subject to specified conditions.

Sections 3503, 3513, and 3800 (Nesting Bird Protections)

Fish & Game Code Sections 3503, 3513, and 3800 protect native and migratory birds, including their active or inactive nests and eggs, from all forms of take. Section 3503 states the following: "It is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto." Section 3503.3 specifically protects raptors (i.e., eagles, falcons, hawks, and owls) (i.e., birds in the orders Falconiformes or Strigiformes) and their nests. Section 3513 protects migratory birds, as it states the following: "It is unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the Migratory Treaty Act." Section 3800 of the California Fish and Game Code protects from take all birds occurring naturally in California that are not resident game birds, migratory game birds, or fully protected birds or nongame birds, except when take is related to mining operations, and when a mitigation plan has been prepared and approved by CDFW.

Sections 3511, 4700, 5050, and 5515 (Fully Protected Species)

Sections 3511, 4700, 5050, and 5515 of the Fish & Game Code identify species that are fully protected from all forms of take. Section 3511 lists fully protected birds, Section 5515 lists fully protected fish, Section 4700 lists fully protected mammals, and Section 5050 lists fully protected amphibians.

Porter–Cologne Water Quality Control Act

See Chapter 12, Hydrology and Water Quality.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMITS

See Chapter 12, Hydrology and Water Quality.

7.2.3 Regional and Local Laws, Regulations, and Policies

Delta Protection Act

The 1992 Delta Protection Act created the Delta Protection Commission and declared that "the Sacramento–San Joaquin Delta is a natural resource of statewide, national, and international significance, containing irreplaceable resources, and 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 (Pub. Res. Code Section 29701)." The Delta Protection Act further required the Delta Protection Commission to prepare and adopt a comprehensive, long-term resource management plan for land uses within the primary zone of the Delta (Pub. Res. Code Section 29760). Requirements for the resource management plan outlined in the Delta Protection Act related to biological resources include the following: (6) preserve and protect riparian and wetlands habitat, and promote and encourage a net increase in both the acreage and values of those resources on public lands and through voluntary cooperative arrangements with private property owners; and (12) protect the Delta from any development that results in any significant loss of habitat or agricultural land.

Consistent with the requirements of the Delta Protection Act, the Natural Resources element of the Delta Protection Commission's Land Use and Resource Management Plan (2010) contains the following goals and policies related to biological resources:

Goal Preserve and protect the natural resources of the Delta. Promote protection of remnants of riparian and aquatic habitat. Encourage compatibility between agricultural practices and wildlife habitat.

Policy P-1 Preserve and protect the natural resources of the Delta. Promote protection of remnants of riparian and aquatic habitat. Encourage compatibility between agricultural practices, recreational uses and wildlife habitat.

Policy P-7 Incorporate, to the maximum extent feasible, suitable and appropriate wildlife protection, restoration and enhancement on publicly-owned land as part of a Delta-wide plan for habitat management.

Policy P-8 Promote ecological, recreational, and agricultural tourism in order to preserve the cultural values and economic vitality that reflect the history, natural heritage and human resources of the Delta including the establishment of National Heritage Area designations.

City of Rio Vista Army Base District Design Guidelines

The City of Rio Vista's ABD zoning standards and design guidelines are intended to guide development at the former Rio Vista Army Reserve Center (MIG 2011). ABD Standards and

Design Guidelines apply to all new public and private development on the site. The River Access, Edge Treatment, and Setbacks and Landscape and Site Design sections of the ABD Standards and Design Guidelines contain standards and guidelines most closely related to terrestrial biological resources. These include balancing the needs of wildlife and public river access, preserving existing healthy trees, avoiding impacts on riparian habitat, and considering wildlife habitat value when selecting plantings (MIG 2011).

City of Rio Vista General Plan

The City of Rio Vista General Plan (2002) describes goals and policies for land use and development within the city. The Resource Conservation and Management Element addresses natural resources, including vegetation and wildlife, and outlines goals for preservation and enhancement of such resources. Goals and policies contained within the City's general plan related to terrestrial biological resources and the Proposed Project include the following.

Goal 10.1 To preserve, protect, and enhance an interconnected system of significant open space areas, including sensitive local resource areas.

Policy 10.1.A The City shall ensure that the development process respects the unique characteristics and functions of Sensitive Local Resource Areas (SLRAs). The preferred treatment is first, avoidance of disturbance; second, on-site restoration; third, in-kind restoration; then, other approaches or mitigation.

Policy 10.1.B The City shall encourage landowners and developers to preserve the integrity of existing terrain and natural vegetation in visually sensitive areas, such as hillsides and ridges, and along important transportation corridors.

Policy 10.1.C The City shall require that new development be designed and constructed to preserve the following types of areas and features as open space to the maximum extent feasible:

- High erosion hazard areas
- Scenic and trail corridors
- Streams and riparian vegetation
- Wetlands
- Drainage corridors
- Other significant stands of vegetation
- Wildlife corridors
- Key hilltops
- Views of the Sacramento River
- Any areas of federal, state or local significance

- Sensitive Local Resource Areas

Policy 10.1.E The City shall require developers to use native and compatible non-native species, especially drought-resistant species, to the extent possible in fulfilling landscaping and natural habitat mitigation requirements.

Policy 10.1.F The City shall require that significant natural habitat areas be identified in advance of development and incorporated into site-specific development project design.

Policy 10.1.G The City shall ensure that development constructs linkages between natural habitat preservation areas.

Policy 10.1.H The City shall ensure that development identifies alternative sites for linkages where sensitive habitat areas may be adversely affected.

Goal 10.3 To preserve and protect the Sacramento River Delta as an important land resource for agriculture and wildflower habitat.

Policy 10.3.A The City shall ensure that agricultural operations, natural resource protection, water-related recreation, and public facility uses shall remain the only allowable uses in the Delta Primary Zone.

Goal 10.4 To preserve and protect biological resources for their wildlife habitat, aesthetic, and recreational values.

Policy 10.4.A The City shall require that development projects be designed to protect and enhance the area's biological resources to the greatest extent feasible.

Policy 10.4.B The City shall encourage landowners and developers to preserve the integrity of existing terrain and natural vegetation in sensitive areas.

Policy 10.4.C The City shall encourage the use of native and compatible non-native species—especially drought-resistant ones—in fulfilling landscaping requirements imposed as conditions of discretionary permits or for project mitigation.

Policy 10.4.D The City shall require new development to mitigate wetland loss in both regulated and non-regulated wetlands to achieve "no net loss" through any combination of the following, in descending order of their desirability: (1) avoidance; (2) where avoidance is not possible, minimization of impacts on the resource; or (3) compensation that provides the opportunity to mitigate impacts on rare, threatened, and endangered species or the habitat that supports these species in wetland and riparian areas.

Policy 10.4.E The City shall require new private or public developments to preserve and enhance existing native riparian habitat, unless public safety concerns require removal of habitat for flood control or other public purposes.

Policy 10.4.F The City shall discourage direct runoff of pollutants and siltation into wetland areas from outfalls serving nearby urban development, so that pollutants and siltation will not adversely affect the value or function of wetlands.

City of Stockton General Plan

The City of Stockton 2035 General Plan (2007) sets goals and policies to guide land use and development decisions in the city. Natural & Cultural Resources Element addresses biological resources and strives to "protect and enhance the natural and cultural resources that make the City of Stockton unique" (City of Stockton 2007). Goals and policies in the City of Stockton's general plan related to biological resources and the Proposed Project include the following:

Goal NCR-1 To protect, restore, and maintain natural and cultural resources in Stockton.

Policy NCR-1.1 *Protect Natural Resources.* The City shall strive to protect natural resource areas, fish and wildlife habitat, scenic areas, open space areas, agricultural lands, parks, and other cultural/historic resources (including Oak trees) from encroachment or destruction by incompatible development.

Goal NCR-2 To preserve and protect sensitive habitats and species in the Planning Area and the Sacramento–San Joaquin Delta.

Policy NCR-2.1 *Protect Sensitive Habitats.* The City shall support preservation, restoration, and enhancement of habitats of State or Federally-listed rare, threatened, endangered and/or other sensitive and special status species.

Policy NCR-2.2 *Management of Wetlands.* The City shall support the management of wetland and riparian plant communities for passive recreation, groundwater recharge, and wildlife habitats. Where possible and appropriate, such communities shall be restored or expanded.

Policy NCR-2.3 *Management of Sensitive Habitats.* The City shall favor sensitive habitat protection and enhancement of contiguous areas over small-segmented remainder parcels.

Policy NCR-2.4 *Impacts to Sensitive Habitats.* The City shall consider the loss of sensitive habitats due to development to be a significant environmental impact. All development that is proposed to disturb or remove sensitive habitat shall demonstrate mitigation for this loss.

Policy NCR-2.5 *SJCOG Multi-Species Habitat Conservation and Open Space Plan.* The City shall continue to coordinate with the San Joaquin Council of

Governments and comply with the terms of the Multi-Species Habitat Conservation and Open Space Plan to protect critical habitat areas that support endangered species and other special status species.

Policy NCR-2.6 *New Development in Sensitive Areas.* The City shall require careful planning of new development in areas that are known to have particular value for biological resources to maintain sensitive vegetation and wildlife habitat.

Policy NCR-2.7 *Development Review.* The City shall review development proposals against the California Natural Diversity Database (CNDDB) to assist in identifying potential conflicts with sensitive habitats or special status species.

Policy NCR-2.8 *Development Review.* The City shall review development proposals in accordance with applicable Federal, State, and local statues protecting special-status species and jurisdictional wetlands.

Policy NCR-2.9 *Appropriate Mitigation Measures.* The City, in its lead agency role, shall take into consideration mitigation standards and policies of resource and regulatory agencies with jurisdiction over biological resources (e.g., USFWS, CDFG, etc.).

Policy NCR-2.10 *Wetland Resources.* The City shall require that a wetland delineation be prepared using the protocol defined by the U.S. Army Corps of Engineers. On development sites with the potential to contain wetland resources, a report on the findings of this survey shall be submitted to the City as part of the application process.

Policy NCR-2.11 *Maintain Biological Resource Database.* The City shall maintain a current database of biological resources, including maps that identify the locations of specific environmentally-sensitive habitats and lists of special-status species.

Policy NCR-2.12 *Requirements for Biological Studies.* On sites that have the potential to contain critical or sensitive habitats or special-species or are within 100 feet of such areas, the City shall require the project applicant to have the site surveyed by a qualified biologist. A report on the findings of this survey shall be submitted to the City as part of the application process.

Policy NCR-2.13 *Encourage Planting of Native Vegetation.* The City shall encourage the planting of native trees, shrubs, and grasslands in order to preserve the visual integrity of the landscape, provide habitat conditions suitable for native vegetation, and ensure the maximum number and variety of well-adapted plants are maintained.

Policy NCR-2.14 *Protect Delta Habitats.* The City shall approve only those activities in the Delta and related waterways that are consistent with the sensitive environmental characteristics of these areas.

Policy NCR-2.16 *Fisheries and Riparian Habitat.* The City shall protect the fisheries and riparian habitat of the Delta and waterways from damage caused by the operation of marinas or the Port of Stockton.

Policy NCR-2.17 *Development within the Primary Zone of the Delta.* The City shall ensure that future changes to the City's General Plan and Development Code for lands in the city located within the Primary Zone of the Delta, as defined by the Delta Protection Act of 1992, be consistent with the goals of, and comply with, the Land Use and Resources Management Plan for the Primary Zone of the Delta adopted pursuant to Section 29763.5 of the Delta Protection Act of 1992.

Policy NCR-2.19 *Interim SJMSCP Compliance for Biological Resources.* Until a Major Amendment to the existing San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP) is adopted to incorporate all areas of the City's proposed Sphere of Influence into the SJMSCP coverage area, the City shall use the requirements of the SJMSCP to ensure effective protection of natural resources and compliance with applicable Federal, State, and City policies and regulations. This process is intended to mirror exactly, the existing SJMSCP requirements for all areas proposed to be included within the City of Stockton SOI, but not currently located in the SJMSCP coverage area. For impacts on biological resources outside the SJMSCP's current coverage area, the City shall require mitigation of these impacts in a manner fully consistent with the current SJMSCP requirements. These requirements would include: 1) the collection of fees (to be used for the acquisition of habitat preserves) equivalent to those specified in the current SJMSCP; 2) the imposition of SJMSCP Incidental Take Minimization Measures, and 3) consultation with resource agencies regarding incidental take coverage.

Habitat Conservation Plans

Habitat Conservation Plans (HCPs) are established in coordination with USFWS and/or NMFS by non-federal entities undertaking projects that might result in the destruction of an endangered or threatened species. HCPs are planning documents to ensure that the anticipated take of a listed species will be minimized or mitigated by conserving the habitat upon which the species depend, thereby contributing to the recovery of the species as a whole. Once adopted, HCPs are applicable to plan signatories for the activities listed in a plan (referred to as "covered activities").

BAY DELTA CONSERVATION PLAN/CALIFORNIA WATER FIX

The proposed Bay Delta Conservation Plan (BDCP) public draft EIR/EIS was released for public comment in December 2013. A Partially Recirculated Draft EIR/Supplemental Draft EIS was released in July 2015, which includes an expanded project alternatives analysis to include the California Water Fix (Alternative 4A).

The BDCP and other HCP/NCCP Alternatives aim to restore and protect threatened and endangered species while also securing water supply, and water quality within a stable regulatory framework. BDCP is a collaboration between public water agencies, state and federal fish and wildlife agencies, non-government organizations, agricultural interests, local governments, and the public. BDCP would support the issuance of permits authorizing incidental take of protected species covered under ESA Section 10 and CESA Section 2835. The California Water Fix is focused on new conveyance and a permitting process under the federal ESA Section 7 consultation and CDFW 2081(b) permit. The Proposed Project is within the boundaries of the draft BDCP Alternatives but is not a covered activity under the proposed BDCP or California Water Fix.

Solano County Multispecies Habitat Conservation Plan

The U.S. Bureau of Reclamation and six cities (Vacaville, Fairfield, Vallejo, Rio Vista, Dixon, and Suisun City), five water supply/irrigation districts, and three special districts, have partnered in the development of the Solano Multi-Species Habitat Conservation Plan (Solano HCP). The Solano HCP encompasses over 585,000 acres of diverse habitats types throughout Solano County and a small portion of Yolo County. The proposed Solano HCP would provide incidental take coverage for 37 plant and animal species, in accordance with ESA Section 10(a)(1)(B) and/or CESA Section 2081(b), during development and routine operations and maintenance activities of Solano HCP participants, which include the City of Rio Vista (Solano County Water Agency 2012). The Solano HCP aims to establish a diverse Reserve System for conservation of the covered species. The RVARC lies within the boundaries of the Solano HCP, and development of the site may qualify as a covered activity under the proposed Solano HCP.

PG&E San Joaquin Valley Operation & Maintenance Habitat Conservation Plan

The PG&E San Joaquin Valley Operation & Maintenance Habitat Conservation Plan (PG&E O&M HCP) (PG&E 2006) covers specific PG&E activities throughout nine counties in the San Joaquin Valley. PG&E O&M HCP complies with the ESA and CESA and addresses multiple species and critical habitats. PG&E O&M HCP outlines steps to minimize, avoid, and compensate for possible direct, indirect, and cumulative adverse effects on threatened and endangered species that could result from PG&E operations and maintenance activities in the San Joaquin Valley. The Ryde Avenue site lies within PG&E O&M HCP boundaries, but is not a covered activity under this HCP.

San Joaquin County Multi-Species Habitat Conservation and Open Space Plan

To balance the expanding population and development of San Joaquin County and the diminishing acreage of natural open spaces, the County created the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP). SJMSCP complies with the ESA and CESA regulations covering 97 plant and animal species within 52 different habitat types throughout the county (San Joaquin County 2000). The SJMSCP provides compensation for the conversion of open space to non-open space uses which affect the plant, fish and wildlife species covered by the Plan. Types of activities covered under SJMSCP include mining, urban development, managing preserves, utility installation, maintenance activities, transportation projects, school expansions, new parks and trails, non-federal flood control projects, expansion of existing urban boundaries, non-agricultural activities occurring outside of urban boundaries, levee maintenance undertaken by the San Joaquin Area Flood Control Agency, maintenance of existing facilities for non-federal irrigation district projects, and similar public agency projects. Participation in the plan is voluntary. The SJMSCP is valid through 2051.

7.3 Environmental Impacts

7.3.1 Methods of Analysis

The Proposed Project would have an impact on biological resources if it resulted in the direct or indirect disturbance, modification, or destruction of habitat, caused death, injury, or harassment of individuals or populations of plant or animal species, or impeded or prevented the dispersal of individuals or populations of special-status species. Potential impacts on existing biological resources were evaluated by comparing the quantity and quality of habitats present in the study area under baseline conditions against anticipated conditions during and after implementation of the activities to be conducted under the Proposed Project. Direct and indirect impacts on special-status species were assessed based on the potential for the species or their habitat to be disturbed (or enhanced) by implementation of the Proposed Project.

Significance Criteria

An alternative would have a significant impact if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW or USFWS;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW or USFWS;
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the CWA (including, but not limited to, marsh, vernal pool, and coastal) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- Conflict with the provisions of an adopted HCP, or other approved local, regional, or state HCP.

7.3.2 Environmental Impacts and Mitigation Measures

Impact BIO-1: Effects on Special-Status Plants.

Construction of the Proposed Project would involve vegetation clearing, excavation, and grading that could result in a direct impact on special-status plant species or their habitat. Operations of the Proposed Project are unlikely to result in surface disturbances to any special-status species or related habitats, and would not have a significant adverse impact on special-status plants.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

This alternative would not involve any ground disturbance that could result in a potential impact on special-status plants. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Table 7-1 lists the special-status plants known to occur in the vicinity of the RVARC study area, and Figure 7-3 shows the CNDDB occurrences of special-status plants within a 5-mile radius of the study area. Tidal freshwater marsh and riparian habitat along the Sacramento River provide suitable habitat for some special-status plants (Table 7-1). Upland portions of the RVARC study area are unlikely to support special-status plant species.

Construction of the marina and boat launch for the ERS under Alternative 2 has the potential to affect known occurrences of Delta tule pea and Suisun Marsh aster (Figures 3-1 and 7-1), as well as several other special-status plants that are considered to be potentially present in the freshwater tidal marsh or riparian areas along the shoreline of the RVARC study area (Table 7-1). Construction of the raw water intake and outfall and other facilities associated with the FTC also has the potential to impact Delta tule pea, Suisun Marsh aster, and other special-status plants with the potential to be present in the freshwater tidal marsh or riparian areas along the shoreline of the RVARC study area (Figure 3-1, Figure 7-1, and Table 7-1). The direct impact on these plant species is considered potentially significant. The impact on suitable habitat for these special-status plant species is addressed in Impact BIO-7.

Several mitigation measures are proposed to avoid, reduce, or compensate for direct impacts on special-status plant species. Implementation of **Mitigation Measure BIO-1a (Design Project to Avoid or Minimize Impacts on Special-Status Plants)** would avoid or minimize disturbance to known occurrences of special-status plants (Figure 7-1), to the extent feasible. Within one year of the start of ground-disturbing activities, **Mitigation Measure BIO-1b (Perform Focused Surveys for Special-Status Plants)** would be implemented to identify the extent to which special-status plants are present and could be adversely affected by the Proposed Project. Mitigation Measure BIO-1b is necessary since the presence of special-status plants could change between the time reconnaissance surveys were conducted in 2014 and construction commences. **Mitigation Measure BIO-1c (Avoid or Minimize Impacts on Special-Status Plant Species during Construction)** would require monitoring to confirm avoidance or minimization of impacts to identified special-status plant populations. Finally, **Mitigation Measure BIO-1d (Compensate for**

Impacts on Special-Status Plant Species) would be implemented to provide compensatory mitigation should special-status plants be adversely affected.

With implementation of these mitigation measures, the impact on special-status plants would be **less than significant with mitigation**.

Mitigation Measure BIO-1a: Design Project to Avoid or Minimize Impacts on Known Occurrences of Special-Status Plants (Alternatives 2, 3, and 4)

To the extent feasible, the Proposed Project shall avoid or minimize impacts on known occurrences of the Delta tule pea and Suisun Marsh aster (as shown on Figure 7-1 of this EIR/EIS). Avoidance and minimization measures may include adjustments of the project design to avoid special-status plants or protection of substrate (e.g., soil, piers) that supports existing occurrences of special-status plants.

Mitigation Measure BIO-1b: Perform Focused Surveys for Special-Status Plants (Alternatives 2, 3, and 4)

Within 1 year before commencement of ground-disturbing activities, a qualified botanist shall perform surveys for special-status plant species with the potential to occur at the site. Floristic surveys will be performed according to the *Protocols for Surveying and Evaluating Impacts to Specials Status Native Plant Populations and Natural Communities* (CDFG 2009 or current version). Floristic surveys will be performed during the appropriate bloom period(s) for each species. If special-status plants are detected within the construction zone or within a 100-foot radius of the construction zone, Mitigation Measure BIO-1c shall be implemented.

Mitigation Measure BIO-1c: Avoid or Minimize Impacts on Special-Status Plant Species during Construction (Alternatives 2, 3, and 4)

If special-status plants are detected within the construction zone or within a 100-foot radius of the construction zone while implementing Mitigation Measure BIO-1b, DWR, USFWS, or the contractor(s) shall install exclusion fencing to protect plants that remain in place. Locations of special-status plant populations shall be clearly identified in the field by staking, flagging, or fencing. The plants shall be monitored throughout the duration of construction to determine whether the project has resulted in adverse effects (direct or indirect), as determined by a qualified botanist. If the botanist determines that special-status plants may have been adversely affected, DWR and USFWS shall implement measures to compensate for the impact as described in Mitigation Measure BIO-1d.

Mitigation Measure BIO-1d: Compensate for Impacts to Special-Status Plant Species (Alternatives 2, 3, and 4)

If avoidance of special-status plants is not feasible, DWR and USFWS shall implement measures to compensate for impacts on special-status plants. Compensation may be provided by purchasing credits at an approved mitigation bank (provided at a minimum 1:1 ratio [mitigation to impact]), or through transplanting perennial species, collecting and dispersing seed of annual species, and other conservation strategies that shall restore and protect the viability of the local population. Because of the differences in plant growth forms and life histories, conservation measures would be developed on a species-specific basis. If compensation measures are implemented, monitoring plant populations shall be conducted annually for 5 years to assess the mitigation's effectiveness. Monitoring shall assess vegetative density, population size, natural recruitment, and plant health and vigor. Monitoring results may trigger management actions such as collection and sowing of additional seed, tillage/disturbance within existing populations to induce establishment, installation of container plants, and control of other competing vegetation to ensure successful plant establishment and survival. The determination of success will be based on whether there has been a substantial reduction (> 20 percent) in the size or abundance of the population compared to baseline conditions. The site shall be evaluated at the end of the 5-year monitoring period to determine whether the mitigation has met the success criteria.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Construction of the entrance to the inland marina under this alternative would impact known occurrences of Delta tule pea and Suisun Marsh aster. These species are concentrated in the northeastern portion of the study area around the existing marine railway where the marina entrance is proposed (Figures 3-2 and 7-1). Several other special-status plants are potentially present along the shoreline of the RVARC study area (Table 7-1), and could be affected by construction of other ERS facilities in these locations. Construction of the raw water intake and outfall and other FTC facilities along the shoreline has the potential to impact Delta tule pea, Suisun Marsh aster, and other special-status plants with the potential to be present in the freshwater tidal marsh or riparian areas along the shoreline of the RVARC study area (Figure 3-2, Figure 7-1, and Table 7-1). The impact on these plant species is considered potentially significant. With implementation of Mitigation Measures BIO-1a through BIO-1d, impacts would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Construction of the entrance to the inland marina for the ERS, and the FTC raw water intake and outfall, has the potential to impact special-status plants that have the potential to be present along the shoreline of the Ryde Avenue study area (Table 7-2). The impact on these plant species is considered potentially significant. With implementation of Mitigation Measures BIO-1a through BIO-1d, this impact would be reduced to a level that is **less than significant with mitigation**.

Impact BIO-2: Effects on Western Pond Turtle.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

This alternative would not result in any construction activities that could impact the western pond turtle (WPT). There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Freshwater marsh and riverine habitat along the Sacramento River within the RVARC study area provide suitable habitat for WPT. Potentially suitable nesting habitat for WPT at the site consists of the undisturbed upland areas with sparse or herbaceous vegetation cover. Construction of the ERS marina and boat launch and the FTC raw water intake, outfall, sedimentation basin, and potentially some of the aquaculture buildings, have the potential to impact WPT and its habitat. Complete avoidance of WPT habitat is not considered feasible, and a direct impact on this species is considered potentially significant. **Mitigation Measure BIO-2 (Avoid or Minimize Impacts on Western Pond Turtle)** would minimize the potential impact on WPT to a level that is **less than significant with mitigation**.

Mitigation Measure BIO-2: Avoid or Minimize Impacts on Western Pond Turtle (Alternatives 2 and 3)

Preconstruction surveys for WPT shall be conducted by a qualified biologist 14 days before and 24 hours before the start of construction activities where suitable habitat exists (i.e., riparian areas, freshwater emergent wetlands, and adjacent undisturbed uplands). If WPTs or their nests are observed during preconstruction surveys, the following measures shall be implemented.

WPTs found within the construction area will be allowed to leave on their own volition or will be relocated by the qualified biologist out of harm's way to suitable habitat immediately upstream or downstream of the project site. If turtles are moved, the qualified biologist shall possess a valid memorandum of understanding from CDFW authorizing the capture and relocation of turtles.

WPT eggs are laid from March to August depending on local conditions (for this site, most likely May to July). The incubation period for eggs varies; for eggs maintained in the laboratory at 30° C, it has ranged from 73 to 80 days (Feldman 1982). If a WPT nest is identified in the work area during preconstruction surveys, a 300-foot no-disturbance buffer shall be established between the nest and any areas of potential disturbance. Buffers will be clearly marked with temporary fencing. Construction will not be allowed to commence in the exclusion area until hatchlings have emerged from the nest or the nest is deemed inactive by a qualified biologist.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Construction of the marina entrance for the ERS, and the FTC's intake and outfall, sedimentation basin, and potentially some of the aquaculture buildings, has the potential to impact WPT and its habitat. A direct impact on WPT is considered potentially significant. With implementation of Mitigation Measure BIO-2, this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

The shoreline in the Ryde Avenue study area is steep, armored with riprap, and generally lacks basking sites for WPT. Upland areas are heavily compacted soils that not suitable for WPT nesting sites. The overall habitat conditions in this portion of the San Joaquin

River/DWSC make it unlikely that this species would occur in the study area; therefore, this alternative would have **no impact** on WPT.

Impact BIO-3: Effects on Burrowing Owl.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

This alternative would not result any construction activities that could potentially impact Burrowing Owl (*Athene cunicularia*) or its habitat. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

The RVARC study area provides marginally suitable habitat for Burrowing Owls. The site supports ruderal/developed with tall, weedy vegetation that is not favored by Burrowing Owls. They generally prefer to inhabit open areas and grasslands with low-growing or grazed vegetation. Although some burrows were observed in the RVARC study area, no evidence of use by Burrowing Owls (e.g., whitewash, feathers) was observed; however, there is the potential for this species to occupy the site or individuals to occur as transients.

If Burrowing Owls were to occupy the site, construction of DRS facilities could disturb them through noise, visual distraction, or a direct impact on occupied habitat. Such impact could affect reproduction or fitness of individuals. This impact would be considered potentially significant.

Mitigation Measure BIO-3 (Avoid or Minimize Impacts on Burrowing Owls) would be implemented to avoid the impact on this species, to the extent feasible. Where disturbance is unavoidable, the impact on burrowing owls would be minimized by establishing buffers around active burrows. If active burrows cannot be avoided, passive relocation techniques could be used. If the owls are relocated, compensation would be provided to offset the impact. With implementation of this mitigation measure, the impact would be reduced to a level that is **less than significant with mitigation**.

Mitigation Measure BIO-3: Avoid or Minimize Impacts on Burrowing Owls (Alternatives 2, 3, and 4)

Before initiating ground-disturbing activities, surveys for Burrowing Owls shall be conducted in accordance with protocols established in the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012 or current version). If ground-disturbing activities are delayed or suspended for more than 30 days after the preconstruction surveys, the site shall be resurveyed. If Burrowing Owls are detected, disturbance to burrows shall be avoided during the nesting season (February 1 through August 31). Buffers shall be established around occupied burrows in accordance with guidance provided in the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012). Buffers around occupied burrows shall be a minimum of 656 feet (200 meters) during the breeding season, and 160 feet (100 meters) during the non-breeding season.

Outside of the nesting season (February 1 through August 31), passive owl relocation techniques may be implemented. Owls would be excluded from burrows within 160 feet of construction by installing one-way doors in burrow entrances.

The work area shall be monitored daily for 1 week to confirm owl departure from burrows before any ground-disturbing activities. Where feasible, burrows would be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe would be inserted into the tunnels during excavation to maintain an escape route for any animals inside the burrow.

If occupied burrows cannot be avoided during the non-breeding season, DWR and USFWS shall enhance or create burrows in adjacent habitat within the dispersal range of the owls at a 1:1 ratio (burrows destroyed to burrows enhanced or created), 1 week before implementation of passive relocation techniques. If Burrowing Owl habitat is enhanced or created, DWR and USFWS shall develop and implement a monitoring and management plan to assess the effectiveness of the mitigation. The plan shall be subject to the approval of CDFW.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The potential impact from construction of DRS to Burrowing Owl would be similar to that described for Alternative 2. Refer to the discussion above for details. Implementation of Mitigation Measure BIO-3 would reduce the potential impact on Burrowing Owl to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

The Ryde Avenue site provides marginally suitable habitat for Burrowing Owl. One burrow of suitable size was observed in the study area, but no signs of this species were observed in the burrow. Ruderal portions of the study area support tall herbaceous vegetation, whereas Burrowing Owls prefer to inhabit short, open grasslands. To some extent, gravel areas with sparse vegetation provide a degree of openness on the site, and Burrowing Owls are opportunistic in their roosting and foraging behavior. Burrowing Owls may occasionally visit the site, but a population is unlikely to become established in the study area because of lack of burrows and heavily compacted soils. There are numerous CNDDB occurrences of this species within a 5-mile radius of the study area. The closest occurrence is approximately 1.5 miles east of the study area, west of McLeod Lake, and northeast of Interstate 5 in a vacant parking lot in central Stockton (Figure 7-6).

Potential impacts from construction of DRS on the Burrowing Owl would be similar to those described for Alternative 2. Refer to the discussion above for details. Implementation of Mitigation Measure BIO-3 would reduce potential impacts on Burrowing Owl to a level that is **less than significant with mitigation**.

Impact BIO-4: Effects on Special-Status Passerine Species and Species Protected under the Migratory Bird Treaty Act.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

This alternative would not result in any construction activities that could potentially impact special-status passerine bird species or species protected under the MBTA. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Table 7-1 lists the special-status bird species known to occur in the vicinity of the RVARC study area, and Figure 7-4 shows the CNDDB occurrences of special-status wildlife within a 5-mile radius of the study area. Tidal freshwater marsh and riparian habitat along the margins of the Sacramento River provide marginally suitable nesting habitat for Tricolored Blackbird and potentially suitable nesting habitat for Song Sparrow (Modesto population). According to the RVARC EA, Tricolored Blackbird has been observed in the study area (USACE 2000). No Tricolored Blackbirds were observed during a site visit conducted on April 28, 2015, which is close to the peak of the nesting season for this species.

Himalayan blackberry thickets and emergent vegetation along the shoreline of the site provide suitable nesting substrate for Tricolored Blackbirds; however, this species nests in large colonies (Beedy 2008), and because of the limited spatial extent of breeding and foraging habitats in the study area, Tricolored Blackbirds are unlikely to nest there. Upland portions of the RVARC study area are unlikely to support nesting of special-status passerines. Several bird species protected under the MBTA may nest within the RVARC study area.

Construction of the DRS facilities could disturb nesting passerines by generating noise, creating visual distractions, or having a direct impact on occupied nests (e.g., vegetation or structure removal). The impact from construction activities that disturb nesting of special-status passerines or birds protected under the MBTA would be considered potentially significant. Implementation of **Mitigation Measures BIO-4a (Avoid Impacts on Nesting Birds), BIO-4b (Implement Preconstruction Surveys and Minimization Measures for Special-Status Passerine Species),** and **BIO-4c (Implement Preconstruction Surveys for Birds Protected under the MBTA),** would reduce this impact to a level that is **less than significant with mitigation**.

Mitigation Measure BIO-4a: Avoid Impacts on Nesting Birds (Alternatives 2, 3, and 4)

Whenever possible, an impact on native nesting birds shall be avoided by not initiating Proposed Project activities that involve clearing vegetation, generating mechanical noise, or ground disturbance during the typical breeding season from February 1 to September 1.

Mitigation Measure BIO-4b: Implement Preconstruction Surveys and Minimization Measures for Special-Status Passerine Species (Alternatives 2 and 3)

If construction begins between February 1 and August 31, surveys for special-status birds shall be conducted within a 1,000-foot radius of the construction area. Surveys would focus on suitable nesting habitat for special-status passerines such as the Tricolored Blackbird and Song Sparrow (Modesto population). If nests are detected, buffers around nests shall be established that are sufficient to ensure that breeding is not likely to be disrupted or adversely affected by construction. No-disturbance buffers around active nests will be a minimum of 250 feet wide, unless a qualified biologist determines that smaller buffers would be sufficient to avoid impacts on nesting birds. Factors to be considered for determining buffer size will include: the presence of natural buffers provided by vegetation or topography, nest height, locations of foraging territory, and baseline levels of noise and human activity. Buffers will be maintained until a qualified biologist has determined that the young have fledged and are no longer reliant on the nest or parental care for survival.

Mitigation Measure BIO-4c: Implement Preconstruction Surveys for Birds Protected under the MBTA (Alternatives 2, 3, and 4)

If construction begins between February 1 and August 31, surveys for nesting birds shall be conducted within a 1,000-foot radius of the construction area. If active nests are detected, buffers around nests shall be established that are sufficient to ensure that breeding is not likely to be disrupted or adversely affected by construction. Buffers around active nests will be a minimum of 100 feet wide, unless a qualified biologist determines that smaller buffers would be sufficient to avoid any impact on nesting birds. Factors to be considered for determining buffer size will include: the presence of natural buffers provided by vegetation or topography, nest height, locations of foraging territory, and baseline levels of noise and human activity. Buffers will be maintained until the young have fledged or the nests become inactive.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The potential impact on special-status passerine species and birds protected under the MBTA would be similar to that described for Alternative 2. Implementation of Mitigation Measures BIO-4a through BIO-4c would avoid or reduce the potential impacts on special-status passerine species and birds protected under the MBTA to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Special-status passerines that breed in freshwater marsh or riparian vegetation, such as the Tricolored Blackbird and Song Sparrow, are unlikely to nest in the very sparse patches of freshwater marsh and riparian vegetation in the study area (Tables 7-1 and 7-2). Mature riparian trees along the margins of the property provide suitable nesting habitat for species protected under the MBTA.

Construction of the DRS facilities could disturb species protected under the MBTA by generating noise, creating visual distractions, or having a direct impact on occupied habitat. With implementation of Mitigation Measures BIO-4a and BIO-4c, this impact on special-status passerine species and birds protected under the MBTA would be reduced to a level that is **less than significant with mitigation**.

Impact BIO-5: Effects on Raptors, including Special-Status Raptor Species.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

This alternative would not involve any construction activities that could result in potential impacts on raptors. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Table 7-1 lists the special-status bird species known to occur in the vicinity of the RVARC study area, and Figure 7-4 shows the CNDDB occurrences of special-status wildlife within a 5-mile radius of the study area. Riparian habitat along the margins of the Sacramento River and mature trees within the RVARC study area provide potentially suitable nesting habitat for raptors such as Red-tailed Hawk, Red-shouldered Hawk, and Cooper's Hawk (*Accipiter cooperii*). Ospreys might nest on artificial structures in the study area, such as power poles. Special-status raptors such as Swainson's Hawk (*Buteo swainsoni*), Northern Harrier, and White-tailed Kite are not expected to nest in the RVARC study area, although these species may nest in adjacent lands and occasionally forage in the study area; however, the site provides low-quality foraging habitat for these species relative to preferred foraging areas such as grasslands, grain fields, and other open agricultural lands.

Construction of the DRS facilities could disturb nesting raptors by generating noise, creating visual distractions, or having a direct impact on occupied nests (e.g., tree removal). Impacts from construction activities that disturb nesting raptors would be considered potentially significant. With implementation of **Mitigation Measure BIO-5 (Avoidance and Minimization Measures for Nesting Raptors, including Swainson's Hawk and White-Tailed Kite),** which requires preconstruction surveys and establishment of buffers around nest sites, this impact would be reduced to a level that is **less than significant with mitigation**. Permanent loss of marginally suitable nesting and low-quality foraging habitat for special-status raptors such as Swainson's Hawk, Northern Harrier, and White-tailed Kite would be a less-than-significant impact.

Mitigation Measure BIO-5: Avoidance and Minimization Measures for Nesting Raptors, including Swainson's Hawk and White-Tailed Kite (Alternatives 2, 3, and 4)

If construction occurs between February 1 and August 31, surveys for nesting raptors, including Swainson's hawk and White-tailed Kite, shall be conducted in accordance with established raptor survey protocols (e.g., Swainson's Hawk Technical Advisory Committee 2000, or current guidance). Surveys will cover a minimum of a 0.5-mile radius around the construction area. If nesting raptors are detected, buffers shall be established around active nests that are sufficient to ensure that breeding is not likely to be disrupted or adversely affected by construction. Buffers around active raptor nests will be 0.5 mile for listed raptors and 500 feet for non-listed raptors, unless a qualified biologist determines that smaller buffers would be sufficient to avoid impacts on nesting raptors. Factors to be considered for determining buffer size will include: the presence of natural buffers provided by vegetation or topography, nest height, locations of foraging territory, and baseline levels of noise and human activity. Buffers will be maintained until a qualified biologist has determined that the young have fledged and are no longer reliant on the nest or parental care for survival.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The potential impacts from construction of the DRS on nesting raptors would be similar to that described for Alternative 2. Refer to the discussion above for details. Implementation of Mitigation Measure BIO-5 would reduce the potential impacts on raptors, including special-status species, to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Mature trees around the periphery of the Ryde Avenue study area provide potentially suitable nesting habitat for raptors such as Red-tailed Hawk and Red-shouldered Hawk. Osprey may nest on power towers in the study area. Special-status raptors, such as Swainson's Hawk and White-tailed Kite, are not expected to nest in the Ryde Avenue study area, but these species may nest within a relatively close proximity and occasionally forage in the study area; however, the site provides low-quality foraging habitat for these species relative to preferred foraging areas, such as grasslands, grain fields, and other open agricultural lands.

The potential impacts from construction of the DRS on nesting raptors would be similar to that described for Alternative 2. Refer to the discussion above for details. Implementation of Mitigation Measure BIO-5 would reduce the impact on raptors, including special-status species, to a level that is **less than significant with mitigation**.

Impact BIO-6: Effects on Bats, including Special-Status Species.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

This alternative would not involve any construction activities that could result in potential impacts on special-status bats. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Construction of the DRS facilities could remove trees that provide suitable roosting habitat for western red bat and non-special-status hoary bats, and buildings that provide possible day and/or night roosts for Townsend's big-eared bat, potentially pallid bat, as well as Brazilian free-tailed bat and Yuma myotis. Impacts from the removal of occupied roost trees or structures would be considered potentially significant. If Proposed Project activities involve removal of such habitat, **Mitigation Measures BIO-6a (Conduct Focused Surveys for Townsend's Big-eared Bats), BIO-6b (Avoid and Minimize Impacts to Bats Roosting in Structures)**, **BIO-6c (Avoid Direct Mortality of Bats Roosting in Trees), and BIO-6d (Replace Bat Special-Status Bat Roost Sites),** which require focused surveys, avoidance and minimization of disturbance, and replacement of roosting habitat, would be required, and would reduce this impact to a level that is **less than significant with mitigation**.

Mitigation Measure BIO-6a: Conduct Focused Surveys for Townsend's Big-eared Bats (Alternatives 2 and 3)

Focused surveys for Townsend's big-eared bats shall be conducted by a qualified bat biologist as determined by CDFW. Surveys shall be conducted between May 1 and July 15 to maximize detection of the species during maternity season. Surveys shall consist of one or more of the following: night roost surveys using night vision equipment and/or infrared sensitive optical or video equipment, and/or night emergence surveys of buildings, using night vision equipment and/or infrared sensitive optical or video equipment and bioacoustic detectors (bat detectors), which shall be deployed to maximize detection at building roosts during emergence, minimize roost disturbance, and minimize detection from other buildings or surrounding areas.

Mitigation Measure BIO-6b: Avoid and Minimize Impacts to Bats Roosting in Structures (Alternatives 2 and 3)

All occupied bat roost sites shall be avoided to the greatest extent feasible. If roosts must be removed, demolition of structures shall be preceded by either humane eviction, phased dismantling, and/or deterrent methods to prevent direct mortality of non-volant (not able to fly) young during maternity season, or adults and juveniles during winter months when in torpor. Humane bat eviction and/or partial dismantling of occupied buildings shall be conducted during seasonal periods of bat activity, which are in this region, between March 1 (or after evening temperatures rise above 45ºF and/or no more than ½ inch of rainfall within 24 hours occurs), and April 15, or between August 31 and October 15 (or before evening temperatures fall below 45ºF and/or more than ½ inch of rainfall within 24 hours occurs).

Six months prior to building demolition, a plan detailing methods and specifications for partial dismantling and/or deterrent measures for each building shall be developed by a qualified bat biologist and submitted to CDFW for approval.

Mitigation Measure BIO-6c: Avoid Direct Mortality of Bats Roosting in Trees (Alternatives 2, 3, and 4)

The following measures shall be implemented to minimize impacts on individual colonial bats using trees for temporary roosts, and obligate tree bats, such as western red bat and hoary bats:

- To avoid the bat maternity season and winter torpor period, tree removal shall occur between March 1 and April 15 or between August 31 and October 15 unless a focused survey conducted by a qualified bat biologist determines that no bats are present in tree(s) to be removed.
- A two-stage tree removal process over two consecutive days shall be implemented for trees that may support colonial roosts (i.e., trees with cavities, crevices, or exfoliating bark) unless a focused survey conducted by a qualified bat biologist determines that no bats are present in tree(s) to be removed. The two-stage tree removal process is as follows:

- Step 1: small branches and small limbs containing no cavity, crevice or exfoliating bark are removed with chainsaws under field supervision by a qualified bat.
- Step 2: the remainder of the tree is to be removed the following day. The disturbance caused by chainsaw noise and vibration, coupled with the physical alteration, has the effect of causing colonial bat species to abandon the roost tree after nightly emergence for foraging. Removing the tree the next day prevents re-habituation and re-occupation of the altered tree.

Mitigation Measure BIO-6d: Replace Bat Special-Status Bat Roost Sites (Alternatives 2, 3 and 4)

If bat roosts cannot be avoided or it is determined that construction activities or site development may cause roost abandonment, such activities may not commence until roost sites have been replaced. To replace tree roosts, elevated bat houses shall be installed outside of, but near, the construction area. Placement and height will be determined by a qualified wildlife biologist, but the bat house would be at least 15 feet high. Bat houses will be multi-chambered and purchased or constructed in accordance with CDFW standards. The number of bat houses required will depend on the size and number of colonies found, but at least one bat house will be installed for each pair of bats (if occurring individually), or of sufficient size and number to accommodate each colony of bats to be relocated.

For replacement of roost sites established in the existing abandoned structures, a qualified bat biologist shall develop a Bat Roost Compensation Plan that addresses the use of the abandoned structures and identifies appropriate compensation measures commensurate with the size of the colony and provide for no net loss in roosting areas for the bats. If the Bat Roost Compensation Plan addresses Townsend's big-eared bat it shall be developed in consultation with CDFW for a CESA Incidental Take Permit. No take of Townsend's big-eared bat would be allowed unless an Incidental Take Permit pursuant to Section 2081(b) of the Fish & Game Code is obtained.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would repurpose some existing buildings at RVARC and require tree removal. Potential impacts from the construction of DRS on roosting habitat for bats would be similar to that described for Alternative 2. Refer to the discussion above for details. Implementation of Mitigation Measures BIO-6a through BIO-6d would reduce the impact on special-status bat species to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Mature trees around the periphery of the Ryde Avenue study area provide potentially suitable habitat roosting habitat for the western red bat; however, the sporadic cover and high level of urban activity decrease the likelihood that special-status bats would occur in the Ryde Avenue study area.

Construction of the DRS facilities could remove trees that provide suitable roosting habitat for the western red bat. Impacts from the removal of occupied roost trees would be considered potentially significant. Implementation of Mitigation Measures BIO-6c and BIO-6d**,** which require avoidance and minimization of occupied roost trees, and replacement of roosting habitat, would reduce this impact to a level that is **less than significant with mitigation**.

Impact BIO-7: Effects on Riparian Habitat and Other Sensitive Natural Communities.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

This alternative would not result in any construction activities with potential for impacts on riparian habitat or other sensitive natural communities. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2, the majority of the Proposed Project would be constructed on disturbed and previously developed land that does not support riparian habitat or other sensitive natural communities; however, portions of the Proposed Project would be constructed in a riparian area which may support sensitive natural communities as identified by CDFW (CDFG 2010) (see Section 7.1.1, “Riparian Woodland”).

Construction of the ERS marina would permanently impact riparian habitat and potentially some sensitive natural communities. Construction of the FTC raw water intake and outfall would also permanently impact a small area of riparian habitat and potentially some associated sensitive natural communities. Riparian habitat may also be temporarily disturbed during construction for equipment access to work areas. Riparian habitat in the study area is very narrow (typically less than 50 feet wide) and disconnected from large tracts of this habitat type. Consequently, it provides much less habitat value than large, contiguous stands of mature riparian habitat. Nevertheless, it does provide suitable nesting habitat for some birds, shade and nutrients for aquatic habitat, and cover and food resources for wildlife. Temporary and permanent loss of the riparian habitat and associated sensitive natural communities would be considered a potentially significant impact. Implementation of **Mitigation Measures BIO-7a (Minimize Area of Disturbance of Riparian Habitat)** and **BIO-7b (Develop and Implement a Restoration Plan for Riparian Habitat and Sensitive Natural Communities Disturbed during Construction),** would reduce this impact to a level that is **less than significant with mitigation**.

Mitigation Measure BIO-7a: Minimize Area of Disturbance of Riparian Habitat (Alternatives 2 and 3)

The disturbance or removal of vegetation will would not exceed the minimum necessary to complete construction and will only occur within the defined work area.

Mitigation Measure BIO-7b: Develop and Implement a Restoration Plan for Riparian Habitat and Sensitive Natural Communities Disturbed during Construction (Alternatives 2 and 3)

DWR and USFWS shall develop and implement a Habitat Restoration Plan to mitigate any temporary and permanent impact on riparian habitat and sensitive natural communities. For any temporary impact, all disturbed soils and new fill in riparian areas shall be revegetated with site-appropriate native species. Any native vegetation with a diameter at breast height (dbh) of 4 inches or greater that is damaged or removed as result of construction activity shall be replaced at a 3:1 ratio; this ratio will increase to 10:1 for native trees of 24 inches dbh and greater. For any permanent impact, riparian habitat shall be mitigated at a ratio of 1.1:1 (replacement to impact). Riparian restoration or compensation may be completed at the Project site, in the Lower Sacramento hydrologic unit (18020109), or at a conservation bank with a service area that covers the Project site. Revegetated or restored areas shall be maintained and monitored to ensure a minimum of 65 percent survival of woody plantings after 5 years.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The potential impact on riparian habitat and potentially some associated sensitive natural communities would be similar to that described for Alternative 2, albeit occurring along a different portion of the shoreline (Figures 3-1 and 3-2). Refer to the discussion above for details. Implementation of Mitigation Measures BIO-7a and BIO-7b, which require development and implementation of a Habitat Restoration Plan, would reduce this impact on riparian and sensitive natural communities to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

No sensitive natural communities were identified in the Ryde Avenue study area. Although the study area supports some individual trees or other riparian plant species that are the dominant species in some sensitive natural alliances or associations, these individual trees and very small patches of riparian vegetation do not provide the functions of riparian habitat or sensitive natural communities.

Construction of the ERS marina and FTC facilities would disturb the shoreline in the study area, which is characterized by riprap with sparse vegetation and a few trees (see photos in Appendix E). Construction in this area would not result in a substantial loss of riparian habitat or a sensitive natural community and thus the impact is considered **less than significant**.

Impact BIO-8: Effects on Waters of the United States.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

This alternative would not result in any construction activities with potential to impact federally protected wetlands. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Aquatic habitats and wetland communities in the RVARC study area are described in Section 7.2.1 of this chapter and in Chapter 8, Section 8.1.2. These habitats support wetlands and waters that are likely to be regulated by USACE and USEPA under Section 404 of the CWA. A wetland delineation was conducted for the study area (Horizon 2015a). The Sacramento River in the study area is considered Traditional Navigable Waters. Wetlands adjacent to the Sacramento River would also be subject to CWA Section 404 regulations, including freshwater marsh and riparian woodlands at or below the high tide line.

Estuarine Research Station

Construction of the marina and boat launch for the ERS, and potentially other aspects of the facility, would temporarily and permanently affect federally protected wetlands and non-wetland waters. While detailed designs have not been completed, the marina and debris reflector would be approximately 1.2 acres in size within waters. Impacts would result over a portion of this area from installation of piles and docks, installation of the debris deflector, and possibly sedimentation or erosion during site grading. These impacts are considered potentially significant. Implementation of **Mitigation Measures BIO-8 (Provide Compensatory Mitigation for Impacts from Work Activities Taking Place in Wetlands and Waters of the United States and the State)**, which will include compensatory mitigation for permanent impacts, and **Mitigation Measures HYD/WQ-2a (Monitor Turbidity during In-water Construction) and HYD/WQ-2b (Implement Turbidity Barrier Surrounding In-water Construction, if Necessary)**, which will reduce or avoid short-term construction impacts, would reduce this impact to a level that is less than significant with mitigation.

Mitigation Measure BIO-8: Provide Compensatory Mitigation for Impacts from Work Activities Taking Place in Wetlands and Waters of the United States and the State (Alternative 2 – ERS)

Work within areas defined as waters of the U.S. that includes placement of fill will require a CWA Section 404 permit and Section 401 Water Quality Certification. All work proposed in jurisdictional waters of the U.S. shall be authorized under these permits, and the work shall comply with the general and regional conditions of the permits. In areas where there would be permanent disturbance to jurisdictional waters or wetlands, DWR and USFWS shall ensure that this mitigation is implemented in a manner consistent with the terms of the CWA Section 404 permit, the *Final Rule on Compensatory Mitigation for Losses of Aquatic Resources* (73 CFR 19594), and the *Regional Compensatory Mitigation and Monitoring Guidelines for the South Pacific Division* (USACE 2015, or current version). Compensatory mitigation may include creation, reestablishment, or enhancement of wetlands in the Proposed Project area or at an USACE-approved off-site location. Compensatory mitigation may also include purchase of credits from an approved mitigation bank or in-lieu fee program. At a minimum, mitigation shall be provided at a ratio which ensures no net loss of the functions and values associated with the impacted resources.

Fish Technology Center

Construction of the FTC raw water intake and discharge outfall would permanently impact a small area of federally protected wetlands and waters. Permanent impacts would be very small and not be substantial (less than 0.1 acre) and therefore less than significant. Temporary construction impacts such as generation of turbidity during construction are considered to be potentially significant. Implementation of Mitigation Measures HYD/WQ-2a and HYD/WQ-2b, which will reduce or avoid short-term construction impacts, would reduce this impact to a level that is less-than-significant with mitigation.

Delta Research Station

The impact of the DRS on federally protected wetlands and waters of the U.S. would be as described above for the ERS and FTC. Refer to the discussion above for details. These impacts are considered potentially significant. Implementation of Mitigation Measures BIO-8 and HYD/WQ-2a and HYD/WQ-2b would reduce this impact on protected wetlands and waters to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The impact from construction of the DRS would be similar to that described for Alternative 2, with a major difference being that this alternative would also result in a net gain of waters of the U.S. by converting approximately 2 acres of uplands to waters. Development of the marina would be subject to the terms and conditions of a CWA Section 404 permit. The net gain in waters of the U.S. would offset permanent impacts, and implementation of Mitigation Measures HYD/WQ-2a and HYD/WQ-2b, would reduce or avoid short-term construction impacts. Accordingly, this impact would be **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

A wetland delineation was conducted for the study area (Horizon 2015b). Riverine habitat along the San Joaquin River/Stockton DWSC, as well as along the fringe of freshwater marsh, is likely to be considered potential jurisdictional waters of the U.S. The portion of the San Joaquin River/Stockton DWSC in the study area is considered a traditionally navigable waterway. Other potential waters within the study area include small drainage ditches that convey stormwater. These features would also be considered jurisdictional waters of the U.S. if it is determined that they have a “significant nexus” to the San Joaquin River/DWSC. Some drainage ditches in the study area appear to drain to Stockton’s stormwater collection system, and are excavated wholly in uplands, and thus are not likely to be considered jurisdictional waters.

A temporary impact on waters of the U.S. from construction of the DRS would include disturbance to the shoreline and some potential sedimentation or erosion during construction of the marina. Some drainage ditches that might be considered waters of the U.S. could also be altered. Construction of the marina would result in net gain of waters of the U.S. by converting approximately 2 acres of uplands to waters. The net gain in waters of the U.S. would offset impacts on existing wetlands, and implementation of Mitigation

Measures HYD/WQ-2a and HYD/WQ-2b, will reduce or avoid short-term construction impacts. Accordingly, this impact would be **less than significant with mitigation**.

Impact BIO-9: Effects of Site Operations on Terrestrial Wildlife.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

This alternative would not result in any changes in operations which could have potential impacts on terrestrial biological resources. There would be **no impact**.

ALTERNATIVES 2 AND 3

Operations of the ERS and FTC would generate noise, light, and an increased level of human activity relative to baseline conditions. Noise generated at the facilities would come from sources such as vehicles, water pumps, generators, boat engines, and other human activity.

While most of the RVARC site does not support sensitive terrestrial wildlife, Townsend's big-eared bat could occupy abandoned structures that are not directly impacted by construction. Noise, lighting, and human activity could displace individuals from occupied habitat and result in substantial adverse effects on Townsend's big-eared bat which would be considered potentially significant. Implementation of Mitigation Measures BIO-6a, BIO-6b, and BIO-6d, would reduce this impact to a level that is **less than significant with mitigation**.

ALTERNATIVE 4

Operations of the ERS and FTC would generate noise, light, and an increased level of human activity. Operations are not anticipated to displace individuals from occupied habitat or result in substantial adverse effects on any of the special-status wildlife species with the potential to occur at the site; therefore, the impacts associated with noise are considered **less than significant**.

Impact BIO-10: Conflict with Local Ordinances or Policies Protecting Biological Resources.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

This alternative would not involve any changed activities that could conflict with any local ordinances or policies protecting biological resources. There would be **no impact**.

ALTERNATIVES 2 AND 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 AND 2

As discussed in Section 7.3.3, several provisions in the City of Rio Vista General Plan and the ABD Design Guidelines related to protection of biological resources are applicable to development at RVARC. The Proposed Project, in combination with the mitigation measures identified in this chapter, is largely consistent with these plans and policies. A potential exception could be Policy 10.1.E of the City of Rio Vista's General Plan, which requires developers to use native and compatible non-native species, especially drought-resistant species, to the extent possible in fulfilling landscaping and natural habitat mitigation requirements. Implementation of **Mitigation Measure BIO-10 (Use Native, Drought-Tolerant Plants for Landscaping)**, along with the other mitigation measures (BIO-1 through BIO-9) listed in this chapter and Chapter 8, *Biological Resources – Aquatic* (Mitigation Measures FISH-1a through FISH-9), would ensure that development of the ERS and FTC under Alternatives 2 and 3 is consistent with the City of Rio Vista General Plan and the ABD Design Guidelines such that impacts would be **less than significant with mitigation**.

Mitigation Measure BIO-10: Use Native, Drought-Tolerant Plants for Landscaping (Alternatives 2, 3, and 4)

The Proposed Project shall use native and compatible non-native species, especially drought-resistant species, for landscaping and natural habitat mitigation requirements.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

As discussed in Section 7.3.3, several provisions in the City of Stockton General Plan related to protection of biological resources are potentially applicable to development at the Ryde Avenue site. The Proposed Project, in combination with the mitigation measures identified in this chapter, is consistent with these plans and policies. Implementation of the mitigation measures listed in this chapter (Mitigation Measures BIO-1 through BIO-10) and Chapter 8 (Mitigation Measures FISH-1a through FISH-9) would ensure that Alternative 4 is consistent with the City of Stockton General Plan such that impacts would be **less than significant with mitigation**.

Impact BIO-11: Conflict with the Provisions of an Adopted Habitat Conservation Plan or other Approved Local, Regional, or State Habitat Conservation Plan.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

This alternative would not involve any change in activities that could conflict with any adopted HCP or other approved local, regional, or state habitat conservation plan. There would be **no impact**.

ALTERNATIVES 2 AND 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 AND 2

The RVARC site is not located within the boundaries of any adopted HCPs. HCPs under development that overlap with the RVARC site are the Solano HCP and the BDCP.

Plant and terrestrial wildlife species proposed to be covered under the Solano HCP that may be impacted by Alternatives 2 and 3 include Mason's lilaeopsis, Burrowing Owl, Swainson's Hawk, and Tricolored Blackbird. The RVARC site is identified in the Solano HCP as part of the Urban Zone and is not proposed as part of the HCP's reserve system. The Proposed Project would not conflict with the Solano HCP's conservation strategy for these species.

Therefore, this impact is considered less than significant. At the time this EIR/EIS is being circulated the Solano HCP has not been approved and incidental take permits for the Solano HCP have not been issued. DWR, USFWS and/or the site developer may seek incidental take coverage under the HCP for covered species that may be adversely affected by the Proposed Project, if the HCP is approved in the future.

Plant and terrestrial wildlife species proposed to be covered under the public draft BDCP and other HCP/NCCP Alternatives that may be impacted by Alternatives 2 and 3 include Delta tule pea, Suisun Marsh aster, Delta mudwort, Mason's lilaeopsis, western pond turtle, Burrowing Owl, Swainson's Hawk, White-tailed Kite, Tricolored Blackbird, and Townsend's big-eared bat. Similar to the Solano HCP, the BDCP and other HCP/NCCP Alternatives do not identify the RVARC site as an important site for conservation of these species, and the Proposed Project would not conflict with the BDCP's conservation strategy for these species. Therefore, this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE

Adopted HCPs that encompass the Ryde Avenue site include SJMSCP and PG&E O&M HCP. The proposed BDCP would also overlap with the Ryde Ave site.

Plant and terrestrial wildlife species covered under SJMSCP that may be affected by Alternative 4 are Delta tule pea, Suisun Marsh aster, Sanford's arrowhead, Burrowing Owl, Swainson's Hawk, and western red bat. Development of the Ryde Avenue site is not bound by the HCP because participation is voluntary for local jurisdictions and project proponents. Furthermore, the primary purpose of the SJMSCP is to provide habitat conservation that offsets the conversion of open space to non-open space uses. The Ryde Avenue site is not designated as Open Space by the City of Stockton or San Joaquin County. The SJMSCP does not identify the Ryde Avenue site as an important site for conservation of these species, and the Proposed Project would not conflict with SJMSCP's conservation strategy for these species; therefore, this impact is considered less than significant.

Plant and terrestrial wildlife species covered under PG&E O&M HCP that may be affected by Alternative 4 are the Burrowing Owl, Swainson's Hawk, White-tailed Kite, and Tricolored Blackbird. This HCP does not identify the Ryde Avenue site as an important site for conservation of these species, and the Proposed Project would not conflict with PG&E O&M HCP's conservation strategy for these species; therefore, this impact is considered less than significant.

Plant and terrestrial wildlife species proposed to be covered under BDCP that may be affected by Alternative 4 are the Delta tule pea, Suisun Marsh aster, Burrowing Owl, Swainson's Hawk, and White-tailed Kite. The BDCP does not identify the Ryde Avenue site as an important site for conservation of these species, and the Proposed Project would not conflict with BDCP's conservation strategy for these species; therefore, this impact would be **less than significant**.

Chapter 8
Biological Resources – Aquatic

This chapter discusses the potential for each DRS alternative to affect aquatic resources, with emphasis on special-status fish and other aquatic species, and their habitats. Specifically, this chapter describes the existing environmental setting in the vicinity of each alternative, discusses federal, state, and local regulations relevant to aquatic resources that might be affected by each alternative, identifies aquatic species potentially affected by each alternative, and proposes mitigation measures to avoid or reduce the potentially significant impacts. The following appendices support this chapter:

- Appendix E, *Biological Resources Technical Appendix*
- Appendix F, Best Management Practices for Pile Removal and Disposal
- Appendix G, CDFW Protocols for Decontamination and Monitoring of Aquatic Invasive Species

8.1 Environmental Setting

8.1.1 Regional Setting

The Delta is a network of islands and channels at the confluence of the Sacramento and San Joaquin rivers, where it mixes with tidal waters from the San Francisco Bay to form the largest estuary on the West Coast. The Delta comprises an area of approximately 750,000 acres, receives runoff from a watershed that includes more than 40 percent of California's land area, and accounts for approximately 42 percent of the state's annual runoff (U.S. Bureau of Reclamation 2012). Tributaries that directly discharge into the Delta include the Sacramento, San Joaquin, Mokelumne, Cosumnes, and Calaveras Rivers.

The Delta supplies water for most of California's agricultural production and many urban and industrial communities across the state, and water moving through the Delta serves many purposes throughout California. In the Delta, the federal Central Valley Project's C.W. "Bill" Jones and State Water Project's Harvey O. Banks pumping plants move water from the Delta to a system of canals and reservoirs for agricultural, environmental, and municipal and industrial uses in the San Joaquin Valley, the San Francisco Bay Area, and portions of Southern California. Surface water resources in the Delta are influenced by the interaction of tides, tributary inflows, Delta hydrodynamics, regulatory requirements, and water management actions, such as transfers, reservoir releases, and upstream and in-Delta diversions.

The Delta provides habitat for all or a portion of the life stages of numerous native fishes, including several rare, threatened, or endangered species (referred to as special-status species). For example, Delta Smelt (*Hypomesus transpacificus*), a species endemic to the San Francisco Estuary, spends much of the year in residency throughout the Delta. The Delta serves as a migration corridor for Central Valley anadromous fish species including adult Chinook Salmon (*Oncorhynchus tshawytscha*) migration upstream to spawning tributaries and Green Sturgeon (*Acipenser medirostris*) before and after spawning in their natal rivers upstream of the Delta. Young of both species may rear or emigrate through the Delta for much of the year. Longfin Smelt (*Spirinchus thaleichthys*) may migrate through the Estuary to spawn in relatively low salinity areas of the Delta, and juveniles and adults may be detected relatively frequently in the uppermost regions of the Estuary (upstream of Confluence). **Table 8-1** summarizes the spatial distribution of special-status species that occur in the Delta at various stages in their life history.

It is important to note that native Sacramento–San Joaquin Delta fishes have been declining at a rapid rate for more than two decades, corresponding with a steady and dramatic increase in non-native species (Moyle 2014). Although there is no single cause for the decline of these native fishes, it has significant consequences for future Delta resource management (Mount et al. 2012). All facets of the Delta ecosystem have changed dramatically in the past century, and most changes have been detrimental to native fishes (Moyle 2014). The factors that cause harm to native species are broadly referred to as stressors. For any native species, many stressors affect both individuals and populations.

According to Mount et al. (2012), stressors can be grouped in different ways, depending on the scientific, policy, or regulatory point of view. They grouped them into five broad categories; each category containing stressors with similar processes, causes, or consequences:

- Discharges that alter water quality (through land and water use activities),
- Fisheries management actions (such as regulation of harvest and operation of hatcheries),
- Flow alteration (through a variety of water management activities),
- Invasive species that alter food webs or change physical habitat, and
- Physical habitat loss and alteration (through actions such as the draining and diking of tidal marshes and seasonal floodplains).

Climate change will likely exacerbate conditions associated with all five groups (Mount et al. 2012).

Table 8-1. Spatial and Temporal Distribution for Various Life History Stages of Special-Status Fish Species Occurring in the Sacramento and San Joaquin Rivers[a,b]

Species/ Life Stage	Distribution	Month Present											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Central Valley Fall-run Chinook Salmon (San Joaquin River)													
Adult migration	Pacific Ocean, Bay–Delta, San Joaquin River (SJR), & tributaries												
Adult spawning	SJR & tributaries												
Juvenile emergence	SJR & tributaries												
Juvenile residency	SJR & tributaries												
Juvenile outmigration	SJR & tributaries, Bay–Delta, & Pacific Ocean												
Central Valley Fall-run Chinook Salmon (Sacramento River)													
Adult migration	Pacific Ocean, Bay-Delta, Sacramento River (SR), & tributaries												
Adult spawning	SR & tributaries												
Juvenile emergence	SR & tributaries												
Juvenile residency	SR & tributaries												
Juvenile outmigration	SR & tributaries, Bay–Delta, & Pacific Ocean												
Central Valley Late-Fall-run Chinook Salmon (Sacramento only)													
Adult migration	SR & tributaries												
Adult spawning	SR & tributaries												

Species/ Life Stage	Distribution	Month Present											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Juvenile emergence & movement	SR & tributaries												
Juvenile residency	SR & tributaries, Bay–Delta, & Pacific Ocean												
Juvenile outmigration	Pacific Ocean, Bay-Delta, SR, & tributaries												
Central Valley Spring-run Chinook Salmon (Sacramento only)													
Adult migration and holding	SR & tributaries												
Adult spawning	SR & tributaries												
Juvenile emergence	SR & tributaries, Bay–Delta, & Pacific Ocean												
Juvenile residency	Pacific Ocean, Bay-Delta, SR, & tributaries												
Juvenile outmigration	SR & tributaries												
Sacramento River Winter-run Chinook Salmon (Sacramento only)													
Adult migration	Pacific Ocean, Bay–Delta, SR, & tributaries												
Adult spawning	SR & tributaries												
Juvenile emergence & movement	SR & tributaries												
Juvenile residency	SR & tributaries												

Species/ Life Stage	Distribution	Month Present											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Juvenile outmigration	SR & tributaries, Bay–Delta, & Pacific Ocean												
Central Valley [c] and Central California Coastal Steelhead Trout													
Adult migration	Pacific Ocean, Bay–Delta, & SR & tributaries												
Adult spawning	SR & tributaries												
Juvenile emergence	SR & tributaries												
Juvenile rearing	SR & tributaries						**Yearlings Only**						
Juvenile emigration	SR & tributaries, Bay–Delta, & Pacific Ocean												
Delta Smelt [a,d]													
Adult migration	Bay–Delta, Suisun Bay, lower SR & lower SJR												
Adult spawning	Suisun Bay/Marsh, lower SR (mostly above Rio Vista) & lower SJR in shallow open water												
Downstream movement/Juvenile rearing	Lower SR, lower SJR, Bay–Delta, & Suisun Bay												
Residency	Bay–Delta, Suisun Bay, and Cache Slough Complex												
Green Sturgeon													
Adult spawning migration	Pacific Ocean, Bay–Delta, SR												

Species/ Life Stage	Distribution	Month Present											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult spawning	SR & SJR												
Juvenile rearing (includes 1- to 2-yr-olds)	SR, SJR, & Bay–Delta												
Juvenile outmigration	SR, SJR, Bay–Delta, & Pacific Ocean												
Hardhead													
Adult spawning	SR, SJR, & tributaries (low to mid-elevation)												
Juvenile rearing	SR, SJR, & tributaries (low to mid-elevation)												
Longfin Smelt[a,e]													
Adult migration	Bay–Delta, Suisun Bay, & lower SR, & SJR												
Adult spawning	Northwestern Bay–Delta & eastern Suisun Bay												
Downstream movement/Larval and Juvenile rearing	Lower Sacramento, Bay–Delta, & Suisun and San Pablo bays												
Residency	Bay–Delta & Suisun and San Pablo bays												

Notes: SJR = San Joaquin River; SR = Sacramento River.
[a] Data from Moyle (2002) unless indicated otherwise.
[b] Code: Light gray, present; dark gray, peak; white, not present.
[c] Based on populations from the Sacramento River basin.
[d] Merz et al. 2011
[e] Merz et al. .2013.

The primary areas of focus in this chapter are the proposed locations for the DRS, as discussed in the following sections—specifically, the Sacramento River near Rio Vista and the San Joaquin River in the Stockton DWSC near the Port of Stockton.

8.1.2 Rio Vista Army Reserve Center Site

The RVARC is located at the western edge of the Delta on the west bank of the Sacramento River. The site is south of the Yolo Bypass and Cache Slough Complex, and approximately 13 miles north of the San Joaquin River confluence (Figures 1-1 and 1-2).

Sacramento River

The Sacramento River is the largest river in California, with headwaters in Modoc County, and flowing south to Chipps Island in the Delta in Solano County. The Sacramento River receives inflow from several rivers and creeks that support important anadromous and resident fish populations, including the Feather, Yuba, and American Rivers; and Mill, Deer, Butte, Battle, and Clear creeks. The lower Sacramento River drains into the Yolo Bypass, the main Sacramento channel, Steamboat Slough, and the Central Delta. The Sacramento River DWSC extends downstream through Rio Vista to Montezuma Slough and accommodates large ships that bring cargo upstream to the Port of Sacramento.

Cache Slough Complex

The Cache Slough Complex is a tidal marsh located north of Rio Vista, where the south end of the Yolo Bypass and Cache Slough meet, and includes the area surrounding Lindsey, Cache, and Miner sloughs, which drain into the Sacramento River DWSC.

Rio Vista Army Reserve Center Site

Riverine habitat in the immediate vicinity of RVARC consists of the main channel of the Sacramento River. Introduced fish species, such as Threadfin Shad (*Dorosoma petenense*), Striped Bass (*Morone saxatilis*), and White Catfish and Channel Catfish (*Ictalurus catus* and *I. punctatus*, respectively), are common in this portion of the Sacramento River (Mari-Gold Environmental Consulting and Novo Aquatic Sciences 2010).

Central Valley Steelhead (*O. mykiss*) and Winter-run, Spring-run, Fall- and Late-Fall-run Chinook Salmon are present in or adjacent to the RVARC site during seasonal migration periods. This portion of the Sacramento River does not provide spawning habitat for salmonids, but does provide migration corridors and some limited juvenile rearing habitat. Green Sturgeon spawn in the Sacramento River upstream of the study area; adults and sub-adults might be present in the vicinity of the study area year round (Israel and Klimley 2008). Adult Longfin Smelt spawn in the vicinity of the study area, primarily during winter months (January through March). Most adults die after spawning; larvae gradually move downstream to rear in brackish waters (Merz et al. 2013). Delta Smelt can occur throughout the low-salinity zone and freshwater tidal areas of the Delta. They are commonly present in the vicinity of the study area year round (Merz et al. 2011). They are also commonly found downstream in Suisun Bay (IEP 2015). Pacific and River Lamprey (*Entosphenus tridentatus* and *Lampetra ayresi*, respectively) most likely migrate through this reach of the Sacramento River to spawn upstream. Ammocoetes (lamprey larvae) might also be present in this reach of the river. The study area is designated as critical habitat for Delta Smelt, Green Sturgeon, Central Valley Steelhead, and Central Valley Spring-run and Winter-run Chinook Salmon (Figure 7-7).

MARINE MAMMALS

Humpback whales (*Megaptera novaeangliae*) have infrequently been observed in the Sacramento River near Rio Vista (*Los Angeles Times* 1985, National Oceanic and Atmospheric Administration [NOAA] 2007), but the Bay-Delta is not part of the species' typical range. Humpback whales are listed as Endangered under the ESA and as Depleted under the Marine Mammal Protection Act (MMPA). California sea lions (*Zalophus californianus*) are occasionally observed foraging in the Sacramento River as far upstream as Discovery Park in Sacramento (CBS13 2012, ABC13 2010) and as far south as Merced County on the San Joaquin River (Kay 2004, USFWS 2014) and as far east as the Mokelumne River at the Town of Woodbridge, San Joaquin County (Solander 1997). This pinniped species is not listed under the ESA, and there are no designated significant ecological areas for this species within the project area. No harbor seals (*Phoca vitulina*) have been documented in the Sacramento or San Joaquin rivers, although they have been documented as far upstream as Suisun Bay in the Delta (Grigg et al. 2012).

8.1.3 Ryde Avenue Site

The Ryde Avenue site is situated along the north bank of the lower San Joaquin River at the Port of Stockton in the Stockton DWSC (Figures 1-1 and 1-3).

San Joaquin River

The San Joaquin River is California's second longest river, flowing from south to north through the San Joaquin Valley; beginning in the Sierra Nevada Mountains and terminating in the Delta. The San Joaquin River receives inflow from several large tributaries, including the Merced, Tuolumne, and Stanislaus Rivers. These rivers flow west out of the Sierra Nevada to the San Joaquin River. The Merced, Tuolumne, and Stanislaus rivers support anadromous fisheries, including Fall-run Chinook Salmon, Steelhead and Pacific Lamprey. White and Green Sturgeon occur in the San Joaquin River upstream to at least mouth of the Merced River. Longfin and Delta Smelt are observed as for upstream as the town of Lathrop. Downstream of Vernalis, the San Joaquin River splits into several channels: the main river channel that flows through Lathrop and Stockton; Middle River; and Old River. Diversions from the San Joaquin River support agriculture throughout the valley and river flows traditionally supported large runs of spawning Chinook Salmon and Steelhead. Because of water policy and several dams in the river system, the populations of these fish in the San Joaquin River have declined dramatically over the years.

Ryde Avenue Site

Riverine aquatic habitat in the immediate vicinity of the Ryde Avenue site includes the San Joaquin River and the Stockton DWSC. The DWSC was constructed in 1928 and is routinely dredged to provide ship navigation. According to the Port of Stockton (2014), the channel depth is 40 feet at average high tide. The channel substrate consists of soft, unconsolidated sediment.

Aquatic habitat in the San Joaquin River/Stockton DWSC supports a broad assemblage of introduced and native fishes. Introduced species such as White Catfish and Channel Catfish, American Shad (*Alosa sapidissima*), and Threadfin Shad are abundant in the channel (Mari-Gold Environmental Consulting and Novo Aquatic Sciences 2010). The San Joaquin River/DWSC is also an important migratory corridor for several special-status fish species. Fall-run Chinook Salmon and Steelhead move through this portion of the Delta during fall/winter migrations to spawn in San Joaquin River tributaries. Outmigrating juveniles are unlikely to rear in the study area for a substantial time primarily because of low dissolved oxygen (DO) levels during the dry season. The adverse effects of low DO levels in DWSC on salmonids are well documented (Newcomb and Pierce 2010).

A nonessential experimental population of Spring-run Chinook Salmon has recently been designated in the San Joaquin drainage (San Joaquin River Restoration Program [SJRRP] 2014). Individuals are potentially present in the vicinity of the Ryde Avenue study area, as are stray Spring-run Chinook Salmon from populations that spawn in the Sacramento River basin.

The San Joaquin River supports White Sturgeon reproduction with adults observed throughout the year (Jackson and Van Eenennaam 2013). Anglers have reported catching Green Sturgeon in the San Joaquin River upstream of Stockton but the extent to which Green Sturgeon use the San Joaquin River is not well documented (Jackson and Van Eenennaam 2013). Aquatic habitat in the study area does not provide suitable spawning habitat, but it does support non-reproductive habitat for Green Sturgeon.

The study area is within the geographic range of the Delta Smelt, which has been observed in the San Joaquin River as far upstream as Paradise Cut, approximately 18 river miles south of Stockton (Merz et al. 2011). In recent decades, Delta Smelt have declined precipitously in this portion of the Delta; they are infrequently detected during winter and spring surveys and results of summer and fall surveys show few Delta Smelt in this area (Nobriga et al. 2008, Sommer et al. 2011, IEP 2015). Similarly, the Estuary Longfin Smelt population has experienced dramatic declines over several decades. The study area is also within the geographic range of Longfin Smelt, which have been observed as far upstream as the town of Lathrop on the San Joaquin River (Merz et al. 2013).

The study area is within designated critical habitat for Delta Smelt, Green Sturgeon, and Central Valley Steelhead (Figure 7-8), and is also within the historical range of Longfin Smelt. Other special-status fish that might be present in the study area year-round are Sacramento Splittail (*Pogonichthys macrolepidotus*), Pacific Lamprey, and River Lamprey.

Adult and juvenile lamprey might be present in the study area during seasonal migrations, and fish in early life stages might be present in the channel substrate year round.

As mentioned in Section 8.1.2, wayward California sea lions have been observed as the San Joaquin River at the National Wildlife Refuge in Merced County. However, their occurrence in the San Joaquin River as far upstream as the Ryde Avenue site is rare. No other marine mammals are known to occur in the in the vicinity of the Ryde Avenue site.

8.1.4 Special-Status Species

Definitions and Methods of Assessment

For the purposes of this Draft EIR/EIS, a special-status fish or marine mammal species refers to those species that meet one or more of the following criteria:

- Species that are listed or proposed for listing as threatened or endangered under the ESA (50 CFR 17.11 for listed animals, and various notices in the FR for proposed species);
- Species that are candidates for possible future listing as threatened or endangered under the ESA (76 FR 66370, October 26, 2011);
- Species that are listed or proposed for listing by the State of California as threatened or endangered under the CESA (14 CCR 670.5);
- Species that meet the definitions of rare or endangered under CEQA (CEQA Guidelines Section15380); and
- Species protected under the MMPA (16 USC Chapter 31).

Background information on special-status fish and marine mammal species with the potential to occur in the Proposed Project Area was compiled through a review of the following resources:

- USFWS Information for Planning and Conservation (IPaC) Trust Resources Report for the RVARC site (USFWS 2015a).
- USFWS IPaC Trust Resources Report for the Ryde Avenue site (USFWS 2015b).
- California Natural Diversity Database (CNDDB) queries for the USGS 7.5-minute quadrangles covering and surrounding the sites (CDFW 2015).
- Inland Fishes of California; revised and expanded (Moyle 2002).
- USFWS Critical Habitat mapper (USFWS 2015c) and NOAA essential fish habitat mapper (NMFS 2010).

Table 8-2 lists the special-status fish and marine mammal species known to occur in the vicinity of the sites. Figures 7-4 and 7-6 in Chapter 7, *Biological Resources – Terrestrial*, show the CNDDB occurrences of special-status fish within a 5-mile radius of the sites. Figures 7-7 and 7-8 show critical habitat within a 5-mile radius of the sites.

The potential for special-status aquatic species to occur in the vicinity of the sites was evaluated according to the following criteria:

None: the area contains a complete lack of suitable habitat, the local range for the species is restricted, and/or the species is extirpated in this region.

Not Expected: suitable habitat or key habitat elements might be present but might be of poor quality or isolated from the nearest extant occurrences, and/or the species is not known to occur in the area.

Possible: presence of suitable habitat or key habitat elements that potentially support the species.

Present: the species was either observed directly or its presence was confirmed by field investigations or in previous studies in the area.

Brief summaries of the life history for special-status-species with the potential to be affected by the proposed project area provided in Appendix E and in Table 8-2.

1 **Table 8-2.** Special-status Fish and Marine Mammals with the Potential to Occur in the Vicinity of the RVARC and Ryde Avenue Sites

Scientific Name Common Name	Federal/State Status	Habitat Characteristics	Potential to Occur at the RVARC Site	Potential to Occur at the Ryde Avenue Site
FISH				
Acipenser medirostris green sturgeon, Southern DPS	FT/CSC	These are the most marine species of sturgeon. Abundance increases northward of Point Conception. Spawns in the Sacramento Rivers. Spawns at temps between 8-14 degrees C. Preferred spawning substrate is large cobble, but can range from clean sand to bedrock. Occasionally reported in the San Joaquin River upstream from Stockton (Jackson and Van Eenennaam 2013)	**Present.** May be present in this portion of the Sacramento River year-round. Spawning habitat includes the Sacramento River upstream from the study area. This portion of the river is designated as critical habitat.	**Possible**. There are anecdotal reports of this species in the San Joaquin River (Jackson and Van Eenennaam 2013). The study area is within designated critical habitat for this species.
Hypomesus transpacificus Delta smelt	FT/SE	Sacramento-San Joaquin Delta. Seasonally in Suisun Bay, Carquinez Strait and San Pablo Bay. Seldom found at salinities > 10 ppt. Most often at salinities < 2ppt.	**Present.** May be present in this portion of the Sacramento River year-round, but more commonly occurs in the low salinity zone west of the study area. This portion of the river is designated as critical habitat.	**Present**. This species has been documented in the San Joaquin River upstream of the study area, and the study area is within designated critical habitat for this species.
Lampetra ayresi River lamprey	--/CSC	Lower Sacramento River, San Joaquin River and Russian River. May occur in coastal streams north of San Francisco Bay. Adults need clean, gravelly riffles. Ammocoetes need sandy backwaters or stream edges, good water quality and temperatures < 25 degrees C.	**Present**. Various lifestages maybe present year-round. Spawning habitat is not present.	**Present**. Adults are present in this portion of the San Joaquin River/DWSC during seasonal migration periods. Early life stages may be present year-round.

Scientific Name Common Name	Federal/State Status	Habitat Characteristics	Potential to Occur at the RVARC Site	Potential to Occur at the Ryde Avenue Site
Lampetra tridentata Pacific lamprey	FSC/--	Found in Pacific Coast streams north of San Luis Obispo Co., however regular runs in Santa Clara River. Size of runs is declining. Swift-current gravel bottomed areas for spawning with water temps between 12-18 C. Ammocoetes need soft sand or mud.	**Present**. Various lifestages maybe present year-round. Spawning habitat is not present.	**Present**. Adults are present in this portion of the San Joaquin River/DWSC during seasonal migration periods. Early life stages may be present year-round.
Mylopharodon conocephalus Hardhead	--/CSC	Occupies areas of large streams with reliable flows at low to mid elevations. Tend to be found in the lower part of the water column in pools, riffles, and streams. In the San Joaquin drainage, present throughout tributary streams of the San Joaquin and Sacramento Rivers. Optimal water temperatures for hardhead range from 24-38° Celsius; however, they require more highly oxygenated streams at higher temperatures.	**Possible**. Spawning habitat is not present.	**Possible**. Spawning habitat is not present.
Oncorhynchus mykiss Steelhead, Central Valley DPS	FT/--	Spawn in the Sacramento and San Joaquin rivers and tributaries before migrating to the Delta and Bay Area. Found in cool, clear, fast-flowing permanent streams and rivers with riffles and ample cover from riparian vegetation or overhanging banks. Spawns in streams with pool and riffle complexes. For successful breeding, requires cold water and gravelly streambed.	**Present**. Species is present in this portion of the Sacramento River during seasonal migration periods. This portion of the river is also designated as critical habitat.	**Present**. This species is present in this portion of the San Joaquin River/DWSC during seasonal migration periods. Study area is generally unsuitable for juvenile rearing. Study Area is within designated critical habitat for this species.

Scientific Name Common Name	Federal/State Status	Habitat Characteristics	Potential to Occur at the RVARC Site	Potential to Occur at the Ryde Avenue Site
Oncorhynchus tshawytscha Chinook salmon, Central valley fall- and late-fall run ESU	FSC/CSC	Populations spawning in the Sacramento and San Joaquin Rivers and their tributaries. Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water and sufficient DO.	**Present**. This species is present in this portion of the Sacramento River during seasonal migration periods.	**Present**. Fall-run Chinook salmon are present in this portion of the San Joaquin River/DWSC during seasonal migration periods. Study area is generally unsuitable for juvenile rearing.
Oncorhynchus tshawytscha Chinook salmon, Central Valley winter-run ESU	FE/SE	Populations spawning in the Sacramento and San Joaquin Rivers and their tributaries. Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water and sufficient dissolved oxygen (DO).	**Present**. This species is present in this portion of the Sacramento River during seasonal migration periods.	**Not Expected**. Naturally spawned spring-run Chinook have been extirpated from the San Joaquin drainage (Lindley et al. 2004). Strays from populations in the Sacramento River basin may occasionally occur.
Oncorhynchus tshawytscha Chinook salmon, Central Valley spring-run ESU	FT/ST	Populations spawning in the Sacramento and San Joaquin Rivers and their tributaries. Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water and sufficient DO.	**Present.** Species is present in this portion of the Sacramento River during seasonal migration periods. This portion of the river is also designated as critical habitat.	**Not Expected.** Naturally spawned spring-run Chinook have been extirpated from the San Joaquin drainage (Lindley et al. 2004). Strays from populations in the Sacramento River basin may occasionally occur.
Oncorhynchus tshawytscha Chinook Salmon, Spring-run ESU (Nonessential experimental population)	See FGC 2080.2 to 2080.4	All spring-run Chinook Salmon, including those that have been released or propagated, naturally or artificially, within the experimental population area, which is defined as the San Joaquin River from Friant Dam downstream to its confluence with the Merced River (exclusive)].	**Not Expected** Spring-run Chinook Salmon has recently been reintroduced to the San Joaquin drainage. Strays from the experimental population into the Sacramento River basin may occasionally occur.	**Possible**. Spring-run Chinook Salmon has recently been reintroduced to the San Joaquin drainage (SJRRP 2014) with a nonessential experimental population status.

Scientific Name Common Name	Federal/State Status	Habitat Characteristics	Potential to Occur at the RVARC Site	Potential to Occur at the Ryde Avenue Site
Poponichthys macroleidotus Sacramento splittail	--/CSC	Endemic to the lakes and rivers of the Central Valley, but now confined to the Delta, Suisun Bay and associated marshes. Slow moving river sections, dead end sloughs. Requires flooded vegetation for spawning and foraging for young.	**Present**. This species may be present in this portion of the Sacramento River year round.	**Present.** This species may be present in this portion San Joaquin River/DWSC year-round.
Spirinchus thaleichthys Longfin smelt	FC/ST	Sacramento-San Joaquin Delta, Suisun Marsh, San Francisco and San Pablo Bay, Humboldt Bay, and Gulf of Farallones. Found in open waters of estuaries, mostly in middle or bottom of water column. Prefer salinities of 15-30 ppt, but can be found in completely freshwater to almost pure seawater. Spawns in freshwater and rears in brackish water.	**Present.** Spawning occurs in the vicinity of the study area during the winter/wet season. Species is concentrated in more brackish waters to the west of the study area in the dry season.	**Possible.** Study area is within the species historic range, but it is now infrequently detected in the southeastern portion of the Delta. Possibly present in the wet season. Not expected the dry season.

Scientific Name Common Name	Federal/State Status	Habitat Characteristics	Potential to Occur at the RVARC Site	Potential to Occur at the Ryde Avenue Site
MARINE MAMMALS				
Megaptera novaeangliae Humpback whale	FE[1], Depleted under MMPA	Humpback whales migrate along the coast of California, moving between summer feeding grounds in northern California and north to southern British Columbia, and spending winter months in coastal Central America and Mexico. Humpbacks stay near the surface of the water during migration, and prefer shallow waters while feeding and calving. Calving occurs in warm waters and females and calves are often found near offshore reef systems, islands, or continental shores. Humpbacks feed in cold coastal waters (NOAA 2015b).	**Not Expected.** While humpback whales have occasionally been observed in the Sacramento River, this is an uncommon occurrence, and is believed only to happen when the whales become disoriented during migration.	**Unlikely.** Straying up the San Joaquin River to Stockton is unlikely.
Zalophus californianus California sea lion	None/ None	California sea lions are found in shallow coastal and estuarine waters along the Pacific coast of the United States and Mexico, and can be found as far north as British Columbia. They breed primarily in the southern extent of their range (NOAA 2015a).	**Possible.** May be present in the Sacramento or the San Joaquin River; however, they are relatively uncommon	**Possible.** See description for the RVARC site.
Phoca vitulina Harbor seal	None/ None	Harbor seals are found along the Pacific coast and are non-migratory. They live in temperate coastal and estuarine habitat and frequently sun themselves along the shoreline (e.g., beaches, rocks, docks) (NOAA 2015c)	**Possible**. No documented occurrences near either project site, but they have been found in other parts of the Delta.	**Not Expected.** Harbor seals have been observed in the Delta, but not in the mainstem of the San Joaquin River.

Status Legend

Federal:

FE = federally listed as endangered

FT = federally listed as threatened
FPE = federally proposed as endangered
FPT = federally proposed as threatened
FC = federal candidate for listing as threatened or endangered
FSC = federal species of concern
MMPA = Marine Mammal Protection Act

State:
SE = state listed as endangered
ST = state listed as threatened
SC = state candidate for listing as threatened or endangered
CSC = California species of special concern
FP = California fully protected

Note: DPS = Distinct Population Segment

8.2 Regulatory Setting

Much of the regulatory setting relevant to fisheries is described in other chapters of this Draft EIR/EIS. Please refer to the following chapters for the descriptions of the following laws, regulations, and policies:

Chapter 7, *Biological Resources – Terrestrial*

- Clean Water Act of 1972 Section 404;
- Rivers and Harbors Act of 1899 Section 10;
- Federal Endangered Species Act of 1973 Sections 7 and 9 (as amended);
- California Environmental Quality Act Section 15380;
- California Endangered Species Act of 1985; and
- California Fish and Game Code Sections 1600 et seq.

Chapter 12, *Hydrology and Water Quality*:

- California Porter–Cologne Water Quality Control Act of 2006 Section 401.

This section continues with a brief description of other regulations that are applicable to fisheries resources.

8.2.1 Magnuson–Stevens Fishery Conservation and Management Act

The Magnuson–Stevens Fishery Conservation and Management Act (Magnuson–Stevens Act) of 1976 is the primary ordinance that governs federal management of fisheries in federal waters, from the 3-nautical-mile State territorial sea limit to the outer limit of the U.S. Exclusive Economic Zone. It establishes exclusive U.S. management authority over all fishing within the Exclusive Economic Zone; all anadromous fish throughout their migratory range, except when in a foreign nation's waters; and all fish on the continental shelf. The Magnuson–Stevens Act establishes eight Regional Fishery Management Councils responsible for the preparation of fishery management plans to achieve the optimum yield from U.S. fisheries in their regions. The Magnuson–Stevens Act also requires federal agencies to consult with NMFS on actions that could damage essential fish habitat (EFH). EFH includes those habitats that support the different life stages of each managed species. A single species might use many different habitats throughout its life to support breeding, spawning, nursery, feeding, and protection functions. EFH can consist of both the water column and the underlying surface (e.g., streambed) of a particular area. The Sacramento River in the vicinity of the RVARC and the San Joaquin River in the vicinity of the Ryde Avenue site are designated EFH for Chinook Salmon.

8.2.2 Endangered Species Act–Critical Habitat

When a species is proposed for listing as endangered or threatened under the ESA, USFWS or National Oceanic and Atmospheric Administration (NOAA) Fisheries must consider whether areas of habitat exist that are essential to the species' conservation. Those areas might be proposed for designation as "critical habitat." Under Section 7 of the ESA, all federal agencies must ensure that any actions that they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species, or destroy or adversely modify its designated critical habitat. These requirements apply only to federal agency actions, and only to habitat that has been designated as critical. Critical habitat requirements do not apply to citizens engaged in activities on private land that do not involve a federal agency.

8.2.3 Marine Mammal Protection Act

All marine mammals are protected under the Marine Mammal Protection Act of 1972 (16 USC Chapter 31). The Marine Mammal Protection Act prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, as well as importing marine mammals and marine mammal products into the U.S.

8.3 Environmental Impacts

8.3.1 Methods of Analysis

Potential impacts on aquatic species and their habitats were evaluated by comparing the baseline conditions for the quantity and quality of habitats present in the locations of Proposed Project activities against anticipated conditions after construction of the Proposed Project. For this evaluation, direct impacts on special-status species were assessed based on the potential for the species or its habitat to be disturbed during construction or operation of the Proposed Project.

Construction

The analysis of the construction-related impacts in this chapter focuses on the potential impacts of in-water construction activities, and upland activities with potential for impacts to the aquatic environment (e.g., construction-related erosion). Construction of the marina and boat ramp for the ERS at the RVARC site would occur either (1) partially excavated in lands adjacent to the Sacramento River and within the river (Alternative 2, Configuration 1; Figure 3-1), or (2) excavated in lands adjacent to the river and allowed to flood once construction is complete (Alternative 3, Configuration 2; Figure 3-2). At the Ryde Avenue site in Stockton, the marina would be excavated adjacent to the San Joaquin River and would then be flooded once construction is complete (Figure 3-3). A raw water intake and discharge outfall for FTC aquaculture operations would also be constructed on the riverbank. Other construction associated with DRS (e.g., research and office buildings, storage buildings) would be performed in upland areas.

Construction activities in or near water can cause a range of short- and long-term effects on fish and aquatic resources. Short-term effects associated with construction-related activities are typically limited to the immediate disturbance area and duration of construction. Short-term, construction-related effects might include the following:

- generation of underwater sound/pressure (i.e., hydroacoustic effects);
- increased turbidity, sedimentation, and erosion; note, however, that these changes may be beneficial for some native species such as Delta Smelt and Longfin Smelt (Feyrer et al. 2007).
- direct physical injury to aquatic species;
- habitat alteration;
- alteration in behavior of special-status aquatic species or potential predators of special-status aquatic species; and
- inadvertent spills or release of hazardous materials.

Long-term effects are those that result in adverse changes to habitat variables that reduce the suitability of aquatic habitat over a longer time period.

Overall, potential effects on fish and aquatic resources resulting from proposed construction activities were qualitatively assessed by identifying key effect mechanisms and evaluating the likelihood of those effects to harm fish or other aquatic resources. Effects assessment methods rely on an understanding of potential effect mechanisms, general construction activities and timing, and a detailed understanding of species habitat use and life history characteristics. The potential effect mechanisms associated with construction activities that are evaluated as part of this effects assessment are described within the individual impact discussions.

Operations

Impacts on aquatic species associated with operations might include both physical and ecological effects. The evaluation of operations addresses the potential impacts on species health and aquatic habitat within the affected area. When possible, impact significance was evaluated using published accounts, available grey literature (i.e., resources produced by public or private entities that are not controlled by commercial publishers. These resources are typically not subject to the same standards of peer-review as scientific journals or text books), and current state and federal recommendations. In some cases, significance was qualitatively assessed by applying available information to a specific operations impact.

Collection of eggs and/or juveniles to serve as donor stock for the fish to be studied at the FTC has potential to reduce the viability of donor populations or other aquatic species and habitats. This can occur due to habitat disturbance during collection, direct mortality to juveniles, eggs, or adult fish, and by reducing the number of remaining eggs and/or juveniles. Prior to collection, USFWS may be required to obtain an ESA Section 10(a)(1)(A) permit, which would include conditions designed to be protective of the species in question and non-target species, including take totals and monitoring criteria for collection from naturally spawning donor stock populations. Because the species to be propagated at the FTC are not definitively defined, and plans for collection of eggs and/or juveniles for stock are not developed, impacts associated with collection of stock are considered speculative and have not been evaluated. Impacts would be considered in the future as plans for the FTC are further developed.

8.3.2 Significance Criteria

An alternative would have a significant impact on fisheries and other aquatic resources if it would:

- Cause the substantial loss of the population of a federally- or state-listed, proposed, or candidate species, either through direct or indirect loss, as a result of modification of the habitat of such a species resulting in increased mortality or decreased reproductive success;
- Cause the substantial loss or long-term degradation of any environmentally sensitive habitat for fish species;
- Cause a substantial disturbance to fish species resulting from human activities;
- Result in avoidance by fish of biologically important habitat for substantial periods, which may increase mortality or reduce reproductive success;
- Substantially interfere with the movement of any resident or migratory fish species;
- Cause a change in species distribution or abundance of a sensitive community; or
- Cause a change in local and regional distribution and extent of the fisheries resource.

8.3.3 Environmental Impacts and Mitigation Measures

Impact FISH-1: Hydroacoustic Effects on Fish and Marine Mammals during Construction.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be construction activities that could cause hydroacoustic impacts on fisheries resources. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Estuarine Research Station

Effects on Fish. Instream construction for the proposed marina would include installation of approximately 30–35 new pilings to secure floating docks and slips. The installation of the new pilings would most likely involve driving the pilings into the riverbed with an impact hammer, which would generate underwater sound–pressure waves. The type of material of which the piles would be constructed is not known at this time, and can affect the extent of pile driving needed.

Pressure waves generated from pile driving have potential to cause adverse physiological effects on fish and marine mammals, including damage to internal organs, over relatively long distances (Washington et al. 1992). Adverse impacts can be caused by extended exposure to low-level noise or by exposure to higher level noise for a shorter period of time. Hydroacoustic impacts on fish can include auditory and non-auditory (e.g., fish bladder, capillaries, eyes) tissue damage, neurotrauma, and temporary or permanent hearing loss, reducing fitness, "which may increase the animal's vulnerability to predators and result in the fish's inability or reduced success in locating prey, inability to communicate, or inability to sense their physical environment" (ICF International Jones & Stokes, and Illingworth and Rodkin 2009). Exposure level and distance from sound, length of exposure, and fish size and anatomy can influence the severity of the impact, with smaller fish being more susceptible to damage. Eggs, larvae, and juvenile fish might be affected more acutely than other life stages because they lack the physical ability, or have reduced ability compared to adults, to move away from loud noise (ICF International Jones & Stokes, and Illingworth and Rodkin 2009). Pile driving has been identified as a specific threat to Pacific Coast Chinook Salmon EFH (Stadler et al. 2011) and might reduce the availability of important resources, such as food, because of substrate disturbance or impeded fish passage.

Table 8-2 lists special-status species with the potential to occur in the vicinity of the RVARC site, and Table 8-1 shows the seasonal timing of their presence. Instream and streambank activities associated with pile driving for marina construction could directly impact these species, including special-status species such as Delta Smelt, Green Sturgeon, and salmonids, if they are present in the river during construction. Construction-related impacts could potentially include mortality, internal damage or impaired behavior, decreased foraging success, and increased predation risk. The impact of pile-driving activity is considered to be a potentially significant impact on these species. Implementation of **Mitigation Measure FISH-1a (In-Water Work Period)** would reduce potential hydroacoustic impacts of instream work activities by avoiding the spawning period of special-status fish species. Because no seasonal restriction exists that can avoid all life stages of the special-status species that may be present in the area (e.g., Delta Smelt, Green Sturgeon), implementation of **Mitigation Measure FISH-1b (Minimize Hydroacoustic Effects of Pile Driving)** would also be required to limit the pile-driving activity to exposure thresholds for which injury to these species is not anticipated. Implementation of these mitigation measures would reduce this impact to a level that is less–than-significant with mitigation.

Effects on Marine Mammals. Installation of the pilings during marina construction would result in vibrations which could disturb marine mammals that are present when construction is taking place. Based on underwater studies of gray whale behavior, a disturbance threshold (Level B harassment) of 160 dB_{RMS} (decibels Root Mean Square) has been identified for marine mammals (*Federal Register* 2006). Marine mammal exposure to sound at this level would likely cause avoidance, but not injury. The current Level A harassment (injury) threshold for non-explosive sounds is 180 dB_{RMS} for cetaceans and 190 dB_{RMS} for pinnipeds, from a distance of less than 10 meters**.** Exposure to sound levels that meet or exceed the Level A harassment threshold is considered a potentially significant impact on marine mammal species. Implementation of **Mitigation Measure FISH-1c**

(Minimize Hydroacoustic Effects of Pile Driving on Marine Mammals) would reduce this impact to a level that is less-than-significant with mitigation.

Mitigation Measure FISH-1a: In-Water Work Period (Alternatives 2, 3, and 4 – ERS)

In-water construction and maintenance operations shall be limited to the period from July 1 to November 1 to minimize adverse effects on special-status fish spawning and migration. This work period shall be confirmed in consultation with USFWS and NMFS based on hydrologic and biological conditions for the year(s) of construction and maintenance.

Mitigation Measure FISH-1b: Minimize Hydroacoustic Effects of Pile Driving on Fish (Alternatives 2, 3, and 4 – ERS)

The NMFS Pile Driving Calculator shall be used to estimate the potential underwater noise-related effects on fish species for Proposed Project construction. An iterative approach would be used to determine the number of pile strikes that could be made within a 12-hour period without surpassing the peak sound pressure level (peak) and cumulative sound exposure level (SEL) thresholds established in the Technical Guidance for Assessment and Mitigation of Hydroacoustic Effects of Pile Driving on Fish (ICF Jones & Stokes, and Illingworth and Rodkin 2009). Pile driving with an impact hammer shall be limited to the number of strikes per 12 hours that is below the peak and cumulative SEL. The number of strikes shall be recorded by a NMFS/USFWS-approved monitor and reported to NMFS and USFWS on request or in a post-construction compliance report. Attenuation devices (e.g., bubble curtains) may be used to increase the allowable number of strikes per 12-hour period based on assessment of the potential decrease in the peak and SEL achieved with the use of the device(s), as determined by a NMFS/USFWS-approved noise assessor and/or noise monitoring equipment.

Mitigation Measure FISH-1c: Minimize Hydroacoustic Effects of Pile Driving on Marine Mammals (Alternatives 2 and 3 – ERS).

Prior to commencing construction, a marine mammal safety zone (MMSZ) shall be delineated based on an assessment of the methods and type of pile driving activities that will be used for marina construction. Delineation of the MMSZ shall be based on information provided in the Technical Guidance for Assessment and Mitigation of Hydroacoustic Effects of Pile Driving on Fish (ICF Jones & Stokes, and Illingworth and Rodkin 2009), or guidance from NMFS. A visual survey for marine mammals within the MMSZ shall be conducted by a qualified biologist prior to commencing pile driving. Pile driving will only occur if the biologist confirms that there are no marine mammals visible in the MMSZ. The qualified biologist shall designate a monitor from the construction contractor to observe the MMSZ during pile driving. The designated monitor and all construction personnel shall be trained in the identification of marine mammals. The designated monitor shall stop pile driving activities if marine mammals move into the MMSZ. No pile driving will be allowed to continue until the animal(s) have left the MMSZ.

Fish Technology Center

Instream work activities for construction of FTC facilities would include excavation in the shoreline area, possibly dewatering, and placement of shoreline protection. These activities are not anticipated to require the use of impact pile driving equipment or other activities that could result in the generation of substantial hydroacoustic impacts (i.e., hydroacoustic disturbance level would remain below the 160 dB_{RMS} threshold for significance: see discussion above). These activities would have less than significant impacts on fish and marine mammals.

Delta Research Station

The impacts on aquatic resources from construction of the DRS would be as described above for the ERS and FTC. See the above for more detailed information. Implementation of Mitigation Measure FISH-1a would reduce potential impacts of instream work activities by avoiding the spawning period of special-status fish species. Implementation of Mitigation Measures FISH-1b and FISH-1c would limit the pile-driving activity to below exposure thresholds at which there is injury to special-status aquatic species. Implementation of these mitigation measures would reduce this impact to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Estuarine Research Station

Under Alternative 3, the marina would be excavated off the main channel. Piles would be driven into the ground before the marina is connected to the main channel, but such pile driving could still create pressure waves that transmit through the ground into the water and affect fish in the area.

The temporary impact of near-water pile driving might result in significant adverse hydroacoustic effects on fish or marine mammals. Implementation of Mitigation Measures FISH-1a through FISH-1c would reduce potential hydroacoustic impacts to a level that would be less than significant with mitigation.

Fish Technology Center

Instream work activities for construction of FTC facilities would include excavation in the shoreline area, possibly dewatering, and placement of shoreline protection. These activities are not anticipated to require the use of impact pile driving equipment or other activities that could result in the generation of substantial hydroacoustic impacts (i.e., hydroacoustic disturbance level would remain below the 160 dB_{RMS} threshold for significance: see discussion above). These activities would have less than significant impacts on fish and marine mammals.

Delta Research Station

The impacts on fisheries resources and marine mammals from construction of the DRS would be as described above for the ERS and FTC. See the above for more detailed information. Implementation of Mitigation Measure FISH-1a would reduce potential impacts of instream work activities by avoiding the spawning period of special-status fish species. Mitigation Measures FISH-1b and FISH-1c would limit the pile-driving activity to below exposure thresholds at which there is injury to special-status aquatic species. Implementation of these mitigation measures would reduce this impact to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Estuarine Research Station

Alternative 4 would have impacts similar to those of Alternative 3, except they would be in the San Joaquin River instead of the Sacramento River, where special-status fish may similarly be present. Marine mammals are unlikely to occur in this area. The impact of near-water pile driving could result in significant adverse hydroacoustic effects on these species. Implementation of Mitigation Measures FISH-1a and FISH-1b would reduce potential hydroacoustic impacts to a level that is less than significant level with mitigation.

Fish Technology Center

Instream work activities for construction of FTC facilities would include excavation in the shoreline area, possibly dewatering, and placement of shoreline protection. These activities are not anticipated to require the use of impact pile driving equipment or other activities that could result in the generation of substantial hydroacoustic impacts (i.e., hydroacoustic disturbance level would remain below the 160 dB_{RMS} threshold for significance; see discussion for Alternative 2 above). These activities would have less than significant impacts on fish.

Delta Research Station

The impacts on fisheries resources from construction of the DRS would be as described above for the ERS and FTC. See the above for more detailed information. Implementation of Mitigation Measure FISH-1a would reduce potential impacts of instream work activities by avoiding the spawning period of special-status fish species. Implementation of Mitigation Measure FISH-1b would limit the pile-driving activity to below exposure thresholds at which there is injury to species of concern. Implementation of these mitigation measures would reduce this impact to a level that is **less than significant with mitigation**.

Impact FISH-2: Effect of Removal of Existing Piers and Piles.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no removal of existing piers and piles, and hence **no impact**.

<u>ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1</u>

Estuarine Research Station

Under Alternative 2, construction of the proposed marina would require removal of some of the existing docks, piers, and/or or pilings within the main channel of the Sacramento River adjacent to the site. Reconnaissance-level site assessment and the age of the structures (estimated by the known historical uses at the site) suggest that these structures are constructed of creosote-treated wood. Creosote contains polycyclic aromatic hydrocarbons (PAH), which contain carcinogenic metabolic intermediates that might cause developmental toxicity under prolonged exposure (Poston 2001). PAHs could leach into the water column and contaminate the sediments that surround the pilings.

Removing creosote-treated piles is generally considered beneficial for fish and their habitat. Removing marine debris, such as creosote piles, is an objective for restoring subtidal habitat in the San Francisco Estuary (California Coastal Conservancy 2010), and piles are frequently removed to mitigate other impacts on aquatic habitats. Although piles and piers might provide structure and complexity to aquatic habitat, these types of positive effects are typically observed from naturally occurring woody debris, such as fallen limbs or trees (Shirvell 1990). Moreover, non-native predators could congregate around piers and piles (see Impact FISH-5).

Pile removal might result in temporary impacts on fish by increasing turbidity (see Impact FISH-4) and could mobilize contaminated sediments. In Australia, it was found that removing a creosote piling released significant amounts of PAHs into the water column, and higher levels of PAHs were found in the sediment surrounding the removed pilings for up to 6 months (Smith 2008). Because most PAHs are found in sediment, threats to fish are mostly a result of bioaccumulation in tissues from consuming invertebrates that are contaminated, mostly those living in low-flow areas (Smith 2008). Fish eggs laid on or close to creosote piles have also been found to have reduced development, and fish exposed to PAHs have had lesions on the liver and skin lesions, abnormal reproductive results, damage to DNA, and eroded fins (Werme et al. 2010).

Pile removal activities resulting in adverse effects to special-status fish (e.g., disturbance of spawning activity, acute exposure to high concentrations of hazardous chemicals) would be considered potentially significant. Implementation of Mitigation Measures FISH-1a and **FISH-2 (Adhere to Best Management Practices When Removing and Disposing of Creosote Piles)** would minimize potential temporary adverse impacts of pile removal on fish and their habitat by avoiding work during spawning periods and using BMPs to minimize environmental impacts associated with releasing harmful chemicals into the aquatic ecosystem during creosote pile removal. Implementation of these mitigation measures would reduce this impact to a level that is less than significant with mitigation. It is anticipated that removing creosote piles will result in long-term beneficial impacts by restoring soft-bottom aquatic habitat and removing sources of PAH contamination to the San Francisco Estuary. This will also result in a net beneficial impact on designated critical habitat and EFH.

Mitigation Measure FISH-2: Adhere to Best Management Practices When Removing and Disposing of Creosote Piles (Alternatives 2 and 3 – ERS).

Removing and disposal of piles shall be completed in accordance with the Washington State Department of Natural Resources' *Best Management Practices for Pile Removal and Disposal* (2007) (Appendix F). Modifications to these BMPs may be made subject to approval by RWQCB, CDFW, NMFS, and/or USFWS, provided that the modifications are equally or more protective of special-status fish species.

Fish Technology Center

Instream work activities for construction of FTC facilities are not anticipated to require removal of creosote-treated piles. There would be no impact.

Delta Research Station

The impacts on fisheries resources from construction of the DRS would be as described above for the ERS and FTC. See the above for more detailed information. Implementation of Mitigation Measures FISH-1a and FISH-2 would minimize potential short-term adverse impacts of pile removal on fish and their habitat by avoiding work during spawning periods and using BMPs to minimize environmental impacts associated with releasing harmful chemicals into the aquatic ecosystem during creosote pile removal. Implementation of these mitigation measures would reduce this impact to a level that is **less than significant with mitigation**. It is anticipated that removing creosote piles will result in long-term beneficial impacts by restoring soft-bottom aquatic habitat and removing sources of PAH contamination to the San Francisco Estuary. This will also result in a net beneficial impact on designated critical habitat and EFH.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, construction of the marina entrance channel for the ERS would most likely require the removal of creosote-treated piles and piers. This activity would have significant impacts similar to those described under Alternative 2. The FTC would not require pile removal. Implementation of Mitigation Measures FISH-1a and FISH-2 would minimize potential temporary adverse impacts of pile removal on fish and their habitat and would reduce impacts to a level that is **less than significant with mitigation**. Beneficial impacts of pile removal would be similar to those described for Alternative 2.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would not require removal of creosote-treated piles and piers; therefore, it would not have any of the potential adverse or beneficial impacts discussed under Alternatives 2 and 3. There would be **no impact**.

Impact FISH-3: Direct Effects on Special-status Fish from Other In-water and Shoreline Construction Activities.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no construction, and hence no impacts related to in-water or shoreline construction. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2, aside from ERS marina construction, other in-water and shoreline construction activities include construction of the intake and outfall associated with the FTC. These activities have the potential to directly impact special-status fish if they are present during construction from the mechanisms described in the methodology discussion above. Construction-related impacts might include loss of individuals, decreased foraging and/or reproductive success, increased predation risk, and restriction of access to habitat.

Impacts on the special-status fish listed in **Table 8-2** would be considered potentially significant. Implementation of Mitigation Measure FISH-1a would reduce potential impacts of instream work activities by avoiding the spawning period of special-status fish species. Because no seasonal restriction exists that can avoid all life stages of special-status fish species that may be present in the area, implementation of **Mitigation Measures FISH-3a (Construct and Maintain Fish Exclosure for Instream and Shoreline Work Areas)**, and **FISH-3b (Relocate Fish Outside of Fish Exclosure Work Area)**, would also be required to further reduce potential impacts of instream work activities by excluding and relocating fish out of instream or shoreline work areas, as feasible (exclusion of the entire marina area during construction is considered to be infeasible). Where exclusions are infeasible, implementation of **Mitigation Measure FISH-3c (Compensate for Impacts on Special-Status Fish Species and their Habitat)**, would provide compensatory mitigation for impacts that cannot be avoided by altering the timing or methods of instream and shoreline work. With implementation of these mitigation measures, this impact would be **less than significant with mitigation**.

Mitigation Measure FISH-3a: Construct and Maintain Fish Exclosure for Instream and Shoreline Work Areas (Alternatives 2, 3, and 4)

To the extent feasible, fish exclusion structures shall be constructed to isolate instream and shoreline work areas. Exclusion structures shall be constructed of woven mesh or netting with a maximum mesh opening of 3/32”. The structures shall remain in place during instream construction activities and shall be monitored daily during instream construction to ensure that they are effectively excluding fish. If the fisheries biologist determines that the exclosure has been compromised, instream construction would be halted until the biologist has repeated Mitigation Measure FISH-3b and the exclosure has been repaired and is deemed effective.

Mitigation Measure FISH-3b: Relocate Fish Outside of Fish Exclosure Work Area (Alternatives 2, 3, and 4)

Once the fish exclusion structure is constructed, qualified fisheries biologists shall survey the exclosure by making a minimum of three passes with dipnets, seines, or by electrofishing, using the protocols established by NMFS (2000). All fish captured, including special-status species, will be placed into a suitable holding container of cool, aerated stream water and then relocated at least 150 feet down-current of the construction area.

Mitigation Measure FISH-3c: Compensate for Impacts on Special-Status Fish Species and their Habitat (Alternatives 2, 3, and 4)

DWR and USFWS shall implement measures to compensate for impacts on special-status fish and their habitat that cannot otherwise be avoided or minimized. Compensation measures may include purchase of credits at an approved conservation bank or a site-specific mitigation plan. The type and quantity of mitigation shall be commensurate with the estimated amount of take of a species, the total area of disturbance, and the resultant impacts (direct and indirect) to special-status fish species as determined though consultation with CDFW, USFWS, and/or NMFS. If site-specific compensation measures are implemented, monitoring shall be conducted annually for 5 years to assess the mitigation's effectiveness. The performance standard for the mitigation shall be no net loss of habitat and no decline in the viability of fish populations resulting from Proposed Project actions. As a guideline, mitigation ratios shall be 1:1 (mitigation to impact) at a minimum.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Estuarine Research Station

Under Alternative 3, the marina would be constructed off the main Sacramento River channel. An earthen berm would separate the marina construction area until construction is complete, at which time the berm would be breached to allow water into the marina. There could be some instream construction for the marina access channel and breaching of the berm. These activities could result in potentially significant impacts on special-status fish, particularly when the berm is breached to allow water into the marina. Implementation of Mitigation Measure FISH-1a, Mitigation Measures FISH-3a through FISH-3c, and **FISH-3d (Minimize Impacts on Fish and Water Quality during Connection of Off-channel Marina),** which requires a controlled breaching of the berm such that fish would not be drawn quickly into the marina basin, would reduce potential impacts to a level that is less than significant.

Mitigation Measure FISH-3d: Minimize Impacts on Fish and Water Quality during Connection of Off-channel Marina (Alternatives 3 and 4 – ERS)

The connection of an off-channel marina to live waters in the adjacent river channel shall be accomplished in a manner that does not result in abrupt changes in water quality or flow conditions (e.g., velocity surge). This shall be accomplished by pumping water into the basin before breaching to equilibrate water levels with the adjacent river, or by other means deemed protective of fish and water quality by a qualified biologist. If water is pumped into the marina basin from the adjacent river to equilibrate water levels, the pumps shall be outfitted with screens with a maximum mesh opening of 0.094 inch to prevent entrainment of special-status fish species, and operated in accordance with NMFS' Water Drafting Specifications (NMFS 2001 or current guidance).

Fish Technology Center

Construction of the FTC outfall under Alternative 3 would have impacts similar to those described under Alternative 2. Please refer to the above discussion for details. Implementation of Mitigation Measure FISH-1a and Mitigation Measures FISH-3a through 3c would reduce these potential impacts to a level that is less than significant with mitigation.

Delta Research Station

The impacts on fisheries resources from in-water construction of the DRS would be as described above for the ERS and FTC. See the above for more detailed information. Implementation of Mitigation Measure FISH-1a and Mitigation Measures FISH-3a through FISH-3d would reduce these potential impacts to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would have impacts similar to those described under Alternative 3. Please refer to the above discussion for details. Implementation of Mitigation Measure FISH-1a and Mitigation Measures FISH-3a through FISH-3d would reduce these potential impacts to a level that is **less than significant with mitigation**.

Impact FISH-4: Effects of Sedimentation and Turbidity on Fish and Their Habitat Resulting from Construction Activity.

Construction-related increases in sedimentation and siltation above background levels could potentially affect some fish species and their habitat by reducing egg and juvenile survival; interfering with feeding activities; causing a breakdown of social organization; irritating sensitive tissues, such as gill and eye membranes; and reducing primary and secondary productivity, which could alter the food web on which fish rely. The magnitude of potential effects on fish depends on the timing and extent of sediment loading and flow in the river before, during, and immediately following construction.

High, chronic levels of suspended sediment can have detrimental effects on salmonid survival, growth, and health (Sigler et al. 1984; Servizi and Martens 1992; Newcombe and Jensen 1996; ICF International 2012). Berg and Northcote (1985) observed changes in social and foraging behavior and increased gill flaring (an indicator of stress) in juvenile coho salmon *O. kisutch* at moderate turbidity (30–60 nephelometric turbidity units [NTUs]). In this study, behavior returned to normal quickly after turbidity was reduced to lower levels (0–20 NTU). Note, however, that turbidity is considered a key habitat attribute for Delta Smelt (Feyrer et al. 2007).

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no construction that could lead to sedimentation and turbidity. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Turbidity is a measure of water clarity; how much the material suspended in water decreases light passage through water. Suspended materials include soil particles (clay, silt, and sand), algae, plankton, microbes, and other substances and the source of suspended materials can have a variety of environmental effects. Instream and shoreline construction for the DRS, such as marina, intake and outfall installation, has the potential to erode soil and increase sedimentation and turbidity in the Sacramento River adjacent to the site. Any increase in turbidity associated with construction of the marina is likely to be brief and occur only in the vicinity of the site, attenuating as suspended sediment settles out of the water column. Instream projects with a footprint larger than that of the Proposed Project have created turbidity plumes of 25–75 NTU extending up to 1,000 feet downstream of construction activities (NMFS 2006). These temporary spikes in suspended sediment could result in avoidance of the site by fish; several studies have documented active avoidance of turbid areas by juvenile and adult salmonids (Bisson and Bilby 1982; Lloyd 1987; Servizi and Martens 1992; Sigler et al. 1984). Alternatively, it has been shown that predation rates on juvenile salmonids by birds decreases under turbid conditions (White 1936), and that predation rates and turbidity can be negatively correlated (Ginetz and Larkin 1976) because fish seek shelter from predators in turbid waters. According to Sommer and Mejia (2013), Delta Smelt are not present when turbidities are less than about 12 NTU and post-larvae are strongly associated with lower Secchi depths. In a laboratory setting, Baskerville-Bridges et al. (2004) found that larval Delta Smelt feeding success increased with increased turbidity caused by suspended algal particles in the water column. Longfin Smelt are often found in higher abundance in turbid waters (Baxter et al. 2010), although very high levels might also cause decreased feeding, growth, and condition (Hobbs 2009; Robinson and Greenfield 2011).

Increased turbidity associated with suspended sediment from instream and shoreline construction has the potential to significantly adversely impact fish and aquatic resources. Implementation of Mitigation Measure FISH-1a would reduce potential impacts of sedimentation and turbidity by avoiding construction during the spawning period of special-status fish species. However, no seasonal restriction exists that can avoid all life stages of special-status fish species that may be present in the area**. Mitigation Measures HYD/WQ-2a (Monitor Turbidity during In-water Construction) and HYD/WQ-2b (Implement Turbidity Barrier Surrounding In-water Construction, if Necessary)** would ensure that turbidity levels are maintained below levels that exceed water quality standards (which are protective of fish) and implement BMPs to control the dispersal of sediment should it become necessary.

In addition, land-based construction activities, such as grading, excavation, and vegetation removal, could result in soil disturbance that could result in erosion to the Sacramento River, with resulting turbidity and sedimentation in the river. As discussed in Chapter 12, *Hydrology and Water Quality*, mandatory compliance with NPDES permits, preparation of a SWPPP, and implementation of **Mitigation Measure HYD/WQ-1 (Implement Construction Best Management Practices for Erosion Control)** would minimize the potential effects of erosion and loss of topsoil.

With implementation of the above-referenced mitigation measures, the impacts of construction-related sedimentation and turbidity on fish and their habitat would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Estuarine Research Center

Under Alternative 3, the marina would be constructed off the main Sacramento River channel. There might be some instream construction for the marina access channel and breaching of the berm. These activities could result in erosion and could generate turbidity that could result in potentially significant impacts on special-status fish, particularly when the berm is breached to allow water into the marina. Implementation of Mitigation Measures FISH-1a, FISH-3d, and HYD/WQ-2a and HYD/WQ-2b would reduce potential impacts to a level that is less than significant.

Fish Technology Center

The impacts from construction of the FTC intake and outfall would be the same as those under Alternative 2. Please see discussions above for complete details. Implementation of Mitigation Measure FISH-1a and HYD/WQ-2a and HYD/WQ-2b would reduce these impacts to a level that is less than significant with mitigation.

Delta Research Station

The impacts on fisheries resources from construction-related sedimentation and turbidity would be as described above for the ERS and FTC. See the above for more detailed information. Implementation of Mitigation Measures FISH-1a, FISH-3d, HYD/WQ-2a and HYD/WQ-2b would reduce potential impacts to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would have impacts similar to those under Alternative 3, except that impacts would occur in the San Joaquin River instead of the Sacramento River. Please refer to the above discussions for more details. Implementation of Mitigation Measures FISH-1a, FISH-3d, HYD/WQ-2a and HYD/WQ-2b would reduce potential impacts to a level that is **less than significant with mitigation**.

Impact FISH-5: Effects of Marina Facilities on Aquatic Habitat Functions.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would no marina development and hence **no impact** on aquatic habitat.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Estuarine Research Station

Aquatic habitat at the RVARC site is designated as critical habitat for Delta Smelt, Southern distinct population segment (DPS) of Green Sturgeon, California Central Valley DPS of Steelhead, and California Central Valley evolutionarily significant unit (ESU) of Spring-run and Winter-run Chinook Salmon (Figure 7-7). Under Alternative 2, development of the marina would result in permanent loss of aquatic habitat, and could result in adverse modification of aquatic habitat. Aquatic habitat would be permanently lost in the footprint of the piles used to anchor marina docks. The total area of aquatic habitat that would be lost from these piles is not known, but would be relatively small (approximately 50–80 square feet) and would be fully or partially offset by the increase in aquatic habitat from removal of existing piling. Permanent loss of aquatic habitat and adverse modification of critical habitat is considered potentially significant.

Floating docks for the marina could also alter the quality of aquatic habitat for special-status fish. Human-modified habitats can change non-native–predator functional and aggregative responses with additive impacts on native prey species (Sabal 2014). Floating docks and piles within the Sacramento River would add shade to fish habitat and alter flow, which could affect juvenile fish movement or aggregation of non-native predators, such as Striped Bass (Sabal 2014). Predatory fish in the Delta, such as Largemouth Bass (*Micropterus salmoides*) and Smallmouth Bass (*Micropterus dolomieu*), are known to congregate around in-water structures, including docks and marinas, because these structure provide cover (Ward and Nigro 1992; Rondorf et al. 2010). These predators use ambush hunting, in which they hole up in the shadow of the dock and prey on juvenile salmonids that cannot see them because of the dark habitat. Striped Bass have also been identified as predators of juvenile salmonids in the Central Valley and can have adverse impacts on migrating fish populations at artificial structures (Sabal 2014). Sabal et al. (2016) found evidence of several species of concern, including Pacific Lamprey, Chinook Salmon, and Delta Smelt, in the stomachs of Striped Bass sampled at a marina in the Delta. Striped Bass sampled from the marina had significantly more fish in their stomach contents than those from other areas. They hypothesized that the marina provided the predators with cover from flow that allowed greater success in preying on passing fish than other sites. This could lead to salmonids avoiding docks, forcing juvenile salmon into deeper waters, where they are more exposed and predation is also high.

Chinook Salmon smolts were found to avoid overhead cover in laboratory choice experiments meant to represent seaward migration (Kemp et al. 2005). Other researchers have observed that migrating Pacific Salmon avoid covered dam passages (Kemp et al.

2008); however, several other studies suggest that fish avoid shaded areas around docks because of the sharp contrast in lighting between lighted and shaded habitat and did not find increased predation rates around in-water structures (Nightengale and Simenstad 2001; Williams et al. 2003; Rondorf et al. 2010). Another study found that higher densities of Smallmouth Bass around docks generally resulted in increased predation on juvenile salmonids in those areas (Chapman 2007). Alternatively, instream complexity can provide cover for juvenile Steelhead, but these types of positive effects are typically observed in the form of woody debris, such as fallen limbs or trees (Shirvell 1990). Shade can also moderate temperatures in the river, thus creating a thermal refuge for rearing or migrating fish (Johnson 2004). Docks also block out sunlight and can reduce aquatic vegetation, thus reducing natural habitat and cover for special-status species, as well as invertebrate prey abundance and complexity resulting from the loss of habitat (Kahler et al. 2000).

Docks and pilings can also be used as perches by predatory birds that can attack and kill juvenile fish. On the Columbia River, piscivorous birds are responsible for predation of 5–15 million migrating salmonid smolts each year (Collis and Roby 2008); however, a study in Washington did not conclusively find that bird predators associated with ferry terminals consumed more juvenile salmon than those occurring at a distance from the terminals (Williams et al. 2003). Furthermore, there is no evidence that other bird predators use dock structures to hunt fish more efficiently (Chapman 2007). Pile caps can reduce the ability of avian predators to perch (Rondorf et al. 2010).

Overwater structures have been identified as a specific threat to Pacific Coast Chinook Salmon EFH (Stadler et al. 2011) and might reduce important resources, such as food, space, and access and passage, if Chinook avoid the marina docks.

Development of the marina under Alternative 2 would result in the placement of approximately 8,000–13,000 square feet of new docks in the Sacramento River. This is a relatively small area in the context of available habitat, and may be partially offset by removal of existing docks, but it could still adversely modify aquatic habitat by improving conditions for predators of special-status fish.

These are considered potentially significant impacts on special-status fish. Removing creosote-treated piers or wharfs (see Impact FISH-2) would offset the impacts of installing new docks; however, the total area of wharf and pier removal is not known at this time. Therefore, **Mitigation Measure FISH-5 (Provide Compensatory Mitigation to Offset Adverse Effects on Aquatic Habitat Functions)** would be implemented and would require that DWR coordinate with appropriate resource agencies to determine proper methods for compensating impacts to aquatic habitat. With implementation of this mitigation, impacts would be reduced to a level that is less than significant.

Mitigation Measure FISH-5: Provide Compensatory Mitigation to Offset Adverse Effects on Aquatic Habitat Functions (Alternatives 2, 3, and 4 – ERS)

To ensure no net increase in overwater structures, DWR shall coordinate with appropriate resource agencies to determine compensatory mitigation for impacts related to construction of docks. Compensatory mitigation may include removal of existing abandoned docks or wharfs in the Delta region. Compensatory mitigation shall be applied at a 1:1 ratio (i.e., 1 square foot of removal for each 1 square foot of dock developed) and such mitigation shall take into account removal of creosote-treated piers or wharfs conducted as part of the Proposed Project.

Fish Technology Center

The FTC would not involve development of a marina; therefore, there would be **no impact**.

Delta Research Station

Impacts from construction of the DRS would as described above. Please see the discussion above for more details. Implementation of Mitigation Measure FISH-5, which requires that docks be constructed of materials that maximize light transfer, would reduce potential adverse effects of constructing new docks. With implementation of this mitigation measure, this impact would be **less than significant with mitigation.**

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Estuarine Research Station

Development of an off-channel marina would adversely affect special-status fishes similar to that of the partially excavated marina as described above for Alternative 2, such as by creating habitat that favors invasive or predator species.

In addition, off-channel marinas are known to cause an increase in invasive aquatic vegetation resulting from poor water circulation. Non-native invasive plant species in the Delta, such as water hyacinth (*Eichhornia crassipes*) and Brazilian waterweed (*Egeria densa*), can quickly colonize newly created aquatic habitat and exclude native aquatic vegetation. Many invasive plant species create habitat different from the natural state of the Delta, where invertebrate abundance and complexity decrease (Toft et al. 2003). Water hyacinth has also been shown to decrease DO levels (Madsen 1997), further degrading the habitat of special-status fish. Increased non-native invasive plant species could also affect food resources by increasing less desirable invertebrate prey species and decreasing water quality by decreasing DO.

Mitigation Measure FISH-5 which requires that proper methods are employed for compensating impacts to aquatic habitat, would be implemented to reduce potential adverse effects of constructing new docks. With implementation of this mitigation, impacts would be reduced to a level that is less than significant with mitigation.

Fish Technology Center

The FTC would not involve development of a marina; therefore, there would be no impact.

Delta Research Station

Impacts from construction of the DRS would as described for Alternative 2 above. Implementation of Mitigation Measure FISH-5, which requires proper methods are employed for compensating impacts to aquatic habitat, would reduce potential adverse effects of constructing new docks. With implementation of this mitigation measure, this impact would be reduced to a level that is **less than significant with mitigation.**

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would have impacts similar to those under Alternative 3, except that they would occur along the San Joaquin River. Refer to the discussion for Alternative 2 for more details. Implementation of Mitigation Measure FISH-5 which requires that proper methods are employed for compensating impacts to aquatic habitat, would reduce potential adverse effects of constructing new docks. With implementation of this mitigation measure, this impact would be reduced to a level that is **less than significant with mitigation.**

Impact FISH-6: Effects on Freshwater Marsh and Riparian Habitat.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no changed or new activities that could have impacts on freshwater marsh or riparian habitat. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2, development of the ERS marina, the FTC intake and outfall, and possibly other DRS facilities may result in temporary and permanent impacts on tidal freshwater marsh and riparian vegetation along the shoreline of the Sacramento River. Instream and streamside vegetation serve important roles in aquatic ecosystems. Riparian vegetation can provide a shade canopy that buffers water temperature, decreases erosion, and/or provides cover from predators (Murphy and Meehan 1991, McCormick and Harrison 2011, Wootton 2012). Streambank vegetation might also provide allochthonous (i.e., derived from outside the system) nutrient inputs, such as terrestrial invertebrates and leaf litter, which provide food for fish either directly or indirectly by increasing production of detritivorous (i.e., eating dead organic matter) aquatic invertebrate prey (Allan et al. 2003, Kawaguchi et al. 2003, Baxter et al. 2005). Loss of riparian vegetation could result in reduced instream habitat availability, increased predation, and reduced prey availability (DeVore et al. 1980, Birtwell et al. 1984, Fischer et al. 2010).

Temporary and permanent loss of tidal freshwater marsh and riparian habitat would be considered potentially significant. Implementation of **Mitigation Measures BIO-7a (Minimize Area of Disturbance of Riparian Habitat)** and **BIO-7b (Develop and Implement a Restoration Plan for Riparian Habitat and Sensitive Natural Communities Disturbed during Construction),** described in Chapter 7, *Biological Resources – Terrestrial*, would minimize disturbance to these habitats and compensate for permanent loss. Implementation of these mitigation measures would reduce this impact to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The impacts of Alternative 3 would be similar to those of Alternative 2, although the primary impact associated with the marina would be related to the access channel, as the majority of the marina facilities would be excavated in an upland location that does not contain riparian for tidal freshwater marsh habitat. This impact is considered potentially significant. Implementation of Mitigation Measures BIO-7a and BIO-7b would reduce this impact to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Construction of the ERS marina access channel and FTC intake and outfall would disturb the shoreline area along the San Joaquin River, which is characterized by riprap with sparse vegetation and a few trees (see photos in Appendix E). Impacts on these areas would not result in a substantial loss of riparian habitat or freshwater marsh; therefore, they would be **less than significant**.

Impact FISH-7: Risk of Release of Construction-Related Hazardous Materials, Chemicals, and Waste into Water, Potentially Harming Fish.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no construction and hence **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Construction of the DRS would require the use of heavy equipment operating along the shoreline or in waters of the Sacramento River. The release of hazardous substances (e.g., fuel, lubricants, hydraulic fluid, and concrete) into waters during construction activities can harm fish, associated prey (e.g., invertebrates), and habitats (NMFS 2006). Petroleum products also tend to form oily films on the water surface that can reduce DO levels to those that are stressful or fatal to fish (NMFS 2006). Acute effects of exposure to toxic substances might include physiological stress or direct mortality of fish and other aquatic organisms (NMFS and USFWS 1998). If chemicals remain in the system, they could have long-term adverse effects on river ecosystems (ICF International 2012).

During in-water construction, a direct spill into the Sacramento River or spills on land that are washed into the river by storm runoff could result in potentially significant impacts. **Mitigation Measure HYD/WQ-3 (Implement Construction-Related Best Management Practices for Hazardous Materials and Waste Management)** would require proper hazardous materials storage, use, transport, and disposal and would require implementation of specific BMPs. Implementation of these mitigation measures would reduce these impacts to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Impacts under Alternative 3 would be similar to those of Alternative 2 and are considered potentially significant. Mitigation Measure HYD/WQ-3 would require proper hazardous materials storage, use, transport, and disposal and would require implementation of specific BMPs. Implementation of these mitigation measures would reduce these impacts to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would have impacts similar to those under Alternatives 2 and 3, except that they would occur in the San Joaquin River. Please refer to the above discussion for more details. Mitigation Measure HYD/WQ-3 would reduce these impacts to a level that is **less than significant with mitigation**.

Impact FISH-8: Effects of Maintenance Dredging on Special-Status Fish and Their Habitat.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no maintenance dredging and hence **no impact**.

ALTERNATIVES 2, 3 AND 4

Estuarine Research Station

The ERS marina would require periodic maintenance dredging to maintain adequate depths for watercraft. Maintenance dredging is expected to be required over a relatively small area once every 10–15 years.

Dredging can cause direct mortality to fish through entrainment in the equipment, as well as by burying fish eggs that might be present in the area. Dredging can also block fish movement, destroy spawning habitat, and reduce the quality and quantity of shallow-water habitat (USFWS 1995). Dredging disturbs sediments and increases turbidity, and could potentially release hazardous pollutants contained in the sediment into the water column. The effects of sedimentation and turbidity on fish are discussed in Impact FISH-4, and of hazardous materials in Impact FISH-7. Dredging activities temporarily disturb the benthic community, which can have short-term adverse effects on prey availability and food web dynamics.

The potential impacts of maintenance dredging on special-status fish and their habitats are considered significant. Implementation of Mitigation Measure FISH-1a would reduce potential impacts of instream work activities by avoiding the spawning period of special-status fish species. Mitigation Measures HYD/WQ-2a and HYD/WQ-2b would ensure that turbidity levels are maintained below those that exceed water quality standards (which are protective of fish) and would require that BMPs be implemented to control the dispersal of sediment, should it become necessary. Finally, Mitigation Measure FISH-3c would provide compensatory mitigation for impact on aquatic habitat. With implementation of these mitigation measures, this impact would be at a level considered less than significant with mitigation**.**

Fish Technology Center

The need for maintenance dredging of the FTC intake and outfall is not anticipated; there would be no impact.

Delta Research Station

Impacts from operation of the DRS would be as described above for the ERS and FTC. See the above for more detailed information. Implementation of Mitigation Measures FISH-1a**,** HYD/WQ-2a, HYD/WQ-2b, and FISH-3c would reduce impacts to a level that is **less than significant with mitigation**.

Impact FISH-9: Inadvertent Propagation or Spread of Invasive or Nuisance Species during Construction and Operations.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no construction or new/changed operations that could lead to inadvertent propagation or spread of invasive or nuisance species. There would be **no impact**.

ALTERNATIVES 2, 3 AND 4

Estuarine Research Station

Marine vessels and equipment are known vectors of aquatic invasive species (AIS) (CDFG 2008). Spread of AIS, including various plants, such as Brazilian waterweed and water hyacinth, and invertebrates, such as Overbite Clam (*Potamocorbula amurensis*) and Zebra Mussel (*Dreissena polymorpha*) and Quagga Mussel (*Dreissena bugensis*), can alter and degrade aquatic habitat functions through various physical and biological mechanisms. For example, invasive mollusks are known to remove substantial amounts of phytoplankton in the water column, thereby causing cascading effects in the aquatic food web.

In-water construction of the ERS marina would require the use of equipment that arrives at the site from unknown locations. This equipment could be infested with AIS not previously introduced to the waters near the site. Introduction of new AIS or the spread of known AIS would be considered a significant impact**. Mitigation Measure FISH-9 (Identify and Inspect All Marine Construction Equipment before Mobilization),** would minimize the potential for the spread of AIS by construction equipment such that impacts would be reduced to a level that is less than significant.

Mitigation Measure FISH-9: Identify and Inspect All Marine Construction Equipment before Mobilization (Alternatives 2, 3, and 4 – ERS).

Before mobilizing marine construction equipment to the site, the construction contractor shall be required to identify all equipment that would be used for in-water construction and provide documentation for the general use and location of the equipment for the previous 6 months. The contractor shall provide recent photographs of the condition of the equipment and allow the equipment to be inspected before mobilization. If DWR and USFWS have reason to believe that the equipment could serve as a vector for AIS, the contractor shall be required to clean all construction equipment in accordance with CDFW protocol (Appendix G, *CDFW Protocols for Decontamination and Monitoring of Aquatic Invasive Species*) before mobilizing the equipment to the Proposed Project site. This protocol describes AIS species of concern, identification methods, monitoring guidelines, reporting requirements, and methods by which to decontaminate watercraft.

The ERS marina would be operated in accordance with established IEP and CDFW protocols for decontamination and monitoring of AIS (Appendix G). In addition to having these measures in place, the ERS would construct a boat/equipment wash-down area in the parking lot adjacent to the proposed boat repair shop (Figure 3-1). With these measures in place, the potential impact from the spread of AIS during site operations is considered less than significant with mitigation.

Fish Technology Center

In-water construction of the FTC intake and outfall may require the use of equipment that arrives at the site from unknown locations. This equipment could be infested with AIS not previously introduced to the waters near the site. Introduction of new AIS or the spread of known AIS would be considered a significant impact. Mitigation Measure FISH-9 would minimize the potential for the spread of AIS by construction equipment such that impacts would be reduced to a level that is less than significant with mitigation.

Aquaculture facilities provide suitable habitat for various forms of AIS, particularly invertebrates, such as the New Zealand Mud Snail (*Potamopyrgus antipodarum)*, Quagga Mussel, and Zebra Mussel. These invasive mollusks are known to dramatically alter aquatic communities in which they become established (Arango et al. 2009; Alonzo and Castro-Diez 2012). Both Quagga and Zebra mussels are filter feeders, capable of removing substantial amounts of phytoplankton and suspended particulate matter from the water. This can cause cascading effects in the aquatic food web. New Zealand Mud Snail colonies also disrupt the base of the food chain by competing with other bottom-dwelling (benthic) invertebrates (small aquatic insects) for algal food sources (Richards et al. 2001; Riley et al. 2008). Because New Zealand Mud Snails are rarely consumed by fish and might be resistant to digestion, dominance of this species in benthic invertebrate assemblages can reduce fish prey abundance (Benson 2006).

Quagga and zebra mussels are of particular concern because they colonize hard surfaces within aquaculture facilities and could clog pipes, screens, aeration devices, and water intake structures. Once established within the facilities, these species might be released downstream with return-flow discharges. Although these species are not currently present in the Delta, if they were to be introduced at the FTC, there is a potential for FTC operations to spread them.

Operations of the FTC would require implementation of a Hazard Analysis and Critical Control Points plan (HACCP), or similar control mechanism. The HACCP would include methods by which to prevent the introduction of AIS into the FTC and operational practices that prevent the spread of AIS within and outside of the facility, should prevention efforts fail. FTC operations would also attempt to minimize the spread of AIS by sampling to determine whether they are present and, if so, taking extra precautions to prevent spread. Sampling would be conducted on a quarterly basis at intake structures, raceway head boxes, settling ponds, and any other areas of concern. If suspect or questionable snails or mussels are found, specimens would be sent to the regional invasive-species scientist for identification (CDFG 2010). As a result, the FTC is not anticipated to result in spread of AIS and impacts would be less than significant.

Delta Research Station

Impacts from construction and operation of the DRS would be as described above. Please see discussions for the ERS and FTC for more details. Implementation of Mitigation Measure FISH-9 would minimize the potential for the spread of AIS by construction equipment such that impacts would be reduced to a level that is **less than significant with mitigation**.

Impact FISH-10: Alterations to Water Quality in the Sacramento or San Joaquin River Resulting from Process Water Discharges from the Fish Technology Center.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the FTC would not be constructed and hence there would be no process water discharges. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Estuarine Research Station

All wastewater generated by the ERS would be directed to the sanitary sewer system. There would be **no impact**.

Fish Technology Center

Water quality can be degraded as a result of discharge from aquaculture facilities (Hinshaw 1973; Selong and Helfrich 1998; Kendra 1991; Simões et al. 2008; Sindilariu et al. 2009). These impacts might include the following:

- increased water temperature,
- decreased DO,
- changes in water chemistry (pH and salinity),
- increased nutrient inputs, and/or
- increased suspended solids.

Water discharged from the FTC might also contain food, drugs, waste, algae, parasites, soluble metabolites, disease microorganisms, and/or other chemicals, all of which have the potential to alter instream water quality.

Many changes in water quality parameters associated with process water discharges have the potential to degrade aquatic habitat quality for salmonids and other taxa that are sensitive to water quality impairments, such as macroinvertebrates (Camargo 1992; Sindilariu 2007). Impaired water quality has also been associated with increased risk of fish diseases resulting from stress (Svobodová et al. 1993). The specific effects of each of the potential changes in water quality parameters on fish and aquatic habitats are discussed below.

Water Temperature

Three of the species that may potentially be housed at the FTC are Delta Smelt, Longfin Smelt, and Green Sturgeon. Delta Smelt sensitivity to water temperature ranges from 6°C to 25°C for normal activity and from 15°C to 20°C for spawning (Bennet 2005). Longfin Smelt typically spawn in temperatures ranging from 7°C to 15°C (Wang 1986), while non-spawning adults inhabit water at temperatures from 16°C to 18°C, but can be found in waters up to 20°C (Baxter 2009). Green Sturgeon function efficiently at temperatures from approximately 15°C to 19°C (Mayfield and Cech 2004), while lab experiments have shown that specific growth rates of juvenile Green Sturgeon are greater at 24°C (Allen et al. 2011).

Water temperatures in the Sacramento River at Rio Vista near the proposed RVARC outfall range from 5°C to 25°C, and average temperatures in summer months is relatively stable at approximately 21.4°C (Sacramento Rio Vista [SRV] station; CDEC 2015a). Water for FTC operations would be supplied from a groundwater well and potentially a blend of surface water to adjust for temperature or fish acclimation before release. Because of the relatively small outflows compared to those of the Sacramento River, and the fact that water temperature requirements for FTC operations are anticipated to be consistent with Sacramento River water temperatures, FTC operations are not expected to have a significant impact on river-water temperature.

Dissolved Oxygen

DO concentrations might be reduced downstream of hatcheries or aquatic research facilities relative to ambient conditions from the metabolic activity of fish or increased biological oxygen demand (BOD) from aerobic heterotrophic organisms as a result of biostimulation from nutrient outputs from the hatchery (Boaventura et al. 1997; Maillard et al. 2005; Viadero et al. 2005; Sindilariu 2007). Salmonids do well at DO concentrations of 10–11 milligrams per liter (mg/L), and some species show signs of stress when DO is lower than 7.8 mgL) (Ellis et al. 1946, Leitritz and Lewis 1980). In addition to direct effects on fish, lower DO concentrations might cause shifts in benthic macroinvertebrate assemblages, excluding sensitive macroinvertebrate taxa (ephemeropterans, plecopterans, trichopterans) and replacing them with assemblages dominated by species that are tolerant of low DO concentrations (leeches, midges, dipterans, mollusks) (Camargo et al. 2011).

DO concentrations from 2010–2014 in the Sacramento River near Rio Vista ranged from 6.6 to 11.6 mg/L (RVB station; CDEC 2015b). Typical decreases in DO as a result of trout hatchery outflows range from 1.26 to 3.2 mg/L (Sindilariu 2007). DO values below 5.0 mg/L can be stressful or fatal to many fish, including salmonids; therefore, if depressed DO resulting from discharges would fall below this level, impacts would be considered significant. The water used in the FTC would be monitored by FTC staff to ensure that the DO level water discharged from the hatchery is above 5.0 mg/L. In addition, BOD in FTC discharges, which might decrease DO levels in the Sacramento River, would be reduced through the primary filtration system of the water treatment facility, which would include filtration and disinfection systems. The outflows from the FTC would be much lower than that of typical hatcheries; therefore, it is unlikely that return flow from the FTC would substantially decrease DO concentrations in the Sacramento River relative to baseline conditions. As a result, this impact is considered less than significant**.**

Salinity and pH

Discharge from hatcheries or aquatic research facilities have the potential to cause changes in water quality, including salinity (or roughly equivalent changes in total dissolved solids concentration[1]) because these discharges might contain waste products and undigested feed that can alter water chemistry. According to McKee and Wolf (1963), the concentrations of dissolved solids which are limiting for freshwater fish are not definitely known, but might range from 5,000 to 10,000 mg/L (salinities of roughly 5–10 Practical Salinity Units [PSUs]), depending on the species and previous acclimation. Although typically occurring in freshwater habitats (salinity <0.5 PSU), Sacramento Suckers (*Catostomus occidentalis*) were captured in tidal creeks and sloughs draining into South San Francisco Bay at salinities of approximately 2.0 PSU, and Common Carp (*Cyprinus carpio*) at salinities of 2.0–6.0 PSU (Saiki and Mejia 2009). According to Moyle (2002), Bluegill (*Lepomis macrochirus*) inhabit freshwater (<1.0–2.0 PSU) but are also found in San Francisco Estuary at salinities up to 5.0 PSU, with 12 PSU being lethal. By comparison, Redear Sunfish (*Lepomis microlophus*) can live in marshes with seasonal salinities of 5.0–12 PSU, and can tolerate salinities up to 20 PSU, making them one of the most euryhaline of sunfishes (Moyle 2002). Inland Silversides (*Menidia beryllina*) are commonly found at 10–15 PSU and can survive salinities >33 PSU (Moyle 2002). Some euryhaline inland fish species (e.g., Western Mosquitofish [*Gambusia affinis*]) can even tolerate hypersaline conditions as high as 58 PSU, although they mostly occur where salinities are <25 PSU (Chervinski 1983; Moyle 2002). Chinook Salmon, Steelhead, White Sturgeon, and Green Sturgeon are anadromous species that spawn in freshwater but typically reside as adults in brackish or saline water, including the Pacific Ocean, and can tolerate a wide range of salinity. Salinity can also affect other freshwater organisms; in one study, toxic dissolved solids thresholds for stream invertebrates ranged between 2,000 mg/L (2.0 PSU) and 13,000 mg/L (13.0 PSU) (Benbow and Merritt 2004).

From 2010 to 2014, the average daily salinity measured in the Sacramento River at Rio Vista Bridge was 247 micro-mhos per centimeter (μƱ/cm), with a minimum of 90 μƱ/cm and a maximum of 5,320 μƱ/cm (SRV station; CDEC 2015a) (equivalent to approximately 173, 63, and 3,724 mg/L, respectively). Tidal variability greatly influences salinity in the western Delta, which explains the large range of values. From 1982 to 2002, the salinity at the Benicia Bridge averaged between 9.25 and 13.3 PSU (9,250 to 13,300 mg/L) (Shellenbarger and Schoellhamer 2011). CDFW assessed changes in salinity from hatchery outflows throughout California and found that, at most, salinity levels increased by 0.032 PSU (32 mg/L or about 50 μʊ/cm) (ICF International Jones & Stokes 2010). This is well below the levels that would impact most aquatic plants and animals, including special-

[1] Total dissolved solids is a measure of the combined content of all inorganic and organic substances contained in suspended form. Salinity comprises some of the ions measured in TDS.

status fish species. As a result, impacts due to changes in salinity from FTC operations, which will have outflows much less than those from typical hatchery outflows, are considered less than significant.

Nutrient Inputs

Excessive nutrient inputs can degrade water quality for fish and aquatic invertebrates, which can alter food webs and cause shifts in aquatic assemblages. Elevated nutrient concentrations (including nitrates and phosphates) might increase primary productivity, which can have cascading positive effects on grazing invertebrates and fish and their predators; however, excessive nutrient inputs might also result in harmful or invasive algal blooms or cause a shift toward dominance by heterotrophic bacteria and fungi that suppress primary production, resulting in a decrease in DO concentration as well as affecting other water quality parameters (Loch et al. 1996; Sindilariu 2007). Increases in nitrate concentrations to 10 mg/L might also lead to nitrite and ammonia toxicity in fish and invertebrates (Camargo et al. 2005).

Several studies (Kelly 1993; Fries and Bowles 2002; Sindilariu 2007) suggest that a hatchery influence on downstream nutrient levels is generally minimal, while another study (Kendra 1991) found increases in downstream nutrient levels that violated water quality standards. The Central Valley RWQCB has established water quality objectives designed to limit nutrient inputs into rivers and EPA has issued criteria for recommended nutrient levels to support healthy aquatic assemblages. In a recent evaluation of environmental impacts of hatcheries in California, CDFW used these agencies' target objectives to evaluate the effect of hatcheries on downstream nutrient levels (ICF International Jones & Stokes 2010). Based on an analysis of nitrate, orthophosphate, total nitrogen, total phosphorus, and ammonium released from California's hatcheries into California waters, CDFW concluded that nutrient discharges from hatcheries would not cause significant impacts on water quality (ICF International Jones & Stokes 2010). The discharges from the FTC would go through the water treatment facility, where it would be filtered and disinfected before returning to the Sacramento River. This outflow should be much less than that from a typical hatchery and thus is expected to be consistent with these findings; therefore, the impact associated with nutrient discharges would be less than significant.

Total Suspended Solids

Suspended solids can decrease water clarity, limiting visibility for fish and other aquatic organisms and reducing photosynthetic activity. Total suspended solids (TSS) >80 mg/L can adversely affect the health of freshwater fish, and turbidity levels between 10 and 25 NTU have been associated with deleterious effects on fish (Summerfelt 1999; ICF International Jones & Stokes 2010). TSS concentrations of 18–35 mg/L have been associated with reduced fish feeding and abundance.

High levels of suspended solids can also alter aquatic communities by causing increased production of heterotrophic bacteria in the sediment, which have been shown to reduce egg and fry survival and lead to fin rot and gill damage (Bisson and Bilby 1982; Summerfelt 1999; Sindilariu 2007). As suspended solids settle, they could further reduce benthic habitat quality for fish and aquatic invertebrates by increasing the amount of fine material and settling into interstitial spaces in gravel. This can cause entombment of emerging salmonid fry and lead to a reduction in habitat for aquatic invertebrates by reducing habitat complexity.

FTC operations would result in an accumulation of organic solids from uneaten feed and biological waste in cultured fish–rearing tanks and settling ponds. High water flows, fish activity, and facility cleaning operations can disturb and re-suspend settled solids into the water column.

An effluent treatment system would treat the water from the FTC to reduce TSS. The treatment system would consist of drum filters, an underground holding tank between the rearing tanks and drum filters, and evaporation ponds (approximately 10,000 square feet in size). This would greatly reduce the volume of solids discharged by FTC operations. Water would exit the drum filters and move into the settling ponds, which would further polish solids in the return flow. If necessary, a portable system to treat the effluent from specific individual rearing tanks or a centralized holding tank and activated carbon filtration system could be installed. The resulting low levels of total suspended solids and turbidity would ensure that the impact on water quality from TSS and turbidity is less than significant.

Conclusion

A decrease in water quality has the potential to represent a direct threat to Pacific Coast Chinook Salmon EFH. Similarly, water quality and temperature are essential features of the designated critical habitat that would threaten Central Valley Spring-run Chinook Salmon, California Central Valley Steelhead, Delta Smelt, and Green Sturgeon near the RVARC site.

However, water discharged from the FTC would be treated and subject to regular monitoring of water quality within the FTC for fish health (see Chapter 12, *Hydrology, Geomorphology, and Water Quality*). These standard operating procedures would be protective of aquatic life in the Sacramento River; therefore, impacts on water quality associated with discharges from the FTC are considered less than significant**.**

Delta Research Station

Impacts from the discharge of process water during operation of the DRS would be as described above for the FTC. Please see the discussion above for more details. Water discharged from the DRS would be treated and subject to regular monitoring of water quality within the FTC for fish health (See Chapter 12, *Hydrology and Water Quality*). These standard operating procedures would be protective of aquatic life in the Sacramento River; therefore, impacts on water quality associated with process water discharges from the DRS are considered **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would have the same impacts as described for Alternative 2, and would be **less than significant**.

<u>ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON</u>

Alternative 4 would have the same impacts as described for Alternative 2, except that they would occur in the San Joaquin River. Water temperatures in the San Joaquin River at Rough and Ready Island (RRI) downstream of the Proposed Project site in Stockton range from about 5.0°C to 27°C, and average temperatures in summer months are relatively stable at around 22–25°C (RRI station; CDEC 2015c).

DO concentrations at RRI range from about 3.2 to 14.8 mg/L (RRI station; CDEC 2015c). DO values at RRI were found to frequently drop below 5.0 mg/L during summer months from 2010–2014. Water used in the FTC would have a short residence time and would be monitored by FTC staff to ensure that the DO level in water discharged from the FTC is above 5.0 mg/L. In addition, BOD in FTC discharges, which could decrease DO levels in the San Joaquin River, would be reduced through the primary filtration system of the water treatment facility, which would include filtration and disinfection systems. The outflows from the FTC will be much lower than those of typical hatchery outflows; therefore, it is unlikely that return flow from the FTC would substantially decrease DO concentrations in the San Joaquin River relative to baseline conditions. To limit impacts of the FTC on the river, staff should monitor DO concentrations in the main channel, especially in summer months.

Between 2010 and 2014, the mean daily salinity on the San Joaquin River at RRI was measured as 669 µ℧/cm, and ranged from 132 to 1,606 µ℧/cm (RRI station; CDEC 2015c) (equivalent to approximately 469, 92, and 1124 mg/L, respectively). CDFW assessed changes in salinity resulting from hatchery outflows throughout California and found that, at most, salinity levels increased by 0.032 PSU (32 mg/L or about 50 µ℧/cm) (ICF International Jones & Stokes 2010). This is well below the levels that would impact most aquatic plants and animals, including special-status fish species. As a result, impacts from FTC operations, which would be much less than those from typical hatchery outflows, would be considered less than significant**.**

A decrease in water quality has the potential to represent a direct threat to Pacific Coast Chinook Salmon EFH. Similarly, water quality and temperature are essential features of the designated critical habitat that would threaten Central Valley Spring-run Chinook Salmon, California Central Valley Steelhead, Delta Smelt, and Green Sturgeon near the RVARC site.

Water discharged from the FTC would be treated, however, and would be subject to regular monitoring of water quality within FTC for fish health (see Chapter 12, *Hydrology and Water Quality*). These standard operating procedures would be protective of aquatic life in the San Joaquin River; therefore, impacts on water quality associated with discharges from the DRS are considered **less than significant.**

Impact FISH-11: Alterations to Water Quality in the Sacramento or San Joaquin River Resulting from Boat Traffic related to the Marina.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, existing IEP long-term monitoring activities would continue throughout the Bay-Delta region. No additional construction or operational activities are associated with Alternative 1. Staff working on IEP projects would continue to commute from various locations from around the region. Alternative 1 would have **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

The ERS marina would house a number of boats. Boat motors introduce metals, hydrocarbons, and other pollutants into the Sacramento River. These compounds can have a negative effect on the water quality for special-status fish in the system, including affecting pH and DO levels (see Impact FISH-10 for discussion of negative effects of pH and DO levels for special-status species). Dangerous metals from boat motors include lead, cadmium, and mercury, and exhaust may be discharged from some types of boat motors into the water column containing nitrogen, phosphorus, and carbon dioxide. In addition, metals from painted boats can contain arsenic. Many of these pollutants settle out of the water column onto sediment on the bottom of the channel. These increased pollutants have been associated with the impaired development and survival of fish and invertebrate eggs, larvae, and juveniles (Soule et al. 1991; Von Westerhagen et al. 1987). In Puget Sound, samples from the surface microlayer with higher toxicity than that of reference sites were found to produce more chromosomal aberrations in developing Sole larvae, reduce Soleidae egg hatching success, and reduce the growth of Rainbow Trout (*O. mykiss*) cells in cultures. These effects were attributed to higher levels of heavy metals and hydrocarbons (Hardy et al. 1987). In California, one study found that Kelp Bass (*Paralabrax clathratus*) larval mortality and chromosomal aberrations increased in areas with higher pollutant concentration (Cross et al. 1987).

In some instances, motorboat traffic can increase turbidity and nutrients in the water column, decreasing water quality (see discussion in Impact FISH-4 for impacts from increased turbidity, and Impact FISH-10 for discussion of how increased nutrients in the water column impact special-status fish). Propeller action from motorboats can disturb bottom sediments. If there is an abundance of nutrients in the sediment, this could increase phytoplankton production, further impairing water clarity (Yousef et al. 1980). Similarly, if toxins are present in the sediment, they could be reactivated in the water column and taken up by special-status fish and their prey. With increasing boat traffic, turbidity on rivers is known to increase across the width of the channel, which can also affect near-shore aquatic plants in shallow bank areas typically used for shelter by juvenile fish (Johnson 1994).

Boating impacts have been identified as a specific threat to Pacific Coast Chinook Salmon EFH (Stadler et al. 2011) and might decrease important features such as food and water quality, as well as disturb substrate, and passing vessels might limit space, access, and passage.

Increased boat traffic may also negatively affect the designated critical habitat for Central Valley Spring-run Chinook Salmon, California Central Valley Steelhead, Delta Smelt, and Green Sturgeon near the RVARC site by disturbing sediment and decreasing water quality and food resources, and possibly limiting space and access for rearing or resident fish. Safe passage through critical habitat might also be compromised for migrating Central Valley Spring-run Chinook Salmon, California Central Valley Steelhead, Delta Smelt, and Green Sturgeon. Boating impacts have been identified as a specific threat to Pacific Coast Chinook Salmon EFH (Stadler et al. 2011) and might decrease important features such as food and water quality, as well as disturb substrate, and passing vessels might reduce space, access and passage.

The RVARC site is in the DWSC of the Sacramento River. This waterway has very high boating and shipping traffic. The relatively small comparative output from the ERS marina would not dramatically increase the amount of pollutants, turbidity, and nutrients to which special-status fish would be exposed. Furthermore, the Proposed Project would not change the overall number of boats in the region, just their harbor location. Therefore, this impact is considered **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would have impacts similar to those under Alternative 2. Please refer to the above discussion for more details. This impact is considered **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would have impacts similar to those under Alternative 2 and 3, except that they would occur along the San Joaquin River. Please refer to the above discussion for more details. The Ryde Avenue site is in the DWSC of the San Joaquin River. This waterway has very high boating and shipping traffic. The output from the marina would not dramatically increase the amount of pollutants, turbidity, and nutrients to which special-status fish would be exposed; therefore, this impact would be **less than significant**.

Chapter 9
Cultural Resources

This chapter describes potential construction impacts on cultural and paleontological resources within the Proposed Project alternative sites. Cultural resources include prehistoric archaeological sites; historic-era archaeological sites; traditional cultural properties (TCPs)/ tribal cultural resources (TCRs)[1]; and historic buildings, structures, landscapes, districts, and linear features. Paleontological resources are the fossil remains of prehistoric flora and fauna, or traces of evidence of the existence of prehistoric flora and fauna. This chapter addresses the occurrence of cultural and paleontological resources and the potential impact that construction activities will have on these resources.

The purpose of this chapter is to describe the regulatory setting associated with cultural and paleontological resources, the environmental setting for these resources, impacts on cultural and paleontological resources as a result of construction and operation of each alternative, and mitigation measures that would reduce these impacts.

This chapter is based in part on more detailed information provided in Appendix H, *Archaeological Inventory Report for the Delta Research Station,* and Appendix I, *Historical Architectural Evaluation for the Delta Research Station.*

9.1 Environmental Setting

For background information about the archaeology, ethnography, and history of the RVARC site and the Ryde Avenue site in Stockton, please refer to the following:

- The archaeology of the Delta region is relevant to both the RVARC site and Ryde Avenue site, and is presented in Appendix H, Section 2.3, "Prehistoric Context."
- Ethnography background information is different for each site and is provided in Appendix H, Section 2.4, "Ethnohistoric Context," under the individual subheadings for Rio Vista and Stockton.

Historic-era background information is also different for each site. For information regarding the RVARC site, refer to Appendix H, Section 2.5, "Historic-Era Context," and Appendix I, Section 4, "Historic Context and Use." Historical information on the Ryde Avenue site is provided below and in Appendix H, Section 2.5.

9.1.1 Ryde Avenue Site in Stockton – Historical Context

The first Euroamerican settlement of present-day Stockton was made by Charles Weber, who moved a group of trappers from nearby French Camp to Stockton in summer 1847. In 1844, Weber had was awarded 49,000 acres in a land grant named Rancho Campo de los Franceses by the Mexican governor, Manuel Micheltorena. Stockton grew rapidly during the California Gold Rush as the provisioning center of the southern Sierra gold mines. People and cargo traveled from San Francisco to Stockton using maritime vessels, with the first steamer arriving in 1849 (Kyle et al. 2002: 349–350). The city was incorporated in 1850, and, by 1854, was the fourth largest city in the state (City of Stockton 2007b:13-33).

As gold rush activity waned, the agricultural, manufacturing, and shipping industries continued to sustain the growth of the city. Rough and Ready Island, which is bordered on the north and east by the San Joaquin River in southwest Stockton, was purchased by Albert Lindly in 1912. Lindley promoted industrial development on the island and the dredging of the San Joaquin River for a deep water port. Through Lindley's efforts, the Port of Stockton and the Stockton DWSC to the San Francisco Bay were completed in 1933 (City of Stockton 2007b:13-14).

The Ryde Avenue site is located on the north bank of the Stockton DWSC opposite the Port of Stockton in an area of mixed residential and industrial use. In contrast to the south bank of the channel, the Ryde Avenue site has been less developed. Dry docks at the adjacent parcel and a rail spur leading to the subject property depicted on the USGS 15-minute Stockton 1952 topographic map suggests that some type of industrial facility was located here in the mid-20th century. The property is currently vacant.

9.2 Regulatory Setting

9.2.1 Federal Laws, Regulations, and Policies

Development of the Proposed Project by USFWS constitutes a federal undertaking; therefore, it mandates compliance with (54 USC 306108), formally and more commonly known as Section 106 of the National Historic Preservation Act (NHPA). To comply with Section 106 of NHPA, the agency must "take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register [of Historic Places, NRHP]." The implementing regulations for Section 106 are found in 36 CFR Part 800, as amended (2004).

The implementing regulations of the NHPA require that cultural resources be evaluated for NRHP eligibility if they cannot be avoided by an undertaking (project). To determine if a site, district, structure, object, and/or building is significant, the NRHP Criteria for Evaluation are applied. A resource is significant and considered a historic property when it:

A. Is associated with events that have made a significant contribution to the broad patterns of our history; or

B. Is associated with the lives of persons significant in our past; or

C. Embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction; or

D. Yields, or may be likely yield, information important in prehistory or history.

In addition to meeting NRHP criteria, as provided in 36 CFR Section 60.4, resources must also exhibit the quality of significance in American history, architecture, archaeology, engineering, and culture and must possess integrity of location, design, setting, materials, workmanship, feeling, and association.

Other “criteria considerations” need to be applied to religious properties, properties that are less than 50 years old, a resource no longer situated in its original location, a birthplace or grave of a historical figure, a cemetery, a reconstructed building, and commemorative properties. These properties are typically not eligible for NRHP unless the criteria for evaluation and criteria considerations are met.

For archaeological sites evaluated under criterion D, integrity requires that the site remain sufficiently intact to convey the expected information to address specific important research questions.

Locations of cultural value that are historic properties are known as TCPs. A place of cultural value is eligible as a TCP “because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community’s history, and (b) are important in maintaining the continuing cultural identity of the community” (Parker and King 1990, rev. 1998). A TCP must be a tangible property, meaning that it must be a place with a referenced location, and it must have been continually a part of the community’s cultural practices and beliefs for the past 50 years or more.

9.2.2 State Laws, Regulations, and Policies

California cultural resources laws and regulations are embodied in CEQA and the CEQA Guidelines, as well as the Public Resources Code. CEQA requires that lead agencies determine whether the project has a significant effect on a unique archaeological resource or a historical resource, pursuant to Sections 21083.2 and 21084.1, respectively. Section 15064.5 of the CEQA Guidelines notes that “a project with an effect that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment.” Lead agencies are expected to identify potentially feasible measures to mitigate significant adverse changes in the significance of a historical resource before they approve such projects. Historical resources are those that are:

- listed in, or determined to be eligible for listing in, the California Register of Historical Resources (CRHR) (Pub. Res. Code Section 5024.1[d]);
- included in a local register of historical resources (Pub. Res. Code Section 5020.1[k]) or identified as significant in an historical resource survey meeting the requirements of Section 5024.1(g); or

- determined by a lead state agency to be historically significant.

Eligibility criteria for CRHR are set forth in Pub. Res. Code Section 5024.1(c). A resource is eligible for CRHR if it:

1. is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. is associated with lives of persons important in our past;
3. embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4. has yielded, or may be likely to yield, information important in prehistory or history.

State CEQA Guidelines Section 15064.5 also applies to unique archaeological resources, as defined in CEQA Section 21083.2(g). A unique archaeological resource implies an archaeological artifact, object, or site for which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets one of the following criteria:

1. Contains information needed to answer important scientific research questions, and there is a demonstrable public interest in that information; or
2. Has a special and particular quality, such as being oldest of its type or the best available example of its type; or
3. It is directly associated with a scientifically recognized important prehistoric or historic event or person.

A non-unique archaeological resource is an archaeological artifact, object, or site that does not meet the above criteria. Impacts on non-unique archaeological resources and resources that do not qualify as historical resources receive no further consideration under CEQA.

Under CEQA Guidelines Section 15064.5, a project potentially would have significant impacts if it would cause substantial adverse change in the significance of one of the following:

1. a historical resource (i.e., a cultural resource eligible for CRHR listing);
2. an archaeological resource (defined as a unique archaeological resource that does not meet CRHR criteria); or
3. human remains (i.e., where the project would disturb or destroy burials).

Section 15064.5 of CEQA also assigns special importance to human remains and specifies procedures to be used when Native American remains are discovered. These procedures are detailed under Pub. Res. Code Section 5097.98.

No state or local agency has specific jurisdiction over paleontological resources on private lands. A paleontological collecting permit is not required by any state or local agency to allow for the recovery of fossil remains discovered as a result of construction-related activities on state or private land in the project area; however, if a state agency were to acquire ownership of project lands, Pub. Res. Code Chapter 1.7 *Archaeological, Paleontological, and Historical Sites*, Section 5097.3, would apply. This section of the code specifies that surveys, excavations, or other operations as necessary on state lands may be undertaken to preserve or record paleontological resources.

As noted above, CEQA Section 21083.2 and CEQA Guidelines Section 15064.5 provide specific guidance on historical and unique archaeological resources and, under CEQA, resources called "historical resources" can be of historic or prehistoric age. It is possible that a paleontological resource could be determined to be a historical resource. Although CEQA does not define what constitutes "a unique paleontological resource," the criteria defining a unique archaeological resource could be applied to define a unique paleontological resource.

AB 52 was approved in September 2014 and goes into effect on July 1, 2015. This bill requires that the state lead agencies consult with a California Native American tribe that is traditionally and culturally affiliated with the geographic area of a proposed project, if so requested by the tribe. The bill, chaptered in CEQA Section 21084.2, also specifies that a project with an effect that may cause a substantial adverse change in the significance of a TCR is a project that might have a significant effect on the environment. AB 52 also specifies that revisions to the CEQA Guidelines Appendix G checklist would be made on or before July 1, 2016, to include a consideration of substantial adverse change to TCRs.

Defined in CEQA Section 21074 (a), TCRs are:

(1) Sites, features, places, cultural landscapes, sacred places and objects with cultural value to a California Native American tribe that are either of the following:

(a) Included or determined to be eligible for inclusion in the California Register of Historical Resources;

(b) Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1.

(2) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe.

TCRs are further defined in CEQA Section 21074 as:

(b) A cultural landscape that meets the criteria of subdivision (a) is a TCR to the extent that the landscape is geographically defined in terms of the size and scope of the landscape; and

(c) A historical resource described in Section 21084.1, a unique archaeological resource as defined in subdivision (g) of Section 21083.2, or a "nonunique archaeological resource" as defined in subdivision (h) of Section 21083.2 may also be a tribal cultural resource if it conforms with the criteria of subdivision (a).

Mitigation measures for TCRs will be developed in consultation with the affected California Native American tribe pursuant to newly chaptered Section 21080.3.2, or according to Section 21084.3. Section 21084.3 identifies mitigation measures that include avoidance and preservation of TCRs, and treating TCRs with "culturally appropriate dignity taking into account the tribal cultural values and meaning of the resource… ."

9.2.3 Local Laws, Regulations, and Policies

Rio Vista General Plan

The City of Rio Vista 2001 General Plan includes a goal and seven policies that focus on historic resources (City of Rio Vista 2002:10-39–1040).

The goal and policies pertinent to the Proposed Project are as follows[2]:

Goal 10.10 To encourage preservation of the City's historic resources while enhancing their value and economic life.

Policy 10.10.A The City shall ensure that urban changes preserve and maintain historic and architectural resources, including historic buildings and industrial spaces that are of historical significance.

Policy 10.10.B The City shall improve local awareness of its cultural and historical resources.

Policy 10.10.C The City shall require that discretionary development projects identify important historic, archaeological, and cultural sites and their contributing environment from damage, destruction, and abuse. The City shall ensure that such assessments are incorporated into the City's cultural and historical database, to be maintained by the Rio Vista Museum.

Policy 10.10.F The City shall regard demolition of historic resources as a last resort, to be permitted only after the City determines that the resource retains no reasonable economic use; that demolition is necessary to protect health, safety, and welfare; or that demolition is necessary to proceed with a new project where the benefits of the new project outweigh the loss of the historic resource.

The City of Rio Vista General Plan also includes implementing measures to support the policies developed for each goal (City of Rio Vista 2002: 10-44–10-56). Twenty-nine implementation measures are presented to address both the natural and cultural resources important to the city. Some of the measures existed at the time the general plan was adopted, some were proposed, and others were adopted when the general plan was

[2] Policy 10.10.D is omitted here because it involves incentive programs to private property owners and is not relevant to the current project.

approved in 2002. The implementation measures most pertinent to cultural resources are listed below, although the language presented here might not include the entire text of each individual measure.

Implementation Measure RCM-3: Community Design Guidelines *(proposed).* The City will apply the Community Design Guidelines, as described in the Community Character & Design element of the General Plan. These guidelines will promote the integration of natural and built environments.

Implementation Measure RCM-4: Natural and Cultural Resources Inventory *(proposed).* The City will initiate, or work with the Rio Vista Museum Board and other interested local civic groups to undertake an inventory of structures (50 or more years old) or sites with potential architectural, historic, archaeological, or cultural significance to the community. The inventory could include developing historic context statements for each property that is determined to have local historical significance. The information will be incorporated into the City's cultural and historical database, to be maintained by the Rio Vista Museum, which then can be made available to historians or property owners pursuing listing on the official state or federal register.

Implementation Measure RCM-5: Public Education/Awareness Programs *(proposed).* A component of this implementing action is to increase public awareness of and involvement in the preservation of cultural and historical resources. The City will work with the Rio Vista Museum Board and local historians to promote involvement in historical research, construction of informational markers and kiosks, and historic structure restoration efforts. Outreach efforts will be made, in partnerships with these groups, to solicit involvement in signage design, funding, and construction through the local schools, businesses, and residents.

Implementation Measure RCM-8: Development Review *(existing).* Historic and Cultural Resources: Any project that may affect the character-defining features of a historic or cultural resource will be reviewed to determine the potential for effects on the significance of the resource to occur. If the property has not been previously evaluated but is 50 years or older, it should be evaluated to determine its potential eligibility and related review requirements. The environmental review and certification process is distinct from, although directly related to, the actual discretionary action decisions.

Implementation Measure RCM-25: Sign Ordinance Review and Update *(proposed).* The City will review and amend the Sign Ordinance to include a section that addresses placement of historical signage, markers, or kiosks on or near historical structures and sites in the City. The Sign Ordinance will be amended to add design guidelines for this informational signage.

Implementation Measure RCM-26: Preservation Ordinance *(proposed).* The City will adopt a Preservation Ordinance as part of its Municipal Code update to be the primary implementing mechanism for preservation of historic structures and sites. The ordinance will establish criteria for the review of new development, alterations, and rehabilitation and remodel projects that involve structures that are 50 or more years old.

Implementation Measure RCM-27: Official Register *(proposed).* The City will work with the Rio Vista Museum Board and interested community members to encourage owners of historic structures to pursue eligibility for listing of their properties in the National Register of Historic Places and the California Register of Historical Resources. As appropriate and to the extent feasible, the City will assist historic property owners with the process.

Implementation Measure RCM-29: State Historical Building Code *(existing).* The State Historical Building Code is Part 8 of Title 24 (State Building Standards Code) and applies to all qualified historic structures, districts, and sites designated under federal, state, and local authority. The code provides alternative building regulations for the rehabilitation, preservation, restoration, or relocation of structures designated as qualified historic buildings.

Rio Vista Army Reserve Center Redevelopment Plan and EIR

The City of Rio Vista prepared the Rio Vista Army Reserve Center Redevelopment Plan and an EIR in 2011 (City of Rio Vista 2011). The RVARC site was conveyed to the City of Rio Vista in 2003 by the U.S. Army after nearly 15 years of inactivity. In the interim, the property was left unattended and the buildings and structures on the base began to deteriorate. Although the buildings were in disrepair, the City of Rio Vista noted the presence of the "U.S. Engineer Storehouse Historic District" on the property and stated that "the 12 buildings and structures nevertheless appear to be collectively eligible for the California Register of Historic Resources" (City of Rio Vista 2011: Volume 1, page 6-6).

The stated objective of the Redevelopment Plan was "to enable [economical and physical] blight elimination and foster public-private revitalization within the proposed Project Area" (City of Rio Vista 2011: Volume 1, page 2-2), through the development of the property for mixed use, including education, recreation, retail, and residential uses.

In addition to the "No Build" (Alternative 1) and "No Project" (Alternative 2) alternatives, the EIR examined three variations of the Redevelopment Plan. Alternative 3, Redevelopment Plan with Reuse of Historic District, fully embraced rehabilitation and reuse of the buildings within the historic district to meet the goals of the redevelopment plan. Rehabilitation would adhere "to the Secretary of the Interior's Standards for the Rehabilitation of Historic Properties, so that the integrity of the suggested historic district and its continued eligibility to the California Register of Historic Resources is preserved" (City of Rio Vista 2011: Volume 1, page 2-45). Alternative 4, Redevelopment Plan without Parks and Recreation, also provided for rehabilitation of buildings and structures, while Alternative 5, Redevelopment Plan with Delta Interpretive Center, did not (City of Rio Vista 2011: Volume 1, page 2-45).

The EIR analyzed potential impacts to cultural and paleontological resources. Impacts to the potential historic district were analyzed under both the Aesthetics and Cultural Resources chapters of the EIR; archaeological resources were addressed only in the cultural resources chapter. Numerous mitigation measures were proposed to avoid significant adverse impacts to cultural resources, most of which pertained to "the rehabilitation and reuse of contributing buildings, structures and setting of the proposed U.S. Engineer Storehouse Historic District in a manner that fully adheres to the Secretary of the Interior's Standards for the Rehabilitation of Historic Properties" (City of Rio Vista 2011: Volume 1, page 2-11).

Army Base District Design Guidelines 2011

In response to the mitigation measures proposed for cultural resources and other environmental elements of the Rio Vista Army Reserve Center Redevelopment Plan EIR, the City of Rio Vista published the *Army Base District (ABD) Design Guidelines* (MIG 2011). These guidelines were prepared with the assumption that the property contained a potential historic district, that five of the buildings within the district "merit consideration for rehabilitation and reuse for their historic and aesthetic value" (MIG 2011:13), and that the water tower in the historic district is an "iconic landmark' in the area and should be preserved (MIG 2011:13). Goals established for Historic Resources are listed below (MIG 2011:25).

Goal C.1 Structure to be Retained

Goal C.1.1 The Water Tower, structure T-23 (1940-1944) is a valuable historic resource that shall be preserved in its current location.

Goal C.2 Structures to be Reused if Feasible

Goal C.2.1 The following structures should be considered for rehabilitation and reuse after a determination of feasibility:

- T-7: Carpenter/Electrical Shop (Pre-1919)
- T-9: Ship Maintenance Shop (1952) (not a "contributing" structure to the potential historic district)
- T-11: Ship Repair Shop (1923-1944)
- T-27: General Purpose Warehouse (1944-1949) (not a "contributing" structure to the potential historic district)
- T-42: General Purpose Warehouse (1923-1929)
- S-102: Ship Repair Dock (1940-1944)
- S-103: Ship Repair Dock (1953-1966) (not a "contributing" structure to the potential historic district)

Of these structures, T-11 (Ship Repair Shop), S-102, and S-103 (Ship Repair Docks) should be given the highest priority for rehabilitation and reuse.

Goal C.2.2 Retain and reuse other historical or otherwise interesting artifacts remaining from previous activities on the site, including the former marine railway (boat ramp), anchors, etc. Materials from buildings to be demolished shall be salvaged and re-used if feasible.

Stockton General Plan 2035

Goal NCR-3 of the *Stockton General Plan 2035 Goals and Policies Report* (City of Stockton 2007a:13-7–13-8), which was developed in support of the current Stockton General Plan, defines the City's goals for preservation of cultural and paleontological resources. Five of the eight policies listed under the goal are pertinent to Alternative 4.[3] The goal and relevant policies are:

Goal NCR-3 To encourage the identification, protection, and enhancement of the city's archaeological, historical, cultural, and paleontological resources for their cultural values.

Policy NCR-3.1 *Evaluation of Historic Resources*. The City shall use appropriate State and Federal standards in evaluating the significance of historic resources that are identified in the city.

Policy NCR-3.3 *Historical/Cultural Resources Inventory*. The City shall continue to maintain and update a historical resources inventory. In addition, the City will expand this inventory to include sites of cultural significance.

Policy NCR-3.5 *Archaeological Resource Surveys*. Prior to project approval, the City shall require project applicant to have a qualified archeologist conduct the following activities: (1) conduct a record search at the Central California Information Center located at California State University Stanislaus and other appropriate historic repositories, (2) conduct field surveys were appropriate, and (3) prepare technical reports, where appropriate, meeting California Office of Historic Preservation Standards (Archeological Resource Management Reports).

Policy NCR-3.6 *Discovery of Archaeological Resources*. Consistent with Stockton Municipal Code Section 16-310.050 – Cultural Resources, in the event that archaeological/paleontological resources are discovered during site excavation, the City shall require that grading and construction work on the project site be suspended until the significance of the features can be determined by a qualified archaeologist/paleontologist. The City will require that a qualified archeologist/paleontologist make recommendations for measures necessary to protect any site determined to contain or constitute an historical resource, a unique archaeological resource, or a unique paleontological resource or to undertake data recovery, excavation, analysis,

[3] Policies specific to the built environment are not listed here because there are no built environment resources on the Ryde Avenue site in Stockton.

and curation of archaeological/paleontologist materials. City staff shall consider such recommendations and implement them where they are feasible in light of project design as previously approved by the City.

Policy NRC-3.7 *Native American Resources*. The City shall consult with Native American representatives regarding cultural resources to identify locations of importance to Native Americans, including archeological sites and traditional cultural properties. Coordination with the Native American Heritage Commission should begin at the onset of a particular project.

Policy NRC-3.8 *Discovery of Human Remains*. Consistent with Stockton Municipal Code Section 16-310.050 – Cultural Resources and the State CEQA Guidelines (Section 15064.5), if human remains of Native American origin are discovered during project construction, it is necessary to comply with State laws relating to the disposition of Native American burials, which fall within the jurisdiction of the Native American Heritage Commission (Public Resources Code Section 5097). If any human remains are discovered or recognized in any location on the project site, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until:

- The San Joaquin County Coroner/Sheriff has been informed and has determined that no investigation of the cause of death is required; and
- If the remains are of Native American origin,
  a. The descendants of the deceased Native Americans have made a timely recommendation to the landowner or the person responsible for the excavation work, for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in Public Resources Code Section 5097.98;
  b. The Native American Heritage Commission was unable to identify a descendant or the descendant failed to make a recommendation within 24 hours after being notified by the Commission, or
  c. The landowner or his or her authorized representative rejects any timely recommendations of the descendent, and mediation conducted by the Native American Heritage Commission has failed to provide measures acceptable to the landowner.

9.3 Environmental Impacts

9.3.1 Methods of Analysis

Archival Research

In-depth cultural resources studies were conducted of both the RVARC and the Ryde Avenue sites. Before conducting field work, a record search was conducted by the Northwest Information Center of the California Historical Resources Information System (CHRIS) at Sonoma State University for the Rio Vista site; and by the Central California Information Center of CHRIS at California State University, Stanislaus, for the Ryde Avenue site. The purpose of the record search was to determine if either area had previously been surveyed for cultural resources, and to identify any previously recorded cultural resources within the Proposed Project alternative sites.

Archival research indicated that three previous cultural resources studies had been completed at or directly adjacent to the RVARC site. One resource, the RVARC site itself, had previously been recorded and will be discussed more thoroughly below. In addition, five submerged vessels had been identified by remote sensing and recorded in the Sacramento River within 0.25 mile of the RVARC site. Archival research revealed that the Ryde Avenue site had not previously been surveyed, and that no cultural resources had been recorded. One architectural resource had been recorded within 0.25 mile of the Ryde Avenue site.

Native American Coordination

A request was made to the California Native American Heritage Commission (NAHC) to review its files for records of sacred sites at the RVARC and Ryde Avenue sites. No sacred sites were identified during this search. NAHC provided a list of individuals who might have additional information about important Native American sites in or near the Proposed Project areas. These individuals were first contacted by mail, then by phone. **Table 9-1** provides a summary of contacts with Native Americans identified by NAHC.

Table 9-1. Native American Consultation

Organization/Tribe	Name of Contact	Letter Date	Telephone Follow-up Date	Comments
Ohlone/Costanoan, Northern Valley Yokut, Bay Miwok	Ms. Katherine Erolinda Perez	November 19, 2014	December 5, 2014	A voice message was left on answering machine.
Miwok	Mr. Randy Yonemura	November 19, 2014	December 5, 2014	A voice message was left on answering machine.
Buena Vista Rancheria	Chairperson Rhonda Morningstar Pope	November 19, 2014	December 5, 2014	A message was left with office staff.
Calaveras Band of Mi-Wuk Indians	Chairperson Gloria Grimes	November 19, 2014	December 5, 2014	A voice message was left on answering machine.
Calaveras Band of Mi-Wuk Indians	Ms. Debra Grimes	November 19, 2014	December 5, 2014	The primary number for this person is out of service. The secondary number is the same as that for the previous individual, Gloria Grimes.
Calaveras Band of Mi-Wuk Indians	Mr. Adam Lewis	November 19, 2014	December 5, 2014	A voice message was left on answering machine (same number as for Gloria Grimes).
California Valley Miwok Tribe	Chairperson Silvia Burley	November 19, 2014	December 5, 2014	Spoke to office staff and was asked to phone back after 2:00 p.m. Spoke to Chairperson Burley 12/8/14. The tribe has no issue with the Proposed Project and will respond in writing at a later date.
Ione Band of Miwok Indians	Chairperson Yvonne Miller	November 19, 2014	December 5, 2014	Spoke to office staff and referred to Anthony Burris for whom a message was left.

Organization/Tribe	Name of Contact	Letter Date	Telephone Follow-up Date	Comments
Ione Band of Miwok Indians Cultural Committee	Chairperson Anthony Burris	November 19, 2014	December 5, 2014	A message was left with office staff.
Wilton Rancheria	Chairperson Raymond Hitchcock	November 19, 2014	December 5, 2014	A voice message was left on answering machine.
Wilton Rancheria	Mr. Steven Hutchason	November 19, 2014	December 5, 2014	A voice message was left on answering machine at the same number as that for Chairperson Hitchcock
Wintun / Patwin	Mr. Kesner Flores	November 19, 2014	December 5, 2014	A voice message was left on answering machine.
Cortina Band of Indians	Chairperson Charlie Wright	November 19, 2014	December 5, 2014	A voice message was left on answering machine.
Yocha Dehe Wintun Nation	Chairperson Marshall McKay	November 19, 2014	December 5, 2014	A message was left on answering machine of Mr. McKay's assistant.
Yocha Dehe Wintun Nation	Mr. Leland Kinter	November 19, 2014	December 5, 2014	A message was left on answering machine for cultural resources staff. Marilyn Delgado returned call and left a voice message stating that James Sarmento, cultural resources manager, would be in touch.
Yocha Dehe Wintun Nation	Ms. Cynthia Clarke	November 19, 2014	December 5, 2014	A message was left on answering machine for cultural resources staff. Marilyn Delgado retuned call and left a voice message stating that James Sarmento, cultural resources manager, would be in touch.

Organization/Tribe	Name of Contact	Letter Date	Telephone Follow-up Date	Comments
Ione Band of Miwok Indians	Ms. Pamela Baumgartner	December 18, 2014	February 23, 2015	Ms. Baumgartner is no longer employed by the tribe as tribal administrator. Talked with Sharol McDade, the new tribal administer. A copy of the original letter was emailed to her on the same day as the follow-up phone call was made. Ms. McDade replied that she forwarded the letter to Andrew Ramey and Kyle Dutchke for review.
Ione Band of Miwok Indians	Ms. Tina Reynolds	December 18, 2014	February, 2015	Ms. Reynolds deferred response to Andrew Ramey, Kyle Dutchke, and Randy Yonemura.
Southern Sierra Miwuk Nation	Chairperson Lois Martin	December, 2014	February 24, 2015	Chairperson Martin noted that the Proposed Project location was outside of her knowledge area but would like to be informed of any discoveries on the Ryde Ave site in Stockton.
Southern Sierra Miwuk Nation	Mr. Les James	December 18, 2014	February 24, 2015	A voice message was left on answering machine.

Anthony Burris responded to the follow-up telephone call on December 9, 2014, stating that he had not received the original letter and requested a replacement. A copy of the letter was forwarded to Mr. Burris on December 9, 2014, by email. Chairperson Lois Martin was reached during a follow-up phone call on February, 24, 2015. Chairperson Martin asked to be notified if anything was discovered during construction, but stated that the area was really beyond her tribe's area of knowledge.

Two letter responses were also received. Chairperson Silvia Burley of the California Valley Miwok Tribe responded on December 10, 2014, noting that her tribe has concerns about the Ryde Avenue site because it has a moderate potential for buried resources. Chairperson Burley also requested that her tribe be notified if any artifacts or human remains are discovered on the Stockton site during construction.

Chairman Marshall McKay of the Yocha Dehe Wintun Nation responded in a letter dated December 15, 2014. Chairman McKay noted that the tribe has no knowledge of cultural resources near the RVARC site; however, he asked for information about the date of construction for the Proposed Project and any mitigation measures. Per the directions given in Chairman McKay's letter, on December 19, 2014, an email was sent to Mr. James Sarmento, Tribal Cultural Resources Manager, which stated that Proposed Project construction would begin after the environmental documents were finalized in summer 2016, and that mitigation measures would be presented in the draft environmental documents.

No other individuals or organizations have expressed concern or offered additional information regarding the Proposed Project in response to any communications. Additional communication will be added to the administrative record as it is received and interested parties will be referred to the appropriate contact at the lead agency for the Proposed Project, if requested.

Field Studies

The RVARC site property was subjected to an intensive archaeological pedestrian survey on September 16, 2014, by qualified archaeologists. A majority of the site was surveyed in 10-meter transects. Densely vegetated areas along the property's shoreline were surveyed intuitively, such that only those areas that were accessible were examined. During the pedestrian survey, the site was inspected for the presence of archaeological materials, including prehistoric and historic-era habitation debris (e.g., stone tools or tool manufacturing debris, glass fragments, tin cans), prehistoric features (e.g. hearths, house pits), and historic-era structural remains (e.g., house foundations, wells).

The architectural history field survey of the property was performed by a qualified architectural historian on September 16, 2014, and a follow-up site visit was conducted on September 30, 2014. Each building and structure on the property was examined and detailed photographs were taken of each feature, along with accompanying notes. The buildings were individually recorded on California Department Parks and Recreation 523 series forms, and consolidated under Form 523d as a historic district.

The entire Ryde Avenue site property was subjected to an intensive pedestrian survey completed on September 30, 2014, by a qualified archaeologist. The site was surveyed in 10-meter transects. As with the RVARC site, the Stockton parcel was inspected for the presence of cultural material, including prehistoric and historic-era habitation debris, prehistoric features, and historic-era structural remains.

Cultural Resources

Archaeological Resources

No archaeological resources were identified on either the RVARC site or the Ryde Avenue site as the result of the archaeological pedestrian surveys. Although no archaeological remains were observed at either site, the presence of archaeological deposits are not always visible on the ground surface and might sometimes be deeply buried under sediment.

Archaeological remains could consist of prehistoric or historic-era artifacts. Prehistoric materials most likely would include obsidian and chert flaked-stone tools (e.g., projectile points, knives, choppers); tool-making debris; or milling equipment, such as mortars and pestles. Historic-era materials might include structure-associated remains; stone or concrete footings and walls; and deposits of metal, glass, and/or ceramic refuse. At the Rio Vista location, historic-era archaeological sites associated with the potential U.S. Engineers Storehouse Historic District (Historic District) could be discovered. As a result, it is possible that construction of the ERS and FTC facilities may uncover buried archaeological remains through construction activities, such as site preparation and trenching and marina development, with the potential to result in a significant impact on archaeological resources.

BUILT ENVIRONMENT RESOURCES

Fourteen buildings and six structures that were constructed between 1913 and 1960 were identified and recorded at the RVARC site.[4] The buildings include ship repair facilities, warehouses, barracks, piers, wharfs, a water tower, and ancillary buildings such as sheds and pump houses. Most of these buildings and structures appear to have been constructed as part of flood control efforts that were administered from the site between 1913 and 1944.

An evaluation conducted by JRP Historical Consulting Services (JRP) in 1997 concluded that the portion of the site directly associated with the Sacramento River Flood Control Project (SRFCP), identified as the U.S. Engineers Storehouse Historic District, appeared eligible for NRHP. Its period of significance was 1919 to 1944, when the SRFCP was completed. The Army did not agree with this assessment, primarily because it believed that there was "no convincing argument for a high level of integrity." California's State Historic Preservation Officer (SHPO) concurred with the Army, and the property was determined ineligible for listing in NRHP. The Rio Vista Army Reserve Center Redevelopment Plan Final EIR (City of Rio Vista 2011) concluded that, while not eligible for the NRHP, the potential Historic District identified by JRP appeared to be eligible for listing in CRHR. Appendix I further evaluates the potential Historic District's eligibility and also concludes that it appears eligible for listing in the CRHR for the purposes of the Proposed Project; the results of this evaluation are summarized below.

The SHPO was contacted by the USFWS in 2015 to initiate consultation under Section 106 of the NHPA for the Proposed Project; consultation continued into 2016. In their most recent letter to SHPO, the USFWS did not nominate the District to the NRHP, but stated that "it is clear that the District is potentially eligible to the NRHP" and, that for the purposes of the current project, would treat the District as eligible for the NRHP. The SHPO did not disagree with the USFWS's statement on NRHP eligibility and the intent to treat the resource as an eligible property. The SHPO also acknowledged the 2015 evaluation of the District as eligible for the CRHR. The SHPO was not asked to make a determination regarding whether

[4] See Brunzell 2015 for a detailed description of each of the buildings and structures recorded at the RVARC site.

the potential Historic District is eligible for listing in the CRHR; for this reason, it is referred to throughout this document as a "potential Historic District."

Fifteen of the recorded buildings and structures are located within the area delineated as the potential Historic District's boundaries, fourteen of which are contributing elements to the potential Historic District. An additional five of the buildings and structures on the parcel lie beyond the potential Historic District boundaries. **Table 9-2 and Figure 9-1** identify the buildings and structures that are contributing elements to the potential Historic District.[5]

The district boundary was delineated to include all of the grouped buildings that contribute to the potential Historic District, with a 50-foot buffer. The exception to the 50-foot buffer is around the water tower (Resource T-23) and the large wooden pier (Resource S-105), whereby the boundary is tightened around the edges of these resources.

Table 9-2. Buildings and Structures Recorded at the RVARC Site

Building	Construction	Use	Status
Resources within the Potential Historic District Boundaries			
T-7	1913–1919	Carpenter Shop, Ship Repair Shop	Contributor
T-8	1942–1946	Compressor Shed	Contributor
T-9	1942–1946	Welding Shop, Maintenance Shop, Carpenter Shop	Contributor
T-11	1942–1946	Machine Shop, Welding Shop, Blacksmith Shop, General Purpose Shop	Contributor
T-23	By 1937	Water Tower	Contributor
T-24	By 1942	Pump House (water tower)	Contributor
T-25	1923–1937	Garage/Oil Shed/Paint Shop	Contributor
T-26	1923–1929	Barracks	Contributor
T-27	1942–1946	Warehouse	Contributor
T-41	1923–1929	Office	Contributor
T-42	1923–1929	Warehouse	Contributor

[5] The potential Historic District defined by Brunzell (2015) differs slightly from the Historic District identified by JRP (1997) in that the period of significance for the former resources is 1919-1951, while the period of significance for the JRP district is 1919-1944. As a result, two post-1944 buildings included in the current proposed district, T-9 and T-27, were not in JRP's proposed historic district.

Building	Construction	Use	Status
T-43	By 1937	Paint Shop, Storage	Contributor
S-102	1958–1960	Concrete Wharf	Non-contributor (outside period of significance)
S-103	By 1937	Wooden Wharf	Contributor
S-104	By 1937	Large Wooden Pier	Contributor
Resources Outside of the Potential Historic District Boundaries			
T-22	1942–1946	Garage	Not applicable
T-46	1942–1946	Tool shed, Barracks	Not applicable
T-50	1942–1946	Temporary Storeroom, Rigging Loft	Not applicable
S-105	1952–1954	Wooden Pier	Not applicable
Marine Ways	1942–1946		Not applicable

Source: Appendix I

The potential Historic District area covers approximately 4 acres along 900 feet of the Sacramento River waterfront. The waterfront area is the historic heart of the base, and the extant structures within the area possess a high degree of integrity. The bulk of the buildings possess integrity of location, design, setting, workmanship, feeling, and association, although blight and deterioration of the site have caused some loss of materials integrity. Some buildings, for example, are missing doors and windows. In addition, most of the buildings on the base were clad in asbestos shingles circa 1958, resulting in a partial loss of integrity. Many of the asbestos shingles have subsequently deteriorated and fallen away, often revealing intact, original wood siding underneath; therefore, the shingles are considered reversible and have not resulted in a substantial loss of integrity for the buildings. Despite the deterioration of most of the buildings in the complex, as a group clustered along the waterfront, they continue to convey a clear sense of the original purpose of the base.

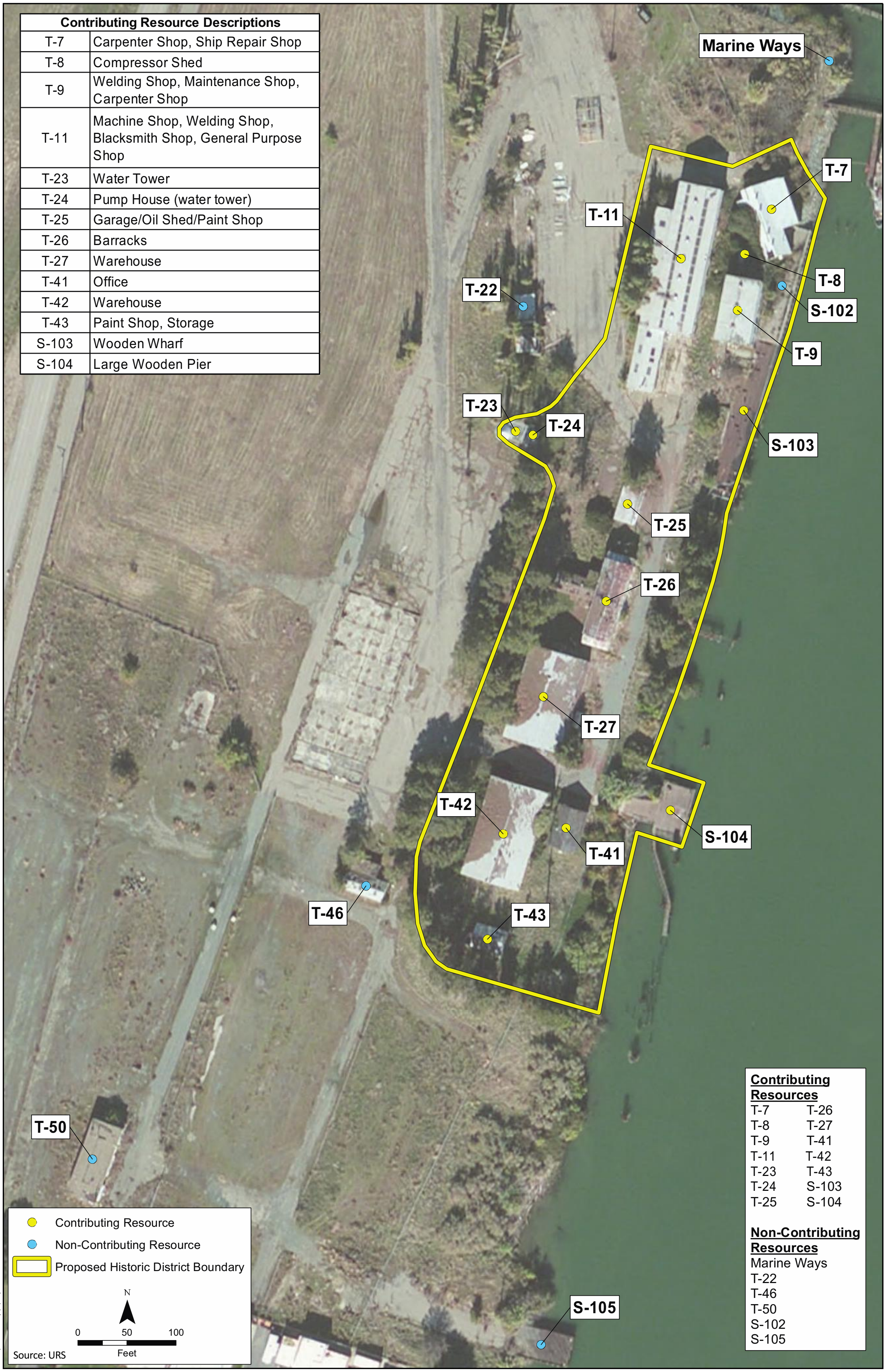
Although seven buildings have collapsed, burned, or been demolished since 1997, only one of these buildings was within the boundaries of the potential Historic District. In addition, all were sheds, pump houses, or other ancillary buildings, and most were quite small. None of the large buildings that are significantly associated with the historic uses of the property have been demolished.

One exception to the overall high integrity of the buildings at the complex is the Marine Ways. The original carriage apparatus has been removed, resulting in a substantial loss of integrity for the Marine Ways; therefore, the described boundary of the potential Historic District excludes the Marine Ways.

According to CCR Section 4852(c), historical resources "must retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance… Alterations over time to a resource or historic changes in their use may themselves have historical, cultural, or architectural significance. It is possible that historical resources may not retain sufficient integrity to meet the criteria for listing in the National Register, but they may still be eligible for listing in the California Register."

The area and potential Historic District is directly associated with the SRFCP, one of the most important public works ever undertaken in California; therefore, it is potentially eligible for listing in CRHR as a historic district under criterion 1 for its association with events that have made a significant contribution to the broad pattern of our history. The U.S. Engineers Storehouse played a crucial role in a project that enabled both the residential and the agricultural development of the Central Valley. The boundary of the potential Historic District shown on Figure 9-1 appears to retain sufficient integrity of design, setting, location, association, feeling, and workmanship to justify eligibility under criterion 1 of CRHR, for its association with historic flood control activities in the Central Valley. It is important to emphasize that the buildings are not considered a district eligible for the CRHR due to distinct architectural characteristics but, rather, as a waterfront complex of warehouses, shops and wharves that conveys a clear sense of mission and function, and a strong sense of time and space.

Contributing Resource Descriptions	
T-7	Carpenter Shop, Ship Repair Shop
T-8	Compressor Shed
T-9	Welding Shop, Maintenance Shop, Carpenter Shop
T-11	Machine Shop, Welding Shop, Blacksmith Shop, General Purpose Shop
T-23	Water Tower
T-24	Pump House (water tower)
T-25	Garage/Oil Shed/Paint Shop
T-26	Barracks
T-27	Warehouse
T-41	Office
T-42	Warehouse
T-43	Paint Shop, Storage
S-103	Wooden Wharf
S-104	Large Wooden Pier



Horizon WATER and ENVIRONMENT

Figure 9-1
Potential Historic District

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9.3.2 Significance Criteria

For the purposes of CEQA, an alternative would have a significant impact with regard to cultural resources if it would:

- Cause a substantial adverse change in the significance of a historical resource pursuant to Section15064.5;
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section15064.5;
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature;
- Disturb any human remains, including those interred outside of formal cemeteries; or
- Cause a substantial adverse change in the significance of a TCR .

Under CEQA, a significant effect on the environment is defined as a substantial or potentially substantial adverse change in any of the physical conditions within the area affected by the Proposed Project alternative, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance (CEQA Guidelines Section 15382). Substantial adverse changes include both physical changes to the historical resource, or to its immediate surroundings such that the significance of the historical resource would be materially impaired. Lead agencies are expected to identify potentially feasible measures to mitigate significant adverse changes in the significance of a historical resource before they approve such projects. Significant adverse change to historical resources could be avoided under CEQA Guidelines Section 15126.4 by the incorporation of minimization measures to the Proposed Project design.

Under Section 106 of the NHPA, effects on historic properties are considered adverse under 36 CFR Section 800.5(a)(1) when "an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association." Adverse effects may include, but are not limited to:

- Physical destruction of or damage to all or part of the property.
- Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access that is not consistent with the Secretary of the Interior's "Standards for the Treatment of Historic Properties" (36 CFR Section 68) and applicable guidelines.
- Removal of the property from its historic location.
- Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance.

- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features.
- Neglect of a property that causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to a Native American tribe.
- Transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

These NHPA standards have been used to inform conclusions pursuant to NEPA.

9.3.3 Environmental Impacts and Mitigation Measures

Impact CUL-1: Potential for Accidental Discovery and Substantial Adverse Effect on Archaeological Resources, TCPs/TCRs, and Human Remains.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the Alternative 1, the ERS and FTC facilities of the DRS would not be constructed. Because archaeological resources, TCPs/TCRs, or human remains would be discovered only under construction activities, there would be **no impact** on historical resources that are archaeological resources, and **no effect** under NEPA.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Archaeological resources or human remains are not known to exist within the RVARC site in those portions of the parcel that would be developed under this alternative; however, ground-disturbing activities, including building site preparation and trenching for pipelines and other underground utilities, have the potential to expose and damage archaeological resources with no ground surface manifestation or human remains. The introduction of fill to the eastern portions of the property and general disturbance to the parcel resulting from past activities by USACE reduces the likelihood of encountering such resources.

Archaeological remains could consist of prehistoric or historic-era artifacts. Prehistoric materials most likely would include obsidian and chert flaked-stone tools (e.g., projectile points, knives, choppers); tool-making debris; or milling equipment, such as mortars and pestles. Historic-era materials might include structural remains; stone or concrete footings and walls; and deposits of metal, glass, and/or ceramic refuse. Human remains might also be discovered as archaeological finds. Historic-era archaeological remains discovered during construction have the potential to be associated with the potential Historic District or other activities of USACE or U.S. Army while the property was owned by the military.

TCPs/TCRs have not been identified at the RVARC site; however, resources that are potential TCPs/TCRs include unique archaeological resources, as described under CEQA Section 21083.2(g), as well as nonunique archaeological resources defined under Section 21083.2(h). As a result, it is possible that a TCP/TCR that is a unique or nonunique archaeological resource could be identified during construction activities, such as building site preparation and trenching for pipelines and other underground utilities.

Should a previously undiscovered archaeological resource that is determined eligible for NRHP/CRHR or demonstrated to be a TCP/TCR be found during construction of the DRS, and the activities have the potential to render the resource ineligible for NRHP/CRHR, impacts would be considered potentially significant. Implementation of **Mitigation Measure CUL-1a** (**Immediately Halt Construction if Cultural Resources Are Discovered),** would reduce any impacts on archaeological sites that are historic properties/historical resources or TCPs/TCRs, and that have been accidentally discovered during construction of the FTC, to less than significant by requiring work to immediately stop in the vicinity of any uncovered archaeological materials until they were evaluated by a qualified archaeologist, and to implement a data recovery plan if the materials appear eligible for NRHP or CRHR.

For those previously unidentified archaeological sites that are accidentally discovered during construction and that contain human remains, implementation of **Mitigation Measure CUL-1b** (**Immediately Halt Construction if Human Remains Are Discovered and Comply with California Health and Safety Code),** would require that work immediately be halted in the vicinity of the finds and that the county coroner be contacted to verify the archaeological nature of the remains. Should the remains be determined to be of Native American ancestry, the Proposed Project proponent will work with a Most Likely Descendent (MLD) identified by NAHC to determine the best course of action such that the remains would be treated with respect and dignity.

With implementation of Mitigation Measures CUL-1a and CUL-1b, impacts would be **less than significant with mitigation** pursuant to CEQA, and there would be a finding of a **moderate adverse effect** under NEPA.

Mitigation Measure CUL-1a: Immediately Halt Construction if Cultural Resources Are Discovered (Alternatives 2, 3, and 4)

Not all cultural resources are visible on the ground surface, but all buried cultural resources are considered archaeological in nature, even though they might reflect elements of architecture. Before the start of ground-disturbing activities, a qualified professional archaeologist who meets the Secretary of Interior's "Standards for Archeology" would develop a training program and printed material to be presented to construction personnel. The purpose of this training and accompanying materials would be to familiarize construction personnel with the relevant legal (Section 106/NEPA/CEQA) context for cultural resources of the Proposed Project and with the types of cultural sites, features, and artifacts that could be uncovered during construction activities.

If any cultural resources, such as structural features, unusual amounts of bone or shell, flaked or ground stone artifacts, historic-era artifacts, human remains, or architectural remains are encountered during any Proposed Project construction activities, work shall be suspended immediately at the location of the find and within an appropriate radius of at least 50 feet. A qualified archaeologist who meets the Secretary of Interior's "Standards for Archeology" shall conduct a field investigation of the specific site and recommend mitigation necessary for the protection or recovery of any cultural resource concluded by the archaeologist to represent a historical resource or unique archaeological resource. Should the buried archaeological resource include human remains, Mitigation Measure CUL-1b would also be implemented.

Mitigation Measure CUL-1b: Immediately Halt Construction if Human Remains Are Discovered and Comply with California Health and Safety Code (Alternatives 2, 3, and 4)

If human remains are accidentally discovered during Proposed Project construction activities, the requirements of California Health and Human Safety Code Section 7050.5 must be followed. Potentially damaging excavation must halt in the area of the remains within a minimum radius of 100 feet, and the local county coroner must be notified. The coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code Section 7050.5[b]). If the coroner determines that the remains are those of a Native American, he or she must contact NAHC by phone within 24 hours of making that determination (Health and Safety Code Section 7050.5[c]). Pursuant to the provisions of California Pub. Res. Code Section 5097.98, NAHC shall identify a MLD. MLD designated by NAHC shall have at least 48 hours to inspect the site and propose treatment and disposition of the remains and any associated grave goods.

Work will not resume in the vicinity of the finds until the area has been examined by a qualified archaeologist who meets the Secretary of Interior's "Standards for Archeology" to ensure that additional human remains are not in the immediate area and DWR and/or USFWS gives approval for construction activities to resume.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The discussion for archaeological resources that are historical resources and TCPs/TCRs presented under Alternative 2 are also applicable to Alternative 3, although any accidentally discovered archaeological resources would have a much higher potential for being directly related to the potential U.S. Engineers Storehouse Historic District. With implementation of Mitigation Measures CUL-1a and CUL-1b, impacts would be reduced to a level that is **less than significant with mitigation** under CEQA, and there would be a finding of a **moderate adverse effect** under NEPA.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

No historic properties that are archaeological in nature or TCPs/TCRs been identified at the Ryde Avenue site in Stockton; however, ground-disturbing activities related to construction of DRS, such as site preparation, trenching, and marina development have the potential to uncover buried archaeological resources. Archaeological remains could consist of prehistoric or historic-era artifacts. Prehistoric materials most likely would include obsidian and chert flaked-stone tools (e.g., projectile points, knives, choppers); tool-making debris; or milling equipment, such as mortars and pestles. Historic-era materials might include structure-associated remains; stone or concrete footings and walls; and deposits of metal, glass, and/or ceramic refuse. Human remains might also be discovered as archaeological finds. Archaeological remains might also be determined to be TCPs/TCRs.

Construction of DRS at the Ryde Avenue site would have the same impacts on archaeological resources that are historical resources and TCPs/TCRs as construction of the DRS under Alternative 2. With implementation of Mitigation Measures CUL-1a and CUL-1b, impacts would be reduced to a level that would be **less than significant with mitigation** under CEQA, and there would be a finding of a **moderate adverse effect** under NEPA.

Impact CUL-2: Potential for a Substantial Adverse Effect on Built Environmental Resources.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, if left untouched, the buildings contributing to the potential eligibility of the Historic District for listing in the CRHR would likely continue to deteriorate. The City of Rio Vista has developed Army Base District Design Guidelines (Guidelines) (MIG 2011) to guide the public–private redevelopment of the property. The Guidelines recognize the parcel's "unique character and 'sense of place' created by the adjacent Sacramento River and the historic riverfront complex of buildings, wharves and trees" (MIG 2011: 7). The Guidelines further identify buildings considered suitable for reuse. Although not all of the contributors to the potential Historic District are specified, at least five may receive special attention during redevelopment (i.e., rehabilitation and adaptive reuse of the buildings) and any overall design would be required to maintain the integrity of the setting. Presumably, the City would continue to market the property for redevelopment and any project proponent would be required to follow the Guidelines, which would require rehabilitation of the buildings according to the Secretary of Interior's "Standards for the Rehabilitation of Historic Properties," and follow the mitigation recommendations presented in the Final EIR prepared for the Rio Vista Army Reserve Center Redevelopment Plan (City of Rio Vista 2011: Volume 1, page 2-6–2-10). The mitigation measures presented in the Final EIR include the following:

> Mitigation 6-2: Before undertaking any activity involving the suggested historic district or its contributing structures, including the removal of hazardous building materials, the City or project sponsor shall evaluate the proposed historic district and its contributing buildings, structures, landscape features, and setting to identify the character-defining spaces, features, materials, spatial relationships, and setting that make it significant and either:
>
> (a) Adhere to the Secretary of the Interior's "Standards for the Rehabilitation of Historic Properties" in all work within and adjacent to the suggested historic district so that the integrity of the historic district and its continued eligibility to the California Register of Historic Resources is preserved.
>
> or

(b) If implementation of mitigation alternative 6-2(a) above is not feasible and a character defining element of the historic district would be damaged, altered, obscured or eliminated so as to cause a loss of integrity and loss of continued eligibility to the California Register of Historic Resources, the project sponsor shall nevertheless implement all feasible mitigation as required by CEQA, consisting of the following measures in the following order, to the extent feasible:

(1) Document the suggested historic district and its contributing elements before any changes that would cause a loss of integrity and loss of continued eligibility to the California Register of Historic Resources. The documentation shall adhere to the Secretary of the Interior's "Standards for Architectural and Engineering Documentation." The documentation shall be made available for inclusion in the Historic American Building Survey (HABS) or the Historic American Engineering Record (HAER) Collections in the Library of Congress, the California Historical Resources Information System, the Bancroft Library, the Rio Vista Library and the Rio Vista Museum.

(2) Retain and reuse the proposed historic district's contributing buildings, structures and setting to the maximum feasible extent.

(3) Continue to apply the Standards for Rehabilitation to the maximum feasible extent in all alterations, additions and new construction within and adjacent to the proposed historic district.

(4) Relocate contributing buildings or structures to another location compatible with their original use, character and setting, preferably within the proposed Project Area, or a nearby riverfront location within or near Rio Vista.

(5) Through careful methods of planned deconstruction to avoid damage and loss, salvage character-defining features and materials for educational and interpretive use on-site or at the Rio Vista Museum, or for reuse in new construction on the site in a way that commemorates their original use and significance.

(6) Interpret the historical significance of the proposed historic district through a permanent exhibit or program within the proposed Project Area, potentially within the proposed park facilities, community center, lodge or research station.

The Final EIR concludes that, even with incorporation of the proposed mitigation measure, proposed redevelopment would have a significant and unavoidable impact on the proposed Historic District (City of Rio Vista 2011: Volume 1, page 2-10).

While redevelopment (or continued deterioration) of the potential Historic District could impair its eligibility for listing in the CRHR, and plans to redevelop the site are longstanding, no specific proposals for redevelopment of the RVARC site are ripe for implementation. It is conceivable the future redevelopment of the site could involve restoration of the buildings that are contributing elements to the potential Historic District and result in a beneficial effect. In addition, no determination has been made by SHPO of the potential Historic

District's eligibility for listing in the CRHR. For these reasons, it is considered speculative that the No Project Alternative would necessarily result in significant impacts on the potential Historic District. There would be **no impact** under CEQA and **no effect** under NEPA.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2, with the exception of the marina and debris deflector (shown in Figure 3-1), the majority of the new facilities would be constructed outside of the potential Historic District boundary (see Figure 3-1 in Chapter 3, *Description of Alternatives*), which is the only resource on the RVARC site that has been determined to potentially be a significant historical resource. Construction of the debris deflector would require removal of a large wooden pier (S-104), which is considered a contributing element of the potential Historic District.

Protective measures implemented under **Mitigation Measure CUL-2a(i)** (**Protect Historic Structures During Project Construction),** would ensure that the buildings, other than the large wooden wharf, within the potential Historic District would not be inadvertently damaged during construction of the facilities. **Mitigation Measure CUL-2a(ii) (Prepare Historic American Building Records/ Historic American Engineering Records)** cannot mitigate the impacts of demolition but will allow the wharf, which was inaccessible at the time of the field inventory, to be fully recorded.

As described in Chapter 14, *Noise,* construction activities would not create vibration and noise to a level that would have the potential to affect nearby sensitive receptors. Since buildings within the potential Historic District are located closer to the construction than the nearest sensitive receptors (approximately 113 feet away), potential vibration effects to buildings within the potential Historic District were evaluated. Consistent with Chapter 14, this analysis used the same vibration impact threshold of 0.2 peak particle velocity (PPV) inch/second as the threshold for determining potential adverse effects on "non-engineered timber and masonry" structures. Vibration effects on these buildings were determined by using the *Caltrans Transportation and Construction-Induced Vibration Guidance Manual* (Jones & Stokes 2004). Using equations from the Caltrans vibration guidance manual, vibratory pile driving activities associated with the marina could generate vibration levels of 0.11 inch per second at the closest building. Since estimated vibration levels are well below the 0.2 in/second threshold, marina construction would not result in damage to these buildings due to ground-borne vibration.

In addition, the district is potentially eligible for listing in the CRHR because of its association with activities that focused on the Sacramento River and Delta region, and its current setting along the Sacramento River waterfront would not be compromised or diminished by construction of Alternative 2. Structures that were involved with the operations of USACE and the U.S. Army once occupied the space where the ERS facilities would be constructed, but the addition of new buildings would not significantly affect the setting of the Historic District, providing that the new buildings comply with the ABD Guidelines (MIG 2011: 33), which state that development "should protect, incorporate and enhance the unique visual character and 'sense of place' of the site created by the combination of the adjacent Sacramento River, the existing riverfront complex of buildings and structures and the mature trees." The Guidelines (MIG 2011:33-34) provide standards and guidelines for building design to ensure that new buildings would be compatible with the potential Historic District.

Compliance with the ABD Guidelines and implementation of Mitigation Measure CUL-2a(i) would avoid impacts on the potential Historic District, other than the wharf that will be removed in order to construct the debris reflector. Application of Mitigation Measure CUL-2a(ii) would require additional recordation of the wharf prior to demolition. These mitigation measures are consistent with SHPO's Section 106 concurrence letter dated November 7, 2016, which acknowledges that with the exception of pier S-104, the potential Historic District will not be impacted. The SHPO letter notes that pier S-104 will be photographed and documented and that interpretive signage will be installed. While the wharf is a contributing element to the potential Historic District, JRP noted that the integrity of the wharf was compromised by the addition of elements outside of the period of significance (JRP 1997). Its removal would not render the potential Historic District ineligible for listing in the NRHP or CRHR, as the District would still retain enough of its character-defining features to convey the reasons for its significance. As a result, under CEQA, this impact would be **less than significant with mitigation** with the implementation of Mitigation Measures CUL-2a(i) and CUL-2a(ii). Because the Historic District is not eligible for the NRHP, there would be a finding of **no effect** under NEPA.

Mitigation Measure CUL-2a(i): Protect Historic Structures During Project Construction (Alternatives 2 and 3)

In the event that SHPO determines that the potential Historic District is not eligible for listing in the CRHR, no protective measures are required. However, in the event that SHPO determines that the potential Historic District is eligible for the listing in the CRHR, or if no determination has been made by SHPO, construction activities in the vicinity of the potential Historic District have the potential to disturb buildings that are contributing elements to this potential historical resource. Precautions to protect built resources from construction vehicles and debris may include fencing or debris meshing. During construction, protective measures shall be field checked as needed by a qualified architectural historian with demonstrated experience conducting monitoring of this nature.

Mitigation Measure CUL-2a(ii): Prepare Historic American Building Records/Historic American Engineering Records (Alternatives 2 – ERS)

Before developing plans for demolishing the wharf (S-104), a Historic American Building Records or Historic American Engineering Record (HAER), as determined through consultation with SHPO, would be prepared to thoroughly document the current conditions of the structure to be demolished. These documents would include information about the wharf's construction design, methods, material, and measurements. The level of recordation would be determined by a qualified architectural historian, structural engineer, and/or architect experienced in the recordation of historical structures in consultation with DWR. In addition to HAER

> or other SHPO approved documentation of the dock that would be removed to make way for a debris deflector under Alternative 2, an interpretive sign would be designed and installed on the principal path that accesses the District. The sign would describe the U.S. Engineers Storehouse Historic District, its role in the Sacramento River Flood Control Project, and deliver a message of conservation and protection of historical sites.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 proposes to use the area within and adjacent to the potential Historic District for construction of the facilities related to the DRS (see Figure 3-2). Under this Alternative, five of the buildings (T-7, T-9, T-11, T-27, and T-42) that contribute to the potential eligibility of the Historic District would be retained and rehabilitated for use as part of ERS and the water tower would be preserved; all other buildings and structures associated with the potential Historic District, with the exception of T-43, would be demolished as the result of ERS construction.

Estuarine Research Station

For the water tower and all of the buildings in the potential Historic District that would not be demolished, Mitigation Measure CUL-2a(i) would protect historic structures during construction. In addition, **Mitigation Measure CUL-2b (Prepare Historic Structure Reports)** would document the baseline condition of the buildings before project construction. Although the buildings have been previously recorded (Brunzell 2015; JRP Historical Consulting Services 1997) and their deteriorating conditions documented (Appendix I), details of the buildings' construction and material content have not been recorded.

In addition, CEQA Guidelines Section 15126.4(b)(1) allows for the rehabilitation of buildings according to the Secretary of Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings to mitigate adverse impacts on historical resources. The Secretary of Interior's 'Standards for Preservation require retention of the greatest amount of historic fabric, along with the building's historic form, features, and detailing as they have evolved over time. The Secretary of Interior's "Standards for Preservation" require acknowledge the need to alter or add to a historic building to meet continuing or new uses while retaining the building's historic character. As noted in the Final EIR prepared for the Rio Vista Army Reserve Center Redevelopment Plan (City of Rio Vista 2011: Volume 1, page 6-17):

> Standards for Rehabilitation allow alterations or additions to a historic resource to allow new uses while retaining the resource's historic character. Under the Standards for Rehabilitation, new additions, alterations, or adjacent new construction must not destroy character-defining features, spaces and spatial relationships. New work must be differentiated from the old and must be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment. New additions, alterations and new construction must be undertaken in such a manner that, if

removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

By complying with the Secretary of Interior's Standards for Rehabilitation when designing the reuse of structures T-7, T-9, T-11, T-27, and T-42 under **Mitigation Measure CUL-2c (Follow the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings)**, the impacts on the potential Historic District would be reduced to a less than significant level for the five buildings identified for rehabilitation.

In addition, the development of interpretive materials, as outlined in **Mitigation Measure CUL-2d (Prepare Interpretive Materials)**, to explain the reuse of some of the buildings and provide the public with information about the historic significance of the potential Historic District, would be consistent with the Guidelines (MIG 2011:31) and Mitigation Measure 6-2(b)(6) of the Final EIR for the Rio Vista Army Reserve Center Redevelopment Plan (City of Rio Vista 2011: Volume 1, page 6-9).

Implementation of Mitigation Measures CUL-2a(i), CUL-2b, CUL-2c and CUL-2d would serve to minimize impacts of construction of ERS on the potential Historic District. With respect to potential vibration effects, construction of the marina would occur approximately 135 feet away and using the same methods described above for Alternative 2, would not result in any adverse effects on buildings within the potential Historic District due to ground-borne vibration. Should SHPO ultimately determine that the potential Historic District is not eligible for listing in the CRHR, none of the mitigation measures would be needed. However, because the ERS under this alternative would involve demolition of contributing elements to the potential Historic District, impacts would be **significant and unavoidable** under CEQA. Because the Historic District is not eligible for the NRHP, under NEPA there would be **no effect** to this resource.

Mitigation Measure CUL-2b: Prepare Historic Structure Reports (Alternative 3 – ERS)

Before developing plans for the rehabilitation of buildings T-7, T-9, T-11, T-27, and T-42, and the preservation of the water tower (T-23), a Historic Structures Report would be prepared to thoroughly document the current conditions of the structures to be demolished, and would include information about the character-defining methods of construction and the materials used in each building. The information provided in the Historic Structure Report would help determine methods by which to preserve the water tower and contribute to decisions about the rehabilitation of buildings T-7, T-9, T-11, T-27, and T-42 for repurposing as part of DRS. The level of recordation would be determined by a qualified architectural historian, structural engineer, and architect experienced in the rehabilitation of historical buildings in consultation with DWR and USFWS. The Historic Structures Report would follow the guidelines provided in "Preservation Brief 43, The Preparation and Use of Historic Structure Reports" by the National Park Service and "Historic Structure Report Format" by the California Office of Historic Preservation.

Mitigation Measure CUL-2c: Follow the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings (Alternative 3 – ERS)

Rehabilitation of buildings T-7, T-9, T-11, T-27, and T-42 (Alternative 3) and the preservation of the water tower (T-23) (Alternatives 2 and 3) would comply the Secretary of the Interior's Standards for the Treatment of Historic Properties pursuant to 36 CFR 68. Preservation and rehabilitation of the buildings would follow the Secretary of the Interior's Standards for the Treatment of Historic Properties, 1995, with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings and the "Illustrated Guide for the Rehabilitation Historic Buildings." DWR and USFWS would work with architectural historians, structural engineers, and architects familiar with the rehabilitation of historic buildings to plan and implement the preservation of the water tower (T-23) (Alternatives 2 and 3) and the rehabilitation of buildings T-7, T-9, T-11, T-27, and T-42 (Alternative 3).

Mitigation Measure CUL-2d: Prepare Interpretive Materials (Alternative 3 – ERS)

Interpretive materials may include, but are not limited to, brochures, videos, websites, signage, exhibits commemorative plaques, or articles or reports for general publication.

Buildings subject to rehabilitation by the Proposed Project would be the subject of informative permanent metal plaques that would be installed on or at the site of each building. Each plaque would provide a brief history of the subject building, and its engineering/architectural features and characteristics. Demolished buildings and the entire Historic District would be commemorated through a public exhibit located on the campus of the DRS and signage along public trails.

Any interpretive materials prepared, such as brochures, articles, or reports for the general public, would use images, drawings, narrative history, or other material produced for the Historic Structure Report, and may include additional archival sources. The interpretive materials should be advertised and made available to and/or disseminated to the public. The interpretive materials may be made available at local libraries, historical societies, or public buildings.

Fish Technology Center

Construction of the FTC facilities would occur entirely outside of the potential Historic District boundary. As a result, impacts on the potential Historic District would be the same as those under the FTC for Alternative 2, and with implementation of Mitigation Measure CUL-2a(i), would be reduced to a level that is **less than significant with mitigation**. Under NEPA, there would be **no effect.**

Delta Research Station

Impacts from construction of the DRS facility would be the same as those described for the ERS and FTC, and would be significant. Implementation of **Mitigation Measures CUL-2a, CUL-2b, CUL-2c, and CUL-2d** would reduce impacts, but not to a level that would be less than significant. Impacts would therefore be **significant and unavoidable** under CEQA. Because the Historic District is not eligible for the NRHP, under NEPA there would be **no effect**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

No historic properties associated with the built environment have been identified at the Ryde Avenue site in Stockton. Construction of the ERS and FTC does not have the potential to accidentally discover resources of the built environment; therefore, there would be **no impact** on those types of cultural resources. Under NEPA, there would be **no effect**.

Impact CUL-3: Potential for a Substantial Adverse Effect on a Unique Paleontological Resource or Geological Feature from Proposed Project Construction.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no construction and **no impact** on paleontological resources. Under NEPA, there would be **no effect**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Ground disturbance resulting from construction activities associated with DRS has the potential to uncover buried significant paleontological resources, which would be considered a potentially significant impact; however, with implementation of **Mitigation Measure CUL-3 (Immediately Halt Construction if Paleontological Resources Are Discovered),** the impacts would be reduced to a level that is **less than significant with mitigation**. Under NEPA, there would be a finding of **moderate adverse effect**. This mitigation measure would require that all work cease in the immediate vicinity of the finds until they are evaluated by a professional paleontologist and an appropriate course of action is implemented.

Mitigation Measure CUL-3: Immediately Halt Construction If Paleontological Resources Are Discovered (Alternatives 2, 3, and 4)

If paleontological resources are encountered during ground-disturbing activities, all work shall stop within 50 feet of the finds to avoid altering the resource and its stratigraphic context until a qualified paleontologist has evaluated, recorded, and determined the appropriate treatment of the resource in consultation with the Proposed Project proponent. Appropriate treatment may include collecting and processing "standard" samples by a qualified paleontologist to recover microvertebrate fossils; preparing significant fossils to a reasonable point of identification; and depositing significant fossils in a museum repository for permanent curation and storage, together with an itemized inventory of the specimens. Work shall not resume in the vicinity of the finds until approved by qualified paleontologist in consultation with DWR or USFWS.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Impacts on paleontological resources for the ERS, FTC, and DRS under Alternative 3 would be the same as those under Alternative 2. Implementation of Mitigation Measure CUL-3 would reduce these impacts to a level that is **less than significant with mitigation** under CEQA, and there would be a finding of **moderate adverse effect** under NEPA.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Impacts on paleontological resources for the ERS, FTC, and DRS under Alternative 4 would be the same as those under Alternative 2. Implementation of Mitigation Measure CUL-3 would reduce these impacts to a level that is **less than significant with mitigation** under CEQA, and there would be a finding of **moderate adverse effect** under NEPA.

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Chapter 10
Geology, Soils, and Seismicity

This chapter describes the existing geology, soils, and seismicity in the vicinity of the RVARC and Ryde Avenue sites. This chapter also describes the relevant federal, state, and local regulations, laws, and policies pertaining to geology and soils. The potential impacts on geology and soils during construction and operation of the Proposed Project are evaluated, and mitigation is proposed to address impacts found to be significant.

10.1 Environmental Setting

The general issues of concern related to geology, soils, and seismicity are described below. This general description is followed by a discussion of local geology, soils, and seismicity at each alternative site.

For geology, each site is considered in the context of its potential for lateral spreading, liquefaction, and collapse, all of which occur with loose, uncompacted sandy soils. Lateral spreading is specific to the movement of hillslopes, even slight ones such as along terraces and riverbanks. Liquefaction is associated with seismic events and is described in more detail under the discussion of seismicity. Land subsidence can occur as a result of groundwater withdrawal and declines in aquifer levels, which can result in compression of the subsurface geologic materials due to the drying up of pore space that formerly contained water. All of these phenomena often lead to uneven settling and movement of building foundations and infrastructure, resulting in structural damage and an increased risk to the integrity and safety of structures.

For soils, three issues are of particular concern. First, land subsidence can occur when areas with saturated soils containing high organic content are drained, resulting in rapid decomposition of the organic material and subsequent settlement. Second, expansive soils can damage building foundations and infrastructure, such as sidewalks and parking lots. Expansive soils are predominantly composed of clays and can undergo substantial volume change in response to changes in moisture content. When wet, expansive soils expand and soften, followed by shrinking and hardening as they dry. Typically, soils that exhibit expansive characteristics comprise the upper 5 feet of the soil. Soils with high shrink-swell potential are also highly corrosive to steel and concrete and can damage structural supports. Finally, soil erosion is a concern if soil particles are removed from a land surface by wind, water, or gravity. Most natural erosion occurs slowly. However, excavation or grading may increase the rate of erosion during construction activities by exposing bare soils to the effects of wind and/or water.

Seismicity is described in terms of potential for ground shaking, ground rupture, landslide, and liquefaction. The following list provides a brief description of key concepts related to these seismic hazards:

- **Ground Shaking.** Seismically induced ground shaking can cause substantial damage to buildings. The Modified Mercalli Intensity (MMI) scale, shown in **Table 10-1**, is a ranking of perceived intensity based on observed effects and is the current standard used throughout the U.S. Less intense earthquakes are typically rated on the basis of individual accounts, whereas higher intensity events are rated based on observed structural damage.

Table 10-1. Modified Mercalli Intensity Scale

Intensity	Shaking	Potential Damage	Description/Damage
I	Not felt	None	Not felt except by a very few under especially favorable conditions.
II	Weak	None	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Weak	None	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	None	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Very Light	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Light	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very Strong	Moderate	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Moderate /Heavy	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Heavy	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Very Heavy	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Sources: USGS 1989 and 2015.

- **Ground Rupture.** Horizontal and/or vertical surface or ground ruptures can also occur during seismic events, typically along fault lines. Ground ruptures can result in damage to buildings, roads, and underground utilities.
- **Landslide.** Slope failure or landslides may occur in steeply sloped areas during seismic events. Saturated soils and precipitation events increase the likelihood that an earthquake will trigger a landslide.
- **Liquefaction.** Soil liquefaction is a phenomenon that occurs when saturated sandy or silty soils lose strength during cyclic loading, as caused by earthquakes. During the loss of strength, the soil acquires "mobility" sufficient to permit both horizontal and vertical movements, behaving like a liquid. The factors known to influence liquefaction potential are soil type and depth, grain size, density, groundwater level, degree of saturation, and the intensity and duration of ground shaking. The greatest potential for liquefaction occurs in areas where the water table is less than 20 feet below ground surface (bgs) and where soils consist of relatively uniform, low-density sands. Clayey-type soils are generally not subject to liquefaction. The probability of liquefaction correlates directly with the intensity and duration of ground shaking (i.e., the stronger and/or longer the earthquake, the greater the chance of liquefaction). As earthquake waves move out from the epicenter, high-frequency waves dissipate more quickly than slower, low-frequency waves. This equates to a rolling motion moving farther away from the fault, versus the jolting sensation produced by high-frequency waves.

10.1.1 Rio Vista Army Reserve Center Site

Local Geology

The RVARC is located on the transitional boundary between the Sacramento River and the eastern toe of the Montezuma Hills in the Central Valley. Most of the RVARC is underlain by Quaternary intertidal deposits of peaty mud associated with the Sacramento River (Graymer et al. 2002). Moving toward the western boundary of the RVARC, the low-lying, rounded Montezuma Hills begin and extend approximately 10 miles westward. The Montezuma Hills are composed of Quaternary sediments of poorly stratified, slightly consolidated deposits of gravels, sands, and clays known as the Montezuma Formation.

The potential for land subsidence at the Rio Vista site is low given that the underlying groundwater aquifer is not in overdraft. Possible locations for lateral spreading would be between the lower and upper terraces and at the river shoreline. Historic and recent record searches and site visits identified no visible evidence of lateral spreading near the terrace slopes or the river's edge. Additionally, much of the shoreline has been lined with rock slope protection and/or retaining walls, which stabilize the soils behind them. The potential for lateral spreading to occur at the site is therefore considered to be very low.

Soils

The RVARC is directly underlain with fill material from dredged spoils. According to Natural Resources Conservation Service (NRCS) mapping (NRCS 2014), the RVARC site's primary soil type is Tujunga fine sand (**Figure 10-1**). This soil unit consists of incoherent alluvium, typically free of gravels. The runoff rate for Tujunga fine sand is slow, with a slight to moderate erosion potential. Tujunga fine sand, which contains mostly fine sands and silts, has a very low shrink/swell rating and does not limit construction (FEMA 2013; NRCS 2014).

A small area (approximately 0.7 acre) along the western boundary of the RVARC site is mapped as Diablo-Ayar clays, 9 to 30 percent slopes, eroded. Diablo-Ayar clays are derived from weakly consolidated sediments and are typically found on river terraces. This unit has a medium runoff rate and a moderate erosion hazard. NRCS (2014) classifies Diablo-Ayer clays as very limiting for new construction because of its very high shrink/swell rating and the steepness of the slopes where the soil unit is found on the site (FEMA 2013; NRCS 2014).

The site does not contain saturated soils with high organic content that could be susceptible to subsidence if drained.

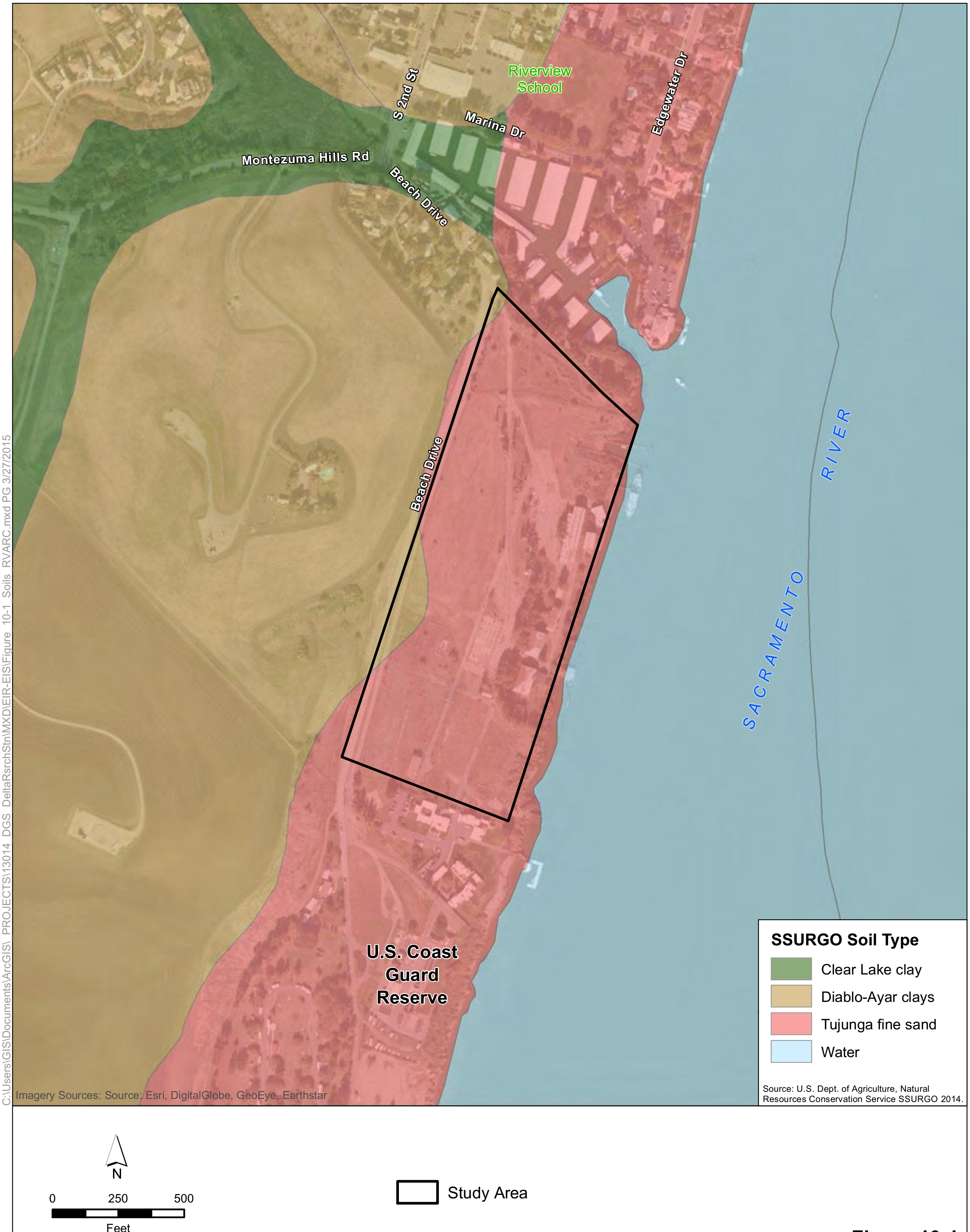


Figure 10-1

Soils for the Rio Vista Army Reserve Center

Seismicity

GROUND SHAKING

No seismically active faults or designated Alquist-Priolo Fault Zones are near the RVARC site. Seismic events from regional faults (e.g., Concord/Green Valley Fault, Greenville Fault, and Mt. Diablo Thrust Fault) may result in ground shaking at the RVARC site (Association of Bay Area Governments [ABAG] 2014). However, because of the distances from likely event epicenters, early International Building Code (IBC) seismic hazard maps classified the Rio Vista area as Seismic Risk Zone 3, with impacts far less severe than those experienced in the San Francisco Bay Area (Seismic Risk Zone 4)[1] (UBC 1997). **Table 10-2** shows the distance, maximum probable earthquake, probability, and shaking severity associated with several regional faults.

Table 10-2. Major Faults near the RVARC Site

Fault	Approximate Distance	Probable Magnitude a	Probability of Earthquake Magnitude 6.7 or Greater	Shaking Severity Experienced at the Project Site b
Rio Vista (potentially active)	0.5 miles west	Not available	Not available	Not available
Concord/Green Valley	23 miles west	6.8	3%	VII – Strong
Greenville	23 miles south-southwest	7.0	3%	VII – Strong
Mt. Diablo Thrust	24 miles southwest	6.7	1%	VII – Strong
Hayward Fault Zone	35 miles southwest	7.0	27%	VI – Moderate

[a] 10% chance of exceedance in 50 years, based on moment magnitude scale (MMS).
[b] Shaking severity is based on Modified Mercalli Intensity (MMI) scale.
Sources: ABAG 2014; City of Rio Vista 2002; USGS 2003, 2014a and 2014b.

GROUND RUPTURE

The Rio Vista Fault is the closest fault to the RVARC site (approximately 0.5 mile west of the site). No surface faulting or tectonic creep has been measured on this fault within the last 200 years; the fault is classified as "potentially active" (City of Rio Vista 2002). Since no active faults or designated Alquist-Priolo Fault Zones are located near Rio Vista, ground ruptures during even a very large seismic event are highly improbable.

[1] Seismic Risk Zones were established by the International Building Code (IBC) (Uniform Building Code [UBC] prior to 2000) for estimated peak ground acceleration (PGA) and are based upon 10% probability of exceedance in a 50-year period. The IBC Seismic Risk Zones classify areas into six zones: 0, 1, 2A, 2B, 3, and 4 (higher value indicates greater risk).

LANDSLIDES

The RVARC site has been previously graded and developed. Although the property is composed of two flat terraces separated by a small slope, the site's topography is otherwise relatively flat. Thus, the risk for potential landslides to occur on the site is extremely minimal. Additionally, the potential for landslides originating from the hill west of Beach Drive are highly unlikely to affect the RVARC site because of the gradual slope of the hill and its distance from the site.

LIQUEFACTION

As mentioned above, soils underlying the RVARC site are predominantly fill material of fine alluvial sands, which are highly susceptible to the effects of liquefaction if not well compacted. As such, USGS mapping classifies the area east of Beach Drive as having "very high" susceptibility to liquefaction (ABAG 2014; USGS 2006).

10.1.2 Ryde Avenue Site in Stockton

Local Geology

The Ryde Avenue site primarily consists of fill material of unknown depth, underlain by Quaternary alluvial deposits (CGS 1991). Most of the surrounding areas to the north, east, and south are underlain with the Quaternary Modesto Formation. The Modesto Formation derives from alluvial fan deposits, typically consisting of unconsolidated coarse sand and silty sand. Across the San Joaquin River to the southwest, the area is underlain by Quaternary Dos Palos alluvium (CGS 1991). Dos Palos alluvium primarily consists of flood deposits.

The Stockton area lies within the San Joaquin Valley Groundwater Basin's Eastern San Joaquin Groundwater Subbasin (Basin number 5-22.01) (DWR 2006). Currently, overdraft of groundwater within the subbasin has led to groundwater depression below the City of Stockton, east of Stockton, and east of Lodi (DWR 2006). As a result, land subsidence is a regional concern.

With a slope of 0 to 5 percent throughout the area, no sudden changes in topography, and gradually sloped riverbanks lined with rock slope protection, the Ryde Avenue site is considered to have very low potential for lateral spreading.

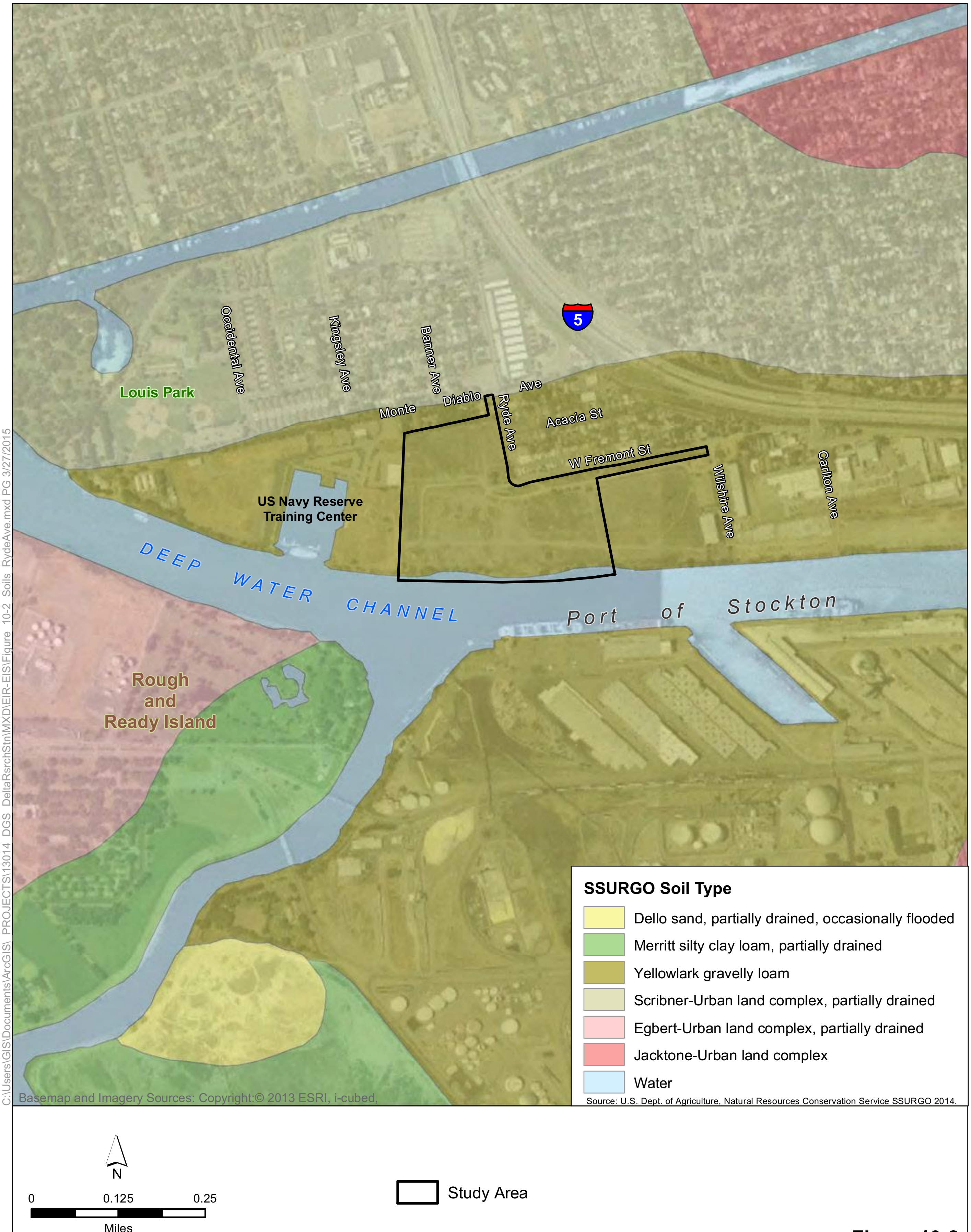
Soils

According to NRCS soil information (NRCS 2014), the soils at the Ryde Avenue site are almost exclusively Yellowlark gravelly loam, 2 to 5 percent slope (map unit 280) (**Figure 10-2**). This soil type is characterized as moderately well drained and moderately erodible. Parent material of Yellowlark gravelly loam is alluvium derived from mixed rock sources. This soil unit is well drained and has a high runoff rate. A cemented hardpan layer extends throughout the Ryde Avenue site at approximately 57–62 inches bgs. A second soil unit, Scribner-Urban land complex, 0 to 2 percent slopes (map unit 245), is present on a very small portion of the site, near the intersection of Monte Diablo Avenue and Ryde Avenue.

The Scribner-Urban land complex is partially drained and consists of a matrix of Scribner soils and Urban lands. Scribner soils are poorly drained and developed from parent material that is an alluvium derived from mixed rock sources and typically located on floodplains. This unit accounts for less than 0.1 percent of the surface area at the Ryde Avenue site.

Of the two soil units at the Ryde Avenue site, only the Yellowlark gravelly loam is of concern as an expansive soil, being composed of approximately 25 percent clay. Due to the physical shrink/swell characteristics of clay, NRCS (2014) soil ratings classify the soil unit as "somewhat limited" for small commercial buildings (three stories and under) because of its moderately expansive soil characteristics.

The site does not contain saturated soils with high organic content that could be susceptible to subsidence if drained.



Horizon WATER and ENVIRONMENT

Figure 10-2

Soils for the Ryde Avenue Site

Seismicity

GROUND SHAKING

The IBC designates the Stockton area as being in Seismic Risk Zone 3 and could be affected by regionally occurring earthquakes (UBC 1997). According to USGS National Seismic Hazards mapping (USGS 2014a), the Ryde Avenue site has an estimated peak ground acceleration (PGA) ranging from 0.30 g to 0.40 g (a measure of acceleration compared to gravity).[2] This degree of shaking has a 10 percent probability of being exceeded in 50 years. When compared to the MMI scale (Table 10-2), would be classified with an MMI value of VII to VIII (USGS 2015). A very large seismic event in the San Francisco Bay Area may be capable of "very strong" shaking with a "moderate" potential for structural damage, in which damage to buildings of good design and construction would be marginal, but damage to chimneys and free-standing masonry structures would be considerable (USGS 1989). **Table 10-3** shows the distance, maximum probable earthquake, probability, and shaking severity associated with several regional faults.

GROUND RUPTURE

No designated Alquist-Priolo Earthquake Fault Zones are located near the Stockton area. The closest known active faults are located more than 25 miles west of the Ryde Avenue site (USGS 2014b). Potential risks from fault or ground rupture are considered negligible.

LANDSLIDES

The Ryde Avenue site's topography is relatively flat, with the site sloping gradually to the north-northeast. Landslides pose no risk at the Ryde Avenue site.

LIQUEFACTION

The Ryde Avenue site is underlain by young alluvial material, which is susceptible to liquefaction. However, the mixed arrangement of coarse sands and silt of the Modesto Formation reduce the mobility of the geologic unit during a seismic event. Similarly, Yellowlark gravelly loam is approximately ¼ clay, with equal parts sand and silt. In Stockton, ground motion from large earthquakes is expected to be a rolling type of motion, which would be less likely to result in liquefaction.

[2] PGA is a measure of how quickly the earth shakes in a given geographic area (i.e., the *intensity* of the earthquake). Generally speaking, a PGA of 0.001 g is perceptible by people, a PGA of 0.02 g causes people to lose their balance, and a PGA of 0.50 may cause well-designed buildings to collapse if the duration of the shaking is sustained.

Table 10-3. Major Faults near the Ryde Avenue Site

Fault	Approximate Distance from the Ryde Avenue Site	Probable Magnitude [a]	Probability of Earthquake Magnitude 6.7 or Greater	Shaking Severity Experienced at the Project Site [b]
Tracy-Stockton (inactive)	2.4 miles south	Not available	Not available	Not available
Midway (potential active)	18 miles southwest	Not available	Not available	Not available
Greenville	25 miles west	7.0	3%	VI – Moderate
Mt. Diablo Thrust	28 miles west	6.7	1%	VI – Moderate
Calaveras	34 miles southwest	7.0	7%	VI – Moderate
Concord/Green Valley	36 miles west	6.8	3%	VI – Moderate
Hayward Fault Zone	44 miles southwest	7.0	27%	V – Light

[a] 10% chance of exceedance in 50 years, based on moment magnitude scale (MMS).

[b] Shaking severity based on Modified Mercalli Intensity (MMI) scale.

Sources: ABAG 2014; City of Rio Vista 2002; USGS 2003, 2014a and 2014b.

10.2 Regulatory Setting

10.2.1 Federal Laws, Regulations, and Policies

National Earthquake Hazards Reduction Act

The National Earthquake Hazards Reduction Act of 1977 (Public Law 95-124) and the resulting creation of the National Earthquake Hazards Reduction Program (NEHRP) established a long-term earthquake risk reduction program to better understand, predict, and mitigate risks associated with seismic events. Four federal agencies are responsible for coordinating activities under NEHRP: USGS, National Science Foundation (NSF), Federal Emergency Management Agency (FEMA), and National Institute of Standards and Technology (NIST). Since its inception, NEHRP has shifted its focus from earthquake prediction to hazard reduction. The current program objectives (NEHRP 2009) are as follows:

1. Developing effective measures to reduce earthquake hazards;
2. Promoting the adoption of earthquake hazard reduction activities by federal, state, and local governments, national building standards and model building code organizations, engineers, architects, building owners, and others who play a role in planning and constructing buildings, bridges, structures, and critical infrastructure or “lifelines”;

3. Improving the basic understanding of earthquakes and their effects on people and infrastructure through interdisciplinary research involving engineering, natural sciences, and social, economic, and decision sciences; and

4. Developing and maintaining the USGS seismic monitoring system (Advanced National Seismic System), the NSF-funded project aimed at improving materials, designs, and construction techniques (George E. Brown Jr. Network for Earthquake Engineering Simulation), and the global earthquake monitoring network (Global Seismic Network).

Implementation of NEHRP objectives is accomplished primarily through original research, publications, and recommendations and guidelines for state, regional, and local agencies in the development of plans and policies to promote safety and emergency planning.

10.2.2 State Laws, Regulations, and Policies

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (Pub. Res. Code Section 2621 *et seq*.), was passed to reduce the risk to life and property from surface faulting in California. The Alquist-Priolo Act prohibits construction of most types of structures intended for human occupancy on the surface traces of active faults and strictly regulates construction in the corridors along active faults (Earthquake Fault Zones). It also defines criteria for identifying active faults, giving legal weight to terms such as “active,” and establishes a process for reviewing building proposals in and adjacent to Earthquake Fault Zones. Under the Alquist-Priolo Act, faults are zoned and construction along or across them is strictly regulated if they are “sufficiently active” and “well defined.” Before a project can be permitted, cities and counties must require a geologic investigation to demonstrate that proposed buildings will not be constructed across active faults.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 (Pub. Res. Code Sections 2690–2699.6) establishes statewide minimum public safety standards for mitigation of earthquake hazards. While the Alquist-Priolo Act addresses surface fault rupture, the Seismic Hazards Mapping Act addresses other earthquake-related hazards, including strong ground shaking, liquefaction, and seismically induced landslides. Its provisions are similar in concept to those of the Alquist-Priolo Act: The State is charged with identifying and mapping areas at risk of strong ground shaking, liquefaction, landslides, and other seismic hazards, and cities and counties are required to regulate development within mapped Seismic Hazard Zones. In addition, the Seismic Hazards Mapping Act addresses not only seismically induced hazards but also expansive soils, settlement, and slope stability. Under the Seismic Hazards Mapping Act, cities and counties may withhold development permits for a site within a Seismic Hazard Zone until appropriate site-specific geologic and/or geotechnical investigations have been carried out and measures to reduce potential damage have been incorporated into the development plans.

California Building Code and International Building Code

Title 24, Part 2 of the California Building Code (CBC), California Code of Regulations (CCR), specifies standards for geologic and seismic hazards other than surface faulting. These codes are administered and updated by the California Building Standards Commission. This code specifies criteria for open excavation, seismic design, and load-bearing capacity related directly to construction in California.

The CBC is based on the IBC (before 2000, known as the Uniform Building Code [UBC]) which was developed by the International Conference of Building Officials (ICBO). The most recent IBC is from 2012, and is used by most states, including California, as well as local jurisdictions to set basic standards for acceptable design of structures and facilities. The IBC provides information on criteria for seismic design, construction, and load-bearing capacity associated with various buildings and other structures and features. Additionally, the IBC identifies design and construction requirements to address and mitigate potential geologic hazards. New construction projects generally must meet the requirements of the most recent version of the IBC.

10.2.3 Local Laws, Regulations, and Policies

Rio Vista Army Reserve Center Site

City of Rio Vista General Plan

The City of Rio Vista 2001 General Plan's (2002) Resource Conservation and Management Element and Safety and Noise Element outline many goals and policies that address geologic and seismic hazards. The following goals and policies are relevant to the Proposed Project:

Goal 10.7 To protect and preserve soils as a natural resource.

Policy 10.7.A The City shall minimize soil erosion and sedimentation by maintaining compatible land uses, suitable building designs, and appropriate construction techniques.

Policy 10.11.F The City shall require new development to incorporate sound soil conservation practices and minimize land alterations. Land alterations [at the RVARC] shall comply with the following guidelines:

- Limit grading to the smallest practical area of land;
- Limit land exposure to the shortest practical amount of time;
- Use erosion and sediment control measures, including temporary vegetation sufficient to stabilize disturbed areas;
- Replant graded areas to ensure establishment of plant cover before the next rainy season;
- Create grading contours that blend with the natural contours onsite or with contours on property immediately adjacent to the area of development;
- Ensure that development near or on portions of hillsides does not cause or worsen natural hazards, such as erosion, sedimentation, increased risk of fire, or degraded water quality; and
- Maintain the character and visual quality of the hillside.

Goal 11.1 To minimize injury and property damage due to seismic activity.

Policy 11.1.B The City shall continue to mitigate the potential impacts of geologic hazards.

Policy 11.1.C Soil erosion and sedimentation shall be minimized by maintaining compatible land uses, suitable building designs, and appropriate construction techniques.

Policy 11.1.D Development projects shall comply with state seismic and building standards in the design and siting of critical facilities, including police and fire stations, school facilities, hazardous materials storage facilities, bridges, and large public assembly halls.

Policy 11.1.E The City shall require contour grading, where feasible, and revegetation to mitigate the appearance of engineered slopes and to control erosion.

Rio Vista Municipal Code

Rio Vista Municipal Code Section 17.44.050, Geological Hazard Areas, establishes special building setback lines to regulate the location of buildings in geologically hazardous areas, such as along the traces of the Rio Vista Earthquake Fault. The purpose of this code is to minimize the potential for loss of property and life resulting from differential movement along the fault traces caused by tectonic forces. However, because of the distance of the RVARC site from the Rio Vista Earthquake Fault (more than 60 feet), the ordinance does not apply.

Ryde Avenue Site in Stockton

City of Stockton 2035 General Plan

The City of Stockton 2035 General Plan (City of Stockton 2007) Health and Safety Element contains the following policies relating to geology, soils, and seismicity:

> **Policy HS-3.1** *Seismic Safety of Structures and Public Facilities***.** The City shall require that new structures intended for human occupancy, public facilities (i.e., treatment plants and pumping stations, major communication lines, evacuation routes, etc.), and emergency/disaster facilities (i.e., police and fire stations, etc.) are designed and constructed to minimize risk to the safety of people due to ground shaking.

> **Policy HS-3.2** *Development in Areas Subject to Geologic Hazards***.** The City shall require all proposed developments, reconstruction, utilities, or public facilities situated within areas subject to geologic-seismic hazards as identified in the soils engineering and geologic-seismic analysis to be sited, designed, and constructed to mitigate the risk associated with the hazard (e.g., expansive, liquefaction, etc.).

> **Policy HS-3.4** *Uniform Building Code***.** The City shall require that alterations to existing buildings and all new buildings be built according to the seismic requirements of the Uniform Building Code.

> **Policy HS-3.5** *Seismic Retrofitting***.** The City shall support and encourage seismic upgrades to older buildings that may be structurally deficient.

> **Policy HS-3.6** *Development within the Primary Zone of the Delta***.** The City shall continue to support the State policy restricting development within the primary zone of the Delta due to soil limitations and other hazards (e.g., liquefaction, subsidence, shrink-swell potential).

> **Policy HS-3.8** *Alquist-Priolo Act Compliance***.** The City shall not permit any structure for human occupancy to be placed within designated Earthquake Fault Zones (pursuant to and as determined by the Alquist-Priolo Earthquake Fault Zoning Act; Public Resources Code, Chapter 7.5) unless the specific provisions of the Act and Title 14 of the California Code of Regulations have been satisfied.

Policy NCR-5.3 The City shall require new development to implement measures that minimize soil erosion from wind and water related to construction. Measures may include, but not be limited to the following:

- Grading requirements that limit grading to the amount necessary to provide stable areas for structural foundations, street rights-of-way, parking facilities, or other intended uses; and/or
- Construction techniques that utilize site preparation, grading, and best management practices that provide erosion and sediment control to prevent construction-related contaminants from leaving development sites and polluting local waterways.

STOCKTON MUNICIPAL CODE

Stockton Municipal Code Section 15.48.010, Grading and Erosion Control Ordinance, establishes uniform requirements for reducing on-site erosion and the loss of topsoil, and protecting and enhancing the water quality of watercourses, water bodies, and wetlands. The ordinance promotes the future health, safety, general welfare, and protection of property by establishing requirements for:

- Clearing and grubbing, grading, filling, and excavation of land to minimize damage to surrounding property, public right-of-way, and degradation of water quality;
- Controlling the discharge of sediments and pollutant runoff from construction-related activities to municipal separate storm drains; and
- Reducing pollutants in stormwater discharges to the maximum extent practicable.

10.3 Environmental Impacts

10.3.1 Methods of Analysis

Impacts related to geology, soils, seismicity, and associated hazards were evaluated qualitatively based on review of site conditions; soil and geologic maps prepared by USGS, CGS, and NRCS; and other relevant data (e.g., seismic predictions).

10.3.2 Significance Criteria

An alternative would have a significant impact with regard to geology, soils, and seismicity if it would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;
  - Strong seismic ground shaking;
  - Seismic-related ground failure, including liquefaction; or
  - Landslides.
- Result in substantial soil erosion or the loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1997), creating substantial risks to life or property; or
- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of waste water.

The last criterion, addressing soil capacity to support septic tanks or alternative wastewater disposal systems, is not applicable because none of the Proposed Project alternatives include septic tank installation. Therefore, this criterion is not discussed further.

10.3.3 Environmental Impacts and Mitigation Measures

Impact GEO-1: Exposure of People or Structures to Adverse Effects from Seismic-Related Ground Shaking, Ground Failure, Fault Rupture, Landslide, or Liquefaction During Construction or Operational Activities.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the IEP's long-term monitoring activities would continue to occur at existing facilities and research locations throughout the Bay-Delta region. The ERS and FTC would not be constructed at the RVARC or Ryde Avenue site. Therefore, this alternative would not expose people or structures to a change in risk related to seismic ground shaking, ground failure, fault rupture, landslide, or liquefaction compared to existing conditions. **No impact** would occur.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As described in "Environmental Setting" above, the RVARC site is not located within an Alquist-Priolo Earthquake Zone, nor is it located in the vicinity of any active fault lines. Since risk of ground failure and fault rupture is found only in close proximity to active fault lines, the likelihood of such occurrences affecting the RVARC site is highly improbable. In addition, seismic-related landslides on or adjacent to RVARC would not be expected considering the relatively flat topography and gradual slope of the hill north of Beach Road. No historic landslide areas are known to exist on or near the site. Given these facts, the potential to expose construction workers, DRS facilities, and staff working at the DRS to seismic-related ground failure, fault rupture, or landslides is considered less than significant.

The RVARC site may experience strong ground shaking following a large seismic event, depending on factors such as the intensity and epicenter of the event relative to the site. However, because of the RVARC site's distance (more than 25 miles) from active fault lines, high-frequency waves would dissipate and the slower, low-frequency waves would dampen as well. Therefore, even during a very large earthquake, probable impacts in the Rio Vista area would be minor with only small damage to unreinforced chimneys or other freestanding masonry structures. A large seismic event may even go unnoticed by construction workers or facility personnel during the event.

Of most risk at the site is liquefaction, to which the material underlying the site is highly susceptible. Liquefaction could damage DRS facilities and expose people to risk of injury or death. However, the Preferred Alternative would be developed in compliance with applicable International, California, and Municipal Building Codes. The current IBC (2011) and CBC (2013) take seismic-induced stresses under consideration for new building construction projects and retrofitting of existing structures. More stringent than the IBC, the seismic building requirements under the CBC, Title 24, Part 2 are specifically tailored to meet regional demands for increased seismic stability in California. Because DWR and USFWS would adhere to these building codes, the potential effects of seismic-induced hazards would be maintained within acceptable levels. The resulting stability of the new

DRS structures would ensure public safety, resulting in an impact that would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would have similar seismic issues to those described for Alternative 2, and facilities would be designed and constructed in compliance with relevant seismic standards. This impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

As described in "Environmental Setting" above, the risk of seismic hazards at the Ryde Avenue site is generally low. As with Alternatives 2 and 3, facilities would be designed and constructed in compliance with relevant seismic standards. This impact would be **less than significant**.

Impact GEO-2: On- or Off-site Landslide, Lateral Spreading, Subsidence, Liquefaction, or Collapse due to an Unstable Geologic Unit or Soil.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the IEP's long-term monitoring activities would continue to occur at existing facilities and research locations throughout the Bay-Delta region. The DRS would not be constructed at the RVARC or Ryde Avenue site. Therefore, this alternative would not expose people or structures to a change in risk as a result of unstable geologic units or soils compared to existing conditions. **No impact** would occur.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As described in "Environmental Setting" above, the RVARC site is not subject to substantial risk related to landslide, lateral spreading, liquefaction, or collapse. In addition, groundwater extraction under the Preferred Alternative for use at the FTC would not result in a net deficit in aquifer volume that could create localized subsidence. Furthermore, as described above under Impact GEO-1, the Preferred Alternative would be developed in compliance with applicable International, California, and Municipal Building Codes. These codes include requirements related to these types of geologic hazards that are adequate to ensure that risks to the DRS facilities would be minimized.

Local geologic conditions could be present that, if unaccounted for, may cause significant risk of geologic hazards. Therefore, **Mitigation Measure GEO-2** (**Conduct a Geotechnical Investigation and Incorporate Report Recommendations into the Design and Construction of the Proposed Project)** would be implemented to further characterize and reduce risks associated with subsurface conditions throughout the site. By following the recommendations resulting from this mitigation measure, this impact would be reduced to a level that is **less than significant with mitigation**.

Mitigation Measure GEO-2: Conduct a Geotechnical Investigation and Incorporate Report Recommendations into the Design and Construction of the Proposed Project (Alternatives 2, 3, and 4)

DWR and USFWS shall require that a geotechnical investigation is conducted by a qualified geotechnical engineer (or team of geotechnical engineers) to evaluate subsurface soil and geologic conditions at the Proposed Project site. The investigation report will provide conclusions and recommendations relative to the geotechnical aspects of designing and constructing the DRS. Recommendations will address site and geologic conditions with a focus on expansive soils, shrink/swell potential, and corrosion, but will also address any other geologic hazards that are identified during the course of the investigation. The report will provide design criteria to address any geotechnical issues to ensure that the facilities remain stable. DWR and USFWS shall require that the design and construction of the DRS incorporates the recommendations put forth by the Geotechnical Investigation Report.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would have similar geotechnical and soil stability risks as those described for Alternative 2, and facilities would be designed and constructed in compliance with relevant standards. Mitigation Measure GEO-2 would also be implemented to address any localized hazards. This impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Estuarine Research Station

As described in "Environmental Setting" above, the Ryde Avenue site is not subject to substantial risk related to collapse or lateral spreading. As described above under Impact GEO-1, the Proposed Project would be developed in compliance with applicable IBC, CBC, and Municipal Building Code standards. These codes include requirements related to these types of geologic hazards. However, local geologic conditions could be present which if unaccounted for, may cause significant risk of geologic hazards. Therefore, Mitigation Measure GEO-2 would be implemented to further characterize and minimize risks associated with subsurface conditions throughout the site. This impact would be reduced to a level that is less than significant with mitigation.

Fish Technology Center

Impacts of the FTC would generally be as described for the ERS, above, and would require implementation of Mitigation Measure GEO-2.

In addition, groundwater supplies, which are utilized for municipal purposes and future operations of the FTC, are in overdraft throughout the subbasin. For this reason, the FTC's groundwater use could exacerbate regional land subsidence, a significant impact. Implementation of **Mitigation Measure HYD/WQ-9 (Perform Groundwater Supply Testing and Implement Groundwater Supply and Quality Protection Measures)** would reduce impacts; however, any use of groundwater for operation of the FTC would increase the potential for subbasin subsidence. Therefore, impacts related to local subsidence would be significant and unavoidable.

Delta Research Station

With implementation of Mitigation Measure GEO-2, impacts of the ERS would be reduced to a less-than-significant level. Impacts of the FTC, however, would be reduced with implementation of Mitigation Measure HYD/WQ-9, but not to a less-than-significant level. Therefore, impacts related to regional land subsidence would be **significant and unavoidable.**

Impact GEO-3: Substantial Risks to Life or Property due to Underlying Expansive Soils.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the IEP's long-term monitoring activities would continue to occur at existing facilities and research locations throughout the Bay-Delta region. The ERS and FTC would not be constructed at the RVARC or Ryde Avenue site. Therefore, this alternative would not expose people or structures to a change in risk related to expansive soils compared to existing conditions. **No impact** would occur.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As described in "Environmental Setting" above, the Tujunga fine sand that underlies most of the RVARC site is not considered an expansive soil. However, the Diablo-Ayer clays that underlie a small portion of the site are considered to have a very high shrink/swell rating. Under the configuration of this alternative, most DRS buildings and structures would be built on Tujunga fine sand. However, a small portion of the proposed employee parking lot would be underlain by Diablo-Ayer clays; it is possible that other portions of the site also possess these soils, given the relatively low resolution of existing soil maps. Heaving and cracking of concrete and asphalt sidewalks and parking lots, or similar damage to other facilities, could result from the expansion and/or contraction of the Diablo-Ayer clays, a potentially significant impact.

As previously described, DRS facilities would be designed and constructed in compliance with IBC, CBC, and Municipal Building Code standards. To ensure that the shrink/swell potential of the site is adequately characterized and that project designs include the necessary features to avoid damage from expansive soils, Mitigation Measure GEO-2 would be implemented, which requires that a geotechnical investigation be prepared and its recommendations implemented. With implementation of this measure, the risks from underlying expansive soils would be reduced to a level that is **less than significant with mitigation**.

<u>Alternative 3: Rio Vista Army Reserve Center, Configuration 2</u>

Alternative 3 would have similar expansive soil issues as those described for Alternative 2, and facilities would be designed and constructed in compliance with IBC, CBC, and Municipal Building Code standards. With implementation of Mitigation Measure GEO-2**,** the risks from underlying expansive soils would be reduced to a level that is **less than significant with mitigation**.

<u>Alternative 4: Ryde Avenue Site in Stockton</u>

Two soil units underlie the Ryde Avenue site. Scribner-Urban land complex has low shrink-swell potential, constitutes a small percentage of the soils, and has no construction or operational activities proposed to occur within 500 feet; therefore, this soil unit is not of concern. However, as discussing in "Environmental Setting" above, Yellowlark gravelly loam is classified as "somewhat limited" for small commercial buildings three stories and under (the types of buildings that would be constructed as part of the Proposed Project) because of moderately expansive soil characteristics. Damage to DRS facilities from shrink/swell soil behavior or corrosion is considered a potentially significant impact.

As previously described, DRS facilities would be designed and constructed in compliance with IBC, CBC, and Municipal Building Code standards. To ensure that the shrink/swell potential of the site is adequately characterized and project designs include the necessary features to avoid damage from expansive soils, Mitigation Measure GEO-2 would be implemented, which requires that a geotechnical investigation be prepared and its recommendations implemented. With implementation of this measure, the risks from underlying expansive soils would be reduced to a level that is **less than significant with mitigation**.

Impact GEO-4: Substantial Soil Erosion or Loss of Topsoil during Construction Activities.

<u>Alternative 1: No Project Alternative</u>

Under Alternative 1, the IEP's long-term monitoring activities would continue to occur at existing facilities and research locations throughout the Bay-Delta region. The ERS and FTC would not be constructed at the RVARC or Ryde Avenue site. Therefore, this alternative would not involve construction that could cause erosion or loss of topsoil, nor would erosion potential of operational activities change compared to existing conditions. **No impact** would occur.

<u>Alternative 2: Rio Vista Army Reserve Center, Configuration 1</u>

Construction of the DRS would involve activities such as trenching and grading that would increase the potential for soil erosion. Following construction, bare portions of the site would be landscaped, and an on-site drainage system would be installed that would be designed to limit the potential for erosion.

As part of construction of the Preferred Alternative, the entire project footprint would be graded, and vegetation and groundcover that currently serves to stabilize the site's soils would be removed. Without proper soil stabilization controls, excavation, backfilling, and grading work could increase the potential for exposed soils to be eroded by wind or stormwater runoff, which could result in long-term soil loss. This is considered a potentially significant impact. As discussed in Chapter 12, *Hydrology and Water Quality,* compliance with the National Pollutant Discharge Elimination System General Construction Permit, preparation of a stormwater pollution prevention plan, and implementation of **Mitigation Measure HYD/WQ-1** (**Implement Construction Best Management Practices for Erosion Control)** would minimize the potential effects of erosion and loss of topsoil. Following implementation of the abovementioned permit and stormwater pollution prevention plan, loss of topsoil as a result of Alternative 2 would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would have similar issues related to soil erosion and loss of topsoil as those described for Alternative 2. With implementation of the general permit, stormwater pollution prevention plan, and Mitigation Measure HYD/WQ-1, the risks of erosion and topsoil loss would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would have similar issues related to soil erosion and loss of topsoil as those described for Alternative 2. With implementation of the general permit, stormwater pollution prevention plan, and Mitigation Measure HYD/WQ-1, the risks of erosion and topsoil loss would be reduced to a level that is **less than significant with mitigation**.

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Chapter 11
Hazards and Hazardous Materials

11.1 Introduction

This chapter describes the environmental setting associated with hazards to physical safety and hazardous materials at the RVARC and Ryde Avenue ites; the regulatory context governing use and management of hazardous materials and the generation, storage, treatment, and disposal of hazardous wastes; the potential impacts of the Proposed Project related to hazardous materials and safety hazards; and the measures that would be employed to avoid, reduce, or mitigate these impacts.

For the purposes of this assessment, hazardous materials are defined as any materials that, because of quantity, concentration, or physical or chemical characteristics, pose a substantial present or potential hazard to human health and safety, or to the environment, if released. For this Draft EIR/EIS, hazardous materials include hazardous and toxic substances, listed hazardous wastes, petroleum products (including crude oil and refined products, such as fuels and lubricants), natural gas, and any material that a handler or the administering regulatory agency has a reasonable basis for believing would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment (California Health and Safety Code Section 25501).

Hazardous wastes include residues, discards, byproducts, contaminated products, or similar substances that exceed regulatory thresholds for the properties of toxicity, ignitibility, corrosivity, and/or reactivity. Federal and state regulations identify by name the specific hazardous wastes that USEPA has designated as “listed wastes.”

In addition to hazardous materials, physical safety hazards considered in this chapter comprise potential hazards related to emergency access, proximity to schools and airports, and potential wildland fires.

11.2 Environmental Setting

This section discusses past land uses with the potential to result in hazardous conditions at the RVARC and Ryde Avenue sites.-

11.2.1 Rio Vista Army Reserve Center Site

The RVARC site is in the southern part of Rio Vista along the west bank of the Sacramento River in Solano County. Land uses in the immediate area of the RVARC site are commercial or governmental, with undeveloped and limited residential uses in the surrounding areas.

Past Land Use

The RVARC site is approximately 28 acres of vacant and improved land, with a number of unoccupied buildings previously used by the U.S. Army for administration, maintenance, and hazardous materials/waste storage and as barracks, warehouses, and a mess hall. The site also has an inactive water supply well, a water tower, and ship repair docks. The history of activities at the RVARC is discussed in more detail in Chapter 9, *Cultural Resources*.

Based on a 2014 site reconnaissance, the buildings are either metal or wood-framed structures with concrete slab-on-grade foundations and various exterior finishes, such as wood, corrugated metal siding, and shingles. As shown in **Figure 11-1**, all of the existing buildings are in disrepair. Based on the age of the buildings, asbestos-containing materials (ACMs) and lead-based paints are most likely present in the building materials and could pose a risk to human health and the environment if disturbed (e.g., during demolition or renovation).

On-site Conditions

According to the California Department of Toxic Substances Control (DTSC) Envirostor website, past uses of dry docks, electric generation/substation, vehicle storage/refueling, maintenance/cleaning, incinerating, oil/water separators, sand blasting, and shipyard ship building/repair might have contributed to releases of hazardous or toxic materials on the site. These materials have been documented to include chlordane, dioxins, metals, petroleum hydrocarbons, and polychlorinated biphenyls (PCBs) (Arcardis G&M 2001). Under DTSC's supervision, site contamination was characterized and remediated, and DTSC granted certified closure status to the site in June 2003 (DTSC 2002).

Second Street is subject to occasional flooding where it crosses Marina Creek, just north of RVARC (City of Rio Vista 2011), which could obstruct emergency vehicles traveling south from the central downtown area to the RVARC site. An alternative route during flood events would require emergency vehicles to detour onto SR 12, Amerada Road, Emigh Road, and Montezuma Road, which would substantially increase their emergency response times to and from the RVARC site.

The *Final Environmental Impact Report – Rio Vista Reserve Center Redevelopment Plan* (City of Rio Vista 2011) identified the presence of a regional, high-pressure natural gas transmission pipeline traversing the northern portion of the property, which could pose an inhalation or explosive hazard from an accidental release.

Photo 1. View of former carpenter shed, electrical shop, and battery storage building facing south.

Photo 2. Interior of the former ship repair shop facing south.

Photo 3. Exterior of the former flammable materials storage building facing south. No hazardous materials or waste was observed.

Photo 4. View of former hazardous materials storage area facing west. No current hazardous materials were observed.

Source: AECOM 2014

Horizon
WATER and ENVIRONMENT

Figure 11-1
Photos of Existing Facilities on the RVARC Site

Photo 5. View of exterior of the pump house near the water tower in the central portion of the site facing north. Pump house contained one groundwater supply well, dismantled well pump, and associated plumbing, and one air compressor.

Photo 6. One 8-inch groundwater supply well with dismantled pump in the pump house. No well lid to protect groundwater was observed and groundwater level was estimated at approximately 8 feet below ground surface.

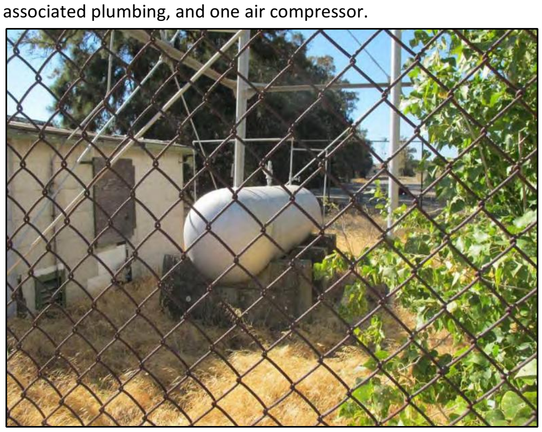


Photo 7. View of one propane tank west of the pump house facing south. Tank holds approximately 1,000 gallons.

Photo 8. View of unlabeled drums north of the parking area. No secondary containment was observed.

Source: AECOM 2014

Horizon WATER and ENVIRONMENT

Figure 11-1
Photos of Existing Facilities on the RVARC Site

Potential Local Hazards

In addition to the RVARC site, other potential sources of hazardous materials occur in the vicinity of the site. Environmental Data Resources, Inc. (EDR), a vendor commonly used to conduct real estate due diligence, compiled a report identifying sites listed on environmental regulatory databases (e.g., Leaking Underground Storage Tank [LUST]; Cortese List; Spills, Leaks, Investigation, and Cleanup databases) to evaluate potential environmental impacts that these sites could have on RVARC (EDR 2014a). For this discussion, only open-status sites with a potential to contribute to on-site hazards at the RVARC site are discussed; therefore, sites with closed status or that are listed without evidence of a release of hazardous materials are omitted from this site area review.

The Rio Vista area has the largest natural gas field in California, and natural gas wells are within 300 feet of the RVARC site (California Department of Conservation, Division of Oil, Gas, & Geothermal Resources [DOGGR] 2015). Seven underground injection wells associated with the Rio Vista Gas Field are within 0.25 mile of the RVARC site (EDR 2014a).

Schools

Riverview Middle School, at 525 2nd Street is the closest school to the RVARC site (approximately 0.2 mile north–northwest of the site) (EDR 2014a).

Airports

The RVARC site is approximately 3 miles south of the Rio Vista Municipal Airport and outside a 2-mile radius of a private airstrip (Federal Aviation Administration [FAA] 2015).

Wildland Fire Hazards

The RVARC site is located along the Sacramento River in an urban setting outside of a wildland–urban interface designated by the California Department of Forestry and Fire Protection (Cal Fire); the closest wildland–urban interface is approximately 19 miles northwest of the site (Cal Fire 2007a). This site is also located outside of a Fire Hazard Severity Zone designated by Cal Fire (Cal Fire 2007a).

11.2.2 Ryde Avenue Site in Stockton

The Ryde Avenue site at 845 Ryde Avenue, Stockton is situated on the north bank of the Stockton DWSC in San Joaquin County. Land uses surrounding the site are predominantly general industrial, commercial, and medium-density residential. Land uses south of the Stockton DWSC primarily consist of industrial uses associated with the Port of Stockton.

Past Land Use

Based on a March 2015 Phase 1 ESA (URS 2015), the Ryde Avenue site has a long history of industrial uses and was most recently used by the Kiewit Corporation for staging materials for San Francisco–Oakland Bay Bridge construction between 2002 and 2013.

On-site Conditions

The Phase 1 ESA identified the following recognized environmental concerns associated with, or with potential to affect, the Ryde Avenue site during construction of the DRS (URS 2015):

- Suspected Oil Stain—One oil stain approximately 7 feet in diameter was observed on the ground surface in an unpaved area. Stained soil indicates that the subsurface might be contaminated and should be characterized. Based on the nature and extent of release, potential followup with the San Joaquin County Environmental Health Department would be needed.
- Wood burning—One burn area (6 square feet) was observed near the Ryde Avenue site entrance. This area is possibly associated with the activities of homeless individuals at the site. Burning some materials could release harmful chemicals into the atmosphere and ground.

Potential Local Hazards

Several sites were identified in the vicinity of the Ryde Avenue site during the records research (EDR 2014b). These sites are reflective of the area's industrial land uses. For this discussion, only open-status sites with a potential to contribute to onsite hazards at the Ryde Avenue site are discussed; therefore, sites with closed status or that are listed without evidence of a release of hazardous materials are omitted from this site area review.

The Rice Terminal at the Port of Stockton, located approximately 2,100 feet southeast of the Ryde Avenue site (**Figure 11-2**), is listed in the Spills, Leaks, Investigation, and Cleanup database because a release of bulk liquid fertilizer from up to seven aboveground storage tanks was identified during a limited soil and groundwater assessment (Kleinfelder 2005). According to a letter issued by the Central Valley RWQCB dated September 21, 2005, soil data for the Rice Terminal site exhibit ammonium and nitrate concentrations up to 14,000 milligrams per kilogram (mg/kg) and 18,000 mg/kg, respectively (Central Valley RWQCB 2005). Groundwater was encountered at approximately 6 feet bgs and contained concentrations up to 24,000 milligrams per liter (mg/L) of ammonium and 15,000 mg/L of nitrate. These ammonium and nitrate concentrations exceed their respective state Water Quality Objectives of 1.5 mg/L and 10 mg/L. Central Valley RWQCB requested additional investigations to evaluate groundwater gradient and flow direction, seasonal variations, and the extent of contamination. No additional information was available on the state's Geotracker website. Because the extent of contamination and groundwater flow direction have not been determined, contamination migrating from this site could pose a threat to groundwater quality beneath the subject property and is considered a recognized environmental condition. In the event that Alternative 4 requires the use of groundwater for its operations, depending on factors such as depth of pumping zone and pumping rate, contaminated groundwater originating from the Rice Terminal could be a consideration for this alternative.

The McCormick & Baxter Creosoting Co. site, located approximately 4,500 feet east–southeast of the subject property, is listed on the National Priorities List and numerous other associated databases, including the Comprehensive Environmental Response, Compensation, and Liability Information System, Record of Decision System, and several underground storage tank databases. The McCormick & Baxter Superfund site is a former wood-preserving facility that treated railroad ties and utility poles between 1942 and 1990. Wood-treating chemicals and oily waste generated from the treating processes were stored in tanks or unlined ponds.

Subsurface investigations revealed that soil and groundwater beneath the site and sediment in Old Mormon Slough, which is adjacent to the site, contain detectable levels of hazardous chemicals, chiefly pentachlorophenol (PCP), arsenic, and dioxins/furans. According to the 2010–2011 Groundwater Monitoring Report dated May 23, 2012 (USACE 2012), groundwater flow within the upper three monitoring zones (to approximately 200 feet bgs) has been predominantly toward the east–southeast, which is in the opposite direction from the Ryde Avenue site. Groundwater in the deepest zone (greater than 200 feet bgs) has been shown to flow toward the northeast, which is consistent with the regional groundwater flow direction. In the event that Alternative 4 requires the use of groundwater for its operations, depending on factors such as depth of pumping zone and pumping rate, contaminated groundwater originating from the McCormick & Baxter Creosoting Co. site could be a consideration and is considered a recognized environmental condition in connection with the Ryde Avenue site.

Schools

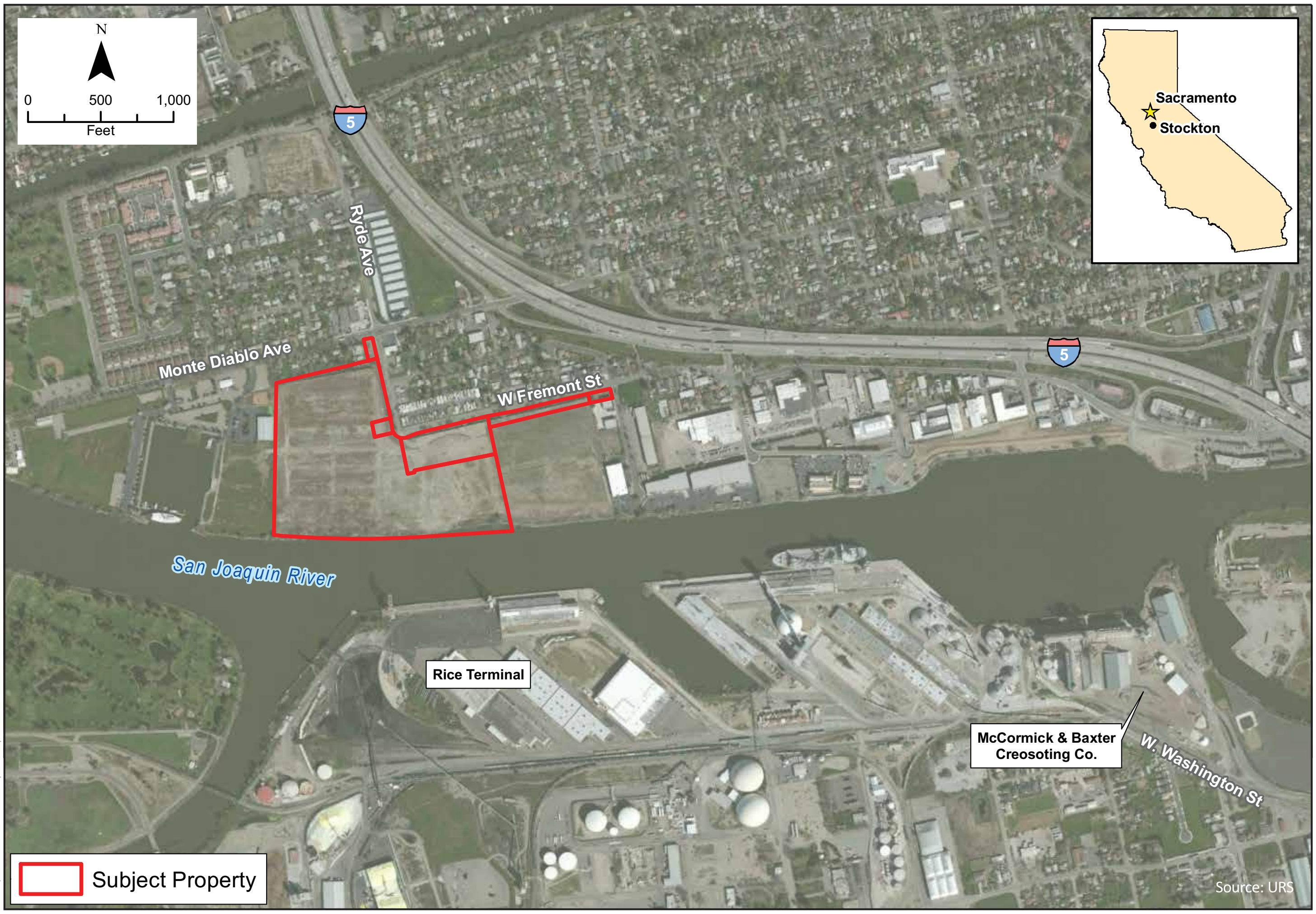
There are no schools within 0.25 mile of the Ryde Avenue site. Victory Elementary School at 1838 West Rose Street is the closest school to the site (approximately 0.72 mile).

Airports

No public or private airports or airstrips are located within 2 miles of the Ryde Avenue site (FAA 2015).

Wildland Fire Hazards

The site is in a developed, urban setting and is not within a Fire Hazard Severity Zone or near a wildland–urban interface, as designated by Cal Fire (Cal Fire 2007b).



13.014, Task 2.2.1 AdminDraft (4-22-15) JD

Horizon
WATER and ENVIRONMENT

Figure 11-2
Hazardous Materials Sites in the Vicinity of the Ryde Avenue Site

11.3 Regulatory Setting

Because regulations for hazardous materials were developed over time, hazardous materials are regulated by numerous agencies whose jurisdictions and responsibilities sometimes overlap. Federal agencies that regulate hazardous materials include USEPA and the Occupational Safety and Health Administration (OSHA). At the state level, agencies such as the California Occupational Safety and Health Administration (Cal/OSHA) and the California Emergency Management Agency (Cal EMA) govern the use and management of hazardous materials. State and local agencies often have parallel or more stringent rules than federal agencies.

Generation, transportation, and disposal of hazardous wastes is also regulated by multiple agencies. USEPA is the federal agency primarily responsible for regulating hazardous materials and waste. The California Environmental Protection Agency's (Cal/EPA's) DTSC has primary state regulatory responsibility but may delegate enforcement authority to local jurisdictions.

The following is a review of federal, state, and local laws, regulations, and agencies that are potentially pertinent to the Proposed Project.

11.3.1 Federal Laws, Regulations, Agencies, and Policies

Federal laws, regulations, agencies, and policies potentially pertinent to the Proposed Project comprise the following:

- **Resource Conservation and Recovery Act** (42 USC Section 6901 *et seq*.). The Resource Conservation and Recovery Act established a program regulating the identification, generation, transportation, storage, treatment, and disposal of hazardous materials and hazardous wastes.
- **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)** (42 USC Section 9601 *et seq*.). CERCLA, also referred to as the Superfund Act, provides federal authority to respond directly to releases or threatened releases of hazardous materials that might endanger public health or the environment. CERCLA regulates former and newly discovered uncontrolled waste disposal and spill sites. CERCLA also established the National Priorities List of contaminated sites and the Superfund cleanup program.
- **Clean Air Act** (42 USC Sections 7401; 7412–7414; 7661a–7661f). Regulations under the CAA are intended to prevent accidental releases of hazardous materials. The CAA establishes national air quality standards for hazardous air pollutants, including asbestos and lead. The CAA is discussed in more detail in Chapter 6, *Air Quality and Greenhouse Gas Emissions*.
- **Federal Insecticide, Fungicide, and Rodenticide Act** (40 CFR Parts 150–189). The Federal Insecticide, Fungicide, and Rodenticide Act regulates the manufacture, distribution, use, and sale of pesticides. All pesticides must be registered under the act.

- **Toxic Substances Control Act** (15 USC Section 2601 *et seq*.). The federal Toxic Substances Control Act established a program administered by USEPA for regulating the manufacture, inventory, and disposition of industrial chemicals, including hazardous materials.
- **Hazardous Materials Transportation Act** (49 USC Sections 1801–1819 and 49 CFR Parts 101, 106, 107, and 171–180). The U.S. Department of Transportation has regulatory responsibility for the safe transport of hazardous materials by motor vehicles, marine vessels, and aircraft.
- **Office of Pipeline Safety** (49 CFR Part 192). The Office of Pipeline Safety has the responsibility of regulating the safety of natural gas pipelines and preventing pipeline emergencies, including the construction, testing, and maintenance of pipelines. This regulation is relevant to the RVARC site.
- **Occupational Safety and Health Act of 1970**. OSHA is the federal agency responsible for administering the Occupational Safety and Health Act to ensure worker safety in handling and using chemicals in the workplace, and has adopted numerous regulations for that purpose (CFR Title 29).

11.3.2 State Laws, Regulations, Agencies, and Policies

State laws, regulations, agencies, and policies that may be pertinent to the Proposed Project comprise the following:

- **DTSC Hazardous Waste Control Act** (California Health and Safety Code Section 25100 *et seq*.). Similar to the Resource Conservation and Recovery Act, the Hazardous Waste Control Act regulates the identification, generation, transportation, storage, and disposal of materials the State of California has deemed hazardous.
- **California Health and Safety Code Section 93105.** Pursuant to this code, CARB regulates emissions and particulates released into the air.
- **California Department of Pesticide Regulation** (3 CCR Division 6, Sections 6500–6806). This agency and code stipulate requirements for the use of pesticides.
- **Caltrans/California Highway Patrol** (49 CFR Parts 100–185; CCR Title 13, Division 2, Chapter 6). Caltrans and the California Highway Patrol are responsible for overseeing the transportation of hazardous wastes and materials.
- **California Government Code Section 65962.5.** This code requires DTSC to compile and maintain lists of potentially contaminated sites throughout the State of California.
- **Cal Fire Wildland Fire Management.** The Office of the State Fire Marshall and Cal Fire administer state policies regarding wildland fire safety.
- **Cal/OSHA** (8 CCR Sections 1529 and 1532). Cal/OSHA is the primary agency responsible for protecting workers from health and safety hazards on the job. This regulation protects workers from potential exposure to ACMs and lead-containing

building materials during construction or demolition. These regulations pertain to the RVARC site.

- **Hazardous Materials Release Response Plans and Inventory Law of 1985 (Business Plan Act).** The Business Plan Act requires facilities using hazardous materials to prepare Hazardous Materials Business Plans that contain an inventory of hazardous materials handled, facility floor plans showing where hazardous materials are stored, an emergency response plan, and provisions for employee training in safety and emergency response procedures (California Health and Safety Code, Division 20, Chapter 6.95, Article 1).
- **Polanco Redevelopment Act** (Health and Safety Code Sections 33459–33459.9).[1] The Polanco Redevelopment Act allows community development agencies to guide and pursue cleanup of Brownfield properties (former industrial or commercial sites where future use is affected by environmental contamination) with limited immunity to environmental liability. This act is relevant to the RVARC site.
- **California Business and Professions Code (Section 7110) and California Government Code 4216.** These codes outline contractors' responsibility to notify the Underground Service Alert (USA) before initiating any ground-disturbing construction activities. USA is a service that notifies its members of excavations that could encroach on buried utilities. For the Proposed Project, the contractor(s) would be required to contact Underground Service Alert of Northern/Central California and Nevada (USA North).

11.3.3 Local Laws, Regulations, Agencies, and Policies

Local laws, regulations, agencies, and policies that may be pertinent to the Proposed Project comprise the following:

- **Solano County Environmental Health Services** (California Health and Safety Code, Chapters 6.5, 6.67, 6.7, 6.75, 6.95, and 6.11 and CCR Titles 19, 22, 23, and 24). This agency is the Certified Unified Program Agency (CUPA) for all cities and unincorporated areas within Solano County. The CUPA enforces applicable state laws and provides regulatory oversight for various hazardous materials programs. These regulations pertain to the RVARC site.
- **Solano County Department of Agriculture** (CCR Title 3)**.** This department regulates and oversees the use and application of pesticides/herbicides through the permitting process and site inspections. These regulations pertain to the RVARC site.
- **Solano County Office of Emergency Services** (Emergency Operations Plan, Volumes 1 and 2). This office presents protocols and procedures to be followed during various emergencies, including those involving hazardous materials. These protocols and procedures are relevant to the RVARC site.
- **San Joaquin County Environmental Health Department** (California Health and Safety Code Sections 25180 and 25200, CCR Title 22, Section 66001). This agency is

the CUPA for all cities and unincorporated areas within San Joaquin County. CUPA enforces applicable state laws and local regulations set forth in the San Joaquin General Plan and provides regulatory oversight for various hazardous materials programs. The Ryde Avenue site would be subject to these regulations.

- **City of Rio Vista General Plan.** This general plan establishes the following policies regarding the use, handling, and emergency support for hazardous materials (City of Rio Vista 2002):

  Policy 11.6.C The City shall comply with State law regarding the use of toxic chemicals in parks.

  Policy 11.6.D The City shall ensure the proper use, storage, and disposal of toxic chemicals to the greatest extent feasible.

  Policy 11.6.E The City shall ensure that it maintains sufficient resources, contacts, and personnel to provide the public with emergency notification in the event of a hazardous materials spill or airborne release.

  This general plan also proposes to designate the following roads as truck routes for transport of hazarous materials in Rio Vista: Airport, Church, Liberty Island, and Canright Roads. These truck routes and the above-listed policies are relevant to the RVARC site.

- **City of Rio Vista Hazardous Materials Oversight.** The City of Rio Vista refers any development proposal that might involve hazardous materials or wastes to the fire department, police department, or CUPA and any other agencies responsible for hazardous materials. This ordinance is relevant to the RVARC site.

- **Rio Vista Natural Gas Ordinance** (Rio Vista Municipal Code, Section 13.12-13.13)**.** This ordinance regulates the natural gas operations in the city, including construction, exploration, drilling, production, and transportation. This ordinance is relevant to the RVARC site.

- **Rio Vista Comprehensive Emergency Management Plan.** This plan provides guidance for responding to emergencies within Rio Vista city limits. The plan defines the primary and support roles of City of Rio Vista agencies and departments in after-incident assessment and reporting. This emergency management plan is relevant to the RVARC site.

- **City of Stockton General Plan 2035.** This general plan outlines the City of Stockton's responsibilities and policies regarding hazardous materials. The following general plan policies are relevant to the Ryde Avenue site (City of Stockton 2007):

  Policy HS-5.2 *Hazardous Materials*. The City shall require that hazardous materials are used, stored, transported, and disposed of within the city in a safe manner and in compliance with local, State, and Federal safety standards.

Policy HS-5.3 *Designated Routes for Hazardous Materials Transport*. The City shall restrict transport of hazardous materials within the city to routes that have been designated for such transport.

Policy HS-5.4 *Hazardous Materials Management*. The City shall cooperate with the County in the identification of hazardous material users (both large and small scale) and in the development of an inspection process and hazardous materials management plan.

Policy HS-5.5 *Hazardous Materials Inventory*. The City shall require, as appropriate and as a component of the environmental review process, a hazardous materials inventory for project sites, including an assessment of materials and operations for any development applications. Particular attention should be paid to land that previously contained agricultural uses.

Policy HS-5.6 *Household Hazardous Waste Collection System*. The City shall continue to work with San Joaquin County Public Works Department to provide household hazardous waste disposal and recycling services.

Policy HS-5.7 *Increase Public Awareness*. The City shall work to educate the public as to the types of household hazardous wastes and the proper methods of disposal.

Policy HS-5.8 *Compatibility with Surrounding Land Uses*. The City shall use the development review process to ensure compatibility between hazardous material users and surrounding land use.

Policy HS-5.9 *Hazardous Materials Studies*. The City shall ensure that the proponents of new development projects address hazardous materials concerns through the preparation of Phase I or Phase II hazardous materials studies for each identified site as part of the design phase for each project. Recommendations required to satisfy Federal or State cleanup standards outlined in the studies will be implemented as part of the construction phase for each project.

11.4 Environmental Impacts

11.4.1 Methods of Analysis

Potential impacts associated with the construction and operation of the Proposed Project could occur as a result of encountering known or unknown sites of contamination; unintended spills or releases of hazardous materials during routine transport; use, storage, and disposal of hazardous materials; and other types of hazards, such as wildland fires.

The analysis of potential construction impacts associated with hazards and hazardous materials is based on available information about existing site conditions (described in Section 11.2) and anticipated construction activities associated with development of the ERS and FTC facilities. Analysis of the Proposed Project's hazards and hazardous materials impacts during operations is based on daily operations that occur at the existing IEP sites, as described by DWR and USFWS (see Table 3-1) and information provided in Chapter 3, *Description of Alternatives*. Operation of the ERS facilities is presumed to be similar to daily operations at the existing IEP facilities.

11.4.2 Significance Criteria

An alternative would have a significant impact with regard to hazards and hazardous materials if it would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- Result in hazardous emissions or handling hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school;
- Be located on a site included on the Cortese List, which is a list of hazardous materials sites compiled pursuant to California Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment;
- Result in a safety hazard for people residing or working in a project area that is located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport;
- Result in a safety hazard for people residing or working in a project area that is within the vicinity of a private airstrip;
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
- Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

As discussed in Section 11.2, the RVARC site is approximately 3 miles south of the Rio Vista Municipal Airport, and the Ryde Avenue site is approximately 8 miles northwest of the Stockton Metropolitan Airport. Both sites are more than 2 miles from the nearest public or private airstrip. Therefore, the criteria related to safety hazards in the vicinity of a public airport or private airstrip do not apply and are not discussed further.

As discussed in Section 11.2, neither the RVARC site nor the Ryde Avenue site in Stockton is within designated wildlands or at urban–wildland interfaces; therefore, the criterion related to risk involving wildland fires does not apply and is not discussed further.

11.4.3 Environmental Impacts and Mitigation Measures

Impact HAZ-1: Risk to the Public or the Environment from an Accidental Spill or Release Resulting from the Transport, Use, and Disposal of Hazardous Materials during Construction.

Construction of the DRS would require the temporary use, transportation, and handling of potentially hazardous materials, including fuels, lubricating oil, grease, hydraulic fluid, cements, paints, solvents, and possibly other hazardous materials commonly used in the construction industry. Hazardous wastes generated during construction would include spent containers of these hazardous materials.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the ERS and FTC facilities would not be built. Neither the RVARC site nor the Ryde Avenue site in Stockton is currently in use; therefore, accidental spills or releases resulting from the use, transport, or disposal of hazardous materials are not expected. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2, several existing buildings would be removed. Abatement of ACMs and lead-based materials during any demolition or renovation of existing buildings at the RVARC site would be supervised by a Cal/OSHA-certified contractor and conducted in a manner compliant with federal, state, and local regulations. These regulations would protect construction workers by requiring the use of personal protective equipment, and would protect the public by implementing dust-control procedures or other means by which to prevent the release of airborne particulates.

In addition, under this alternative, construction equipment used at the RVARC site would require fuels, oils, solvents, and other hazardous materials described above. Improper storage, use, disposal, or transport of these hazardous materials could result in an accidental spill, which could pose a significant risk to construction workers and public. DWR and USFWS would comply with applicable federal, state, and local regulations to reduce risks or hazards to construction workers, the public, sensitive receptors, and the environment. Construction equipment would be properly maintained to avoid fuel leaks. As described in Chapter 12, *Hydrology and Water Quality*, a SWPPP would be prepared and **Mitigation Measure HYD/WQ-1 (Implement Construction Best Management Practices for Erosion Control)** and **Mitigation Measure HYD/WQ-3 (Implement Construction–Related Best Management Practices for Hazardous Materials and Waste Management)** would be implemented, which would require spill prevention and control measures to protect the public and adjacent waterways.

By following regulatory requirements, and with the implementation of these mitigation measures, this impact would be **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, potential impacts related to transport/use of hazardous materials during construction would generally be similar to those of Alternative 2. Under this alternative, several existing buildings situated near the Sacramento River waterfront would be removed, or renovated and reused, that could contain ACMs and lead-based materials. By following regulatory requirements, and by implementing Mitigation Measures HYD/WQ-1 and HYD/WQ-3, this impact would be **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Under Alternative 4, potential impacts related to transport/use of hazardous materials during construction would generally be similar to those of Alternative 2 (see above for a complete description). There are no buildings on the Ryde Avenue site; therefore, unlike Alternative 2, there would be no impacts related demolition or renovation of buildings. By following regulatory requirements, and by implementing Mitigation Measures HYD/WQ-1 and HYD/WQ-3, this impact would be **less than significant with mitigation**.

Impact HAZ-2: Risk to the Public or the Environment from an Accidental Spill or Release Resulting from the Transport, Use, and Disposal of Hazardous Materials during Project Operation.

A variety of chemicals would be stored at the ERS laboratory and storage facility and at the FTC buildings. Chemicals that would be used include ethanol and formalin for preserving benthic samples, formaldehyde, hydrochloric acid, Finquel, and various other chemicals (refer to Table 3-5 for a complete list). Retail-sized containers of lubricants (e.g., WD-40® and Electrical Grade 2-26 lubricant); pesticides and insecticides (e.g., Black Flag® Ant and Roach Killer); paints (e.g., primers and spray paints); glues/adhesives; laboratory chemicals (e.g., isopropyl alcohol and iodine); water treatment chemicals; and compressed gases (e.g., argon, oxygen) would also be stored and used on-site. Anticipated wastes containing regulated constituents (e.g., used oil, used oily solids, and gasoline) that could be generated at the site would be appropriately stored in 55-gallon steel drums or similar containers, manifested in accordance with applicable standards, and transported and disposed of at a local recycling center or an approved solid waste landfill.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the ERS and FTC facilities would not be built. Chemical use for existing IEP activities would continue as under baseline conditions. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2, handling and storage of hazardous materials used during operations and maintenance of the ERS and FTC facilities would be performed in compliance with federal, state, and local regulations. As described in Chapter 3, operations and maintenance of ERS and FTC would include the preparation of a hazardous materials business plan, training for employees, proper storage containers and buildings, an inventory of the Proposed Project's hazardous materials, and an emergency response plan as required by

CUPA. Compliance with the applicable provisions of USEPA, Fed/OSHA, Cal/OSHA, Cal/EPA, Cal EMA, and CUPA permitting requirements, and the County and City General Plan policies, would be part of the operations and maintenance requirements for the ERS and FTC facilities, and would ensure that potential hazardous materials conditions would be fully addressed. Given these regulations, impacts related to transport and use of hazardous materials that could pose a risk to the public or environment in the event of an accidental spill would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, potential impacts related to the transport and use of hazardous materials during Proposed Project operations and maintenance would generally be similar to those of Alternative 2 (see above for a complete description) and would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Under Alternative 4, potential impacts related to transport/use of hazardous materials during Proposed Project operations and maintenance would generally be similar to those of Alternative 2 (see above for a complete description) and would be **less than significant**.

Impact HAZ-3: Accidental Rupture of a Pipeline.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, no pipelines would be affected; therefore, there would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As discussed in Section 11.2, a regional high-pressure natural gas transmission pipeline is present in the northern portion of the RVARC site that could pose an inhalation or explosion hazard if there were an accidental rupture or release from this pipeline. Before construction, the contractor would be required to notify USA North to alert utility owners of excavation and to identify the locations of their utilities. Gas pipelines are regulated by the U.S. Department of Transportation Office of Pipeline Safety. Through compliance with maintenance, inspection, and operational requirements for pressurized gas lines under applicable regulations, potential impacts related to the accidental release or rupture of the pipeline during construction or operations of Alternative 2 would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The impacts of Alternative 3 related to the pipeline on the site would be the same as those of Alternative 2 (see above for a complete description) and would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Under the Alternative 4, no pipelines would be affected; therefore, there would be **no impact**.

Impact HAZ-4: Emit or Handle Hazardous Materials within 0.25 Mile of an Existing School.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no use of hazardous materials near a school; therefore, there would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As discussed in Section 11.2, Riverview Middle School (525 South 2nd Street) is approximately 0.2 mile north of the RVARC site. As described in Impacts HAZ-1 and HAZ-2, DWR and USFWS would comply with applicable federal, state, and local regulations during construction and operations to minimize potential impacts related to accidental release of hazardous materials. During construction, DWR and USFWS would also implement **Mitigation Measure AQ/GHG-2a (Implement Fugitive Dust Best Management Practices)**, which would reduce dust emissions, and Mitigation Measures HYD/WQ-1 and HYD/WQ-3 to reduce potential impacts during construction. In addition, under this alternative, several existing buildings would be removed. This has the potential to expose school children to hazards associated with demolition and the ACMs and lead-based materials present in the existing buildings. Abatement of ACMs and lead-based materials would be temporary and supervised by a Cal/OSHA-certified contractor compliant with federal, state, and local regulations to protect construction workers by requiring them to wear personal protective equipment and protect the public by employing dust control procedures. Given these protocols, impacts on Riverview Middle School from handling ACMs or lead-based materials would not be significant.

As previously described, operations and maintenance procedures would include preparation of a hazardous materials business plan, training for employees, proper storage containers and buildings, an inventory of the Proposed Project's hazardous materials, and an emergency response plan as required by the CUPA. Complying with these measures would reduce risks or hazards to sensitive receptors at Riverview Middle School from Propose Project–related emission, transport, use, storage, or disposal of hazardous materials. With implementation of these mitigation measures and compliance with regulations, this impact would be **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, potential impacts related to transport and use of hazardous materials during construction would generally be similar to those of Alternative 2 (see above for a complete description). By following regulatory requirements and by implementing Mitigation Measures AQ/GHG-2a, HYD/WQ-1, and HYD/WQ-3, this impact would be **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

No schools have been identified within 0.25 mile of the Ryde Ave site; therefore, there would be **no impact** on sensitive receptors at schools.

Impact HAZ-5: Disturbance of Contaminated Media Associated with a Known Hazardous Materials Site (i.e., a Site Identified under Government Code Section 65962.5) or that Could Pose a Hazard to Workers, Public Health, or the Environment.

Construction activities, such as clearing, grubbing, importing fill, placing fill, and compaction would disturb soils in the Proposed Project construction areas. If contamination is present in site soils, construction activities could expose construction workers to the contaminants through direct contact, incidental ingestion, or inhalation. Similarly, in the event that groundwater underlying the work areas is contaminated, construction workers could be exposed to contaminated groundwater during construction dewatering. Use of groundwater for the FTC's process water supply could also result in exposure to contaminated groundwater if such contamination were to exist. Dredging for the marina could also result in exposure of workers or the public to contaminated spoils.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, any contamination on the RVARC and Ryde Avenue sites would remain undisturbed and would not affect workers, public health, or the environment. No ground disturbance would occur; therefore, there would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Although residual soil contamination has been documented at the RVARC site (Arcadis 2001), DTSC granted closure status to the site, indicating that no further action to remediate the site is required. Based on the site's regulatory status, remaining contaminant concentrations are not expected to pose an unacceptable risk to human health or the environment ; however, the possibility exists that contaminated soil or groundwater could be encountered. which could pose a significant risk during construction.

Implementation of **Mitigation Measure HAZ-5a (Preconstruction Hazardous Materials Assessment)** and, as necessary, **Mitigation Measure HAZ-5b (Soil and Groundwater Management Plan)** would ensure that sediment and dewatered groundwater are sampled for hazardous pollutants and properly stored, transported, and disposed of if determined to be hazardous. In addition, **Mitigation Measure HYD/WQ-6 (Spoils Materials Assessment, Handling, and Disposal Plan)** in Chapter 12, *Hydrology and Water Quality,* would require that spoils from dredging are properly characterized, handled, and disposed of. With implementation of these mitigation measures, this impact would be **less than significant with mitigation**.

Mitigation Measure HAZ-5a: Preconstruction Hazardous Materials Assessment (Alternatives 2, 3, and 4)

Before project construction, DWR, USFWS, or their contractor(s) shall perform an investigation of the excavation area's sediment and, as appropriate, underlying groundwater quality, and areas of any suspected impairments (e.g., stained soils) to characterize and confirm soil and groundwater quality. Samples shall be collected from the Proposed Project areas that will be disturbed during construction and to the depth of the planned excavation in each area. Subsurface soil and groundwater samples shall be analyzed for total petroleum hydrocarbons (such as gasoline, diesel, and waste oil), Title 22–regulated metals, and volatile organic compounds (VOCs) or any other chemicals of concern to evaluate the potential presence of contamination. If the results of the hazardous materials assessment indicate that the sediments and groundwater are not hazardous (i.e., no exceedances of the hazardous waste criteria for all constituents tested and for all collected samples), the soils would be eligible for reuse on-site or for disposal at an appropriate upland facility, and implementation of Mitigation Measure HAZ-5b would not be required.

If the soils or groundwater quality are determined to be potentially hazardous (have at least one exceedance of the hazardous waste criteria for all constituents tested), Mitigation Measure HAZ-5b would be required. In this case, the results of the hazardous materials assessment shall be incorporated into the soil and groundwater management plan prepared under Mitigation Measure HAZ-5b to determine whether specific soil and groundwater management and disposal procedures for contaminated materials are required; excavated soils are suitable for reuse; and construction worker health and safety procedures for working with contaminated materials are required.

Mitigation Measure HAZ-5b: Soil and Groundwater Management Plan (Alternatives 2, 3, and 4)

This measure applies to all soil excavation activities that would disturb soils or groundwater determined to be potentially hazardous as specified in Mitigation Measure HAZ-5a. Before construction, DWR and USFWS shall require the construction contractor(s) to prepare and implement a soil and groundwater management plan, subject to review by DWR and USFWS, that specifies the method by which contaminated soil and groundwater are to be handled and disposed of. The plan will include all necessary procedures to ensure that excavated materials and fluids generated during construction are stored, managed, and disposed of in a manner that is protective of water quality and in accordance with applicable laws and regulations. The plan shall include the following information:

- Step-by-step procedures shall be included for evaluating, handling, stockpiling, storage, testing, and disposal of excavated material, including criteria for reuse and off-site disposal. All excavated materials shall be inspected before initial stockpiling, and spoils that are visibly stained and/or have a noticeable odor shall be stockpiled separately to minimize the amount of material that may require special handling. If some of the spoils do not meet the reuse criteria, these materials shall be disposed of at a permitted landfill facility.
- Procedures to be implemented if unknown subsurface conditions or contamination are encountered shall be included. Procedures shall be provided for containing, handling, and disposing of groundwater generated from construction dewatering, the method for analyzing groundwater for hazardous materials most likely to be encountered at specific locations (based on the

results of Mitigation Measure HAZ-5a), and the appropriate treatment and/or disposal methods.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, potential impacts on human health from exposure to residual site contaminants would be similar to those of Alternative 2 (see above for a complete description). With implementation of Mitigation Measures HAZ-5a, HAZ-5b (if needed), and HYD/WQ-6, this impact would be **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Estuarine Research Station

As described in Section 11.2, an area of stained soil approximately 7 feet in diameter was observed at the Ryde Avenue site during a recent Phase I ESA (URS 2015). Disturbance of this contaminated soil could pose a hazard to workers, public health, or the environment. Implementation of Mitigation Measure HAZ-5a and, if needed, Mitigation Measure HAZ-5b would ensure that potential hazards to workers are less than significant. In addition, Mitigation Measure HYD/WQ-6 would require that spoils from dredging are properly characterized, handled, and disposed.

Fish Technology Center

The potential impacts on human health from exposure to residual site contaminants during construction of the FTC would be similar to those of the ERS (see above for a complete description). With implementation of Mitigation Measures HAZ-5a, HAZ-5b (if needed), and HYD/WQ-6, this impact would be less than significant with mitigation.

In addition, contaminated sites have been identified within 1 mile of the Ryde Avenue site. Alternative 4 would involve the use of groundwater for operations at the FTC, which could lead to inadvertent extraction of contaminated groundwater and distribution of contaminants from these off-site sources. Impacts resulting from extracted contaminated groundwater originating from off-site sources would be potentially significant. As described in Chapter 12, *Hydrology and Water Quality,* implementation of **Mitigation Measure HYD/WQ-9 (Perform Groundwater Supply Testing and Implement Groundwater Supply and Quality Protection Measures)** would require that USFWS perform a study that includes groundwater quality testing and measures to protect groundwater quality. This would ensure that risks associated with impaired groundwater quality would be less than significant.

Delta Research Station

The potential impact of the DRS would be as described above for the ERS and FTC (see above for a complete description). With implementation of Mitigation Measures HAZ-5a, HAZ-5b (if needed), HYD/WQ-6, and HYD/WQ-9, this impact would be **less than significant with mitigation**.

Impact HAZ-6: Potential for the Project to Impede Emergency Response.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no actions taken that could affect emergency response; therefore, there would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As discussed in Section 11.2, 2nd Street is subject to occasional flooding where it crosses Marina Creek, just north of the RVARC (City of Rio Vista 2011), which could obstruct emergency vehicles traveling south from the central downtown area to the RVARC. An alternate route would increase response times to and from the DRS; however, flooding is infrequent and there would generally be sufficient advance knowledge of such flooding to provide for evacuation as needed. Finally, during such a flood, the likelihood of an emergency occurring where the increased response time would create a substantial issue is considered very low. As a result, this impact is considered **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The impacts of Alternative 3 would be the same as those of Alternative 2 (see above for a complete description) and would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

No existing road conditions near the Ryde Avenue site could impede emergency response times; therefore, there would be **no impact** associated with this hazard.

Chapter 12
Hydrology and Water Quality

This chapter describes the hydrology and water quality in the vicinity of the RVARC site and the Ryde Avenue site, the regulatory setting, and the potential impacts related to these resources as a result of construction and operation of the Proposed Project.

12.1 Environmental Setting

The Proposed Project would be located in the Delta either within/along the Sacramento River (Alternatives 2 and 3) or the San Joaquin River/Stockton DWSC (Alternative 4). Relevant regional and site-specific hydrologic, floodplain, water quality, groundwater, and tidal information for the region and these specific sites is provided below.

12.1.1 Regional Setting

Sacramento River Watershed and Hydrology

The Sacramento River is the largest in California in terms of discharge and length (approximately 327 miles). Its watershed covers a large portion of the northern part of the state (27,246 square miles) and is bound by the Sierra Nevada on the east, the Coast Ranges on the west, and the Delta on the south. The basin runoff averages 22.4 million acre-feet per year (MAFY), nearly one-third of the state's total natural runoff. The major tributaries are, from north to south (upstream to downstream), the Pit River, the McCloud River, Cottonwood Creek, Battle Creek, Deer Creek, Cache Creek, the Feather River, the American River, and Putah Creek (DWR 2013).

San Joaquin Watershed and Hydrology

The San Joaquin River is the second longest river in California, traversing roughly 300 miles from its headwaters near the crest of the Sierra Nevada, flowing west to the San Joaquin Valley floor, then turning to continue northwest until draining into the Delta. Its watershed covers about 32,000 square miles and is bound by the Sierra Nevada on the east, the coastal Diablo Range on the west, and a low broad ridge on the south separating it from the Tulare Lake hydrologic region. The San Joaquin River has an average annual unimpaired runoff of approximately 1.8 million MAFY. From south to north (upstream to downstream), its major tributaries are the Merced, Tuolumne, and Stanislaus Rivers (DWR 2013).

Sacramento–San Joaquin River Delta

The Delta is at the confluence of the Sacramento and San Joaquin River basins, which collectively drain about 40 percent of California waters, and accounts for approximately 42 percent of the state's annual runoff (SJRRP 2012). The Delta covers an area of approximately 750,000 acres and is part of the largest estuary on the West Coast. The Delta is an assemblage of river channels and diked islands that ultimately drain to the San Francisco Bay (Central Valley RWQCB 2011). The Sacramento River is the largest source of Delta water (see description of discharge above). The Sacramento, Mokelumne, Calaveras, and Cosumnes rivers, other eastside tributaries, and the San Joaquin River add another 3.9 MAF, with an additional 1 MAF of local precipitation (DWR 2013). The federal Central Valley Project (CVP), the State Water Project (SWP), and several water districts divert an average of approximately 5 MAF of the flow into the Delta (DWR 2013).

In addition to providing substantial water supplies, the Delta region also has vital transportation and water conveyance facilities, such as the Sacramento and Stockton DWSCs. The channels allow for goods to be transported inland from California's coastal ports and other domestic and international ports to the Ports of Sacramento and Stockton, respectively. USACE regularly dredges the 43.5-mile Sacramento DWSC and the 41-mile Stockton DWSC to remove accumulated sediments and maintain their authorized navigation depths of 30 feet and 35 feet, respectively (USACE 2013).

Flows and Tides

Management of the Delta as a water conveyance and water supply system has dramatically altered flow patterns and quantities in the Delta from historical patterns (DWR 2013). Delta circulation, transport, and mixing of water are influenced primarily by the following mechanisms: (1) freshwater inflows to the Delta, (2) Pacific Ocean tides spreading through San Francisco Bay and the Delta, (3) in-Delta operations of SWP/CVP water supply facilities, and (4) cumulative effects of in-Delta agricultural diversions. Export operations for SWP/CVP can slow or reverse flows in the San Joaquin River and other southern Delta channels (DWR et al. 2013).

Flooding

The Delta and its two main tributaries, the Sacramento and San Joaquin rivers, have an extensive and devastating history of flooding that has resulted in loss of life, property, and economic prosperity (DWR 2012). As a result, a Central Valley flood management system has been developing since the 1800s and includes levees along the major rivers and streams of the Valley floor and around the islands of the Delta, a major bypass system for the Sacramento River and its tributaries, several bypass segments along the San Joaquin River, and reservoirs on nearly all major rivers and streams draining to the Central Valley (DWR 2012); however, major floods still occur in the Delta area, and the Delta's flood management system is threatened by impacts from development, subsidence, climate change, sea level rise, and levee stability and inadequate maintenance (DWR 2013).

Winter storms that cause high water surface elevations and flooding and have strong winds are a common cause of Delta levee failure. High tides, high winds, and high water can increase flooding risks because high water in the Delta can overtop levees and/or increase the hydrostatic pressure on levees and their foundations, which causes instability and increases the risk of failure from levee seepage (DWR 2013). Additional flooding can occur during low flow months if levees are weakened or damaged, such as the inundation of Jones Tract in June 2004.

Water Quality

Water quality in the Delta varies based on the location, extent, and dynamics of the freshwater–saltwater interface (e.g., freshwater flow quantities from the contributing rivers). In addition, present and past land uses in the Delta watershed (i.e., agriculture, mining, urbanization) have contributed pollutants to the Delta's waterways. These pollutants of concern are discussed further below and include nutrients, pesticides, mercury, selenium, and other persistent bioaccumulative toxic substances (DWR 2013).

Regional Climate

Climate is the accumulation of daily and seasonal weather events over a long-range period. The San Joaquin and Sacramento River basins are characterized by hot, dry summers and cool, rainy winters. Winter weather in the San Joaquin River region is characterized by periods of dense and persistent low-level fog most prevalent between storms. Most precipitation results from air masses that move in from the Pacific Ocean during winter. These storms usually arrive from the west or northwest. More than one-half of total annual precipitation falls during the winter rainy season, November through March. Annual precipitation in the Stockton area is approximately 13 inches, and in the Rio Vista area is 16.6 inches (DWR 2015a, Western Regional Climate Center 1977). Monthly air temperatures range from an average minimum of 36.7ºF in December to an average maximum of 93.8ºF in July (DWR 2015a). Within the Delta climate region, mean temperatures have increased by approximately 1.5–2.4ºF in the past century (DWR 2015a).

Sea Level Rise

Until the late 19th or early 20th century, when global temperatures began to rise, sea levels were relatively stable for thousands of years; however, in the 20th century, rising global temperatures resulted in expanding ocean waters; melting land ice; an increasing ocean volume; and, ultimately, rising global mean sea levels (National Academy of Sciences 2012). Potential effects of sea level rise include wetland loss, storm surge inundation, increased risk of coastal flooding, and coastal erosion and shoreline retreat (National Academy of Sciences 2012).

Sea levels will rise at a higher rate during the 21st century (National Academy of Sciences 2012). By 2100, projected sea level increases in California, south of Mendocino, will range from 16–65 inches based on different scenarios of greenhouse gas emissions and local factors (National Academy of Sciences 2012). This range reflects uncertainties about future global greenhouse gas emissions, land-ice melting rates, and other uncertainties, including uncertainties in the models (Coastal and Ocean Working Group of the California Climate Action Team 2013). For illustrative purposes and based on past sea level rise projections, sea level rise areas shown in this chapter's figures use a sea level rise of 55 inches above the mean higher high water (MHHW) levels to indicate potential areas of sea level rise inundation at the RVARC or Ryde Avenue sites. This amount of sea level rise falls within the upper range of the 2100 estimates described above.

12.1.2 Rio Vista Army Reserve Center Site

Topography

The RVARC site is located on the west bank of the Sacramento River and immediately east of the Montezuma Hills, which are located approximately 100 feet west of the site. The Montezuma Hills' land feature nearest to the RVARC site has an elevation of approximately 100 feet and is a fault scarp, which is a vertical uplift resulting from fault slips (City of Rio Vista 2011). Within the RVARC site, elevations range from approximately 8 feet above mean sea level (msl) (based on the North American Vertical Datum 1988 [NAVD88]) along the Sacramento River shoreline to approximately 36 feet above msl along the western boundary of the site (Horizon Water and Environment 2015a). The site is relatively flat and has two gently sloping "terraces" that are connected by a small, moderately sloped area near the center. The lower terrace along the river has an average elevation of approximately 18 feet and the upper terrace has an average elevation of approximately 33 feet above msl (City of Rio Vista 2011).

Hydrology

Surface waters in the vicinity of the RVARC site include the Sacramento River (which includes the Sacramento DWSC), Cache Slough, Steamboat Slough, Marina Creek, and Threemile Slough (**Figure 12-1**). The Sacramento River is the largest and closest surface water to the RVARC site and is tidally-influenced in this area. Sacramento River flows and tidal ranges are recorded at a monitoring station in Rio Vista. Based on a 10-year monitoring period (1995–2005), average monthly Sacramento River flows (filtered for tidal influence) at Rio Vista are typically lowest in October (approximately 8,000 cubic feet per second [cfs]) and peak in February (approximately 64,000 cfs) (USGS 2015).

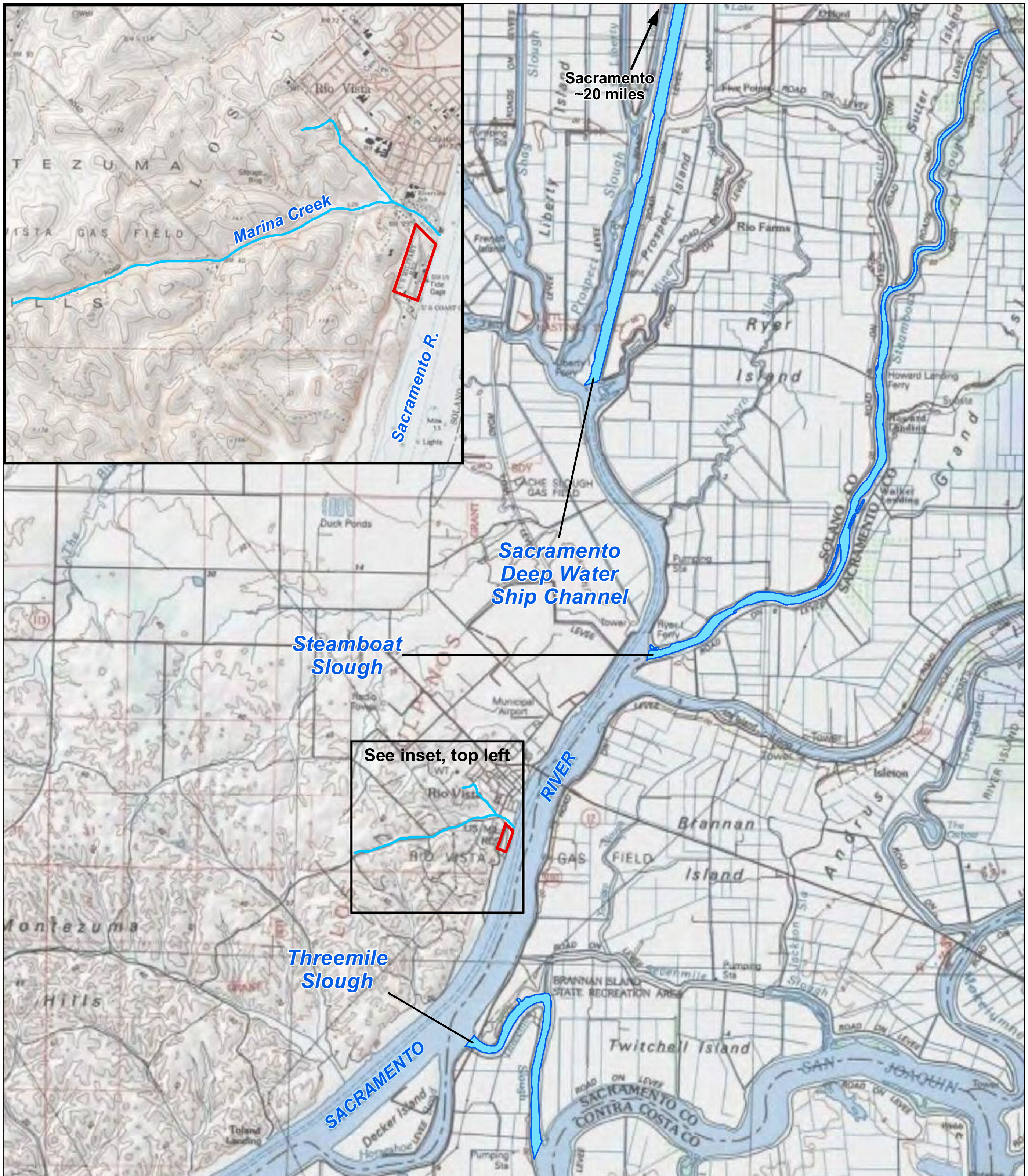
The tides in the Sacramento River at Rio Vista have a mixed semi-diurnal tidal cycle, which means that the river experiences two high and two low tides of unequal height each lunar day (USACE and Port of West Sacramento 2011). From 1978 to 1997, the historical mean and diurnal tidal ranges at the Rio Vista monitoring station were 3.02 and 4.08 feet, respectively (NOAA 2015).

STORMWATER DRAINAGE

Apart from the Sacramento River, no surface waters are located within the RVARC site (City of Rio Vista 2011). Runoff from the site is collected in existing catch basins, absorbed into the soil, or flows by way of surface runoff to the Sacramento River. Existing drainage infrastructure on the site, which was previously used for military purposes, includes 10 catch basins and approximately 650 linear feet of storm sewers that drain through outfall pipes to the Sacramento River (City of Rio Vista 2011). This infrastructure was determined to be inadequate for use in future development (City of Rio Vista 2011).

FLOOD HAZARDS

Before the 1940s, Rio Vista was flooded numerous times by flows from the Sacramento River. Since then, major flood control facilities and water diversion projects constructed upstream have reduced Sacramento River floodflows such that Rio Vista is generally no longer affected (City of Rio Vista 2011).



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0 1 2
Miles

RVARC Site

Figure 12-1

Surface Waters Near the RVARC Site

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The expression "100-year flood" is shorthand for a flood that has a 1-in-100 probability (a one percent annual chance) of occurring in any given year. Thus, a 100-year floodplain is the potential area that would be flooded during a flood of this magnitude. As shown in **Figure 12-2**, only limited areas of the RVARC site are in the 100-year floodplain. According to the FEMA's Flood Insurance Rate Map for Rio Vista, the Sacramento River's 100-year base floodplain elevation is 10 feet, which means that areas within or adjacent to the Sacramento River that have an elevation less than 10 feet above msl would be within the 100-year floodplain (FEMA 2009).

There are no dams within Solano County that would have the potential to inundate the RVARC site (Solano County 2012); however, Rio Vista and the RVARC site are downstream of multiple dams in the Sacramento River watershed and would potentially be in a dam inundation zone. Solano County has designated the Folsom and Nimbus Dams, located in Sacramento County on the American River, as having a "high" potential to inundate areas of Solano County (Solano County 2012). Based on dam failure inundation maps for Folsom and Nimbus dams (Governor's Office of Emergency Services [Cal OES] 2015), dam-failure related flooding is unlikely to occur in the Rio Vista and RVARC site area and any increase in river flows would likely be restricted to the Sacramento River channel. There are no dams or levees within the site (City of Rio Vista 2011).

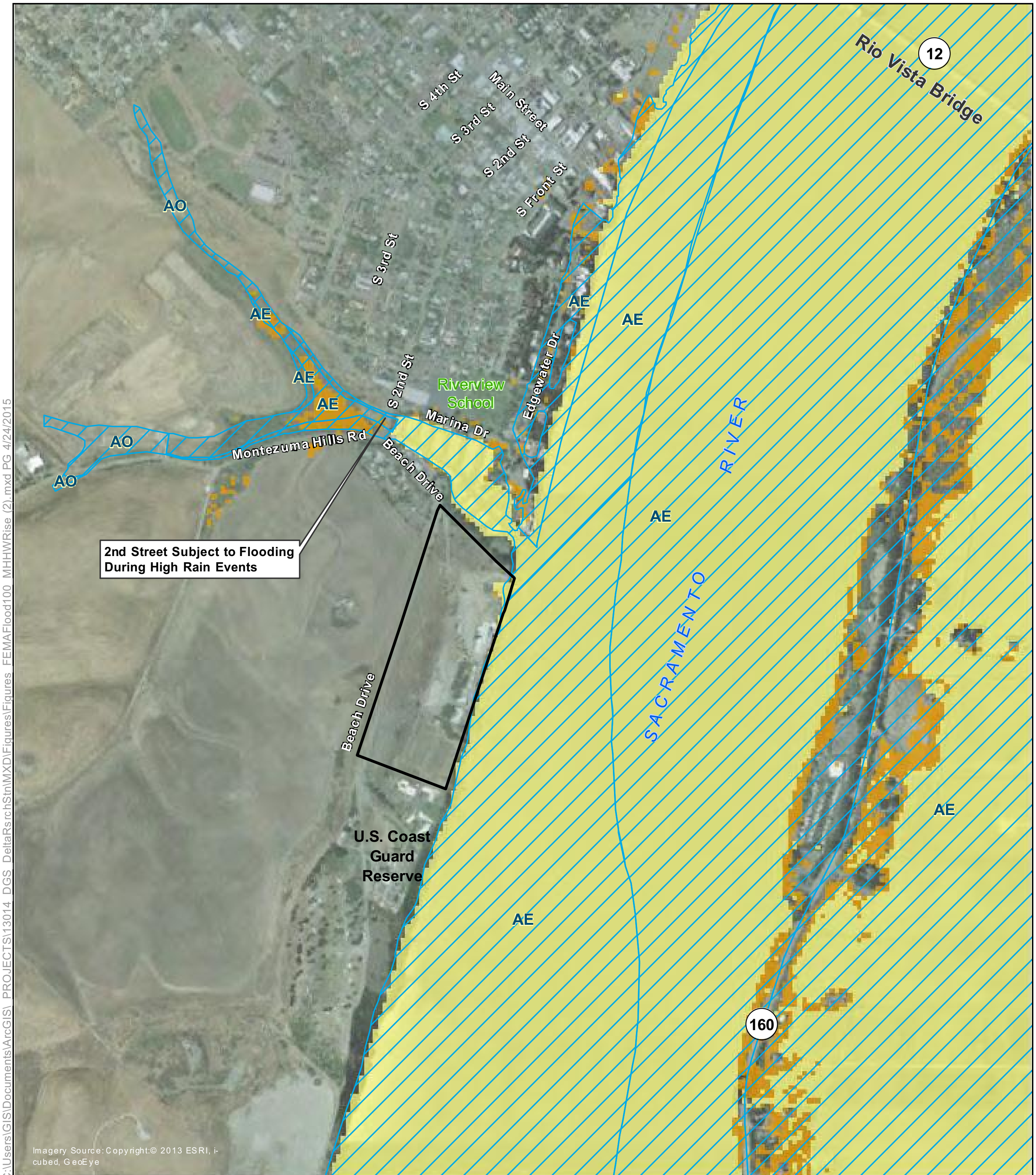
Sea-level Rise Hazards

Similar to the floodplain hazard areas discussed above and as shown in Figure 12-2, a small area in the northeastern portion of the site would potentially be inundated by a projected sea level rise. As mentioned earlier, the figure shows inundation under a sea level rise scenario of 55 inches above MHHW.

Tsunami Hazards

A tsunami is a wave or series of waves in the ocean that can travel extremely quickly (up to 500 miles per hour) to land and be substantially greater in height than normal waves, thereby causing flooding of inland areas and hazards to life and property (CGS 2015). Typical tsunami-generating sources are earthquakes, landslides, or volcanic eruptions.

CGS, in concert with Cal OES and the University of Southern California, has developed official maps for all populated areas at risk from tsunamis in California (CGS 2013a). In Solano County, tsunami inundation areas are generally limited to areas surrounding the Mare Island Strait (Napa River) and San Pablo Bay (Solano County 2012, CGS 2013b). The RVARC site is not in a tsunami inundation area.



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0 0.125 0.25

Miles

Horizon WATER and ENVIRONMENT

100-Year Flood Zone

Zone AE Base Flood Elevations determined.
Zone AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

RVARC Site

Existing Area at or below MHHW

Potential Additional Area at or below MHHW with 55" Sea Level Rise

Flood zone source: FEMA, 2009; 2012; 2013; 2014
Tidal depths source: URS, 2008

Figure 12-2

Flood and Sea Level Rise Risk Analysis for the RVARC Site

Groundwater

The RVARC site is located in the eastern portion of the Solano subbasin (basin number 5-22.66) within the Sacramento Valley Groundwater Basin. The subbasin is bounded by Putah Creek on the north, the Sacramento River on the east, the English Hills and Montezuma Hills on the west, the north Mokelumne River on the southeast, and the San Joaquin River on the south (DWR 2004). Approximate surface area of the subbasin is 425,000 acres. Water-bearing units in the Solano subbasin include sedimentary continental deposits; younger and older alluvium; and the Tehama Formation, which is the thickest. The general direction of historical groundwater flows was from the northwest to the southeast. (DWR 2004).

At the RVARC site, groundwater flow is believed to generally follow topographic patterns in a generally easterly direction toward the Sacramento River from the Montezuma Hills (Arcadis G&M, Inc. 2001a). Depending on the season and recent rainfall patterns, the onsite depth to groundwater at the RVARC site ranges anywhere from 6 to 25 feet bgs, with the depth to groundwater decreasing near the Sacramento River (Arcadis G&M, Inc. 2001b).

GROUNDWATER QUANTITY

The Solano subbasin does not have a groundwater storage calculation, and groundwater levels have generally increased since the 1950s, when surface water supplies began supplementing groundwater (DWR 2004, City of Rio Vista 2011). The City of Rio Vista relies solely on groundwater for its water supply. At monitoring wells in the Rio Vista area, recent groundwater elevations indicate that groundwater levels are not in decline (City of Rio Vista 2011). DWR does not consider the basin to be in overdraft (the condition of a groundwater basin where in which the amount of water withdrawn exceeds the amount of water replenishing the basin over a period of time [DWR 2014b]) because well yields are reported in the thousands of gallons per minute in the Tehama Formation, and groundwater supplies have been sufficient to meet or exceed groundwater demands in the subbasin (City of Rio Vista 2011). In addition, the Solano County Water Agency's biannual groundwater level reports indicate that groundwater levels may drop in dry years but rebound in wet years and show no trend of overdrafting (Solano County Water Agency 2010), which indicates no shortage (City of Rio Vista 2011).

As described in more detail in Section 12.2.2 below, the passage of recent groundwater-related regulations requires additional groundwater basin monitoring, prioritization, and management. Under the DWR-implemented California Statewide Groundwater Elevation Monitoring (CASGEM) prioritization program, the 515 groundwater basins throughout the state are ranked based on water supply, water demand, and other factors identified in the California Water Code (DWR 2014a). Priority ranking categories are high, medium, low, and very low (see Section 12.2.2 for further descriptions of these rankings). The Solano subbasin has a medium priority ranking (ranked 107 of the 515 groundwater basins and 1 of the 84 medium-priority basins) and only portions of the subbasin have monitored groundwater elevations (DWR 2014a). No impacts on the overall Sacramento Valley Basin have been identified related to groundwater use in this subbasin (DWR 2014a).

Water and Sediment Quality

Surface Water Quality

The water quality of the Delta, including the Sacramento River adjacent to the RVARC site, has impairments that negatively affect the ability of the Delta waters to meet identified beneficial uses (as further detailed under the Section 303[d] discussion below). Past sampling of Sacramento River water quality near Rio Vista indicated the following:

- pH levels and DO measurements suitable to support beneficial uses (pH in the range of 7–8 and DO measurements of approximately 10.2–12.7 mg/L);
- an order-of-magnitude increase in turbidity from the water surface to deeper waters (approximately 1–15 NTU); and
- low salinity (mostly freshwater) near Rio Vista and an increase in salinity with greater water depth (approximately 03–0.25 microsiemens per centimeters [μS/cm]) (USACE and Port of West Sacramento 2011).

Sacramento River Sediment Quality

Based on multiple sampling events between 2000 and 2007 at various locations in the Sacramento River's DWSC, Sacramento River sediments had one or more exceedances of applicable sediment quality criteria for the following pollutants: arsenic, cadmium, copper, chromium, lead, mercury, nickel, polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and zinc (USACE and Port of West Sacramento 2011); however, concentration readings of some heavy metals (e.g., chromium and nickel) might be the background concentrations of those metals from native materials (USACE and Port of West Sacramento 2011).

Near the RVARC site, Sacramento River sediments indicated the presence of arsenic, dioxins/furans, and nickel (Arcadis G&M, Inc. 2001a); however, the concentrations of these contaminants were not widespread or high enough to be considered hazardous, warrant remedial actions, or pose a risk to humans or ecological receptors (Arcadis G&M, Inc. 2001a).

Groundwater Quality

The Solano Subbasin's groundwater quality is generally good with few impairments, and is suitable for domestic and agricultural uses. The subbasin's water types vary and are classified as sodium bicarbonate in the southern and eastern areas. Total dissolved solids (TDS) range from 250 to 500 ppm in the northwest and eastern portion of the subbasin to levels greater than 500 ppm in the central and southern areas. Most of the subbasin's water is classified as hard to very hard. Iron concentrations along the Sacramento River are greater than 0.05 ppm but less than the California Code of Regulations Title 22 drinking water maximum contaminant level (MCL) for iron of 0.3 ppm (DWR 2004).

Impairments in the subbasin, as indicated by the number of wells with a concentration above an MCL, include nitrates, pesticides, primary and secondary inorganics, and VOCs.

Primary inorganics and VOCs were detected in only one well out of more than 50 wells sampled. Other subbasin impairments include hardness and manganese (DWR 2004).

Previous groundwater quality evaluations for the RVARC site indicated limited coliform bacteria impairments, and the removal of past contaminated soils from the site (City of Rio Vista 2011, Horizon Water and Environment 2014). Based on a study conducted in 2001, groundwater quality underlying the site was determined not to be impaired and to be suitable for potable and other uses (Arcadis G&M, Inc. 2001a).

12.1.3 Ryde Avenue Site in Stockton

Topography

The Ryde Avenue site in Stockton is located in the northernmost portion of the San Joaquin Valley, which is bounded by the Sierra Nevada mountain range to the east and the Coastal Range Mountains to the west. The undeveloped site is on the north bank of the Stockton DWSC. The Ryde Avenue site has a relatively flat to gently sloping topography with a slight downward gradient to the northeast and an approximate elevation of 11 feet above msl (URS 2015).

Hydrology

The Stockton DWSC, a portion of the San Joaquin River that has been dredged for navigation by ocean-going cargo vessels to the Port of Stockton, is the primary surface water feature near the Ryde Avenue site (DWR 2013). Other surface waters within the vicinity of the Ryde Avenue site are the Stockton DWSC turning basin, the San Joaquin River, Burns Cutoff, the Calaveras River, McLeod Lake, and the Smith Canal (**Figure 12-3**). The Smith Canal, which is hydraulically connected to the Stockton DWSC, is located approximately 1,500 feet north of the Ryde Avenue site. The San Joaquin River's discharge point into the Stockton DWSC is immediately south of the site.

The dredged portion of the Stockton DWSC extends for approximately 41 miles, has depths of roughly 35 feet, and is approximately 400 feet wide near the Ryde Avenue site. The size and geometry of the Stockton DWSC strongly influence the tidal exchange and mixing in the channel (Jones & Stokes 2002). For example, velocities in the channel are substantially less than those in the upstream San Joaquin River, which has an average depth of only 10 feet and an approximate width of 200 feet in the Stockton area (Central Valley RWQCB 2014a, Schmeider et al. 2008). The ship channel experiences regular flow reversals from tidal influence (Central Valley RWQCB 2014a). As a result of these physical conditions and the tidal influence in the channel, it can take days or even weeks for upstream waters out of a particular area to completely move farther downstream (Schmeider et al. 2008, Jones & Stokes 2002). In some areas of the channel (e.g., the turning basin), it appears the water column never mixes (Schmeider et al. 2008).

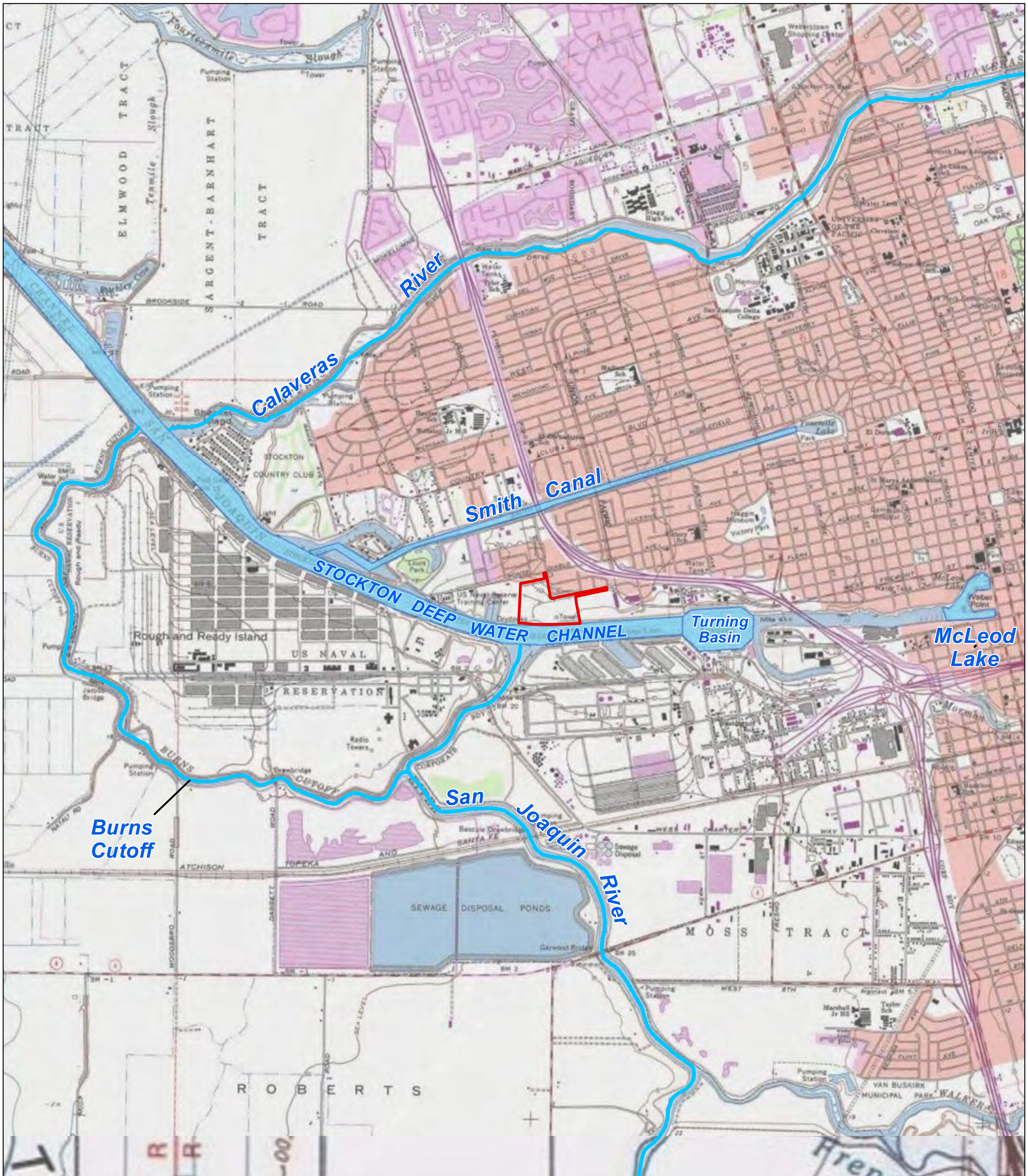

Figure 12-3

Surface Waters Near the Ryde Avenue Site

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Miles

Ryde Avenue Site

Horizon WATER and ENVIRONMENT

Stormwater Drainage

The City of Stockton uses the Stockton DWSC and other local waterways (sloughs, canals, creeks) to convey stormwater flows and has identified drainage areas associated with each waterway. The Ryde Avenue site is located within the Smith Canal drainage area, which discharges through the Smith Canal into the Stockton DWSC (City of Stockton 2007). The Smith Canal's drainage area consists of established neighborhoods and minimal undeveloped areas. Stormwater drainage facilities associated with the canal include 10 pumping stations and a network of stormwater drainage pipes. One large drainage pipe (diameter greater than 24 inches) underlies Ryde Avenue and discharges through a pumping station into the canal. Three additional pumping stations that presumably discharge into the Stockton DWSC are located west of the Ryde Avenue site near the U.S. Navy Reserve Training Center site (two stations) and near Wilshire Avenue (one station) (City of Stockton 2007). Most of Stockton's storm drainage system has sufficient capacity but localized storm drain capacity issues do occur (City of Stockton 2007).

There are two stormwater drainage ditches on the Ryde Avenue site. One drainage ditch is approximately three feet wide and appears to drain the surrounding residential area and a slope along the Ryde Avenue site boundary (Horizon Water and Environment 2015b). The first drainage ditch flows east into a drainage inlet at the Ryde Avenue curb. The second is approximately two feet wide and drains a portion of the Ryde Avenue site. It flows through two culverts into a small sump and, through a sump pump, into the storm drain system (Horizon Water and Environment 2015b).

Flood Hazards

Historically, Stockton has experienced flooding from the San Joaquin River and other surrounding Delta waterways when development of Delta land reduced the available floodplain and increased flooding potential (City of Stockton 2007). Stockton's flood risk is largely influenced by water surface elevations in the San Joaquin River and other Delta channels (City of Stockton 2007). Levees along the Delta waterways (e.g., Stockton DWSC) and upstream dams generally protect the city from flooding; however, a risk of flooding remains during large flood events in the San Joaquin River, Delta flooding accompanied by high tides, or levee or dam failure (City of Stockton 2007).

Dams upstream of the Stockton area that pose an inundation risk to the city include New Melones Dam, San Luis Dam (San Luis Reservoir), Lake McClure, Camanche Dam (Camanche Reservoir), Camanche South Dikes, New Hogan, and Salt Springs. Of these, the Ryde Avenue site is in a dam-failure inundation zone for the New Melones and New Hogan Dams, and potentially in an inundation zone for Lake McClure, and Camanche Reservoir (San Joaquin County 2003, Cal OES 2015). New Melones and New Hogan Dams are located on the Stanislaus and Calaveras Rivers, respectively, approximately 40 miles east and approximately 30 miles northeast of the Ryde Avenue site. The Ryde Avenue Site is respectively 60 miles northwest, and 25 miles southwest of Lake McClure, and Camanche Reservoir (San Joaquin County 2003).

As shown in **Figure 12-4**, a portion of the Ryde Avenue site would be in the FEMA 100-year floodplain associated with Smith Canal (FEMA 2009). Areas within the floodplain areas are those along Ryde Avenue and Mount Diablo Avenue and along West Fremont Street near Wilshire Avenue. Levees along the Stockton DWSC and Smith Canal protect the remainder of the site from the 100-year floodplain. Water levels in Smith Canal and the Stockton DWSC are controlled by water elevations in the Delta (City of Stockton 2007).

SEA-LEVEL RISE HAZARDS

Sea level rise–hazard areas within the Ryde Avenue site would generally occur near the storm drains in the northern/eastern areas of the site and in the southern areas of the site along the Stockton DWSC (Figure 12-4).

TSUNAMI HAZARDS

There are no tsunami inundation areas in San Joaquin County (CGS 2013a). The tsunami inundation areas nearest to San Joaquin County are in neighboring Contra Costa and Alameda Counties and are roughly 40+ miles from the Ryde Avenue site (CGS 2013a); therefore, the Ryde Avenue site is not in a tsunami inundation area.

Groundwater

The Ryde Avenue site in Stockton overlies the San Joaquin Valley Groundwater Basin's Eastern San Joaquin Groundwater Subbasin (Basin number 5-221) (DWR 2006). The Eastern San Joaquin Groundwater Subbasin is defined by the extent of unconsolidated/semi-consolidated sedimentary deposits that are bounded by the Mokelumne River on the north and northwest, San Joaquin River on the west, Stanislaus River on the south, and consolidated bedrock on the east (DWR 2006). The Eastern San Joaquin Groundwater Subbasin is open on the north, west, and south to surrounding subbasins (Eastern San Joaquin County Groundwater Basin Authority 2014). The approximate surface area of the subbasin is 707,000 acres. Water-bearing units in the Eastern San Joaquin subbasin comprise the Alluvium and Modesto/Riverbank Formations, Flood Basin Deposits, the Laguna Formation, and the Mehrten Formation. In general, groundwater flows to the north. (DWR 2006).

Groundwater levels in the basin have been in decline since the 1960s (DWR 2006). Some evidence suggests that long-term groundwater elevations between 1992 and 2012 have generally stabilized (Eastern San Joaquin County Groundwater Basin Authority 2014). However, the subbasin is only partially monitored and further monitoring might be required to determine more recent groundwater level trends (DWR 2014b) though more recent data suggests groundwater levels are decreasing. In 2013, 68 out of 81 wells sampled in the Stockton area experienced groundwater level declines from the previous year (San Joaquin County Flood Control and Water Conservation District 2013). In Spring 2014, 250 wells out of 288 comparable wells (i.e., approximately 87 percent of wells sampled in both 2013 and 2014) showed a decrease in groundwater levels compared to the previous year (San Joaquin County Flood Control and Water Conservation District 2014). In the Stockton area, depth to groundwater was 4 to 36 feet bgs at irrigation wells and 50 to 80 feet bgs at production wells (MWH 2014).

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N

0 0.125 0.25

Miles

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100-Year Flood Zone

Zone AE Base Flood Elevations determined.
Zone AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

Ryde Avenue Site

Existing Area at or below MHHW

Potential Additional Area at or below MHHW with 55" Sea Level Rise

Flood zone source: FEMA, 2009; 2012; 2013; 2014
Tidal depths source: URS, 2008

Figure 12-4

Flood and Sea Level Rise Risk Analysis for the Ryde Avenue Site

In the vicinity of the Ryde Avenue site in Stockton, depth to shallow groundwater ranged between 5 and 10 feet bgs (URS 2015). Groundwater flow at the site may be south toward the Stockton DWSC or follow Stockton's regional northeast groundwater flow pattern toward a low point approximately 4 miles east of Stockton (San Joaquin County Flood Control and Water Conservation District 2013 and 2014). It is likely that shallow groundwater levels near the San Joaquin River and the Stockton DWSC are similar to the surface water levels (MWH 2014).

GROUNDWATER QUANTITY

Groundwater serves as the primary water source for municipal and agricultural use in San Joaquin County, supplying 60 percent of the water supplies (Eastern San Joaquin County Groundwater Basin Authority 2014). The overall storage capacity of the Eastern San Joaquin Groundwater Subbasin has been estimated at 42.4 MAF, although this is considered an underestimate because it was based on a study area approximately 120,000 acres less than the subbasin's current defined area (DWR 2006). The municipal and agricultural use of groundwater has historically led to substantial overdraft of the Eastern San Joaquin Groundwater Subbasin. Based on 1990 data, overdraft of the subbasin was estimated at 70,000 AFY in northeastern San Joaquin County and an additional 35,000 AFY in the Stockton East Water District area, which includes the City of Stockton and the Ryde Avenue site (DWR 2006). Other sources have cited the annual groundwater overdraft in the subbasin at approximately 150,000 AF (Northeastern San Joaquin County Groundwater Banking Authority 2004). This historical groundwater overdraft and corresponding groundwater level decline in the subbasin suggest that the subbasin has an additional 1–2 MAF of potential operable groundwater storage capacity (Eastern San Joaquin County Groundwater Basin Authority 2014).

Although data collected through 2012 suggested that groundwater use in the subbasin peaked in the 1990s and more recent use was approximately 75 percent of the average use between 1976 and 1996 (Eastern San Joaquin County Groundwater Basin Authority 2014), the declining groundwater levels at numerous wells in the basin in 2013 and 2014, as described above, suggest that groundwater use has increased since 2012, likely as a result of California's ongoing drought and reduced recharge. Future demands (in 2035) are anticipated to be similar to 2012 demand levels (Eastern San Joaquin County Groundwater Basin Authority 2014).

Despite recent groundwater use reductions, the long-term groundwater overdraft in the subbasin has resulted in DWR designating the Eastern San Joaquin Subbasin as a high priority ranking under the DWR-implemented CASGEM prioritization program detailed below (DWR 2014). In addition, the Eastern San Joaquin Subbasin is ranked as the fifth priority out of 515 groundwater basins throughout the state (DWR 2014).

Water and Sediment Quality

SURFACE WATER QUALITY

The Stockton DWSC is a Delta waterway with water quality impairments that negatively affect its ability to meet identified beneficial uses (as further detailed under the Section 303[d] discussion below). Potential surrounding or upstream sources of impairments in the Stockton DWSC include resource extraction, contaminated sediments, urban runoff/storm sewers, agriculture and agricultural return flows, municipal point sources (wastewater discharge), recreational and tourism activities, and unknown sources (SWRCB 2011). The lack of flushing of the Stockton DWSC contributes substantially to these issues.

Historically, the most prominent water quality issue in the Stockton DWSC has been low DO concentrations that affect aquatic organisms' health and/or ability to migrate upstream (DWR 2013). The primary factors contributing to DO impairment in the Stockton DWSC were identified by Central Valley RWQCB (2014b) as follows:

- loads of oxygen-demanding substances, such as algae, from upstream sources react by numerous chemical, biological, and physical mechanisms to remove DO from the water column in the Stockton DWSC; and
- DWSC geometry and reduced flow through the DWSC affects the various mechanisms that add or remove DO from the water column, such that net oxygen demand exerted in DWSC is increased.

Since 2005, Central Valley RWQCB's implementation of a DO control program to control point and non-point sources of this impairment has resulted in less frequent, lower magnitudes, and shorter durations of excursions of DO concentrations below water quality objectives. For example, DO impairment in the channel has been reduced from a span of 14 miles (in 1994) to approximately 7 miles (in 2013). Upgrades to the City of Stockton's Regional Wastewater Control Facility to reduce nitrogen loading into the San Joaquin River were a major factor in improved channel DO concentrations, and the use of an aerator to improve the DO levels is another critical factor. Despite the improvements in reducing DO impairment, Central Valley RWQCB recommends that the City continue to monitor Stockton DWSC's DO concentrations and continue to use the aerator to minimize impairments. (Central Valley RWQCB 2014a).

STOCKTON DWSC SEDIMENT QUALITY

According to the waste discharge requirements for Order R5-2004-0061-001 for ongoing Stockton DWSC maintenance dredging activities, chemical and physical testing of sediment from the DWSC is required before each maintenance project. Prior to reuse of DWSC dredged materials, the sediment quality must be below the maximum concentrations of various constituents including arsenic, barium, cadmium total chromium, chromium VI, copper, lead, mercury, nickel, selenium, zinc, and pH. Based on sediment quality testing conducted in 2000, concentrations of the above-listed constituents met the sediment quality criteria (Central Valley RWQCB 2012).

GROUNDWATER QUALITY

The Eastern San Joaquin Subbasin has a poor quality water (saline) front along approximately 16 miles of the east side of the Delta that might threaten its ability to meet municipal and agricultural uses (DWR 2006). The subbasin's water types are primarily calcium-magnesium bicarbonate or calcium-sodium bicarbonate. TDS concentrations range from 30 to 1,632 ppm, with an average of approximately 300 ppm (from samples at 174 water supply wells). The highest specific conductance values were generally found along the western part of the subbasin and the San Joaquin River alignment (DWR 2006).

Because of groundwater overdraft, as described above, salinity is a great concern in the subbasin. The results of recent salinity monitoring in the north Stockton area found that three out of five tested wells indicated increases in chloride, electrical conductivity, and TDS concentrations (San Joaquin County Flood Control and Water Conservation District 2013). As a result of elevated salt levels that make the water unsuitable for drinking and agricultural supplies, several municipal supply wells in Stockton and several irrigation wells have been abandoned (Eastern San Joaquin County Groundwater Basin Authority 2014). In addition, the saline front continues to migrate eastward as groundwater levels decline, particularly in Stockton where the front was moving eastward at a rate of approximately 150 feet per year (DWR 2006). Sources of this highly saline water include surface water infiltration, salt dissolution near the Delta margin, contributions from underlying deposits, and possible irrigation return flows (Eastern San Joaquin County Groundwater Basin Authority 2014).

In addition to salinity, other impairments in the subbasin include nitrates, pesticides, radiological pollutants, primary and secondary inorganics, and VOCs and semi-volatile (S) VOCs, as indicated by the number of wells with a concentration above the CCR Title 22 drinking water MCL. Of the approximately 180 wells that were sampled, the primary impairment was secondary inorganics (71 impairments) (DWR 2006).

Specific existing groundwater quality issues related to previous hazardous materials releases within the vicinity of the Ryde Avenue site are described further in Chapter 11, *Hazards and Hazardous Materials,* and briefly summarized below. An on-site oil stain approximately 7 feet in diameter might indicate that the subsurface soils within the stained area, and potentially the underlying groundwater, are locally affected (URS 2015). Pentachlorophenol (PCP), arsenic, and dioxins/furans have been found in the sediment and groundwater underlying a former wood-preserving facility near Old Mormon Slough (approximately 0.8 mile or 4460 feet east/southeast of the Ryde Avenue site) (URS 2015). Although the shallow groundwater flows at that site are generally in a direction opposite of the Ryde Avenue site, deeper groundwater flows follow the subbasin's regional flow patterns and are to the northeast (URS 2015). A Port of Stockton site, approximately 0.4 mile (2,100 feet) southeast of the Ryde Avenue site, has ammonium and nitrate impairments from a former liquid fertilizer spill (URS 2015). No additional information is known about groundwater flows or direction at this site; although it is possible that the Stockton DWSC could act as a hydrologic barrier to shallower groundwater flows and minimize the risk of the impairments at the Port of Stockton site migrating to the Ryde Avenue site (URS 2015).

12.2 Regulatory Setting

12.2.1 Federal Laws, Regulations, and Policies

Clean Water Act

The CWA is the primary federal law that protects the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. CWA Sections 303, 401, and 402 are the most relevant to the Proposed Project. SWRCB and its nine RWQCBs implement Sections 303, 401, and 402 at the state level. CWA Section 404, which regulates the discharge of dredge-and-fill materials to the waters of the United States, is discussed in Chapter 8, *Biological Resources–Aquatic*.

SECTION 303(D)

Under CWA Section 303(d), states are required to identify "impaired waterbodies" (those not meeting established water quality standards), identify the pollutants causing the impairment, establish priority rankings for waters on the list, and develop a schedule for developing control plans to improve water quality. USEPA then approves the state's recommended list of impaired waters, or adds to and/or removes waterbodies from the list. Each RWQCB must update the Section 303(d) list every 2 years. Waterbodies on the list have no further assimilative capacity for the identified pollutant, and the Section 303(d) list identifies priorities for developing pollution control plans for each listed waterbody and pollutant.

The pollution control plans triggered by CWA Section 303(d) list are called Total Maximum Daily Loads (TMDLs). A TMDL is a "pollution budget" designed to restore the health of a polluted body of water and ensure the protection of beneficial uses. A TMDL also contains the target reductions needed to meet water quality standards and allocates those reductions among the pollutant sources in the watershed (point sources, nonpoint sources, and natural sources) (40 CFR 130.2).

The current Section 303(d) list for waterbodies in California is the 2008–2010 list approved by USEPA on November 12, 2010. **Table 12-1** lists the Section 303(d) TMDL requirement status for the relevant Delta waterways (SWRCB 2011), which are the Stockton DWSC adjacent to the Ryde Avenue site and the downstream Delta waterways.

Table 12-1. Sacramento–San Joaquin River Delta Clean Water Act Section 303(d) TMDL Requirement Status by Waterway

Sacramento–San Joaquin Delta Waterway	Pollutant (TMDL Requirement Status)
Stockton DWSC	Chlorpyrifos (B) Dichlorodiphenyltrichloroethane (DDT) (A) Diazinon (B) Dioxin (A) Furan Compounds (A) Group A Pesticides (A) Invasive Species (A) Mercury (A) Organic Enrichment/Low Dissolved Oxygen (B) Polychlorinated biphenyls (PCBs) (A) Pathogens (B) Unknown Toxicity (A)
Delta Waterways (Western Portion), includes the Sacramento River Adjacent to the RVARC Site	Chlorpyrifos (B) DDT (A) Diazinon (B) Electrical Conductivity (A) Group A Pesticides (A) Invasive Species (A) Mercury (A) Unknown Toxicity (A)

Notes: DWSC = Deep Water Ship Channel; RVARC = Rio Vista Army Reserve Center; TMDL = Total Maximum Daily Load

TMDL Requirement Status:

A: TMDL still required

B: Being addressed by USEPA-approved TMDL

Source: SWRCB 2011

Section 401

CWA Section 401 requires an evaluation of water quality when a proposed activity requiring a federal license or permit could result in a discharge to waters of the U.S. In California, SWRCB and its nine RWQCBs issue water quality certifications. Each RWQCB is responsible for implementing Section 401 in compliance with the CWA and its water quality control plan (also known as a Basin Plan). Applicants for a federal license or permit to conduct activities that might result in the discharge to waters of the U.S. must also obtain a Section 401 water quality certification to ensure that any such discharge would comply with the applicable provisions of the CWA.

SECTION 402

CWA Section 402 regulates point-source discharges to surface waters (other than dredge or fill material) through the NPDES, which is administered by USEPA and some states. The NPDES program provides for both general permits (those that cover a number of similar or related activities) and individual permits for discharges to the waters of the U.S. In California, this regulation is implemented at the state level and is described further below.

Federal Emergency Management Agency

Congress established the National Flood Insurance Program (NFIP) to provide access to federally backed flood insurance protection for property owners and to address the need to reduce the destructive consequences of flooding. FEMA administers the NFIP and works closely with state and local officials to identify flood hazard areas and flood risks. Under the NFIP, if a community adopts and enforces a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas, flood insurance will be made available within the community. Floodplain management ordinances are designed to prevent new development from increasing the flood threat and to protect new and existing buildings from anticipated flooding.

Executive Order 13690

On January 30, 2015, President Obama issued Executive Order 13690 – Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input, which amends Executive Order 11988 – Floodplain Management. The Federal Flood Risk Management Standard builds upon work completed by the Hurricane Sandy Rebuilding Task Force, which announced in April 2013 that all Sandy-related rebuilding projects funded by the Sandy Supplemental (Public Law 113-2) must meet a consistent flood risk reduction standard. When implementing the Federal Flood Risk Management Standard, federal agencies are given the option to select one of three approaches for establishing the flood elevation and hazard area used in siting, design, and construction:

- Utilize best-available, actionable data and methods that integrate current and future changes in flooding based on science,
- Use the base flood elevation (or 1-percent-annual-chance flood determined using best available data) and an additional height to calculate the freeboard value, or
- 500-year, or 0.2%-annual-chance, flood elevation.

The new flood risk standard requires all future federal investments in and affecting floodplains to meet the level of resilience established by the standard. This standard applies to new structures and facilities that are federally funded such as the ERS and FTC.

12.2.2 State Laws, Regulations, and Policies

Porter–Cologne Water Quality Control Act

The California Porter–Cologne Water Quality Control Act (Porter–Cologne Act) was passed in 1969 and, together with the federal CWA, provides regulatory guidance to protect water quality and water resources. The Porter–Cologne Act established the SWRCB and divided California into nine regions, each overseen by an RWQCB. The Porter–Cologne Act established regulatory authority over waters of the state, which are defined as "any surface water or groundwater, including saline waters, within the boundaries of the state" (CWC Section 13050). More specifically, the SWRCB and its nine RWQCBs have jurisdiction over any surface or groundwater to which a beneficial use might be assigned. The Porter–Cologne Act also assigned responsibility for implementing CWA Sections 303, 401, and 402 to the SWRCB and the RWQCBs.

The Porter–Cologne Act requires the development and periodic review of Basin Plans for the protection of water quality in each of the state's nine regions. It requires that each RWQCB formulate and adopt a Basin Plan for all areas within the region (CWC Section 13240). A Basin Plan is unique to each region and must identify beneficial uses, establish water quality objectives for the reasonable protection of the beneficial uses, and establish a program of implementation for achieving the water quality objectives. All three Proposed Project alternatives are in the Delta, within the jurisdiction of the Central Valley RWQCB.

The Fourth Edition of the Sacramento River Basin and the San Joaquin River Basin Plan (Central Valley RWQCB 2011) specifies the following beneficial uses for the Delta:

- Municipal and Domestic Supply: Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
- Agriculture Irrigation and Stock Watering: Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation (including leaching of salts), stock watering, or support of vegetation for range grazing.
- Industry Process Supply: Uses of water for industrial activities that depend primarily on water quality.
- Industry Service Supply: Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.
- Recreation (REC-1 and REC-2): Uses of water for recreational activities involving body contact with water (REC-1), where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs. Uses of water for recreational activities involving proximity to water, but where there is generally no body contact with water, nor any likelihood of ingestion of water (REC-2). These uses include, but are not limited to, picnicking, sunbathing,

hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing or aesthetic enjoyment in conjunction with the above activities.

- Freshwater Habitat (Warm and Cold): Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
- Migration (Warm and Cold): Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.
- Spawning (Warm): Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.
- Wildlife Habitat: Uses of water that support terrestrial or wetland ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
- Navigation: Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

The Basin Plan also covers the beneficial uses of groundwater. All groundwater in the region is considered suitable or potentially suitable for municipal and domestic water supply, agricultural supply, industrial service supply, and industrial process supply, as defined above (Central Valley RWQCB 2011).

The Basin Plan provides water quality objectives to maintain a high level of water quality in streams in the basin and to protect the beneficial uses listed above. The water quality objectives include specific concentrations and/or goals to protect beneficial uses for the following constituents and contaminants: bacteria, color, DO, pH, temperature, turbidity, toxicity, pesticides, radioactivity, sediment, biostimulatory substances, chemical constituents, floating material, settleable material, suspended material, oil and grease, tastes and odors, and salinity (measured through electrical conductivity) (Central Valley RWQCB 2011). In addition, the Basin Plan incorporates some water quality objectives established in the Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary (Central Valley RWQCB 2011). Key water quality objectives established in the Basin Plan (Central Valley RWQCB 2011) that might apply to the Proposed Project are listed below.

- Bacteria: fecal coliform concentrations, based on a minimum of not less than 5 samples for any 30-day period, shall not exceed a geometric mean of 200/100 mL (milliliters), nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 mL.

- Biostimulatory Substances: water shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses.
- Dissolved oxygen within the legal boundaries of the Delta: 7 mg/L in the Sacramento River downstream of the I Street Bridge; 6 mg/L in the San Joaquin River (between Turner Cut and Stockton from September 1 through November 30); and 5 mg/L in all other Delta waters.
- pH: The pH shall not be depressed below 6.5 nor raised above 8.5.
- Salinity (measured in electrical conductivity) in the Sacramento River at Emmaton: Maximum 14-day running average of mean daily electrical conductivity, depending on water year type, of 0.63–2.78 µ℧/cm (i.e., 630–2780 µS/cm) (SWRCB 2006);
- Temperature: The temperature of any cold or warm freshwater habitat shall not be increased by more than 5°F (2.8°C) above natural receiving water temperature
- Turbidity for Delta waters: Shall not exceed 150 NTUs in other Delta waters (those outside of the Central Delta[1]).

Similar to surface waters, groundwater quality objectives have been established to protect the beneficial uses of groundwater. The Basin Plan has established groundwater quality objectives related to bacteria, radioactivity, toxicity, chemical constituents, and tastes and odors (Central Valley RWQCB 2011).

National Pollutant Discharge Elimination System Permits

DISCHARGES FROM AQUATIC ANIMAL PRODUCTION FACILITIES

The Central Valley RWQCB regulates discharges from facilities for coldwater concentrated aquatic animal production (CAAP) to surface waters. The waste discharge requirements for CAAP facilities are specified in Order No. R5-2014-0161 (General NPDES No. CAG135001) (Central Valley RWQCB 2014b). The order covers discharges to surface waters from CAAP facilities in the Central Valley Region discharging to the Sacramento and San Joaquin River Basins and the Tulare Lake Basin. Discharges to local waterbodies (Sacramento River or Stockton DWSC) from the aquaculture facility may be regulated by the order. The order defines CAAP as a fish hatchery, fish farm, or other facility that contains, grows, or holds coldwater fish species or other coldwater aquatic animals, including, but not limited to, Salmonidae (e.g., trout and salmon) in ponds, raceways, or other similar structures. In addition, to be regulated by this NPDES permit, the CAAP facility must discharge at least 30

[1] Three Delta areas (Western, Central and Eastern) were defined by the Central Valley RWQCB. The Central Delta has been defined by the Central Valley RWQCB as an area that "lies between the easterly boundary of the Western [Delta] Area and a line east of the Sacramento River, Staten Island, Rindge Tract, Victoria Island, and the Tracy Pumping Plant. This area includes primarily the channels which carry the cross flow of the Sacramento River" to the federal and state pumping plants. Both the RVARC and Ryde Avenue sites are located outside of the Central Delta and located, respectively, in the Western Delta and the Eastern Delta (Central Valley RWQCB 1967).

calendar days per year, produce at least 20,000 pounds harvest weight of aquatic animals per year, and feed at least 5,000 pounds of food during the calendar month of maximum feeding. This permit also applies to CAAP facilities that the Central Valley RWQCB determines to be a significant contributor of pollution to waters of the U.S. [40 CFR 122.24(c)]. CAAP facilities that do not meet the above criteria and are not designated as a significant contributor are not considered to be a point source and are not required to obtain coverage under this order or another NPDES permit; however, Central Valley RWQCB allows enrollment under this order for facilities not designated significant and not meeting the above criteria. (Central Valley RWQCB 2014b). It is anticipated that the FTC would be exempt because it would not produce at least 20,000 pounds harvest weight of aquatic animals per year or feed at least 5,000 pounds of food during the calendar month of maximum feeding.

Construction Activities

Most construction projects that disturb 1 acre or more of land are required to obtain coverage under the SWRCB's General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order 2009-0009-DWQ, as amended by 2010-0014-DWQ and 2012-0006-DWQ). The NPDES General Construction Permit requires the applicant to file a public notice of intent to discharge stormwater and prepare and implement a stormwater pollution prevention plan (SWPPP). A SWPPP must include a site map and a description of the proposed construction activities; demonstrate compliance with relevant local ordinances and regulations; and present a list of BMPs that would be implemented to prevent soil erosion and protect against discharge of sediment and other construction-related pollutants to surface waters. Permittees are further required to conduct annual monitoring and reporting to ensure that BMPs are correctly implemented and are effective in controlling the discharge of construction-related pollutants (SWRCB 2012).

Dewatering Activities

Although some construction-related dewatering is covered under the General Construction Permit, the RWQCB has also adopted a General Dewatering Permit, Order No. R5-2013-0074 (NDPES No. CAG995001) (Central Valley RWQCB 2013). This permit applies to various categories of dewatering activities and would most likely apply to the Proposed Project if construction would require dewatering in greater quantities than that allowed by the General Construction Permit and would discharge the effluent to surface waters. The General Dewatering Permit contains waste discharge limitations and prohibitions similar to those in the General Construction Permit. To obtain coverage, the applicant must submit a Notice of Intent and a pollution prevention and monitoring program.

Industrial Activities

In April 2014, the SWRCB adopted an updated General Permit for Storm Water Discharges Associated with Industrial Activities, Order NPDES No. CAS000001 (Industrial General Permit) authorizing discharges of industrial stormwater from specific industry categories to surface waters as long as those discharges fully comply with the Industrial General Permit.

The updated Industrial General Permit becomes effective on July 1, 2015, and supersedes existing Order 97-03-DWQ, except for the previous order's requirement to submit annual reports by July 1, 2015, and for enforcement purposes. Some of the general industrial facility types regulated under this permit are manufacturing facilities; hazardous waste treatment, storage, or disposal facilities; transportation facilities (including marinas); and facilities subject to stormwater effluent–limitation guidelines, new source performance standards, or toxic pollutant–effluent standards found in 40 CFR, Chapter I, Subchapter N (SWRCB 2014).

Similar to other NPDES permits, the Industrial General Permit establishes TMDLs, discharge prohibitions, SWPPP requirements, monitoring and reporting requirements, effluent and receiving water limitations, and authorized non-storm water discharges. In addition, it establishes minimum BMPs and training expectations and rules, and identifies procedures for facilities that would be exempt from coverage under this permit. The permit establishes technology-based effluent limitations and water quality–based receiving water limitations. As an example, the Industrial General Permit requires that dischargers implement BMPs that comply with its requirements for the best available technology economically achievable/best conventional pollutant control technology (BAT/BCT) to reduce or prevent discharges of pollutants in their stormwater discharge in a manner that reflects best industry practice considering technological availability and economic practicability and achievability (SWRCB 2014). This permit may apply to some or all of the Proposed Project, such as the marina.

NPDES Municipal Stormwater Permitting Program

The SWRCB and RWQCBs regulate stormwater discharges from municipal separate storm sewer systems (MS4s) through the Municipal Storm Water Permitting Program (SWRCB 2013a). Permits are issued under two phases depending on the size of the urbanized area/municipality. Phase 1 MS4 permits are issued for medium (population between 100,000 and 250,000 people) and large (population of 250,000 people or more) municipalities, and are often issued to a group of co-permittees within a metropolitan area. Phase I permits have been issued since 1990.

City of Stockton/San Joaquin County MS4 Permit

The City of Stockton and San Joaquin County have jurisdiction over and/or maintenance responsibilities for storm drains in the Stockton Urbanized Area, including but not limited to, the Stockton DWSC, Smith Canal, and Calaveras River. The City and County are covered under a renewed Phase I MS4 permit (Order No. R5-2007-0173, previously Order No. R5-2002-0181) that requires, among other things, that each agency prepare a stormwater management plan for approval by Central Valley RWQCB. In October 2009, the Central Valley RWQCB approved both the City and County's stormwater management plans (Resolution No. R5-2009-0105). Requirements in the permit that might be applicable to the Ryde Avenue site include, but are not limited to, discharge prohibitions, receiving water limitations, and provisions to comply with the City and County's stormwater management programs (Central Valley RWQCB 2015).

City of Rio Vista MS4 Permit

Beginning in 2003, SWRCB began issuing Phase II MS4 permits for smaller municipalities (population less than 100,000) and non-traditional permittees, such as military bases or public campuses. The City of Rio Vista urban cluster is covered as a traditional permittee under the most recent Phase II MS 4 Permit, General Permit for the Discharge of Storm Water from Small MS4s (Order No. 2013-0001-DWQ), which covers Phase II permittees statewide. Requirements in the permit that might be applicable to the RVARC site include, but are not limited to, discharge prohibitions, effluent limitations, receiving water limitations, and provisions for all traditional small MS4 permittees (SWRCB 2013a, 2013b).

Sustainable Groundwater Management Act

In September 2014, the Sustainable Groundwater Management Act (SGMA) was signed by Governor Edmund G. Brown Jr. and includes the provisions of the following three California bills: SB 1168, AB 1739, and SB 1319. The SGMA builds on existing groundwater management provisions including SBX7 6 (2009), which established the CASGEM program. A key intent of the SGMA is to acknowledge that local groundwater management is best and, as such, requires the formation of locally controlled Groundwater Sustainability Agencies (GSAs). GSAs must develop and adopt Groundwater Sustainability Plans (GSPs) within the timetables established under the SGMA for groundwater basins or subbasins that DWR designates as medium or high priority. Thus, GSPs must be established for the Solano and Eastern San Joaquin groundwater subbasins, which have medium and high priority rankings, respectively (DWR 2015b, 2015c).

Sustainable groundwater management, as defined by the SGMA, is the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results. Undesirable results are defined as (DWR 2015b, 2015c):

- chronic lowering of groundwater levels (not including overdraft during a drought if a basin is otherwise managed);
- significant and unreasonable reduction of groundwater storage;
- significant and unreasonable seawater intrusion;
- significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies;
- significant and unreasonable land subsidence that substantially interferes with surface land uses; or
- depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

DWR has the responsibility of ensuring implementation of the SGMA. As part of its new responsibilities, DWR recently released a *Draft Groundwater Sustainability Program Strategic Plan* (March 2015), which describes DWR's roles and responsibilities under the SGMA. In addition, the Strategic Plan provides the agency's strategy to assist with implementing groundwater sustainability, shares information with those who have interests in or management responsibilities for groundwater, and describes the structure through which DWR implements specific actions in coordination with stakeholders and partners. (DWR 2015b, 2015c).

CASGEM BASIN PRIORITIZATION

In 2009, SBX7 6 was adopted and, through an amendment to the California Water Code, mandated that DWR establish a statewide groundwater elevation–monitoring program to track seasonal and long-term groundwater elevation trends in California's groundwater basins (DWR 2015d). In response, DWR developed the CASGEM program to identify the extent of groundwater elevation–monitoring within each of the groundwater basins defined in Bulletin 118-2003, and to prioritize those basins to help identify, evaluate, and determine the need for additional groundwater elevation–monitoring. DWR's basin prioritization was directed to consider the following factors:

1. Population overlying the basin
2. Rate of current and projected growth of the population overlying the basin
3. Number of public supply wells that draw from the basin
4. Total number of wells that draw from the basin
5. Irrigated acreage overlying the basin
6. Degree to which persons overlying the basin rely on groundwater as their primary source of water
7. Any documented impacts on the groundwater within the basin, including overdraft, subsidence, saline intrusion, and other water quality degradation
8. Any other information determined to be relevant by DWR

Basins are then categorized into four priority levels: high, medium, low, and very low. DWR's initial CASGEM evaluation of California's 515 groundwater basins identified in Bulletin 118-2003 identified 43 groundwater basins as high, 84 basins as medium, 27 basins as Low, and the remaining 361 groundwater basins or subbasins as very low (DWR 2015c). The majority of annual groundwater uses relies on and the majority of California's population overlies the 127 groundwater basins designated as high or medium priority (DWR 2015c).

Fish & Game Code Section 5650—Water Pollution: Prohibited Materials

According to Fish & Game Code Section 5650:

It is unlawful to deposit in, to permit to pass into, or place where it can pass into the waters of the State any of the following: any petroleum, acid, coal or oil tar, lampblack, aniline, asphalt, bitumen, or residuary product of petroleum, or carbonaceous material or substance. …any refuse, liquid or solid, from any refinery, gas house, tannery, distillery, chemical works, mill or factory of any kind… any substance or material deleterious to fish, plant life, mammals, or bird life.

Every person who violates Section 5650 is subject to a civil penalty of not more than $25,000 for each violation.

Central Valley Flood Protection Board

The Central Valley Flood Protection Board (CVFPB) was established to control flooding along the Sacramento and San Joaquin Rivers and their tributaries in cooperation with USACE. The CVFPB maintains the integrity of the existing flood control system comprising levees, channels, other flood control works, and designated floodways throughout its jurisdiction by issuing permits for encroachments. The CVFPB enforces standards for construction, maintenance, and protection of adopted flood control plans to protect public lands from floods. 23 CCR specifies the types of activities for which a CVFPB permit is required before beginning any construction work within CVFPB jurisdiction. These construction activities include the following:

- The placement, construction, reconstruction, removal or abandonment of any landscaping, culvert, bridge, conduit, fence, projection, fill, embankment, building, structure, obstruction, encroachment, excavation, the planting, or removal of vegetation, and any repair or maintenance that involves cutting into a levee (23 CCR Section 6).
- Work on existing structures that predate permitting or where it is necessary to establish conditions normally imposed by permitting. The circumstances include those where responsibility for the encroachment has not been clearly established or ownership and uses have been revised (23 CCR Section 6).

Construction of proposed structures are subject to 23 CCR Section 113b, which states that dwellings within an adopted plan of flood control must comply with the following requirements:

- Structures may be constructed within an adopted plan of flood control provided they conform to the following:
  - Structures may not be constructed on a levee section or within 10 feet of a levee toe (recommended 20 feet landside or 15 feet waterside);
  - Structures must be securely anchored and floodproofed to at least 2 feet above the 100-year flood elevation or 2 feet above the design floodplain, whichever is higher. The floodproofing must be consistent with the potential uses of the structure;
  - Structures must be located and oriented to have a minimal impact on flood flows; and
  - The number of structures permitted is limited to the minimum reasonably necessary to accomplish an appropriate land use activity (CCR Section 113[b]).

Delta Protection Commission and Land Use Management Plan

The following goal and policies contained in the Delta Protection Commission and Land Use Management Plan (2010) are relevant to hydrology and water quality within the vicinity of the two alternative sites:

Goal: Protect and enhance long-term water quality in the Delta for agriculture, municipal, industrial, water-contact recreation, and fish and wildlife habitat uses, as well as other beneficial uses.

Policy P-1: State, federal and local agencies shall be strongly encouraged to preserve and protect the quality of the Delta both for in-stream purposes and for human use and consumption.

Policy P-2: Ensure that Delta water rights and water contracts are respected and protected, including area of origin water rights and riparian water rights.

12.2.3 Local Laws, Regulations, and Policies

City of Rio Vista General Plan

The General Plan for the City of Rio Vista (2002), *Resource Conservation and Management*, and *Safety and Noise* elements, outline many goals and policies that address hydrology, water quality, and may be applicable the Proposed Project, as provided below. Additional goals in the City's General Plan related to geology/soils or hazardous materials are provided in other chapters of this Draft EIR/EIS.

Goal 10.1 To preserve, protect, and enhance an interconnected system of significant open space areas, including sensitive local resource areas.

Policy 10.1.E The City shall require developers to use native and compatible non-native species, especially drought-resistant species, to the extent possible in fulfilling landscaping and natural habitat mitigation requirements.

Goal 10.5 To manage and protect the City's water resources.

Policy 10.5.A The City shall ensure that natural drainage flows are maintained in new development projects to the greatest extent feasible.

Policy 10.5.B The City shall review individual projects to determine the setback requirements that will adequately buffer natural drainage corridors from development.

Policy 10.5.D The City shall ensure that natural drainage corridors and other watercourses are protected from the adverse effects of construction activities and urban runoff.

Policy 10.5.E The City shall require proposed development projects that would encroach into natural drainage corridors to implement one or more of the following measures, in descending order of their desirability:

- Avoid disturbance of the drainage corridor.
- Replace any riparian vegetation (onsite, in-kind).
- Restore another section of drainage corridor (in-kind).
- Pay a mitigation fee for restoration elsewhere in the City.
- Implement other mitigation as appropriate.

Policy 10.5.F The City shall restrict development of lands in the 100-year floodplain to protect human habitation, property and sensitive wildlife or vegetation.

Policy 10.5.G The City shall discourage grading activities during the rainy season, unless adequately mitigated, to avoid sedimentation of drainage ways and damage to riparian habitat.

Policy 10.5.H The City shall condition projects on applying pollution control measures that will restrict pollutants from entering Rio Vista's storm drain system.

Policy 10.5.I The City shall ensure that groundwater resources are protected from contamination and overdraft.

Policy 10.5.L The City shall recognize water as a limited resource by encouraging the use of water conservation measures.

Goal 10.7 To protect and preserve soils as a natural resource.

Policy 10.7.A The City shall minimize soil erosion and sedimentation by maintaining compatible land uses, suitable building designs, and appropriate construction techniques.

Goal 11.2 To minimize the potential for loss of life and property due to flooding through the use of flood control solutions that are cost effective and minimize environmental impacts.

Policy 11.2.D The City shall require new development to provide sufficient mitigation in order to ensure that the cumulative rate of peak runoff does not exceed predevelopment levels.

City of Rio Vista Flood Hazard Protection Ordinance

The City of Rio Vista has adopted a Flood Hazard Protection Ordinance (Rio Vista Municipal Code Chapter 15.16) to protect human health and life, minimize expenditure of public money for costly flood control projects, and minimize damage to businesses and public facilities (City of Rio Vista 2015). The Flood Hazard Protection Ordinance defines standards for construction and utilities and establishes provisions related to development in floodways and special flood hazard areas (City of Rio Vista 2015).

City of Rio Vista Stormwater Management Ordinance

The City of Rio Vista has a stormwater management ordinance (Chapter 13.20 of the City's municipal code), which is intended to assist in protecting and enhancing the water quality of watercourses, waterbodies, and wetlands in a manner pursuant to and consistent with CWA, the Porter–Cologne Act, NPDES, and the Phase II MS4 permit applicable to the City of Rio Vista. As such, the ordinance establishes the City's stormwater permitting authority, defines authorized non-stormwater discharges, identifies BMPs and other measures to reduce stormwater pollutants, and describes the stormwater permitting process and related fees and enforcement activities. (City of Rio Vista 2014).

Solano County Flood Damage Prevention Ordinance

The Solano County Flood Damage Prevention Ordinance (Ordinance No. 1427, Solano County Code Sections 12.2-1 through 12.2-61) establishes flood-related review processes for development permit applications, details design requirements to minimize flood-related property or life hazards, and defines duties and responsibilities of a County floodplain administrator (Solano County 2015).

City of Stockton General Plan

The City of Stockton General Plan 2035 (2007 guides land use and development decisions within Stockton. The City's General Plan contains the following goals and policies related to hydrology and water quality that may be applicable to Alternative 4.

Goal PFS-4 To manage stormwater in a manner that is safe and environmentally sensitive to protect people and property and to maintain the quality of receiving waters.

Policy PFS-4.1 The City shall require detention storage with measured release to ensure that the capacity of downstream creeks and sloughs will not be exceeded. To this end:

- Outflow to creeks and sloughs shall be monitored and controlled to avoid exceeding downstream channel capacities;
- Storage facilities shall be coordinated and managed to prevent problems caused by timing of storage outflows.

Policy PFS-4.2 The City shall require the preparation of watershed drainage plans for proposed developments within the urban services boundary. These plans shall define needed drainage improvements and estimate construction costs for these improvements. The plans will also identify a range of feasible measures that can be implemented to reduce all public safety and/or environmental impacts associated with the construction, operation, or maintenance of any required drainage improvements (i.e., drainage basins, etc.).

Policy PFS-4.3 The City shall require, as part of watershed drainage plans, Best Management Practices (BMPs), to reduce pollutants to the maximum extent practicable.

As of November 25, 2003, the City shall require that all new development and redevelopment projects comply with the post-construction Best Management Practices (BMPs) called for in the Stormwater Quality Control Criteria Plan (SWQCCP), as outlined in the City's Phase 1 Stormwater NPDES permit issued by the California Water Quality Control Board, Central Valley Region (Order No. R5-20020-0181). Also the owners, developers, and/or successors-in interest must establish a maintenance entity acceptable to the City to provide funding for the operation, maintenance, and replacement costs of all post-construction BMPs.

The City shall require, as part of its Storm Water NPDES Permit and ordinances, to implement the Grading Plan, Erosion Control Plan, and Pollution Prevention Plan (SWPPP) during construction activities of any improvement plans, new development and redevelopment Policy projects for reducing pollutants to the maximum extent practicable.

Policy PFS-4.8 The City shall incorporate low impact development (LID) alternatives for stormwater quality control into development requirements. LID alternatives will include: (1) conserving natural areas and reducing imperviousness, (2) runoff storage, (3) hydro-modification (to mimic pre-development runoff volume and flow rate), and (4) public education.

Goal HS-6 To minimize the risk to the community from flooding.

Policy HS-6.1 The City shall approve new urban development only when the project is shown to be protected from a 100-year flood.

Policy HS-6.3 The City shall preserve floodways and floodplains for non-urban uses, except that development may be allowed in a floodplain with mitigation measures that are in conformance with the City's floodplain management program.

City of Stockton Provisions for Flood Hazard Reduction

Similar to the City of Rio Vista and Solano County, the Stockton Municipal Code (Chapter 15.44 Flood Damage Prevention) establishes general standards for development with consideration of flood-related risks. The municipal code identifies construction standards and standards for utilities that should be met when developing in areas of special flood hazards. Such standards include, but are not limited to, ensuring that the lowest floor of structures are at least 2 feet above the base flood elevation. A development permit must also be obtained before any construction or development in a special flood-hazard area (City of Stockton 2011).

City of Stockton Municipal Code

The Stockton Municipal Code has two sections that govern stormwater facility design, and construction and operation for new development and industrial use projects in Stockton. The stormwater management and discharge control ordinance (Section 13.16) requires compliance with the City's MS4 Phase I NPDES permit, defines qualified and exempt discharge prohibitions, and identifies national categorical stormwater effluent limitations, and BMPs related to stormwater quality at industrial use sites (City of Stockton 2015). The second section, 13.20 Stormwater Quality Control Criteria Plan, requires the City to prepare and implement a plan that establishes uniform requirements for the selection and incorporation of post-construction BMPs for stormwater quality control into new development projects, defines evaluation criteria for BMPs, and details the procedures for dischargers to obtain stormwater pollutant prevention credits (City of Stockton 2015).

City of Stockton Standard Specifications

The City of Stockton Standard Specifications contain requirements for construction and installation of water and stormwater facilities and other public works projects (City of Stockton 2003). The standard specifications detail construction criteria for stormwater facilities (basins, storm drains); procedures for excavation, fill mixing and placement, pipe installation, and other construction methods; and testing and disinfection of installed water facilities (City of Stockton 2003). The standard specifications apply to all Stockton Department of Public Works projects within Stockton. Any deviation from the specifications must be approved by the city engineer.

12.3 Environmental Impacts

12.3.1 Methods of Analysis

Potential short and long-term impacts on water quality were assessed qualitatively based on the degree to which the proposed construction and operational activities could result in violations of water quality standards, impairment of beneficial uses, or water quality conditions that could be harmful to aquatic life or human health. Each of these potential impacts is discussed below. Potential temporary and permanent impacts from the Proposed Project were evaluated based on the beneficial uses established by the Central Valley RWQCB and described in Section 12.2, "Regulatory Setting," above.

Impacts on hydrology were assessed qualitatively by evaluating the Proposed Project's potential to increase the volume or timing of stormwater runoff, and alter or impair existing drainage patterns or surface-water flows. Potential groundwater supply/quantity impacts were evaluated by qualitatively considering the existing groundwater supply conditions of the underlying subbasins, the Proposed Project's construction and operational water demands, and the RVARC and Ryde Avenue sites' suitability for groundwater recharge. Flood hazards were assessed by considering 100-year floodplains and evaluating the potential for construction or operational activities to affect flood hazards by placing facilities in a floodplain or altering drainage patterns or flow timing and quantities.

The potential for inundation as a result of projected sea level rise was evaluated by assessing whether the Proposed Project facilities would occur within or adjacent to a mapped sea level rise hazard area. The impact assessment qualitatively considers the uncertainty in the projections of future sea level rise, each site's general topography, and each site's potential to be affected by the current projected range of sea level rise in California (16–65 inches).

Potential tsunami, mudflow, and seiche impacts were evaluated by identifying the Proposed Project's proximity to defined tsunami hazard areas, reviewing the topography of the Proposed Project site and the surrounding area and the Proposed Project's proximity to large waterbodies, and qualitatively evaluating the Proposed Project's likelihood of probable risks to human life or property associated with any existing tsunami, seiche, or mudflow hazards.

Regulatory requirements and permits, and their likely measures to protect water quality, are considered in the impact analysis where relevant.

12.3.2 Significance Criteria

An alternative would have a significant impact with regard to hydrology or water quality if it would:

- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of preexisting nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted);
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site;
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality;
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;

- Place within a 100-year flood hazard area structures that would impede or redirect floodflows;
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam, sea level rise; or
- Have the potential for inundation by seiche, tsunami, or mudflow.

The Proposed Project does not include the construction or modification of any homes in a flood hazard area. For this reason, the seventh criterion does not apply to the Proposed Project and is not considered further.

12.3.3 Environmental Impacts and Mitigation Measures

Impact HYD/WQ-1: Potential Sedimentation Impacts from Upland Construction-Related Ground-Disturbing Activities.

Construction of the Proposed Project would involve ground disturbance and stockpiling of soils, which could result in sediment transported by wind or water into storm drainage infrastructure or directly into local surface waters, thereby degrading the quality of those receiving waters. The transport of sediments into surface waters could potentially result in increased turbidity and secondary effects on water quality parameters such as water temperature or DO. In addition, the transport of sediments into local waterbodies could transport sediment-bound pollutants to these waterbodies.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no construction; therefore, there would be **no impact** related to sedimentation from construction activities.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2, construction activities for the DRS would expose approximately 14 acres of soil from grading, clearing, and removing vegetation, trenching, excavation, and performing similar ground-disturbing activities. Upland excavation activities would result in excess soils that might need to be stored temporarily on-site before they are reused for construction or hauled off-site for reuse or disposal. Imported fill to be used for construction might also be stored onsite. Disturbed or exposed soils may be transported by wind or water to the Sacramento River.

As discussed in Section 12.1.2, under “Groundwater Quality,” the RVARC site has been previously remediated and contaminated soil has been removed; therefore, soils at the site are not considered impaired (Arcadis 2001a), and the primary water quality impact related to potential sediment transport to local surface waters would most likely be the sediment itself and not sediment-bound contaminants; although previously undiscovered sites of contamination could be present.

Because the Proposed Project's construction activities would disturb greater than 1 acre of land, coverage would be required under the NPDES General Construction Permit, which requires preparation and implementation of SWPPP. The SWPPP would, at a minimum, include an Erosion Control Plan and describe BMPs and their implementation, inspection, and repair requirements, and would also detail the monitoring or reporting requirements. **Mitigation Measure HYD/WQ-1 (Implement Construction Best Management Practices for Erosion Control),** would be implemented to ensure sufficient site-specific erosion control BMPs during construction. This mitigation measure minimizes the Proposed Project's potential to result in substantial soil erosion and potential sedimentation impacts on the Sacramento River by identifying the minimum BMPs that should be incorporated in the SWPPP. Implementation of BMPs and compliance with the NPDES General Construction Permit would minimize the impact by containing all sediments onsite, revegetating disturbed areas, and constructing barriers or implementing other measures to prevent runoff from the site to the Sacramento River. In addition, implementation of **Mitigation Measure AQ/GHG-2a (Implement Fugitive Dust Best Management Practices)** would also minimize potential for sediment transport from the site.

These mitigation measures may be integrated with compliance with the General Construction Permit, or permit compliance requires more protective measures, those measures can be implemented instead. With implementation of these mitigation measures, this impact would be reduced to a level that is **less than significant with mitigation**.

Mitigation Measure HYD/WQ-1: Implement Construction Best Management Practices for Erosion Control (Alternatives 2, 3 and 4)

DWR, USFWS, and/or their contractor(s) shall implement the following measures during Proposed Project construction, or shall implement alternative measures that are equally or more effective:

- Implement practices to reduce erosion of exposed soil and stockpiles, including watering for dust control, establishing perimeter silt fences, and/or placing fiber rolls.
- Minimize soil disturbance areas.
- Implement practices to maintain water quality, including silt fences, stabilized construction entrances, and storm-drain inlet protection.
- Where feasible, limit construction to dry periods.
- Revegetate disturbed areas.

The performance standard for these erosion control measures is to use the best available technology that is economically achievable. The measures may be included in SWPPP requirements, as appropriate.

<u>Alternative 3: Rio Vista Army Reserve Center, Configuration 2</u>

Alternative 3 would result in impacts similar to those discussed under Alternative 2; however, under this alternative, upland marina construction would result in more soil disturbance and excavation and a greater potential for impacts than Alternative 2. Implementation of Mitigation Measures HYD/WQ-1 and AQ/GHG-2a would reduce these impacts to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Construction activities for Alternative 4 would be similar to those discussed above for Alternative 3, with the main difference being the receiving waters that could be affected (i.e., the Stockton DWSC or the on-site or downstream storm drainage ditches). With implementation of Mitigation Measures HYD/WQ-1 and AQ/GHG-2a, this impact would be **less than significant with mitigation**.

Impact HYD/WQ-2: Potential Turbidity Impacts from In-water Construction Activities.

The Proposed Project would involve some construction activities in surface waters. These activities might stir up sediment and result in the potential for exceedances of turbidity standards in these waters.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no in-water construction activities at the RVARC site or Ryde Avenue site; therefore, there would be **no impact** on surface water turbidity.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2, in-water activities, such as dredging or pile driving, would be required to construct the ERS marina.

The FTC would also include construction of a raw water intake and discharge outfall to the Sacramento River, which could result in disturbance to soils and substrate on the riverbank. These construction activities within the Sacramento River channel could potentially erode the Sacramento River bank and/or suspend sediments in the Sacramento River channel, resulting in potential water quality impacts related to turbidity, sediment, settleable material, or suspended material. Although the Delta, including this portion of the Sacramento River, is not listed as impaired under CWA Section 303(d) for these issues, construction could potentially result in exceedances of Central Valley RWQCB-established qualitative and quantitative water quality objectives for these constituents, a potentially significant impact.

The construction contractor would be required to have coverage under a CWA 404 permit, a CWA 401 water quality certification, and a 1602 streambed alteration agreement for the in-water activities, and implement any measures that these permits required to minimize turbidity-related impacts. **Mitigation Measures HYD/WQ-2a (Monitor Turbidity during In-water Construction),** and **HYD/WQ-2b (Implement Turbidity Barrier Surrounding In-water Construction, if Needed),** would be implemented to require that turbidity be monitored during in-water construction and that a turbidity barrier be used if turbidity thresholds are exceeded, ensuring that the area of disturbance is minimized and that disturbed areas containing disturbed riverbank or channel sediments are confined to the in-water construction area. These mitigation measures may be integrated with the aforementioned permits, or if the permits contain more protective measures, those measures can be implemented instead. With implementation of these mitigation measures, this impact would be reduced to a level that is **less than significant with mitigation**.

Mitigation Measure HYD/WQ-2a: Monitor Turbidity during In-water Construction (Alternatives 2, 3 and 4)

Instream work shall be conducted in a manner as to not cause turbidity increases in the receiving water exceeding the Basin Plan objectives beyond a daily averaging period. Threshold limits in the Basin Plan for turbidity generation are as follows:

- Where natural turbidity is between 0 and 5 NTUs, increases shall not exceed 1 NTU.
- Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent.
- Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs.
- Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent.

To determine compliance, turbidity shall be measured twice daily in surface waters at the construction site, and 300 feet down-current and up-current from the construction site. Should the above-referenced limits be exceeded, Mitigation Measure HYD/WQ-2b shall be implemented.

Mitigation Measure HYD/WQ-2b: Implement Turbidity Barrier Surrounding In-water Construction, if Necessary (Alternatives 2, 3 and 4)

If turbid conditions are generated during instream work activities that exceed the Basin Plan standards, such work activities shall be temporarily halted while a turbidity barrier, also known as a silt barrier or silt curtain, is placed around the construction area to control turbidity. This turbidity barrier shall be designed and installed such that turbidity outside the barrier does not exceed Basin Plan objectives. Turbidity shall continue be monitored outside the barrier and upstream and downstream, as described above in Mitigation Measure HYD/WQ-2a, and if exceedances of Basin Plan objectives occur, the turbidity-generating construction activities shall be halted until the barrier is repaired or replaced and deemed effective. The turbidity barrier shall remain in place until in-water construction activities have been completed and disturbed areas in the river channel or on the bank have been stabilized. The construction contractor will be required to comply with the terms of this mitigation measure through a contractual agreement with DWR and USFWS.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

This alternative would involve fewer in-water construction activities than Alternative 2 because the majority of the marina work would be conducted upland in the dry area. Some in-water construction activities (e.g., soil excavation) would be required to hydraulically connect the marina to the Sacramento River, for the construction of the boat launch, and for installation of the FTC intake and outfall. In-water activities would result in potential turbidity impacts similar to those described above for Alternative 2, although they would be somewhat less likely to have turbidity/sediment pollutant impacts because the marina would be isolated from the Sacramento River until a hydraulic connection was created. Regardless, these impacts are considered potentially significant. With implementation of Mitigation Measures HYD/WQ-2a and HYD/WQ-2b, potential turbidity impacts of in-water construction activities would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Under Alternative 4, in-water construction activities and associated potential turbidity impacts would be similar to those described for Alternative 3, with the main difference being the waterbodies that could be affected (i.e., the Stockton DWSC instead of the Sacramento River). Implementation of Mitigation Measures HYD/WQ-2a and HYD/WQ-2b would ensure that potential turbidity impacts of in-water construction activities would be reduced to a level that is **less than significant with mitigation**.

Impact HYD/WQ-3: Degrade Water Quality from Use of Hazardous Materials during Upland Construction Activities.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, no construction work involving hazardous materials would occur at either the RVARC site or Ryde Avenue site; therefore, this alternative would not degrade the quality of nearby surface waters and there would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

During Proposed Project construction, construction equipment would require use of hazardous materials, including fuels and oils. Improper storage, use, disposal, or transport of hazardous materials and the potential for accidental spills of these materials could impair the water quality of local surface waters (Sacramento River and Marina Creek) if on-site soils became contaminated from a hazardous materials spill.

The construction contractor would be required to have coverage under and comply with the requirements of the General Construction Permit, which would contain provisions to prohibit the discharge of contaminated effluent and require the development and implementation of a SWPPP, which would include spill prevention, pollution prevention and monitoring plans. To ensure that appropriate measures are implemented as part of permit compliance, or in the event that no permit is required, Mitigation Measures HYD/WQ-1 and **HYD/WQ-3 (Implement Construction–Related Best Management Practices for**

Hazardous Materials and Waste Management), would minimize this risk to less than significant by requiring proper hazardous materials storage, use, transport, and disposal, and by requiring the implementation of specific BMPs. These mitigation measures may be integrated with the requirements of the General Construction Permit, or if permit compliance results in more protective measures, those measures can be implemented instead. Implementation of these mitigation measures would reduce this impact to a level that is **less than significant with mitigation.**

Mitigation Measure HYD/WQ-3: Implement Construction–Related Best Management Practices for Hazardous Materials and Waste Management (Alternatives 2, 3, and 4)

DWR and USFWS shall ensure, by enforcing contractual obligations, that the construction contractor(s) transport, store, and handle construction-related hazardous materials in a manner consistent with relevant regulations and guidelines, including those recommended and enforced by Caltrans and RWQCB; the applicable County department; and the applicable local fire department. Recommendations might include minimizing the amount of hazardous materials/waste stored on-site at any one time; transporting and storing materials in appropriate and approved containers; maintaining required clearances; and handling materials using the applicable federal, state, and/or local regulatory agency protocols.

In addition, the contractor(s) shall implement the following measures during all construction activities:

- Minimize the contact of construction materials, equipment, and maintenance supplies with stormwater and surface waters.
- Limit fueling and other activities involving hazardous materials to designated areas only; provide drip pans under equipment and conduct daily checks of vehicle condition.
- Limit hazardous materials storage to upland areas outside of surface water channels.
- Develop a spill prevention and emergency response plan to handle potential fuel or other spills.
- Inspect all equipment daily for fuel, lubrication, and coolant leaks and for any leak potential (e.g., cracked hoses, loose filling caps, stripped drain plugs); all equipment must be free of fuel, lubrication, and coolant leaks.

The performance standard for these measures is to use the best available technology that is economically achievable. The measures may be included in SWPPP requirements, as appropriate.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Construction of Alternative 3 would involve use of the same hazardous materials and result in the same risks to surface water and groundwater quality as those under Alternative 2;

however, Alternative 3 would entail more upland construction activities (i.e., soil excavation work) associated with the marina. Implementation of Mitigation Measures HYD/WQ-1 and HYD/WQ-3 and compliance with permit requirements would reduce potentially significant surface water quality impacts to a level that is **less than significant with mitigation.**

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Hazardous materials use during upland construction activities at the Ryde Avenue site would pose water quality risks similar to those under Alternatives 2 and 3. Local surface waters that could potentially be impaired by using hazardous materials include the adjacent Stockton DWSC and on-site storm drain ditches, which could transport the pollutants to Smith Canal and ultimately the DWSC. Implementation of Mitigation Measures HYD/WQ-1 and HYD/WQ-3 and compliance with permit requirements would reduce potentially significant surface water quality impacts to a level that is **less than significant with mitigation.**

Impact HYD/WQ-4: Degrade Water Quality from Hazardous Materials Use during In-water Construction Activities.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no in-water construction activities at either the RVARC site or Ryde Avenue site; therefore, this alternative would not degrade water quality at either site and there would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2, the ERS would include in-water construction activities for the marina. Construction of the FTC would require some in-water construction activities for the raw water intake and discharge outfall. These in-water construction activities would require construction equipment (e.g., barges, cranes, etc.) that use fuels or oils. Such fuels or oils could be transported into the Sacramento River through accidental spills or improper hazardous materials use, storage, transport, and disposal. This could result in degraded water quality within the Sacramento River and might violate Central Valley RWQCB water quality objectives, a potentially significant impact. Mitigation Measure HYD/WQ-3 would minimize this risk by requiring proper hazardous materials storage, use, transport, and disposal and would include implementation of appropriate BMPs. With implementation of this mitigation measure, this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, in-water construction activities and use of fuels and oils for operating construction equipment would most likely be less than that for Alternative 2 because the majority of marina construction would be inland; however, some in-water construction work would be required to hydraulically connect the marina to the Sacramento River and for the construction of the boat launch, FTC intake and outfall. As a result, impacts are considered potentially significant. With implementation of Mitigation Measure HYD/WQ-3**,** this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

The impacts from construction of Alternative 4 would be similar to those for Alternative 3, with the main difference being that the Stockton DWSC would be affected instead of the Sacramento River. These impacts are considered potentially significant. With implementation of Mitigation Measure HYD/WQ-3, this impact would be reduced to a level that is **less than significant with mitigation**.

Impact HYD/WQ-5: Potential Water Quality Impacts from Construction-Related Dewatering.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no construction at either the RVARC site or Ryde Avenue site; therefore, this alternative would not require dewatering and there would be **no impact** on water quality.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

On-site groundwater levels range from approximately 6 to 25 feet bgs. Construction of the marina would require excavation to a level that is deep enough to accommodate watercraft and would likely encounter shallow groundwater. . Construction activities in contact with groundwater could transport pollutants directly to the groundwater, and dewatering effluent could transport pollutants to local surface waters.

As discussed in Section 12.1.2, under “Groundwater Quality,” the RVARC site has been previously remediated and contaminated soil has been removed; therefore, its soil and groundwater quality are not considered impaired (Arcadis 2001a). Thus, the primary water quality impact on local surface waters would most likely be sediment transport, although previously undiscovered locations of contamination could exist and related transport of sediment-bound contaminants.

In the event that groundwater dewatering is required, the construction contractor would be required fully comply with the General Dewatering Permit, including its stipulated waste discharge limitations and prohibitions. This permit contains requirements to ensure that water quality standards would not be violated and that water quality would not be substantially degraded; therefore, under this alternative, potential water quality impacts from dewatering would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Similar to Alternative 2, excavation activities under Alternative 3 for construction of the inland marina could encounter shallow groundwater. In the event that groundwater dewatering is required, the construction contractor would be required to comply with the General Dewatering Permit, including its stipulated waste discharge limitations and prohibitions. This permit contains requirements to ensure that water quality standards would not be violated, and that water quality would not be substantially degraded; therefore, under this alternative, potential water quality impacts from dewatering would be **less than significant**.

<u>ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON</u>

The construction impacts of this alternative would be similar to those of Alternative 3. Dewatering would be likely because groundwater levels in the vicinity of the Ryde Avenue site range between 5 and 10 feet bgs. In addition, as described above in Section 12.1.3, "Groundwater Quality," an on-site oil stain (stained soils) could be an indicator that the Ryde Avenue site might have contaminated or hazardous sediments. Groundwater underlying the Ryde Avenue site might also be contaminated from local and regional impairments. As such, in the event that dewatered groundwater is not properly contained, it could be discharged to nearby waters and potentially impair the Stockton DWSC.

Compliance with the General Dewatering Permit would ensure that such contaminated water would not be discharged to surface waters or groundwater; therefore, these impacts would be **less than significant.**

Impact HYD/WQ-6: Potential Water Quality Impacts from Storage, Transport, and Disposal of Spoils from In-water Excavation.

<u>ALTERNATIVE 1: NO PROJECT ALTERNATIVE</u>

Under Alternative 1, ERS and FTC would not be constructed at either the RVARC site or Ryde Avenue site in Stockton; therefore, this alternative would not generate any spoils materials at these sites and there would be **no impact** on water quality.

<u>ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1</u>

Dredging for the ERS marina and boat launch and the FTC intake and outfall may result in the generation of spoils, which would need to be transported off-site and disposed. Some could also be temporarily stored on-site. In addition, it is estimated that from 7,000 to 11,000 CY of sediment might need to be dredged every 10–15 years. This excavated material could potentially contain heavy metals, pesticides, or other pollutants. Depending on the pollutant concentrations, these spoils could be considered hazardous waste and could potentially affect water quality if:

- wet spoils were stockpiled and allowed to dry on-site, with decant water from the stockpile flowing to the river or other waterbodies (e.g., shallow groundwater in an excavated area); and/or
- spoils were transported or disposed of improperly, resulting in water quality contamination.

Although past sampling of Sacramento River sediments near the RVARC site (Arcadis 2001a) did not find high concentrations of any pollutants (e.g., heavy metals) that would require remediation or pose a risk to ecological or human receptors, the quality of excavated spoils generated from in-channel construction activities should be confirmed to determine the appropriate handling, transport, and disposal procedures. Without this sampling and implementation of measures to properly handle, store, transport, and/or dispose of potentially hazardous spoils, this impact would be potentially significant.

Implementation of **Mitigation Measure HYD/WQ-6 (Spoils Materials Assessment, Handling, and Disposal Plan),** would reduce this impact to a less-than-significant level by ensuring that sediments are sampled for hazardous pollutants; appropriate disposal or reuse options are identified; and spoils are properly stored, transported, and disposed. With implementation of this mitigation measure, this impact would be **less than significant with mitigation**.

Mitigation Measure HYD/WQ-6: Spoils Materials Assessment, Handling, and Disposal Plan (Alternatives 2, 3, and 4)

Before construction or maintenance activities involving dredging and spoils storage, transport, and disposal, DWR and USFWS shall require the construction contractor(s) to develop and implement a Spoils Material Assessment, Handling, and Disposal Plan for these activities. This plan would be subject to review and approval by DWR and USFWS and shall specify the methods for assessing the quality of sediments to be excavated and for handling and reusing/disposing. The plan would include all necessary procedures to ensure that spoils and decant water generated during construction are stored, managed, and disposed of in a manner that is protective of water quality and that meets relevant water quality standards, in accordance with applicable laws, regulations, and permitting requirements. The plan shall include the following information.

- Step-by-step procedures for evaluation, handling, stockpiling, storage, testing, and disposing of spoils, including criteria for reuse and offsite disposal. Evaluation procedures would include preconstruction sampling to characterize and confirm sediment quality. Samples shall be collected from the proposed areas to be dredged or excavated during construction and to the depth of the planned dredging/excavation in each area. Samples shall be analyzed for total petroleum hydrocarbons (as gasoline, diesel, and waste oil), Title 22 metals, and VOCs or any other chemicals of concern to evaluate the potential presence of contamination. The contractor, in conjunction with DWR and USFWS, shall compare the sediment sampling results to the plan's criteria for reuse and off-site disposal, and then determine the appropriate stockpiling, storage, testing, and disposal procedures for the spoils. Construction worker health and safety procedures for working with contaminated materials shall be outlined in the plan and implemented if spoils are determined to be hazardous.
- During construction activities, all dredged/excavated materials shall be inspected before initial stockpiling, and spoils that are visibly stained and/or have a noticeable odor indicating contamination shall be stockpiled separately to minimize the amount of material that might require special handling. If some of the material does not meet reuse or disposal criteria at the site to which the material would be otherwise taken, these materials

shall be disposed of at a facility licensed to accept such material, such as a permitted hazardous waste landfill facility (i.e., Kettleman Hills Hazardous Waste Facility). Additional sampling may be conducted during construction activities, if necessary, to confirm whether spoils are/are not hazardous or are suitable for a particular refuse or disposal option.

- The plan shall also include procedures to be implemented if unknown subsurface conditions or contamination are encountered. This shall include procedures for containment, handling, and disposal of runoff water generated from spoils dewatering; the method by which to analyze spoils or runoff water for hazardous materials most likely to be encountered at specific locations (based on the results of the preconstruction sediment sampling); and the appropriate treatment and/or methods for storage, transport, and ultimate reuse/disposal.

Alternative 3: Rio Vista Army Reserve Center, Configuration 2

The construction impacts of Alternative 3 would be similar to those of Alternative 2. Although the marina would be constructed in an upland area, some dredging would still be needed for the final step of connecting the marina to the Sacramento River by breaching an earthen barrier. Dredging for other aspects of the Proposed Project (boat ramp, FTC intake and outfall, marina maintenance) would also be needed. Impacts from these activities are considered potentially significant. With implementation of Mitigation Measure HYD/WQ-6 this impact would be reduced to a level that is **less than significant with mitigation**.

Alternative 4: Ryde Avenue Site in Stockton

Similar to that of Alternative 3, construction of Alternative 4 would include in-water construction work to connect the marina to the adjacent surface water (Stockton DWSC), other in-water work, and maintenance dredging over the long-term. Impacts would be similar to those of Alternative 3 and are considered potentially significant. With implementation of Mitigation Measure HYD/WQ-6, this impact would be reduced to a level that is **less than significant with mitigation**.

Impact HYD/WQ-7: Interfere Substantially with Groundwater Recharge from Site Development.

Alternative 1: No Project Alternative

The No Project Alternative would not involve development at either the RVARC site or Ryde Avenue site in Stockton; therefore, there would be **no impact** related to interference with groundwater recharge.

Alternative 2: Rio Vista Army Reserve Center, Configuration 1

The existing RVARC site is mostly undeveloped with pervious surfaces that allow for some level of groundwater infiltration and recharge. Construction of upland DRS facilities would create impermeable surfaces that could reduce onsite groundwater recharge; however, the

Solano subbasin is not in a state of overdraft, indicating that a lack of recharge is not an issue for the basin. In addition, the amount of impervious surface that would be created as a result of the DRS facilities would be very small compared with the overall surface area overlying the basin; therefore, development of the site would not represent a substantial reduction in the area available for groundwater recharge for the basin, and recharge could still occur in the large undeveloped areas in the vicinity of the RVARC site, such as the Montezuma Hills. Site development would not therefore substantially interfere with groundwater recharge; therefore, this impact would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Although the quantity of impermeable surfaces created at the RVARC site for construction and operations of Alternative 3 for the DRS would most likely be greater than that for Alternative 2, the potential impacts on potential groundwater recharge would be the same. As with Alternative 2 (see discussion above), this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

The Ryde Avenue site is an undeveloped parcel with pervious surfaces that potentially allow for groundwater recharge of the Eastern San Joaquin subbasin. Similar to that of Alternative 3, construction of the ERS and FTC facilities would create impermeable surfaces that could prevent some groundwater recharge at the Ryde Avenue site. The Eastern San Joaquin subbasin is in a state of overdraft, and as such, reductions in groundwater recharge are a potential concern; however, the Ryde Avenue site is relatively small and located in an urban area and, as such, would not be a priority groundwater recharge area. In addition, substantial recharge areas in San Joaquin County primarily occur to the east or south of the City of Stockton (San Joaquin County 2009). Further, because the site is adjacent to the Stockton DWSC, water that percolates into the soil is most likely to encounter shallow groundwater and be transported to the DWSC. For these reasons, this impact would be **less than significant**.

Impact HYD/WQ-8: Deplete Groundwater Supplies from Construction Activities.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

The No Project Alternative would not involve construction at the RVARC site or Ryde Avenue site; therefore, there would be **no impact** related to groundwater depletion.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Construction activities for the ERS and FTC facilities might require the use of groundwater to control dust and sediment. In addition, shallow groundwater found at the RVARC site might be encountered during construction activities. Dewatering would be unlikely, depending on the extent of the shallow or perched groundwater at the time of grading and excavation.

Water used during construction would be imported to the site; however, even if groundwater were used, it would not be a substantial amount and would not deplete groundwater supplies. In addition, the volume of perched groundwater to be dewatered is not anticipated to be substantial enough to affect storage in deeper aquifers or groundwater levels outside of the immediate Proposed Project site. Thus, the Proposed Project's construction-related water demands and potential dewatering activities would not result in a substantial deficit in the underlying aquifer; therefore, this impact would be **less than significant**.

Alternative 3: Rio Vista Army Reserve Center, Configuration 2

Under Alternative 3, water usage during construction and groundwater dewatering would generally be similar to those described for Alternative 2. Excavation for the inland marina would result in a greater volume of excavated soil and sediment; therefore, more water would be necessary for sediment and dust control. Marina construction would also extend to greater depths and could require more dewatering than Alternative 2. Despite these differences, this alternative is not anticipated to result in a substantial deficit in the underlying aquifer; therefore, this impact would be **less than significant**.

Alternative 4: Ryde Avenue Site in Stockton

Construction-related water use and groundwater dewatering activities under this alternative would be similar to those described for Alternative 3. Alternative 4 would involve more soil/sediment excavation than Alternatives 2 and 3 and, as a result, potentially require more water for sediment control and/or dewater more groundwater. Water for sediment control would be imported to the site; however, even if groundwater were used, it would not be a substantial amount and would not deplete groundwater supplies. Dewatered groundwater that is not contaminated would most likely be discharged to local storm drains and ultimately the Stockton DWSC, which would be the likely destination of shallow groundwater on the site under baseline conditions. In addition, the overall quantity of dewatered groundwater during Propose Project construction would be relatively small compared to the underlying aquifer's groundwater storage; therefore, this impact would be **less than significant**.

Impact HYD/WQ-9: Substantially Deplete Groundwater Supplies from Operational Water Usage.

Alternative 1: No Project Alternative

Under Alternative 1, the ERS and FTC facilities would not be constructed at either the RVARC site or Ryde Avenue site. Existing IEP activities would continue in various locations in the Bay–Delta region and water usage from these activities would be similar to those of existing conditions; therefore, there would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Estuarine Research Station

Operation of the ERS would require water supplies for the facility's employees and visitors and other uses, such as the wet laboratory. Such water supplies for the operation of ERS facilities would be obtained from City of Rio Vista municipal supplies. As described in Chapter 16, *Public Services, Utilities, and Energy*, the City of Rio Vista's primary water source is groundwater. As described in that chapter, the estimated water demand of the ERS could be accommodated by the City of Rio Vista's available supplies. In addition, well yields in the Solano subbasin's Tehama Formation, the primary water-bearing formation in Rio Vista, are reported in the thousands of gallons per minute (gpm) and groundwater supplies are believed adequate to meet and exceed the current groundwater demands in the basin (DWR 2004). Furthermore, DWR does not consider the basin to be in overdraft (DWR 2004). Given the above conditions, this impact would be less than significant.

Fish Technology Center

The FTC would require potable water for employees at its facilities and process water for its aquaculture operations. The FTC's potable water demands would involve uses similar to those of the ERS, although the quantity would be much smaller compared to the ERS and would be met by the City of Rio Vista's entitlements and resources. As described above and in Chapter 16, *Public Services, Utilities, and Energy*, the City of Rio Vista's groundwater supplies are adequate to meet the FTC's municipal water demands; therefore, the FTC operations would not pose a substantial depletion of groundwater supplies.

Operation of FTC's aquaculture facilities would require a larger quantity of water (up to approximately 3,000 gpm), which would be provided by on-site wells. Based on a preliminary study, it is estimated that this water could be obtained from three to four production wells having a depth of approximately 500 feet at the RVARC site (MWH 2008, MWH 2014). This study indicated that interference with City production wells appears unlikely and sufficient groundwater supplies appear to be available to meet the FTC's aquaculture demands (MWH 2008, MWH 2014); however, this study is preliminary and recommends further investigations, including a test well, to confirm its conclusions. Thus, this impact is considered potentially significant. Implementation of **Mitigation Measure HYD/WQ-9 (Perform Groundwater Supply Testing and Implement Groundwater Supply and Quality Protection Measures)** would require that a groundwater study be conducted and, if necessary, appropriate measures be implemented to reduce groundwater pumping and/or secure additional supplies. With implementation of this measure, this impact would be reduced to a level that is less than significant with mitigation.

Mitigation Measure HYD/WQ-9: Perform Groundwater Supply Testing and Implement Groundwater Supply and Quality Protection Measures (Alternatives 2, 3, and 4 – FTC)

Before construction of the FTC facilities, a groundwater study shall be conducted by a qualified geotechnical/hydrogeological engineer. The groundwater study shall evaluate whether the FTC's groundwater demands, in combination with the existing groundwater use in the subbasin, will exceed the subbasin's sustainable yield; result in substantial effects on local groundwater levels, groundwater supplies, or nearby wells; or result in groundwater quality impairments at previously unimpaired wells. Specifically, the groundwater study will determine if the Proposed Project will meet the following criteria and develop recommended actions to ensure these criteria are met:

- Does not result in a net deficit in the aquifer volume or a lowering of the local groundwater table level such that the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted; and
- Does not alter the extent or location of existing water quality impairments such that existing unimpaired local wells become impaired and/or could not support existing land uses or planned uses for which permits have been granted.

The groundwater study can also be used to determine whether groundwater production potential, temperature, and water quality are sufficient for the FTC's aquaculture facilities. The groundwater study might involve the following or other similar approaches that are adequate to address potential impacts:

- drilling test well(s);
- performing pumping tests;
- monitoring groundwater levels at multiple locations (including the nearest City production well);
- monitoring groundwater quality and temperature at the test well(s); and
- identifying and detailing any actions to minimize groundwater supply or level decreases (e.g., changes in well screening or depths, reduction in water demands), and any groundwater quality impacts (migration of existing impairments to the FTC site or other previously unimpaired wells).

USFWS and/or its contractor shall implement the actions recommended by the groundwater study or implement other actions sufficient to ensure that there are no significant impacts and the above criteria are met. Recommended actions might include, but would not be limited to:

- altering the operation or design of the aquaculture facility to minimize aquaculture facility water use, such as water reuse or recycling, or reducing the size of the aquaculture facility;
- using surface water supplies; or
- preparing appropriate tiered or supplemental environmental documentation for any new or previously unevaluated impacts associated with these solutions.

Delta Research Station

The overall impacts of DRS would include those described above for ERS and FTC. With implementation of Mitigation Measure HYD/WQ-9, this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Potential impacts on groundwater supplies related to the operation of Alternative 3 would be identical to those identified above for Alternative 2. With implementation of Mitigation Measure HYD/WQ-9, this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Estuarine Research Station

Similar to Alternative 2, the estimated potable demand of the ERS facilities would be up to 0.08 million gallons per day (mgd). Potable water service to this site is provided by California Water Service (CalWater), a private company that provides water to the majority of central Stockton. As described in Chapter 16, *Public Services, Utilities, and Energy*, the City of Stockton relies on both surface water and groundwater sources to meet its water demands. In addition, as described in Chapter 16, the City of Stockton (through CalWater) has sufficient supplies to meet ERS water demands. Thus, water use for the ERS facilities would not substantially deplete groundwater supplies; therefore, this impact would be less than significant.

Fish Technology Center

Under Alternative 4, the FTC would generate the same potable water demands as those under Alternative 2. This demand would be substantially less than that of the ERS. As described above and in Chapter 16, *Public Services, Utilities, and Energy*, the City of Stockton through CalWater would have supplies sufficient enough to meet the FTC's potable water demand and would not substantially deplete CalWater's groundwater supplies.

Also similar to that under Alternative 2, operation of the FTC under Alternative 4 would require up to 3,000 gpm of groundwater. Because the Eastern San Joaquin subbasin, which underlies the Ryde Avenue site in Stockton, is substantially overdrawn, additional groundwater use for the FTC aquaculture facilities would result in a potentially significant impact on the subbasin's supplies and groundwater elevations. USFWS would implement Mitigation Measure HYD/WQ-9 to reduce potential groundwater supply impacts from FTC operations. This measure would require that a groundwater study be prepared to demonstrate that FTC's groundwater demands would not exceed the subbasin's sustainable yield or result in substantial effects on local groundwater levels or groundwater supplies. However, the potential exists that FTC demands cannot be accommodated within the sustainable yield of the aquifer, given the existing overdraft conditions in the subbasin, and no other feasible mitigation may exist for the impact; therefore, despite implementation of Mitigation Measure HYD/WQ-9, this impact would be significant and unavoidable.

Delta Research Station

Groundwater use and related potential impacts on existing groundwater supplies would be the same as those described above for the ERS and FTC (see above for details); therefore, the impacts of DRS, despite implementation of Mitigation Measure HYD/WQ-9, would be **significant and unavoidable**.

Impact HYD/WQ-10: Degrade Water Quality from Wastewater Discharges.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

The No Project Alternative would not involve development of ERS or FTC facilities at the RVARC site or Ryde Avenue site; therefore, there would be no effluent discharges and **no impact** on water quality.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Estuarine Research Station

Domestic water used for the ERS would be discharged to the City's sewer system, which would treat the effluent before discharge to the Sacramento River. As a result, such effluent would not be expected to violate water quality standards or otherwise degrade water quality. Laboratory wastewater and any other wastewater that cannot be accepted by the City's wastewater treatment system would be discharged into a holding tank and disposed of off-site at an appropriate facility; therefore, ERS effluent would not degrade water quality. This impact would be less than significant.

Fish Technology Center

As with the ERS, domestic water used for the FTC would be discharged to the City's sewer system, which would treat the effluent before discharge into the Sacramento River. As a result, such effluent would not be expected to violate water quality standards or otherwise degrade water quality.

In addition, the FTC would include aquaculture facilities and an on-site effluent treatment system for process water used in these facilities. Aquaculture activities at the FTC would involve the use of a variety of fish feeds and chemicals to sustain fish growth and prevent diseases. Potential chemicals used for aquaculture activities would include those listed in Table 3-6. In addition, aquaculture operations would generate metabolic waste from fish raised at the facility. The FTC would discharge treated effluent directly into the Sacramento River, which would pose a risk of degrading surface water quality.

The effluent treatment system for the aquaculture facility would capture effluent and process this effluent through drum filters, an underground holding tank, and evaporation ponds before ultimately discharging the treated effluent into the Sacramento River. Operation of the effluent treatment system would require that the drum filters be periodically cleaned, accumulated sediments in the evaporation ponds be removed, and other maintenance activities be performed on a regular basis. Accumulated, dried sludge in the evaporation ponds would be hauled off-site to a landfill for disposal. During these maintenance activities, if filtered effluent materials or untreated effluent were to be improperly disposed or released onto the ground surface, the aquaculture nutrients/chemicals could leach into underlying soils or groundwater or flow to local surface waters and potentially degrade groundwater or surface water quality.

In addition, it is possible that the aquaculture chemicals or nutrients in the effluent entering the evaporation ponds could potentially affect groundwater quality if the evaporation ponds were unlined or had leaks that allowed the effluent to leach into the underlying soils or groundwater. Finally, discharges of effluent into the Sacramento River, if not properly treated, could violate water quality standards or otherwise degrade water quality.

Aquaculture NPDES permits are typically required for aquaculture facilities that exceed an annual production of 20,000 pounds of fish or that feed more than 5,000 pounds of feed in a month. Although the effluent from the FTC aquaculture facility is not expected to exceed the NPDES discharge permitted amount (MWH 2014), the possibility for exceedance of this amount and the need for a NPDES permit does exist.

Implementation of **Mitigation Measure HYD/WQ-10 (Effluent Treatment System Design and Maintenance),** would minimize impacts by ensuring proper maintenance and functioning of the effluent treatment system, implementing BMPs that are protective of water quality, and designing or modifying the treatment system as necessary to provide additional treatment. These measures would be incorporated and conducted in coordination with the applicable NPDES permit for the discharge. With implementation of Mitigation Measure HYD/WQ-10, this impact would be reduced to a level that is less than significant with mitigation.

Mitigation Measure HYD/WQ-10: Effluent Treatment System Design and Maintenance (Alternatives 2, 3 and 4 – FTC)

The effluent treatment system shall be designed and operated such that effluent meets Basin Plan standards. Quarterly sampling shall be conducted for suspended and settleable solids; dissolved oxygen; temperature; and flow. A sampling and record keeping plan shall be developed to document the sample collection, sample analysis and recording procedures.

The effluent treatment system shall be regularly maintained by USFWS or its contractor. Maintenance activities shall include but not be limited to: general equipment maintenance; disposal of sediments/sludge from the evaporation ponds and drum filters at an appropriate waste disposal site, and maintenance of the evaporation ponds such as ensuring capacity is not compromised by settled particles, checks for cracks in the pond, or tears in the pond liner if any is used.

In addition, USFWS and/or its contractor shall prepare and implement an operational and management plan to minimize water quality impacts and ensure compliance with applicable solid waste disposal regulations. The plan shall also include, at a minimum, the following:

1. Feed management and feeding strategies must minimize the discharge of unconsumed food.

2. Rearing and holding units must be cleaned at such frequency and in such a manner to minimize the discharge of accumulated solids discharged to surface waters.

3. Fish grading, harvesting and other activities within the rearing and holding units must be conducted in such a manner to minimize the discharge of accumulated solids.

4. Fish mortalities must be removed and properly disposed of on a regular basis to prevent discharge to surface waters. Procedures must be identified and implemented to collect, store, and dispose of fish and other solid wastes.

5. Prior to discharge to surface waters, water used in the rearing or holding units or hauling trucks that is disinfected with chlorine must be neutralized so that the total residual chlorine is less than 19 µg/liter.

6. All drugs and pesticides shall be used in accordance with applicable label directions (FIFRA or FDA), except under the following conditions:

    a. Participation in Investigational New Animal Drug (INAD) studies, using established protocols; or

    b. Extra-label drug use, as prescribed by a veterinarian.

7. <u>Materials storage</u>. USFWS and/or its contractor shall ensure proper storage of drugs, chemicals, and feed in a manner designed to prevent spills that may result in the discharge of drugs, pesticides or feed to surface waters; and implement procedures for properly containing, cleaning, and disposing of any spilled material.

8. <u>Structural maintenance</u>. USFWS and/or its contractor shall:

    a. Inspect the production system and the wastewater treatment system on a routine basis in order to identify and promptly repair any damage.

    b. Conduct regular maintenance of the production system and the wastewater treatment system in order to ensure that they are properly functioning.

9. <u>Recordkeeping</u>. USFWS and/or its contractor shall:

    a. In order to calculate representative feed conversion ratios, maintain records for aquatic animal rearing units documenting the feed amounts and estimates of the numbers and weight of aquatic animals.

    b. Keep records documenting the frequency of cleaning, inspections, maintenance and repairs.

10. <u>Training</u>. USFWS shall:

    a. Train all relevant facility personnel in spill prevention and how to respond in the event of a spill in order to ensure the proper clean-up and disposal of spilled material.

Train personnel on the proper operation and cleaning of production and wastewater treatment systems including training in feeding procedures and proper use of equipment.

Delta Research Station

Potential impacts associated with the DRS would be the same as those described for the ERS and FTC. With implementation of Mitigation Measure HYD/WQ-10, this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Potential impacts of this alternative would be identical to those described for Alternative 2. Refer to that section for more detailed information. With implementation of Mitigation Measure HYD/WQ-10, this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Potential impacts of this alternative would be similar to those described for Alternative 2. Refer to that section for more detailed information. With implementation of Mitigation Measure HYD/WQ-10, this impact would be reduced to a level that is **less than significant with mitigation**.

Impact HYD/WQ-11: Degrade Groundwater Quality from Operational Groundwater Use.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

The No Project Alternative would involve the continuation of existing IEP surveys and monitoring activities which would not have any incremental potential to degrade water quality; therefore, there would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

The ERS facilities, including its laboratories, would rely on the City of Rio Vista's water supplies and would not involve any direct groundwater pumping at the RVARC site to meet the facilities' water demands. As discussed under Impact HYD/WQ-9, groundwater is the City's primary water supply source to meet its municipal demands and would be used to meet the ERS facilities' operational water demands. In addition, as described under Impact HYD/WQ-9, the City of Rio Vista has sufficient groundwater supplies to meet ERS demands and would not significantly alter its pumping quantities or patterns to meet ERS demands. Thus, the ERS operational water demands would not result in any significant groundwater quality changes.

Operational water demands for the FTC aquaculture facility would be met through the construction and operation of the Proposed Project's onsite groundwater wells. The onsite FTC wells could pump quantities of up to 3,000 gpm, and, as a result, potentially alter groundwater flow patterns such that any existing groundwater quality impairments in the

Proposed Project vicinity would be transported to the FTC's groundwater wells or other previously unimpaired wells in the vicinity; however, no impaired sites are known to exist within 1 mile of the RVARC site (City of Rio Vista 2011; DTSC 2015a, 2015b). The Delta Marina property is the nearest site with previous impairments. This property lies to the north of Marina Creek's inlet, which had cleanup activities because of underground storage tanks. Cleanup activities at that site were deemed complete in 2012 (DTSC 2015b). Thus, the Proposed Project's pumping activities to meet the FTC's water demands would not alter groundwater flow patterns such that existing groundwater quality impairments would be transported to the FTC's groundwater wells or other previously unimpaired wells in the Proposed Project vicinity.

As discussed under Impact HYD/WQ-9, municipal water supplies from the City of Rio Vista would meet the limited FTC employee-related water demands. Because of the relatively small quantities of water required by the FTC employees, it is not anticipated that the City of Rio Vista would significantly alter its groundwater pumping patterns or quantities to meet these demands.

Thus, DRS operational water demands would not degrade groundwater quality and this impact would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Impacts from construction and operations of Alternative 3 would be identical to those described for Alternative 2; therefore, this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Estuarine Research Station

Operation of the ERS facility would generate water demands associated with domestic uses (for employees) and other ERS uses (e.g., laboratories). As discussed under Impact HYD/WQ-9, water demands associated with the ERS facilities would be supplied by CalWater and derived from surface water and/or groundwater resources. In addition, as described in Chapter 16, *Public Services, Utilities, and Energy*, the City of Stockton (through CalWater) has sufficient supplies to meet the ERS water demands. Thus, water use for the ERS facilities would not degrade groundwater quality from operation-related groundwater use and this impact would be less than significant.

Fish Technology Center

Under Alternative 4, the aquaculture facility's operational water demands would be met by on-site groundwater wells and by CalWater's supplies (for domestic FTC demands). The FTC's potable water demand would be much less than that of the ERS and would be easily met.

As described above, the groundwater quality of the East San Joaquin subbasin, which underlies the Ryde Avenue site, is impaired by a saline (salinity) front. Groundwater pumping for the FTC's aquaculture facility could affect the existing groundwater quality by potentially affecting the advance or direction of the saline front. In addition, as described in

Section 12.1.3, "Groundwater Quality," there are other existing groundwater quality issues related to previous hazardous materials releases within the Ryde Avenue site vicinity. Pumping activities for the FTC's operation would potentially alter groundwater flow patterns such that existing groundwater quality impairments would be transported to the FTC's groundwater wells or other previously unimpaired wells in the Proposed Project vicinity. This impact would be potentially significant.

Mitigation Measure HYD/WQ-9 requires the development and implementation of a groundwater study that would evaluate the potential for the FTC's operations to result in quality impairments at previously uncontaminated wells, and require measures to fully minimize those impacts (such as reducing the FTC's groundwater demands); therefore, with implementation of Mitigation Measure HYD/WQ-9, this impact would be reduced to a level that is less than significant with mitigation.

Delta Research Station

Potential groundwater quality impacts associated with DRS would be the same as those described for ERS and FTC. With implementation of Mitigation Measure HYD/WQ-9, this impact would be reduced to a level that is **less than significant with mitigation**.

Impact HYD/WQ-12: Violate Groundwater or Surface Water Quality Standards or Degraded Water Quality from Operational Hazardous Materials Use.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1 and similar to existing conditions, existing IEP activities would involve the use of hazardous materials, including fuel and oil for boat operations and monitoring and surveying equipment. Potential spills or leaks of these materials could potentially affect surface water or groundwater quality if these materials are not transported, stored, used, or disposed of properly. Hazardous materials use, storage, transport, and disposal would continue to be performed in accordance with all applicable standard federal, state, and local laws. Thus, the No Project Alternative would not be expected to result in any hazardous materials discharges to groundwater or surface waters, and, as a result, would not degrade surface water quality; therefore, this impact would be **less than significant**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

The Proposed Project's operations would require the use of hazardous materials and would generate hazardous wastes. Improper storage, transport, use, or disposal of these materials could potentially have impacts on surface waters. Potential chemicals stored/used on-site would include those listed in Table 3-6. The ERS facility would include the operation of a metal shop, which could contain or require the use of hazardous materials. The marina would involve use of fuels, lubricants, and other potentially hazardous materials.

As described in Chapter 11, *Hazards and Hazardous Materials*, hazardous materials required for the Proposed Project's operations would be used, stored, transported, and disposed in compliance with all applicable federal, state, and local laws. In addition, implementation of

Mitigation Measure HYD/WQ-12 (Implement Operation-Related Best Management Practices for Hazardous Materials and Waste Management), including preparation and implementation of a spill prevention and emergency response plan and transporting and storing materials in appropriate and approved containers, will ensure that no hazardous materials enter any nearby waterways. In addition, the facilities may need to obtain coverage under the Industrial General Permit (e.g., for the marina). Coverage under the Industrial General Permit would further minimize the potential for hazardous wastes or materials to enter surface waters. Regardless of whether coverage under the Industrial General Permit is required and obtained, with implementation of Mitigation Measure HYD/WQ-12, this impact would be reduced to a level that is **less than significant with mitigation**.

Mitigation Measure HYD/WQ-12: Implement Operation-Related Best Management Practices for Hazardous Materials and Waste Management (Alternatives 2, 3, and 4)

DWR and/or USFWS shall ensure that all hazardous materials used during Proposed Project operation are transported, stored, and handled in a manner consistent with relevant regulations and guidelines, including those recommended and enforced by Caltrans, RWQCB, the applicable county department, and the applicable local fire department. Recommendations might include minimizing the amount of hazardous materials/waste stored on-site at any one time; transporting and storing materials in appropriate and approved containers; maintaining required clearances; and handling materials using the applicable federal, state, and/or local regulatory agency protocols. In addition, all precautions required by RWQCB-issued Industrial General Permit (to the extent that coverage under this permit is required) will be taken to ensure that no hazardous materials enter any nearby waterways.

In addition, DWR and USFWS shall implement the following measures during all operation activities:

- Implement practices to minimize the contact of potentially hazardous materials, equipment, and maintenance supplies with stormwater, groundwater, and surface waters.
- Limit fueling and other activities involving hazardous materials to use in designated areas only; provide drip pans under equipment and conduct daily checks of vehicle condition.
- Limit hazardous materials storage to upland areas outside of surface water channels.
- Develop a spill prevention and emergency response plan to handle potential fuel or other spills.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Potential impacts from Alternative 3's operational-related hazardous materials use, storage, transport, and disposal would be the same as those under Alternative 2; therefore, with implementation of Mitigation Measure HYD/WQ-12, this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Potential impacts of Alternative 4's operational-related hazardous materials use, storage, transport, and disposal would be the same as those for Alternative 2 operation; therefore, with implementation of Mitigation Measure HYD/WQ-12, this impact would be reduced to a level that is **less than significant with mitigation**.

Impact HYD/WQ-13: Create or Contribute Runoff Water Exceeding the Capacity of Existing or Planned Stormwater Drainage Systems from Project Operations and Substantially Alter the Existing Drainage Pattern of the Site Resulting in Flooding On-site or Off-site.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

The No Project Alternative would not create impermeable surfaces or in any other way generate additional runoff water or result in on-site or off-site flooding at the RVARC site or Ryde Avenue site in Stockton; therefore, there would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under existing conditions, runoff from the RVARC site enters the Sacramento River through existing drainage facilities and/or from overland surface runoff. Development of the DRS would create new impermeable surfaces from construction of buildings, structures, parking areas, and internal roadways. The Proposed Project would include removal of existing on-site stormwater drainage systems and constructing a new stormwater drainage system. In addition, the Proposed Project could involve demolishing some existing buildings and creating new structures that could alter discharge locations and/or existing runoff patterns. This could alter the existing drainage patterns or affect the capacity of existing or planned stormwater drainage systems. If not adequately designed, construction of the DRS facilities could thereby result in localized flooding. This impact would be potentially significant.

Implementation of **Mitigation Measure HYD/WQ-13 (Prepare and Implement a Drainage Plan)** would ensure that the Proposed Project includes the required stormwater facilities and drainage design to prevent on-site and off-site flooding and exceedances of stormwater facility capacity. With implementation of this mitigation measure, this impact would be reduced to a level that is **less than significant with mitigation**.

Mitigation Measure HYD/WQ-13: Prepare and Implement a Drainage Plan (Alternatives 2, 3, and 4)

DWR, USFWS, and/or their contractors shall develop and implement a drainage plan for the Proposed Project that meets applicable stormwater quantity and quality requirements. Applicable stormwater requirements may include, but not be limited to:

- NPDES General Permit No. CAS000004 (Water Quality Order No. 2013-0001-DWQ) Waste Discharge Requirements for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) applicable to the City of Rio Vista or the City of Stockton,
- NPDES General Permit No. CAS000001 (Water Quality Order No. 2014-0057-DWQ) General Permit for Stormwater Discharges Associated with Industrial Activities, and
- LEED v4 for Building Design and Construction requirements appropriate to a LEED Silver standard or better.

Potential measures to be implemented during Proposed Project operations may include, but not be limited to:

- Implementing rainwater management measures to manage on-site runoff for the ninety-fifth or ninety-eighth percentile of regional or local rainfall events using LID approaches and green infrastructure; and
- Establishing and implementing an annual inspection and maintenance program of all stormwater management facilities to confirm and ensure continued performance.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would have a potential to impact stormwater capacity and flooding from creation of impermeable surfaces similar to those of Alternative 2 (see above for more detail). As with Alternative 2, this impact would be potentially significant and require Mitigation Measure HYD/WQ-13 to ensure that the Proposed Project includes the required stormwater facilities and drainage design to prevent on-site and off-site flooding and exceedances of stormwater facility capacity. With implementation of this mitigation measure, this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Impacts from Alternative 4 would be similar to those of Alternatives 2 and 3 (see above for more details) and would be potentially significant. With implementation of Mitigation Measure HYD/WQ-13, this impact would be reduced to a level that is **less than significant with mitigation**.

Impact HYD/WQ-14: Provide Substantial Additional Sources of Polluted Runoff from Project Operations or Substantially Alter the Existing Drainage Pattern of the Site Resulting in Substantial Erosion or Siltation On-site or Off-site.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

The No Project Alternative would not create impermeable surfaces, alter drainage patterns, or in any other way generate substantial additional sources of polluted runoff. In addition, this alternative's activities are identical to those under existing conditions; therefore, this alternative would have no potential to alter existing drainage patterns and there would be **no impact.**

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As described in Impact HYD/WQ-13, the Proposed Project would alter the existing RVARC site drainage pattern by creating impermeable surfaces, including parking areas. During operations, if disturbed areas were not revegetated, converted to impervious surfaces, or have permanent erosion control measures implemented, soils remaining exposed after construction is complete could transport sediment to the Sacramento River. Use of the parking areas by employees and visitors could also transmit pollutants, such as oils or fuels from vehicles onto the parking area surface. Pollutants from the vehicles would accumulate during the dry summer months and could be transported to the Sacramento River through stormwater flows during initial winter storms ("first flush"), thereby providing an additional source of polluted runoff. In addition, if the drainage system is not designed properly, the Proposed Project's impermeable surfaces could alter the existing drainage locations/patterns/quantities in a manner that would create on-site or off-site erosion or siltation. These potential surface runoff-related water quality impacts would be potentially significant and implementation of Mitigation Measure HYD/WQ-13 would be required to ensure potential impacts from this alternative's creation of new impermeable surfaces and altered drainage patterns would be reduced by implementing a drainage plan that would design and implement appropriate stormwater infrastructure to capture runoff flows and prevent erosion and water contamination.

Proposed in-channel structures (e.g., partially excavated marina and aquaculture facility outfall) could also affect river drainage patterns, as further described below. Operation of the marina, including the pilings, in the Sacramento River would potentially alter the river's flow patterns or velocities such that it would result in erosion within the river channel. Although the Proposed Project includes placement of shoreline protection riprap in the river to minimize potential erosion-related impacts from the marina's placement, **Mitigation Measure HYD/WQ-14 (Perform Hydraulic Analysis and Conform to Standards in Applicable County and State Requirements)** would be required to ensure that the Proposed Project would not substantially alter the existing drainage pattern such that it results in substantial erosion or siltation. Mitigation Measure HYD/WQ-14 would require the development and implementation of appropriate erosion-protection measures. Implementation of Mitigation Measure HYD/WQ-14 would minimize the above-discussed potential erosion-causing impacts associated with the construction of impermeable surfaces and altered drainage patterns. Implementation of Mitigation Measures HYD/WQ-13 and HYD/WQ-14 would reduce this impact to a level that is **less than significant with mitigation**.

Mitigation Measure HYD/WQ-14: Perform Hydraulic Analysis and Conform to Standards in Applicable County, State, and Federal Requirements (Alternatives 2, 3 and 4)

Before finalizing the design of the ERS and FTC facilities, including but not limited to, the ERS marina and boat launch and the FTC aquaculture facility intake and outfall, DWR, USFWS, or their contractors shall conduct an analysis of pre- and post-Proposed Project hydraulic conditions, including erosive and flood conditions, in the Proposed Project area. The analysis shall include an assessment of the potential change in velocity, floodplain storage, and Base Flood Elevation (BFE) for the pre- and post-Proposed Project conditions. The analysis would also determine the Proposed Project's potential to affect any levees and alter existing or create new sea level–rise inundation areas. If the analysis determines that the Proposed Project would significantly decrease floodplain storage, affect the stability of any levees, create or alter sea level–rise inundation areas, or result in a significant increase in BFE or velocity or cause erosion, measures would be designed and implemented to reduce these potential effects to an acceptable level. This could include:

- implementing bank stabilization measures at erosional locations;
- providing increased floodplain storage;
- designing in-water facilities to accommodate flooding and sea level rise;
- designing upland facilities to avoid increases in BFE, such as by securely anchoring and floodproofing structures to at least 2 feet above the 100-year flood elevation or 2 feet above the design floodplain;
- locating and orienting structures to be outside of any sea level–rise inundation areas (based on the National Academy of Sciences' projection range of 16–65 inches);
- ensuring that existing facilities not previously in a sea level–rise hazard area would not be subjected to sea level–rise hazards as a result of the Proposed Project;
- locating and orienting structures to have a minimal impact on floodflows;
- designing facilities by using the 500-year flood elevation;
- using best available, actionable hydrologic and hydraulic data and methods that integrate current and future changes in flooding based on climate science or other factors or changes affecting flood risk to determine the vertical flood elevation and corresponding horizontal floodplain; and
- minimizing the number of structures in the floodplain.

As a performance standard, the design and construction shall conform to the standards contained in the most current version of the county codes and comply with the CVFPB permit requirements for the Proposed Project; such standards are considered by DWR and USFWS to be sufficient to reduce this impact to avel that is less than significant.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would have similar impacts to those of Alternative 2. Although the marina would not be in the Sacramento River channel, following connection to the river, the channel leading from the river to the marina could alter the Sacramento River's flow patterns/velocities in a manner that results in erosion, a potentially significant impact. The Proposed Project would include shoreline protection to reduce this potential impact; in addition, Mitigation Measure HYD/WQ-14 would be required to fully characterize the existing conditions and ensure that all necessary and appropriate erosion control and protection measures were implemented. Mitigation Measure HYD/WQ-13 would be also required to ensure that potential impacts from this alternative's creation of new impermeable surfaces and altered drainage patterns would be reduced by implementing a drainage plan that would design and implement appropriate stormwater infrastructure to capture runoff flows and prevent erosion and water contamination. Impacts associated with construction of other in-water facilities, such as the intake and outfall structures, would be the same as those described for Alternative 2. With implementation of Mitigation Measures HYD/WQ-13 and HYD/WQ-14, this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would have impacts similar to those of Alternative 3 (see above for details) and would require implementation of Mitigation Measures HYD/WQ-13 and HYD/WQ-14 to minimize these potential impacts. Alterations of the existing on-site drainage ditches would be considered in the required drainage study and renovated in a manner that would minimize potential erosive impacts. Therefore, with implementation of these mitigation measures, this impact would be reduced to a level that is **less than significant with mitigation**.

Impact HYD/WQ-15: Place Structures that Impede or Redirect Floodflows and Expose People or Structures to Significant Risk of Loss, Injury, or Death from Flooding.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, no facilities would be constructed as part of this alternative; therefore, there would be **no impact** related to impeding or redirecting floodflows such that flooding risks could occur.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

The RVARC site is adjacent to and overlaps a small portion of the Sacramento River's 100-year floodplain, which has base flood elevations of 10 feet above msl (Figure 12-2). The partially excavated marina, boat launch, and outfall would be built in the 100-year floodplain and would potentially affect the river's floodflows; therefore, construction of these components would potentially impede or redirect floodflows and would most likely require that the lead agency obtain a CVFPB permit.

Proposed Project activities would not be conducted on or adjacent to a levee or dam. There is a levee along the east side of the Sacramento River across from the Proposed Project site and numerous other levees in the Delta, the Sacramento River, and its tributaries; however, the Sacramento River bank adjacent to the RVARC site is not protected by a levee (City of Rio Vista 2011); thus, a levee would not be directly affected by DRS construction. Nonetheless, construction of the marina, boat launch, and intake and outfall could potentially redirect river flows such that levees along the Sacramento River were indirectly affected.

The site is not within the inundation zone of Nimbus or Folsom Dams. Although the DRS would not create flood hazards from construction within a dam inundation zone or directly affect the stability of any levees, the DRS' potential to impede or redirect river flows could result in a potentially significant impact. Implementation of Mitigation Measure HYD/WQ-14 would ensure that the Proposed Project's design includes measures to minimize the potential impacts of the Proposed Project facilities on flood flows; therefore, with implementation of this mitigation measure, this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, the marina would be constructed outside of the Sacramento River channel but would be connected to the river, thereby providing additional floodplain storage outside of the main Sacramento River channel; however, the marina, boat launch, intake and outfall would be located in the 100-year floodplain and would potentially redirect floodflows. Implementation of Mitigation Measure HYD/WQ-14 would ensure that the Proposed Project's design includes measures to minimize the potential impacts of the Proposed Project facilities on floodflows; therefore, with implementation of this mitigation measure, this impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

The northern portion of the Ryde Avenue site in Stockton is within a 100-year floodplain associated with the Smith Canal and adjacent to the Stockton DWSC's 100-year floodplain and flood protection levee (Figure 12-4). As such, a portion of some of the ERS facilities (e.g., office/administration building) would be within the Smith Canal floodplain and a portion of the boat launch and FTC intake and outfall would be within the Stockton DWSC's 100-year floodplain. Construction of the office/administration building could potentially impede or redirect floodflows. Construction of the boat launch and marina would provide a negligible or beneficial effect on floodflows by providing an expanded/inland flood area. In addition, construction of the boat launch and outfall and connection of the marina to the Stockton DWSC could potentially affect the stability of the existing channel levee along the site. Implementation of Mitigation Measure HYD/WQ-14 would include measures to minimize the potential flood-related risks to humans and structures from development within a 100-year floodplain and adjacent to/within a levee.

As described in the environmental setting section above, the Ryde Avenue site in Stockton is within inundation zones for the New Melones Dam and New Hogan Dam and potentially within inundation zones for three other dams (San Joaquin County 2003). During the Proposed Project's construction and operations, workers and structures would potentially be at risk of inundation by a dam failure; however, this risk would not be greater than the existing risk to the site and the surrounding City of Stockton's risk. Thus, the Proposed Project's risk related to dam inundation would be less than significant.

Implementation of Mitigation Measure HYD/WQ-14 would reduce the overall impacts related to placing structures that impede or redirect floodflows and expose people or structures to significant risk of loss, injury, or death involving flooding would be reduced to a level that is **less than significant with mitigation**.

Impact HYD/WQ-16: Risk of Inundation by Tsunami, Seiche, or Mudflow.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, existing IEP activities would continue and would potentially take place on waterbodies that could be affected by a tsunami or seiche; however, these potential risks would be the same as those under existing conditions and would not be significant. No new facilities would be constructed that could be affected by a tsunami or seiche. The No Project Alternative would not include any activities that would contribute to a mudflow risk. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

The RVARC site is far removed from the risk of tsunamis, as discussed above. The Proposed Project site is adjacent to the Sacramento River, but the site is on an existing topographical terrace approximately 10 feet above the Sacramento River's elevation. A seiche is an occasional and sudden oscillation (fluctuation) of a surface water body's levels that can be caused by wind, earthquakes, and other factors. Seiches are often generated by earthquakes if oscillations occur at the appropriate frequency. An earthquake producing the necessary oscillation frequency would need to coincide with severe flooding of the Sacramento River to pose a significant risk to the Proposed Project's structures or human life as a result of seiche. It is unlikely that such a large seiche would occur and pose a risk to the Proposed Project facilities; therefore, this impact would be less than significant.

The Proposed Project would be located approximately 100 feet down gradient from the Montezuma Hills fault scarp; however, as described in Chapter 10, *Geology and Soils*, the Proposed Project would not be subject to risk from debris (mud)-flow source areas as mapped by the Association of Bay Area Governments (City of Rio Vista 2011). The Proposed

Project would not involve any activities that could affect the stability of the Montezuma Hills. Ground-disturbing activities could cause mudflows if performed such that they create sloping; however, the Proposed Project's construction activities would include BMPs to maintain soil stability and minimize sloping, as described above. For these reasons, potential impacts related to seiche, tsunami, or mudflows would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3's potential impacts related to tsunami, seiche, or mudflows would be the same as those described for Alternative 2 (see above for details) and would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

The Ryde Avenue site in Stockton is far removed from the risk of tsunamis, as described above. The site is located adjacent to the Stockton DWSC and could potentially be at risk of a seiche in that waterbody; however, the site would be protected from the channel by a levee and the risk of a seiche being large enough to significantly affect human life or the Proposed Project's structures would very low and not significant.

The Proposed Project would be located in a relatively flat area surrounded by urban development and far from slopes that could be prone to mudflows. As described for Alternative 2, the Proposed Project's construction and design would ensure that no steep or unstable slopes are created and would not create a risk of mudflows; therefore, this impact would be **less than significant**.

Impact HYD/WQ-17: Expose People or Structures to Significant Risk of Loss, Injury, or Death Involving Sea Level Rise.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, no structures would be constructed. In addition, the No Project Alternative would not involve any actions that could expose existing IEP facilities to additional risk associated with SLR. Therefore; there would be **no impact** related to exposing people or structures to significant risks involving sea level rise.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

The RVARC site is adjacent to, and overlaps a portion of the Sacramento River's potential sea level–rise inundation area (Figure 12-2). The marina and boat launch would be built in the potential sea level–rise inundation area. Although the ERS facilities (marina/boat launch) would be constructed in a sea level–rise inundation area, the marina's docks would be designed to float and could accommodate increasing Sacramento River levels. Pilings and other ERS facilities associated with the marina and boat launch would have a negligible effect on altering the geographic extent of sea level–rise inundation areas. DRS facilities constructed in a projected sea level–rise inundation area would not be subject to damage and thus would not create flood-related hazards from construction within a sea level–rise inundation area; therefore, this impact would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, the marina would be constructed outside of the Sacramento River channel but connected to the river, thereby potentially creating new sea level–rise inundation areas in and surrounding the marina channel. As described for Alternative 2, the marina and boat launch facilities would be designed such that they could accommodate rising river levels associated with sea level rise. DRS facilities constructed in a projected sea level–rise inundation area would not be subject to damage and thus would not create flood-related hazards from construction within a sea level–rise inundation area; therefore, this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Portions of the Ryde Avenue site would be within and/or adjacent to potential sea level–rise inundation areas associated with the Smith Canal and the Stockton DWSC (Figure 12-4). As such, the boat launch, the marina, and a portion of some of the ERS facilities (e.g., office/administration building) would be within potential sea level–rise inundation areas. Construction of the office/administration building could potentially impair or redirect sea level rise–related flows. Construction of the boat launch and marina would potentially expand or alter the potential sea level–rise inundation area overlapping the Ryde Avenue site by creating an inland marina. Areas surrounding the new marina channel would potentially be subject to sea level–rise inundation as described for Alternative 3; however, implementation of Mitigation Measure HYD/WQ-14 would ensure that the Proposed Project's design includes measures to minimize the potential impacts of the Proposed Project facilities (including the marina) on creating or altering sea level–rise inundation areas, and/or potentially exposing people or structures to an inundation risk related to sea level rise; therefore, with implementation of Mitigation Measure HYD/WQ-14, this impact would be reduced to a level that is **less than significant with mitigation**.

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Chapter 13
Land Use and Planning

This chapter describes existing land uses, regulatory setting, and impacts on land use and planning that would result from the development of each DRS alternative described in Chapter 3, *Description of Alternatives*.

13.1 Environmental Setting

13.1.1 Rio Vista Army Reserve Center Site

The RVARC site (Assessor's Parcel Number 049-320-060) is located on Beach Drive in the southern part of Rio Vista. The 28.16-acre site is situated on the west bank of the Sacramento River (also Sacramento DWSC), which extends for approximately 1,600 feet as the southeastern site boundary. The site extends 2,052 feet along Beach Drive as the northwestern site boundary, and is approximately 680 feet wide. The site is composed of two terraces separated by a slight bluff that runs northeast=southwest through the center of the site; vacant buildings and other facilities remaining from the previous military use are mostly clustered on the lower terrace along the central waterfront portion of the property.

The site was formerly the Rio Vista Army Reserve Center, which was used for maintenance, repair, and storage of shallow-draft river and harbor craft from 1913 until its deactivation in 1989. The RVARC site has not been used for more than 20 years. Currently, 14 vacant buildings (56,415 square feet total) and 10 other facilities formerly used to support military purposes remain on the site. These other facilities include a well and elevated water storage tank; water, sewer, and storm drainage pump stations; a marine railway by which boats were drawn out of the water for repair; four docks; and 14 moorings in the river. The existing buildings are dilapidated and deteriorating, and are therefore considered unsafe or unhealthy for persons to live or work in or around (City of Rio Vista 2011). The entire site is fenced, and the entry gate is located at the northwest corner of the site on Beach Drive. The City of Rio Vista took ownership of the site in 2003 and annexed it in 2006.

Land uses directly adjacent to the site are a private marina on the Sacramento River to the northeast, a U.S. Coast Guard station along the river to the southwest, agricultural land across Beach Drive to the northwest, and agricultural land across the Sacramento River to the southeast. Several single-family residences are located across Beach Drive near the northwest and southwest corners of the site. A paved path runs parallel to the southeastern side of Beach Drive along the northwestern boundary of the RVARC site. As shown in Figures 3-1 and 3-2 in Chapter 3, *Description of Alternatives,* a PG&E natural gas pipeline easement traverses the northern portion of the site. The City of Rio Vista's Beach Drive Wastewater Treatment Plant is located southwest of the U.S. Coast Guard station along the

Sacramento River. Farther down the river, Sandy Beach County Park and Campground is accessed from Beach Drive.

13.1.2 Ryde Avenue Site in Stockton

The Ryde Avenue site (Assessor's Parcel Numbers 133-060-006, 133-050-011, 133-090-007, 133-100-005, and 133-200-009) comprises five parcels totaling 35.11 acres and located at 845 Ryde Avenue in Stockton. The site is privately owned and is currently vacant. Surrounding land uses are the U.S. Navy Reserve Training Center to the west, industrial uses to the east, mobile homes and single-family residential development to the north, and the Stockton DWSC (which adjoins the San Joaquin River) to the south, with the Port of Stockton located across the channel to the south. The Louis Park Softball Complex is located approximately 0.25 mile northwest of the Ryde Avenue site.

13.2 Regulatory Setting

No federal laws or regulations related to land use are applicable to the Proposed Project. The following discussion describes state and local laws, regulations, and policies pertinent to the Proposed Project.

13.2.1 State Laws, Regulations, and Policies

California State Lands Commission Public Trust Doctrine

The California State Lands Commission has jurisdiction and management authority over all ungranted submerged lands owned by the State of California; the beds of navigable rivers, streams, lakes, bays, estuaries, inlets, and straits; and submerged lands for which grants have been or may be made (Pub. Res. Code Section 6301). A lease from the State Lands Commission is required for any portion of a project extending onto lands under the commission's exclusive jurisdiction. Use of state lands and lands underlying the state's easements are limited to waterborne commerce, navigation, fisheries, open space, recreation, or other recognized Public Trust purposes. At the RVARC and Ryde Avenue sites, the lands below the ordinary high-water marks of the Sacramento River and San Joaquin River, respectively, may be subject to State Lands Commission jurisdiction (State Lands Commission 2010).

In granting leases, the State Lands Commission considers and invokes the Public Trust Doctrine. Under the Public Trust Doctrine, title to lands under navigable waters up to the high-water mark is held by the state in trust for the people (State Lands Commission n.d.). The federal Submerged Lands Act grants states sovereignty over their tidal and submerged lands, and the U.S. Supreme Court established the states' duty to protect (in perpetuity) the public's interest in these areas. The California Supreme Court (*Marks v. Whitney* 1971, 6 Cal.3d 251; *National Audubon Society v. Superior Court* 1983, 33 Cal.3d 419; *People v. California Fish Co.* 1913, 166 Cal. 576) has interpreted the range of public interest values in these waterways to include general recreation activities, such as swimming and boating, and preservation of lands in their natural state as open space, as wildlife habitat, and for scientific study (Frank 1983).

Delta Protection Commission Land Use and Resource Management Plan

The 1992 Delta Protection Act recognized the Sacramento–San Joaquin River Delta to be of international significance. The act mandated designation of primary and secondary zones within the "legal Delta" as defined in California Water Code Section 12220, creation of a Delta Protection Commission, and completion of a Land Use and Resource Management Plan (Management Plan). The mission of the Delta Protection Commission is to protect and restore the overall quality of the Delta environment, including agriculture, wildlife habitat, and recreational activities, and to ensure orderly, balanced conservation and development and improved flood protection.

According to the Delta Protection Commission's Primary and Secondary Zone map, the boundary of the legal Delta and the Primary Zone run along the shore of the Sacramento River adjacent to the RVARC site. The existing wharves, moorings, and boat ramp are located within the Primary Zone but the remaining landward portion of the RVARC site (affected by Alternatives 2 and 3) falls outside of the legal Delta (City of Rio Vista 2011). The Secondary Zone is outside the Primary Zone and, although it is within the "legal Delta," it is not within the planning area of the Delta Protection Commission. The Ryde Avenue site (Alternative 4) is within the Secondary Zone. The Delta Protection Commission may comment on projects in the Primary Zone and on projects in the Secondary Zone that have the potential to affect the Primary Zone (Delta Protection Commission 2014).

A Management Plan for the Primary Zone was prepared and adopted by the Delta Protection Commission in 1995 and revised in 2002 and 2010. The Management Plan sets out findings, policies, and recommendations on the topics of environment, utilities and infrastructure, land use, agriculture, water recreation and access, levees, and marine patrol/boater education/safety programs. Refer to other chapters in this EIR/EIS for discussions of Management Plan goals and policies related to the Proposed Project (e.g., Chapter 7, *Biological Resources – Terrestrial*; Chapter 12, *Hydrology and Water Quality*; Chapter 16, *Public Services, Utilities, and Energy*; and Chapter 17, *Recreation*).

13.2.2 Local Laws, Regulations, and Policies

Rio Vista Army Base Reuse Plan

The Rio Vista Army Base Reuse Plan (Reuse Plan), prepared in 1998 and supplemented in 2001, established a vision for the reuse of the RVARC site, consistent with the conditions of the transfer of the former base from the Army to the City of Rio Vista (Economic & Planning Systems 1998). The main purpose of the Reuse Plan was to establish a range of future uses of the site upon which the Army could identify and carry out an appropriate level of hazardous materials remediation sufficient to protect those uses. The Reuse Plan served as a basis for the subsequently adopted General Plan designation and policies that pertain to the site.

The Reuse Plan proposed a public-private redevelopment project on the RVARC site that includes recreation uses available to the general public and visitor-serving uses oriented toward the river and the Delta. The Reuse Plan's preferred concept plan included the following uses:

- 21,000-square-foot multi-purpose community center with indoor hardwood courts, classrooms, and meeting rooms;
- Outdoor active recreation areas with three soccer fields or four ball fields, outdoor basketball courts, and four tennis courts;
- 2-acre Children's Delta Discovery Park with interactive activities and exhibits that teach children about the river and Delta environment;
- Riverfront promenade incorporating the existing wharf and a small public marina/cove with a few temporary berths for visitors;
- 50-room lodge/country inn retreat/conference center with meeting rooms for 100 persons, a small café/coffee shop, and a small retail shop, organized along the waterfront and around the marina/cove;
- 9,000-square-foot free-standing restaurant with some retail uses;
- Camping area and recreational vehicle park;
- Picnic area;
- 380 off-street parking spaces; and
- New street and water, sewer, and storm drainage infrastructure.

The Reuse Plan determined that, based on the cost of rehabilitation and their limited suitability for future uses, none of the buildings on the RVARC site should be retained or renovated. When the plan was prepared in 1998, no user of a marine research facility was identified as having the need or resources for a facility in Rio Vista. Additionally, dry-dock boat storage was deemed incompatible with the envisioned recreation uses.

The 2001 Supplemental Economic Analysis reevaluated the financial feasibility of a marine research facility, and compared the research facility to the lodge-retail-restaurant use recommended by the 1998 Reuse Plan in terms of jobs, city revenue, and economic multiplier effects. The 2001 supplemental analysis concluded that a research facility was a realistic project actively being planned by a consortium of state and federal agencies, was financially feasible, and would have substantially greater economic benefits than a lodge, which was determined to be infeasible at the time (City of Rio Vista 2011).

The Reuse Plan informed development of the Rio Vista Army Reserve Center Redevelopment Plan and EIR as well as the Army Base District Design Guidelines. Reuse Plan goals relevant to reuse of the RVARC site include the following:

Goal #1: Develop new, significant Citywide-serving recreation uses and amenities at the Army Base, consistent with the conveyance regulations for the Army Base.

Goal #2: Orient and integrate the reuse of the Army Base with the Sacramento River and Delta environment.

Goal #3: Encourage a public/private approach to redevelopment of the Army Base and implementation of the Reuse Plan.

Goal #4: Encourage redevelopment that allows for expansion of the City's economic base through the creation of new employment opportunities for local residents, new demand for local goods and services, and the attraction of new visitors to Rio Vista.

Goal #5: Ensure that the Army Base is conveyed to the City free of all environmental hazards, and that all toxics and other environmental problems have been remediated consistent with state and federal standards and the final Reuse Plan, and that the existing buildings, foundations, and the related asbestos are removed from the site.

Goal #6: Work with the Army to develop a remediation plan for the site that will be consistent with the Reuse Plan and take advantage of opportunities such as the creation of the public marina.

City of Rio Vista General Plan 2001

General Plan Land Use Designation

According to the City of Rio Vista General Plan 2001 (2002), the RVARC site is designated as Army Reserve Reuse Area (AB) Special District. The General Plan's Army Base Reuse Area Special District land use designation allows:

- 10 to 30 percent commercial recreation (e.g., lodge, marina);
- A range of active and passive recreation uses (sports fields, environmental/ discovery park, amphitheater, community/recreation center, swimming pool);
- Recreation-serving retail (restaurant, convenience mart, bait shop, sports equipment sales);
- Educational/institutional uses (Delta science and interpretive center, laboratories, riverine/environmental research facilities); and
- Multifamily residential (ancillary use only: limited to short-term occupancy for visiting officials, scholars, students, and faculty).

This land use designation allows a maximum floor area ratio (FAR) of 20-50 percent (0.2 to 0.5) for non-residential uses on site and an of 20 percent (0.2) for the district (City of Rio Vista 2002).

Relevant General Plan Goals and Policies

The following policies contained in the General Plan's Land Use Element are relevant to Alternatives 2 and 3:

Policy 4.1.A Growth shall provide a strong diversified economic base and a reasonable balance between employment and housing for all income ranges.

Policy 4.1.D The City shall accommodate projected population and employment growth in areas where the appropriate level of public infrastructure and services are planned or will be made available concurrent with development.

Policy 4.1.E The City shall ensure a comprehensive, logical growth process as areas develop, particularly where significant changes in land use are being considered.

Relevant goals and policies from the General Plan's Community Character and Design Element include the following:

Goal 5.1 To respect the character of the existing landform and the natural drainage patterns.

Policy 5.1.B The City shall ensure that natural creek beds and watercourses remain undisturbed for a minimum distance of 20 feet from the top of the bank.

Goal 5.2 To weave the natural features of Rio Vista into the urban fabric for public use.

Policy 5.2.A The City shall integrate natural gas well sites and transmission line easements into the public parks and open space system.

Policy 5.4.A The City shall require development projects to incorporate native habitat.

Policy 5.7.D The City shall require developers to create core commercial landmarks with the use of building features at key locations and the creation of central plazas and open space courtyards, which would provide an internal focus for any commercial or mixed-use project.

Policy 5.15.A The City shall ensure that all nonresidential buildings front on adjacent streets and create a pedestrian orientation wherever possible.

Policy 5.15.E Where nonresidential buildings are sited close to a residential area, the City shall ensure that their scale and character complement the adjacent neighborhood.

Goal 5.21 To ensure that reconstruction and new additions enhance rather than detract from the surrounding neighborhood.

Policy 7.1.A The City shall make every effort to attract new job-producing businesses that will maximize economic benefits to existing residents and businesses, and attract other businesses to Rio Vista.

> **Policy 7.1.C** The City shall investigate and use all feasible means of providing economic and other incentives to new businesses and business retention/expansions.

Rio Vista Zoning Ordinance

The zoning designation of the RVARC site is Army Base District. This district is intended to provide guidance for the development of the site and is intended to be a mix of public recreation, limited commercial activities that support recreational uses, and Delta research facilities. Permitted uses allowed in the Army Base District include a children's play area; fishing facilities and public river access to launch kayaks, canoes, and other small craft; interpretive center or multi-purpose community center; multi-use trail; picnic and seating areas; open space; riverfront promenade; water tower; and piers and wharves. Conditional uses allowed in the Army Base District include estuarine research station (including laboratories and offices); Delta science facilities, including conference center and education classrooms; Fish Technology Center (including fish refuge, research, and endangered fish propagation), dry-dock boat storage, in-water boat slips, docks, and boat ramp to support research uses; and vehicle and boat storage to support the listed conditional uses (City of Rio Vista 2014). Before development of these uses, a conditional use permit must be obtained from the City of Rio Vista's zoning administrator or planning commission.

Army Base District Design Guidelines

The City of Rio Vista's Army Base District Design Guidelines were developed to establish a planning and design framework that would lead to redevelopment of the RVARC in the best interests of the City of Rio Vista (MIG 2011). The Army Base District Design Guidelines are intended to provide guidance for development of recreational and recreation-supporting uses, consistent with the Army's condition of transfer of the property; to promote environmentally sustainable economic recovery from the base closure; and to preserve and take full advantage of the site's unique character and "sense of place" created by the adjacent Sacramento River and the riverfront complex of buildings, wharves, and mature trees (MIG 2011). This document contains both mandatory standards and non-mandatory guidelines, which indicate a preferred approach or outcome. The Standards and Guidelines are meant to supplement design criteria from the General Plan Community Character and Design Element, and are consistent with the mitigation measures contained in the Redevelopment Plan EIR (City of Rio Vista 2011).

City of Stockton 2035 General Plan

General Plan Land Use Designation

The Ryde Avenue site is designated as Commercial in the City of Stockton 2030 General Plan. This designation allows for retail, service, and commercial recreational uses; business, medical, and professional offices; residential uses; public and quasi-public uses; and other similar and compatible uses. The maximum FAR is 0.3. Outside the downtown area, up to 23 dwelling units per gross acre are permitted, and up to 29 dwelling units per net acre are permitted (City of Stockton 2007).

<u>RELEVANT GENERAL PLAN GOALS AND POLICIES</u>

The City of Stockton is amending its General Plan. The Land Use Element of the current General Plan contains the following goals and policies that are relevant to the Proposed Project (City of Stockton 2007):

Goal LU-4 To encourage commercial and mixed use commercial/housing development at locations that provide convenient neighborhood retail and services to existing and new housing areas, and that maximize regional shopping opportunities where their economic viability can be sustained.

Policy LU-4.1 *Commercial Revitalization*. The City shall encourage the upgrading, beautification, revitalization, and appropriate reuse of existing commercial areas and shopping centers.

Goal LU-5 To encourage, facilitate, and assist the location of new industry, and the expansion of existing industry.

Policy LU-5.3 *Parcel Assembly*. The City shall support the assembly of land for new industrial growth where the fragmentation of parcels and/or the limited size of existing parcels act as a deterrent to new industrial development.

Policy LU-5.5 *Compatible Land Use*. The City shall ensure an adequate separation between sensitive land uses (residential, educational, healthcare) and industrial land uses to minimize land use incompatibility associated noise, odors, and air pollutant emissions from industrial uses.

Policy LU-5.6 *Development Design*. The City shall require that industrial development incorporate landscaping and good design in accordance with Citywide Design Guidelines.

The following goal from the Economic Development Element is pertinent to land uses within the Proposed Project area:

Goal ED-1 To maintain a thriving business community that provides a sound tax base for the City, jobs for the local workforce, and commercial shopping opportunities for residents and visitors alike.

City of Stockton Zoning Ordinance

The Ryde Avenue site is zoned as Industrial-General (IG) and Industrial-Limited (IL) by the City of Stockton (City of Stockton 2014a). Allowable land uses within the IG Zoning District include light manufacturing, warehousing, bulk storage, offices, government and public utility buildings and structures, laboratories, and outdoor civic events conducted by nonprofit organizations, agricultural uses, and other uses (City of Stockton 2012). The IL District allows for similar uses as the IG District with the notable exception that heavy manufacturing is not permitted (City of Stockton 2014b). Land uses adjacent to the Ryde Avenue site on the north and east are zoned as Residential-Low Density, IL, and Residential-Medium Density.

13.3 Environmental Impacts

13.3.1 Methods of Analysis

The analysis of land use and planning considers the Proposed Project in the context of applicable land use policies, plans, and programs. Inconsistencies with land use policies are considered a significant impact only if those inconsistencies would result in significant adverse effects on the physical environment. Any such physical impacts on the environment that could result from inconsistency with land use plans or policies have been addressed in the other resource chapters (Chapters 5 through 12 and Chapters 14 through 19), not in this land use analysis. Consistency of each alternative with the laws, regulations, and policies identified in "Regulatory Setting" above is discussed in Impact LU-2.

13.3.2 Significance Criteria

An alternative would have a significant impact with regard to land use and planning if it would:

- Physically divide an established community;
- Conflict with an applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect; or
- Conflict with any applicable habitat conservation plan or natural community conservation plan.

The third criterion, regarding conflict with an applicable habitat conservation plan or natural community conservation plan, is addressed in Chapter 7, *Biological Resources – Terrestrial*, and Chapter 8, *Biological Resources – Aquatic*. As such, this criterion is not addressed further in this chapter.

13.3.3 Environmental Impacts and Mitigation Measures

Impact LU-1: Potential for the Project to Physically Divide an Established Community.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, the IEP activities would continue operating as under existing conditions. The DRS would not be built at the RVARC or Ryde Avenue site. As such, the No Project Alternative would result in **no impact** related to physical division of an established community.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As described in "Environmental Setting" above, the RVARC site is mostly vacant with the exception of buildings previously used to support military uses. Surrounding land uses include some residences, a U.S. Coast Guard station, Sandy Beach County Park and Campground, and the Sacramento River.

Under Alternative 2 (the Preferred Alternative), the DRS facilities would avoid affecting most of the existing facilities and structures on the site's lower terrace. Development of DRS facilities would represent a new use at the RVARC, but proposed uses would not displace any residents, represent any new land uses that are incompatible with surrounding uses, or physically divide the community. In addition, the DRS is considered a conditional use under the City of Rio Vista's zoning ordinance. Therefore, the impact related to physical division of an established community would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Similar to Alternative 2, construction and operation of Alternative 3 would occur within the RVARC site boundaries. Although this alternative would rehabilitate and reuse existing buildings on the site's lower terrace, the DRS facilities would be compatible with surrounding land uses. Construction and operation of Alternative 3 would not disrupt or divide an established community. Therefore, this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Construction and operation associated with Alternative 4 would occur within the Ryde Avenue site boundaries. The ERS and FTC would not displace any residential uses and would be consistent with the City of Stockton's General Plan land use designation and zoning ordinance. As such, the impact related to division of an established community would be **less than significant**.

Impact LU-2: Potential for the Project to Conflict with Applicable Land Use Plans, Policies, and Regulations.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, the DRS would not be developed. In the near term, the RVARC and Ryde Avenue sites would remain similar to existing conditions and, over the longer term, they could be subject to future development. Failing to develop the DRS at either site would not result in conflicts with applicable land use plans or policies adopted for the purpose of reducing or minimizing an environmental effect. As such, the No Project Alternative would have **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

State Lands Commission's Public Trust Doctrine

As described in "Regulatory Setting" above, the proposed marina and other in-water facilities associated with the DRS may be within the jurisdiction of the State Lands

Commission. Before construction of the DRS, DWR's contractor would coordinate with the State Lands Commission to determine whether the facilities would indeed be within State Lands Commission jurisdiction and whether a lease of state lands would be needed. Given that the in-water facilities would be used to support monitoring and research on the Bay–Delta's aquatic resources conducted by DWR and other tenants (including CDFW, which is also a state agency), Alternative 2 (the Preferred Alternative) would be consistent with the Public Trust Doctrine.

Delta Protection Commission Land Use and Resource Management Plan for the Primary Zone of the Delta

Other chapters throughout this Draft EIR/EIS describe resource-specific goals and policies relevant to Alternative 2 (the Preferred Alternative). See Chapter 7, *Biological Resources – Terrestrial;* Chapter 12, *Hydrology and Water Quality;* Chapter 16, *Public Services, Utilities, and Energy;* and Chapter 17, *Recreation*, for details. For the reasons described in those chapters and with implementation of appropriate mitigation measures and BMPs, Alternative 2 would be consistent with the primary mission of the Delta Protection Commission and would not conflict with the goals and policies of the Management Plan.

City of Rio Vista General Plan 2001

The Preferred Alternative would involve development of approximately 187,000 gross square feet of new buildings and structures at the RVARC site. This would result in a 0.3 FAR, which is consistent with the 0.2–0.5 FAR maximum development intensity for nonresidential uses at the site and the 0.5 FAR maximum development intensity allowed for individual future parcels at the site under the City of Rio Vista's General Plan. The DRS facilities would constitute laboratory and scientific research facilities, which are allowable uses according to the General Plan land use designation (AB Special District). On the whole, development of the DRS would be consistent with goals and policies in the City of Rio Vista General Plan. The Preferred Alternative would also be consistent with the City of Rio Vista General Plan's vision for enhancing Rio Vista's waterfront and creating and maintaining economic vitality.

Given that the DRS is in the conceptual design phase, consistency with many of the goals and policies from the General Plan's Community Character and Design Element cannot be evaluated and would require consideration in the advanced planning and design phase. Construction of the Preferred Alternative could result in short-term conflicts with policies pertaining to protection of natural resources, cultural resources, public health and safety, and other resources. However, implementation of mitigation measures described throughout this EIR/EIS would reduce any short-term inconsistencies with the aforementioned resources.

In conclusion, because development of the DRS would be consistent with goals and policies outlined in the City of Rio Vista General Plan, this impact would be less than significant.

City of Rio Vista Zoning Ordinance

The Preferred Alternative would be consistent with the site's ABD zoning district. While a variety of uses are permitted on the site, Delta research facilities are a conditional use allowed in the ABD, including an estuarine research station, fish technology center, dry boat storage, in-water boat slips, docks, and boat ramp. Accordingly, the contractor hired by DWR and USFWS would apply for and obtain a conditional use permit from the City of Rio Vista. Undeveloped portions of the RVARC site could be developed for other permitted uses. As such, no conflict with the City of Rio Vista's zoning ordinance would occur.

Rio Vista Army Base Reuse Plan

The Preferred Alternative would help fulfill the Rio Vista Army Base Reuse Plan's goals of integrating reuse of the site with the Sacramento River and Delta environment (Goal #2) and creating new employment opportunities and the new demand for local goods and services (Goal #4). This alternative would not preclude goals pertaining to recreation and public uses; undeveloped portions of the RVARC site would be available for future development that involves such uses, and portions of the DRS would be publicly accessible. As such, no conflict with the Rio Vista Army Base Reuse Plan would occur.

Army Base District Design Guidelines

Many of the design standards and guidelines relate to provision of public access along the waterfront. While the Preferred Alternative does not include public uses, other than repaving portions of the existing path along Beach Drive upon completing the entrances to the site, it does not preclude future addition of public uses at the site, and portions of the DRS would be publicly accessible. Further, by consolidating DRS development within the western and southern portions of the site, much of the lower terrace and the northern portion of the RVARC site would remain available for future development. The City of Rio Vista would have the opportunity to implement other public uses envisioned in the design standards and guidelines (e.g., riverfront access, picnic areas, landscaping, interpretive/education center) on these undeveloped portions of the site. The Preferred Alternative (Configuration 1) site layout (depicted in Figure 3-1 in Chapter 3, *Description of Alternatives*) is conceptual at this time, and the standards and guidelines would need to be considered further during the advanced planning and design phase to determine consistency. In addition, as described in Chapter 5, *Aesthetics,* Mitigation Measures AES-2a (Incorporate City of Rio Vista's Army Base District Design Standards and Guidelines) and AES-3a (Implement Rio Vista Army Base District Design Standards and Guidelines Related to Site Lighting) would require adherence to many of these standards and guidelines. When applying for a conditional use permit, the contractor(s) hired by DWR and USFWS would likely meet with City of Rio Vista staff to review preliminary plans and discuss consistency with applicable standards. Based on the current conceptual plans, the Preferred Alternative would be consistent with the ABD design standards and guidelines.

Conclusion

As described above, the Preferred Alternative (Alternative 2) would be consistent with applicable land use plans, policies, and regulations. There would be **no impact**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Similar to Alternative 2, Alternative 3 would be consistent with the State Lands Commission's Public Trust Doctrine, the Delta Protection Commission's Management Plan, the City of Rio Vista General Plan and zoning ordinance, and the Rio Vista Army Base Reuse Plan. Alternative 3 would involve approximately 187,000 gross square feet of development, resulting in a FAR of 0.24, which is consistent with the maximum development intensity established in the City of Rio Vista zoning ordinance for the ABD zoning district. Refer to the Alternative 2 discussion for more information.

With respect to the Rio Vista Army Base District Design Guidelines (MIG 2011), Alternative 3 would have more potential to result in inconsistencies with the design standards and guidelines than Alternative 2. Because the ERS and FTC facilities would encompass most of the RVARC site, including the lower terrace, the areas available for future development would be limited to 10 acres at the pad north of the PG&E easement and the southwestern portion of the site. While these undeveloped areas could be developed for some of the additional uses envisioned in the Rio Vista Army Base District Design Guidelines, the space limitations of Alternative 3 would likely substantially reduce options for recreation and commercial uses near the waterfront, public access to the waterfront, and tree and habitat preservation.

The Alternative 3 (Configuration 2) site layout (depicted in Figure 3-2 in Chapter 3, *Description of Alternatives*) is conceptual at this time, and the standards and guidelines would need to be considered further during the advanced planning and design phase to determine consistency. In addition, as described in Chapter 5, *Aesthetics,* Mitigation Measures AES-2a (Incorporate City of Rio Vista's Army Base District Design Standards and Guidelines) and AES-3a (Implement Rio Vista Army Base District Design Standards and Guidelines Related to Site Lighting) would require adherence to many of these standards and guidelines. When applying for a conditional use permit, the contractor(s) hired by DWR and USFWS would likely meet with City of Rio Vista staff to review preliminary plans and discuss consistency with applicable standards. However, based on the current layout, impacts would be significant even after implementation of mitigation.

Conclusion

Because this alternative would be inconsistent with several ABD design standards and guidelines, including those aimed at preserving healthy trees, wetlands, and riparian habitat on the site, this impact is considered potentially significant. DWR and USFWS have considered another alternative that would avoid such conflicts with the ABD design standards and guidelines (Alternative 2, the Preferred Alternative); no other feasible mitigation has been identified that would reduce the policy consistency conflicts of Alternative 3. Therefore, this impact would be **significant and unavoidable**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

California State Lands Commission's Public Trust Doctrine

Similar to Alternatives 2 and 3, Alternative 4 may encroach upon public trust lands as a result of marina construction. This alternative may require a public trust easement (lease of State lands) from the State Lands Commission. Refer to the Alternative 2 discussion above for additional details regarding consistency with the State Lands Commission's Public Trust Doctrine.

Delta Protection Commission Land Use and Resource Management Plan for the Primary Zone of the Delta

As previously described, Alternative 4 is within the Secondary Zone of the Delta. DRS facilities would be consistent with the overall mission of the Delta Protection Commission and would not conflict with any of the policies and recommendations of the Land Use and Resource Management Plan for the Primary Zone of the Delta.

City of Stockton 2035 General Plan

Alternative 4 would be consistent with the Ryde Avenue site's Commercial designation in the general plan as this designation permits professional office, public, and quasi-public uses. On the whole, this alternative would also be consistent with the City of Stockton's General Plan policies that promote economic development and job growth throughout Stockton.

City of Stockton Zoning Ordinance

This alternative would be consistent with the Ryde Avenue site's IG and IL zoning designations, which allow for warehousing, government and public utility buildings and structures, and laboratory uses.

Conclusion

As described above, Alternative 4 would be consistent with applicable land use plans and policies. This impact would be **less than significant**.

Chapter 14
Noise

This chapter describes the existing ambient noise environment in the area surrounding the RVARC site in Rio Vista and the Ryde Avenue site in Stockton, and also summarizes the applicable federal, state, and local regulations and policies for noise. The chapter focuses on potential noise impacts on the human environment resulting from construction and operation of the Proposed Project and its alternatives. Where significant impacts are identified, mitigation measures are proposed. Hydroacoustic effects on fish are addressed in Chapter 8, *Biological Resources – Aquatic.*

14.1 Environmental Setting

14.1.1 Acoustic Fundamentals

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound typically associated with human activity and that interferes with or disrupts normal activities. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, time of day, perceived importance of the noise, sensitivity of the individual, its appropriateness in the setting, and the type of activity during which the noise occurs.

Sound is a physical phenomenon consisting of vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the pitch of a sound and is measured in hertz (Hz), whereas intensity describes the loudness of sound and is measured in decibels (dB), using a logarithmic scale. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually as pain at still higher levels. The minimum change in the sound level of individual events that an average human ear can detect is approximately 3.0 dB. The average person perceives a change in sound level of approximately 10 dB as a doubling (or halving) of the sound's loudness; this relation holds true for sounds of any loudness. Sound levels of typical noise sources and environments are provided in **Figure 14-1**.

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet flyover at 1,000 feet		
	100	
Gas lawnmower at 3 feet		
	90	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawnmower at 100 feet	70	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60	
		Large business office
Quiet urban, daytime	50	Dishwasher in next room
Quiet urban, nighttime	40	Theater, large conference room (background)
Quiet suburban, nighttime		
	30	Library
Quiet rural, nighttime		Bedroom at night, concert hall (background)
	20	
		Broadcast/recording studio
	10	
	0	

Source: Caltrans "TeNS" document (Caltrans, 2009)

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Figure 14-1
Typical Noise Levels

Because of the logarithmic nature of the dB unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically; however, some simple rules are useful in dealing with sound levels. For example, if the intensity of a sound is doubled, the sound level increases by 3.0 dB, regardless of the initial sound level. Thus, by way of examples, 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB.

The frequency of a sound is a measure of how many times per second the crest of a sound pressure wave passes a fixed point. For example, when a drummer beats a drum, the skin of the drum vibrates a certain number of times per second. A particular tone that makes the drum skin vibrate 100 times per second generates a sound pressure wave that oscillates at 100 Hz, and this pressure oscillation is perceived as a tonal pitch of 100 Hz. Sound frequencies between 20 and 20,000 Hz are within the range of sensitivity of the best human ear.

Sound from a tuning fork (a pure tone) contains a single frequency; however, most sounds that one hears in the environment do not consist of a single frequency but a broad band of frequencies differing in sound levels. The method commonly used to quantify environmental sounds consists of evaluating all of a sound's frequencies according to a weighting system that reflects human hearing sensitivity as follows: less sensitive at low frequencies and extremely high frequencies, but better at mid-range frequencies (unsurprisingly, within the sound spectra usually associated with speech and music). This system is called "A" weighting, and the dB level measured is called the "A-weighted" sound level (dBA). In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter that corresponds to the dBA curve of frequency-dependent dB adjustments.

Although dBA might adequately indicate the level of environmental noise at any point in time, community noise levels vary continuously. Most environmental noise includes a conglomeration of noise from distant sources that creates a relatively steady background noise in which no particular source is identifiable. A single descriptor called the L_{eq} (equivalent sound level) is used. L_{eq} is the energy mean dBA during a measured time interval and is the "equivalent" constant sound level that would have to be produced by a given source to equal the fluctuating level measured.

In addition, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the L_{max} and L_{min} indicators, which represent the root mean square maximum and minimum obtainable noise levels during the monitoring interval. The L_{min} value obtained for a particular monitoring location is often called the "acoustic floor" for that location. Also useful is the L_X indicator, which provides the sound level that is exceeded for a cumulative X percent of a given measurement period. For example, an L_{90} value is often considered a good approximation of aggregate acoustical contribution from continuous sources of noise in an ambient outdoor level measurement because the level is exceeded ninety percent (90 percent) of the time over the measurement time period. The L_{50}, on the other hand, is often called the "median" sound level as it is exceeded over half of the time for a measurement period.

Another important noise descriptor is the day–night noise level, or L_{dn}. This value is calculated as the 24-hour L_{eq} value, except with a 10-dBA penalty for the noise that is measured during nighttime hours (10 p.m. to 7 a.m.) to emphasize the heightened sensitivity to noise at night, when most people are sleeping.

14.1.2 Rio Vista Army Reserve Center Site

The RVARC site is adjacent to the Delta Marina Yacht Harbor to the north and U.S. Coast Guard property to the south. The RVARC site and surrounding land uses are generally categorized as residential, rural, and recreational, with the exception of the Beach Drive Wastewater Treatment Facility south of the U.S. Coast Guard property. Residences are in various locations near the RVARC site.

Outdoor ambient sound-level measurements were conducted on February 17 and 18, 2015, to get a better understanding of the existing noise environment. Noise monitoring locations are listed below and shown in **Figure 14-2**. Measured sound levels and metrics recorded at each location are presented in **Table 14-2**, and photo logs are provided in **Appendix J** of this document.

The nearest sensitive receptor to the DRS facilities under Alternatives 2 and 3 would vary because of the different site configurations. The nearest sensitive noise receptor is approximately 440 feet from the nearest Proposed Project components under either alternative. **Table 14-1** presents the noise measurement locations and a brief description of the observed existing noise within the area.

Table 14-1. Description of Observed Noise Environment at Noise Measurement Sites - RVARC

Measurement ID	Description of Observed Noise Environment
LT-1	Long-term measurements (24 hours) taken at the western property boundary of the RVARC site along Beach Drive. Audible or witnessed noise sources during instrument setup comprised vocalizing birds, aircraft flyovers, rustling leaves from winds, children shouting/playing at nearby residence(s), vehicular traffic on Beach Drive, and distant vehicular traffic from SRs 12 and 160.
ST-1	Short-term measurements (15 minutes) taken at same site as and together with LT-1. Audible or witnessed noise sources during measurements comprised vocalizing birds, aircraft flyovers, rustling leaves from winds, vehicular traffic on Beach Drive, and distant vehicular traffic from SRs 12 and 160.
ST-2	Short-term measurements taken at the northernmost campsite (#6) of the Sandy Beach County Park campground south of the RVARC site. Audible or witnessed noise sources during measurements comprised vocalizing birds, vocalizing frogs, aircraft flyovers, rustling leaves from winds, human speech from nearby campsites, mechanical noise from the south and east, and distant vehicular traffic from SRs 12 and 160.
ST-3	Short-term measurements taken near the driveway of a residential receptor

Measurement ID	Description of Observed Noise Environment
	presumed to be occupied by an assigned Sandy Beach County Park ranger south of the RVARC site. Audible or witnessed noise sources during measurements comprised vocalizing birds, aircraft flyovers, rustling leaves from winds, mechanical noise from the southeast and south, metal-clanking noise from the USCG facility, intermittent and momentary sirens from the USCG facility, vehicular traffic on Beach Drive, and distant vehicular traffic from SRs 12 and 160.
ST-4	Short-term measurements taken near the driveway of a residential receptor at 780 Beach Drive north of the RVARC site. Audible or witnessed noise sources during measurements comprised vocalizing birds, vocalizing frogs, barking dogs, aircraft flyovers, children shouting/playing at nearby residence(s), rustling leaves from winds, distant mechanical noise to the south and northeast, vehicular traffic on Beach Drive, and distant vehicular traffic from SRs 12 and 160.

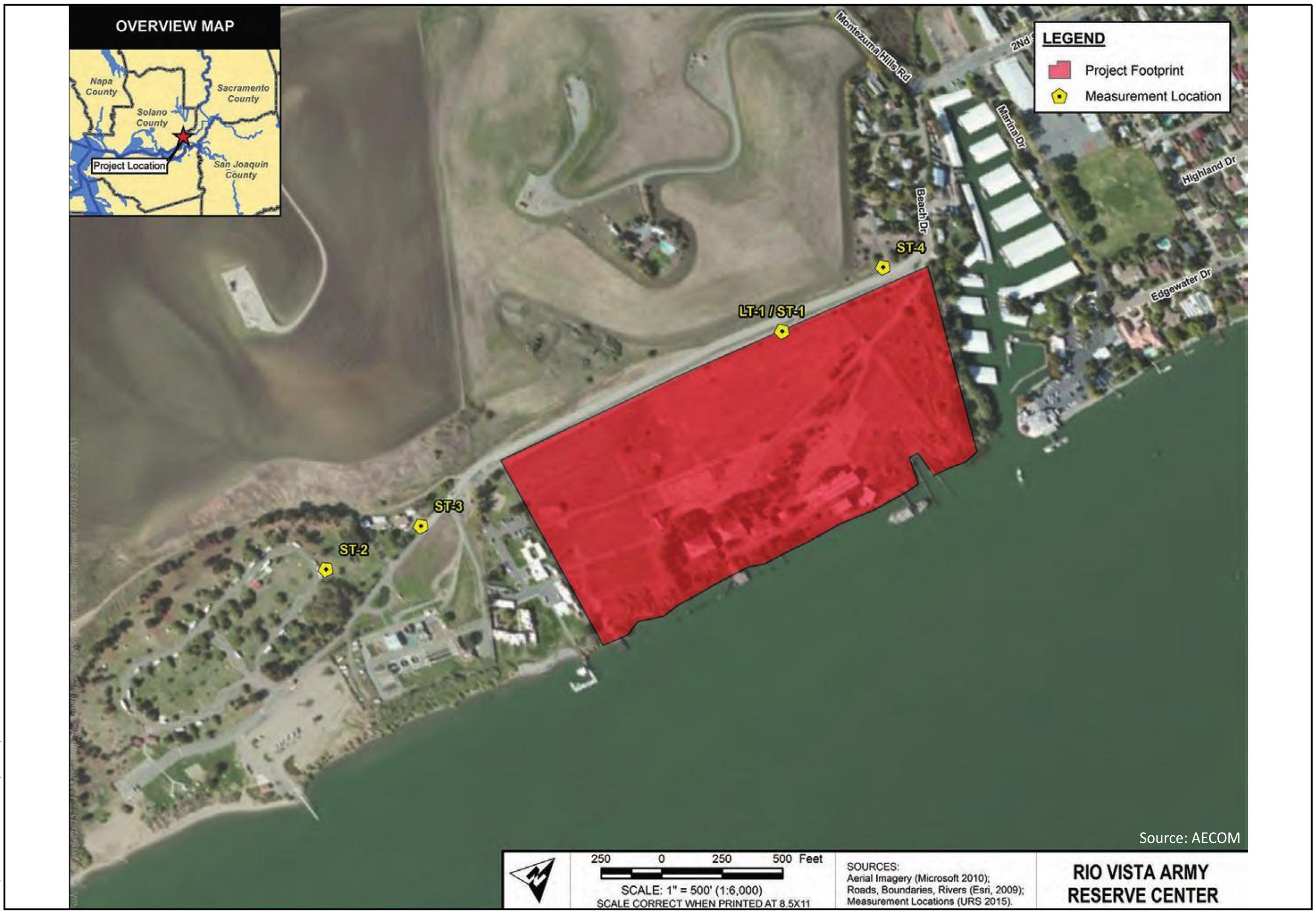

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Figure 14-2
Rio Vista Army Reserve Center Noise Measurement Locations

As indicated in **Table 14-2**, during daytime hours, noise levels in the area range from 45 to 57 dBA L_{eq}, while nighttime and evening noise levels range between 42 and 53 dBA L_{eq}.

Table 14-2. Measured Noise Levels at Monitoring Locations–RVARC Site

Measurement ID	Period	Date	Start - Stop	L_{eq}	L_{10}	L_{50}	L_{90}
LT-1	24 Hours	2/17/15-2/18/15	11:55 a.m.–11:55 a.m.	49	49	44	42
ST-1	Daytime	2/17/15	12:02 p.m.–12:17 p.m.	57	51	44	41
	Evening	2/17/15	9:26 p.m.–9:41 p.m.	44	46	44	42
	Night	2/17/15	10:43 p.m.–10:58 p.m.	42	44	42	41
ST-2	Daytime	2/17/15	12:48 p.m.–1:03 p.m.	45	46	44	42
	Evening	2/18/15	7:00 p.m.–7:15 p.m.	44	45	43	42
	Night	2/17/15	10:00 p.m.–10:15 p.m.	47	48	47	46
ST-3	Daytime	2/17/15	12:43 p.m.–12:57 p.m.	50	48	44	42
	Evening	2/18/15	7:03 p.m. - 7:18 p.m.	43	44	42	41
	Night	2/17/15	10:22 p.m.–10:37 p.m.	45	47	44	43
ST-4	Daytime	2/17/15	1:25 p.m.–1:40 p.m.	50	45	40	38
	Evening	2/18/15	7:26 p.m.–7:41 p.m.	53	48	43	42
	Night	2/17/15	10:47 p.m.–11:02 p.m.	42	43	41	40

Notes:
L_X = sound level (in A-weighted decibels [dBA]) exceeded for X percent of a given measurement period; L_{eq} = equivalent sound level; LT = long term; ST = short term;
Daytime = 7 a.m.–7 p.m.; Evening = 7 p.m.–10 p.m.; Night = 10 p.m.–7 a.m.

14.1.3 Ryde Avenue Site in Stockton

The Ryde Avenue site is located at 845 Ryde Avenue in Stockton within San Joaquin County. The site is adjacent to vacant land zoned for industrial uses to the east and west, and low to medium–density residential uses to the north. The Ryde Avenue site vicinity is generally categorized as industrial and residential. Residential homes are located solely north of the site.

Outdoor ambient sound level measurements were conducted on February 17 and 18, 2015, to provide a baseline of the existing noise environment. Noise monitoring locations and a summary of the observed noise environment at each location are summarized in **Table 14-3** and shown in **Figure 14-3**. Measured levels and metrics recorded at each location are presented in **Table 14-4**, and detailed noise measurement data and a photo log are provided in Appendix J. According to Figure 3-3, the nearest sensitive receptor would be approximately 100 feet from the nearest DRS components.

Table 14-3. Description of Observed Noise Environment at Noise Measurement Sites – Ryde Avenue Site

Measurement ID	Description of Observed Noise Environment
LT-1	Long-term measurements taken at the southern property boundary of 2635 West Fremont Street (City Gardens Mobile Home Park). Audible or witnessed noise sources during instrument setup comprised vocalizing birds, rustling leaves from winds, and vehicular traffic from Fremont Street and Interstate 5 (I-5). Receivers at this location recorded significant traffic noise from I-5 resulting from reflections caused by highway elevation and the reflective nature of the northern fence line surrounding the Ryde Avenue site.
ST-1	Short-term measurements taken in front of a multifamily residence at 2923 Monte Diablo Avenue northwest of the Ryde Avenue site. Audible or witnessed noise sources during measurements comprised vocalizing birds, barking dogs, aircraft flyovers, landscaping activities, human speech from nearby residences, rustling leaves from winds, vehicular traffic on Monte Diablo Avenue, and distant vehicular traffic from I-5.
ST-2	Short-term measurements taken on the southwest corner of an undeveloped residential lot at 2702 Monte Diablo Avenue along Ryde Avenue north of the Ryde Avenue site. Adjacent to this location is a commercial plaza (Pine Woods Plaza) with restaurants and a convenience store. Audible or witnessed noise sources during measurements comprised vocalizing birds, barking dogs, vehicular traffic from I-5, mechanical noise from the convenience store rear (presumed heating, ventilation, and air conditioning [HVAC] or refrigerator), and vehicular traffic on Monte Diablo Avenue and Ryde Avenue, and. These measurements was conducted only during daylight hours because of security concerns.
ST-3	Short-term measurements collocated with measurements LT-1 at the southern boundary of the City Gardens Mobile Home Park. Audible or witnessed noise sources during the measurements comprised vocalizing birds, barking dogs, distant jackhammering, rustling leaves from winds, and vehicular traffic from Fremont Street and I-5. Receivers at this location recorded significant traffic noise from I-5 at this location because of reflections caused by highway elevation and the reflective nature of the northern fence line surrounding the Ryde Avenue site. These measurements was conducted only during daylight hours because of security concerns.

Measurement ID	Description of Observed Noise Environment
ST-4	Short-term measurements taken near the front yard of 2319 W. Fremont Street north of the Ryde Avenue site. Audible or witnessed noise sources during measurements comprised vocalizing birds, barking dogs, and vehicular traffic from Fremont Street and I-5. Receivers at this location recorded significant traffic noise from I-5 because of reflections caused by highway elevation and the reflective nature of the northern fence line surrounding the Ryde Avenue site.

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Figure 14-3
Ryde Avenue Noise Measurement Locations

As indicated in Table 14-4, during daytime hours, noise levels in the area range from 58 to 63 dBA L_{eq}, while nighttime and evening measurements range between 49 and 61 dBA L_{eq}.

Table 14-4. Measured Noise Levels at Monitoring Locations – Ryde Avenue Site

Measurement ID	Period	Date	Start - Stop	L_{eq}	L_{10}	L_{50}	L_{90}
LT-1	24 Hours	2/17/15 - 2/18/15	10:45 a.m. - 10:45 a.m.	60	59	53	51
ST-1	Daytime	2/17/15	4:33 p.m. - 4:48 p.m.	58	60	49	45
	Evening	2/17/15	7:22 p.m. - 7:37 p.m.	52	53	45	43
	Night	2/18/15	5:30 a.m. - 5:45 a.m.	49	49	46	45
ST-2*	Daytime	2/17/15	4:54 p.m. - 5:09 p.m.	63	64	59	56
	Night	2/18/15	5:51 a.m. - 6:06 a.m.	59	59	57	55
ST-3*	Daytime	2/17/15	5:16 p.m. - 5:31 p.m.	59	61	55	53
ST-4	Daytime	2/17/15	5:38 p.m. - 5:53 p.m.	62	64	60	59
	Evening	2/17/15	7:43 p.m. - 7:58 p.m.	59	60	57	55
	Night	2/18/15	6:13 a.m. - 6:28 a.m.	61	61	60	58

*Evening and/or night time measurements were not conducted due to investigator safety concerns.

Notes:

L_X = sound level (in A-weighted decibels [dBA]) exceeded for X percent of a given measurement period; L_{eq} = equivalent sound level; LT = long term; ST = short term

Daytime = 7 a.m.-7 p.m.; Evening = 7 p.m.-10 p.m.; Night = 10 p.m.-7 a.m.

14.2 Regulatory Setting

14.2.1 Federal Laws, Regulations, and Policies

Noise Control Act (42 USC Chapter 4901, et seq.)

The Noise Control Act directs USEPA to develop noise-level guidelines that protect the population from the adverse effects of environmental noise (USEPA 1972). USEPA Levels Document Report 556/9-74-004 is a guideline that specifically addresses issues of community noise. This guideline, commonly referred to as the "levels document," contains goals for noise levels affecting residential land use of an L_{dn} less than 55 dBA for exterior levels and an L_{dn} less than 45 dBA for interior levels. The U.S. Department of Housing and Urban Development Noise Guidebook (Noise Guidebook) (2009), Chapter 2, Section 51.101(a)(8), also recommends that exterior areas of frequent human use follow the USEPA guideline of 55 L_{dn}; however, the same section of the Noise Guidebook indicates that a noise level of up to 65 dBA L_{dn} could be considered acceptable.

Occupational exposure to noise is regulated by Title 29 CFR Section 1910.95, Occupational Noise Exposure, which describes the requirements of an employer for implementing feasible administrative or engineering controls, providing personal protective equipment, and/or implementing a hearing conservation program to protect its employees against the effects of noise exposure when it exceeds an average of 90 dBA for an 8-hour period.

Federal Transit Administration Guidelines

The Federal Transit Administration (FTA) has published guidelines for assessing noise and vibration impacts for transit projects, including construction activity and operation (FTA 2006). Where no guidelines or standards are otherwise provided by the local jurisdiction to evaluate noise impacts, the FTA criteria would apply to the Proposed Project.

FTA has developed three "sensitive" land use categories to evaluate the compatibility of predicted noise levels, as described below.

- Category 1 includes land where quiet is an essential element, such as outdoor amphitheaters.
- Category 2 includes residences where people sleep.
- Category 3 includes institutional buildings where quiet is important, such as schools, libraries, and churches.

Categories 1 and 3 use the hourly L_{eq}, whereas Category 2 uses L_{dn}. Such criteria recognize the heightened community annoyance caused by late-night or early-morning operations, and respond to the varying sensitivities of communities to projects under different ambient noise conditions. The noise criteria are to be applied outside building locations for residential land use and at the property line for parks and other significant outdoor uses (FTA 2006). For residential land uses, the FTA "general assessment" daytime noise standard during construction is 90 dBA over a 1.0-hour period.

For vibration impacts, the FTA standard is 0.5-inch peak particle velocity (PPV) or a vibration level (L_V) of 102 vibration decibels (VdB) (FTA 2006) with respect to reinforced-concrete building damage risk. The Lv is used to assess impacts associated with damage to a building. For "non-engineered timber and masonry" structures, the threshold is only 0.2 PPV inch/second or 94 VdB. For assessing human annoyance, FTA guidance indicates 80 VdB for "infrequent" (i.e., less than 30 per day) vibration events.

14.2.2 State Laws, Regulations, and Policies

There are no relevant state regulations applicable to the Proposed Project with regard to noise.

14.2.3 Local Laws, Regulations, and Policies

City of Rio Vista General Plan 2001

The noise component of the Safety & Noise Element (dated July 18, 2002) from the City of Rio Vista General Plan 2001 outlines policies and implementing actions to protect Rio Vista residents from excessive noise levels that are annoying and detrimental to public health. The noise element provides guidance on transportation and airport, industrial, natural gas, and construction noise. General Plan Table 11-3 (presented below) provides the exterior limits from the Safety & Noise Element. The following goals and policies are relevant to the Proposed Project:

Goal 11.12 To protect noise-sensitive land uses from new noise-generating uses that would be incompatible with such sensitive receptors.

Policy 11.12.B The City shall require the appropriate noise attenuation measures to be included in the project design for proposed noise-sensitive uses in proximity to existing noise-producing uses, as needed, to be in compliance with the standards in [General Plan] Tables 11-2 and 11-3.

Policy 11.12.C Where noise attenuation is required to meet the standards of this element, an emphasis shall be placed on site planning and project design. These measures may include, but are not limited to, building orientation, setbacks, landscaping, and building construction practices.

Policy 11.12.G The City shall apply the standards in Table 11-3 to both new noise-sensitive land uses and new noise-generating uses, with the responsibility for noise mitigation placed on the new use. For example, if a developer proposed construction of a new apartment complex near an existing industry, the developer would be responsible for including appropriate noise mitigation in the project design to achieve compliance at the apartments with the standards in Table 11-3. Conversely, if a new industry were proposed near an existing apartment complex, the industry would be responsible for including appropriate noise mitigation in the project design to achieve compliance with the standards in Table 11-3 at the existing apartment building.

Goal 11.15 To minimize the nuisance of noise generated by construction activities.

Policy 11.15.A The City shall regulate construction noise to reduce impacts on adjacent uses consistent with Section 513 of the Zoning Ordinance (Noise Regulation).

Policy 11.15.B Noise associated with construction activities shall be exempt from the noise standards cited in [General Plan] Table 11-3.

Rio Vista General Plan Table 11-3. Noise Standards for New Uses Affected by Non-Transportation Noise, City of Rio Vista Noise Element

New Land Use	Outdoor Activity Area - L_{eq}		Interior – L_{eq}	
	Daytime	Nighttime	Day & Night	Notes
All residential	50	45	35	1, 2, 7, 8
Transient lodging	55	-	40	3
Hospitals and nursing homes	50	45	35	4,8
Theaters and auditoriums	-	-	35	
Churches, meeting halls, schools, and libraries	55	-	40	
Office buildings	55	-	45	5, 6
Commercial buildings	55	-	45	5, 6
Playgrounds and parks	65	-	-	6
Industry	65	65	50	5

Notes:

1. Outdoor activity areas for single-family residential uses are defined as back yards. For large parcels or residences with no clearly defined outdoor activity area, the standard shall be applicable within a 100-foot radius of the residence.
2. For multi-family residential uses, the exterior noise level standard shall be applied at the common outdoor recreation area, such as at pools, play areas, or tennis courts. Where such areas are not provided in multi-family residential uses, the standards shall be applied at individual patios and balconies of the development.
3. Outdoor activity areas of transient lodging facilities include swimming pool and picnic areas, and are not commonly used during night-time hours.
4. Hospitals are often noise-generating uses. The exterior noise level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.
5. Only the exterior spaces of these uses designated for employee or customer relaxation are considered sensitive to noise.
6. The outdoor activity areas of office, commercial, and park uses are not typically used during nighttime hours.

7. It may not be possible to achieve compliance with this standard at residential uses located immediately adjacent to loading dock areas of commercial uses while trucks are unloading. The daytime and night-time noise level standards applicable to loading docks shall be 55 and 50 dB Leq, respectively.
8. The City will apply noise performance standards as outlined in the policies of this Safety & Noise element to ensure that the noise generated from natural gas pipeline compressors is not intrusive for residents living near these sites. Adopting the recommendations of the State's Model Noise Control Ordinance for rural residential areas, the City will adopt a noise standard of not greater than 45 dBA at the residential property line. This higher-than-usual standard for outdoor noise accounts for the continual generation of "white noise" resulting from the compression in natural gas pipelines.

General Notes:

a. The Table 11-3 standards shall be reduced by 5 dB for sounds consisting primarily of speech or music and for recurring impulsive sounds.
b. If the existing ambient noise level exceeds the standards in Table 11-3, the noise level standards shall be increased at 5-dB increments to encompass the ambient level.

Policy 11.15.C The City shall limit construction activities to between the hours of 7 a.m. and 5 p.m. unless an exemption is received from the City to cover special circumstances.

Policy 11.15.D The City shall require all internal combustion engines used in conjunction with construction activities to be muffled according to the equipment manufacturer's requirements.

Rio Vista Municipal Code

The City of Rio Vista Municipal Code (Chapter 17.52, Noise Control) provides restrictions and regulations on various noise-generating activities including construction, airports, amplifications systems and natural gas operations. The Proposed Project would be subject to construction-activity restrictions, which prohibit construction activities from within 500 feet of residential areas between 7:00 p.m. and 7:00 a.m. and on Sundays.

City of Stockton 2035 General Plan

Chapter 11 (Health and Safety) of the City of Stockton General Plan 2035 includes noise regulations and standards. General Plan Table 11-1 (presented below) provides the maximum allowable ambient noise exposure by land use. The general plan also includes several policies that help plan and regulate potential noise impacts and disturbances among different types of land uses. Policies that are relevant to the Proposed Project are as follows:

Policy HS-2.1 *Sensitive Receptors*. The City shall prohibit the development of new commercial, industrial, or other noise-generating land uses adjacent to existing residential uses, and other sensitive noise receptors such as schools, health care facilities, and churches if noise levels are expected to exceed 70 dBA Community Noise Equivalent (CNEL) (decibels on A-weighted scale CNEL) measured at the property line of the noise sensitive land use.

Policy HS-2.10 *Construction Noise*. The City shall seek to limit the potential noise impacts of construction activities on surrounding land uses.

Policy HS-2.11 *Limiting Construction Activities*. The City shall limit construction activities to the hours of 7am to 7pm, Monday through Saturday. No construction shall occur on Sundays or national holidays without a written permit from the City.

Policy HS-2.13 *Noise Buffering*. The City shall require noise buffering or construction treatments (additional insulation, double paned glass, etc.) in new development that includes noise sensitive uses located near major streets, highways, the airport, railroad tracks, or other significant noise sources.

Stockton General Plan Table 11-1. Maximum Allowable Ambient Noise Exposure by Land Use (County Noise Standards)

Land Use Type	Noise Level (Ldn)						
	0-55	56-60	61-65	66-70	71-75	75-80	>80
Residential							
Hotels, Motels							
Schools, Libraries, Churches, Hospitals, Extended Care Facilities							
Auditoriums, Concern Halls, Amphitheaters							
Sports Arenas, Outdoor Spectator Sports							
Playgrounds, Neighborhood Parks							
Golf Courses, Riding Stables, Water Recreation, Cemeteries							
Office Buildings, Business Commercial, Professional							
Mining, Industrial, Manufacturing, Utilities, Agriculture							

	Normally acceptable: Specified land use is satisfactory, based on the assumption that any buildings involved are of normal, conventional construction, without any special noise insulation requirements.
	Conditionally acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed insulation features have been included in the design.
	Unacceptable: New construction or development should not be undertaken.

Note: If existing noise standards are currently exceeded, a proposed project shall not incrementally increase noise levels by more than 3 dBA.

Stockton Municipal Code

The City of Stockton Municipal Code (Municipal Code) Chapter 16.60 (Noise Standards) establishes standards to protect the health, safety, and welfare of those living and working in Stockton. The Municipal Code also helps to implement goals and policies of the General Plan noise element and comply with other state and local regulations such as the Federal Highway Administration (FHWA) and Caltrans.

According to the Municipal Code, construction, demolition, drilling, or repair work that generates disturbance across a residential property line is prohibited between 10:00 p.m. and 7:00 a.m., with the exception of emergency work or public service utilities work. The Proposed Project would be required to comply with the following Land Use–Related Noise Standards, which were established for commercial, industrial, or public facilities adjacent to any noise-sensitive uses or vacant residential, or open space zoning districts (stated in Table 3-7, Part II):

- L_{eq} Daytime (7:00 a.m.–10:00 p.m.): 55 dB
- L_{eq} Nighttime (10:00 p.m.–7:00 a.m.): 45 dB
- L_{max} Daytime (7:00 a.m.–10:00 p.m.): 75 dB
- L_{max} Nighttime (10:00 p.m.–7:00 a.m.): 65 dB

14.3 Environmental Impacts

14.3.1 Methods of Analysis

Impacts associated with construction of the Proposed Project were assessed by applying the FTA *Transit Noise and Vibration Impact Assessment* guideline methods (FTA Manual, Section 12.1, 2006). The general assessment methods presume that the two loudest pieces of construction equipment would operate simultaneously at the same location under full power.

For vibration impacts, no local thresholds or guidelines exist; therefore, the FTA Manual standards were used. For reinforced-concrete buildings, the FTA standards of 0.5 inch per second PPV or an L_V of 102 VdB (FTA 2006) were used to determine building damage risk due to construction vibration. For “non-engineered timber and masonry” structures, the vibration threshold is only 0.2 inch per second PPV or 94 VdB. For assessing human annoyance, FTA guidelines indicate 80 VdB for “infrequent” (i.e., less than 30 per day) vibration events. Vibration levels as a result of project construction were calculated at the approximated distances from the sensitive receptors to project components.

A quasi-qualitative approach was used for analyzing impacts associated with construction and operation of the Proposed Project. The qualitative analysis uses baseline noise measurement data presented in Sections 14.1.2 and 14.1.3, approximate distances to sensitive receptors, assumptions regarding Proposed Project components, and design requirements with respect to applicable noise regulations as defined in Section 14.2, “Regulatory Setting.”

The analysis of changes in roadway noise and potential impacts on noise-sensitive receivers near the Proposed Project relied on a study of changes in anticipated annual daily traffic (ADT) volumes. This approach is similar to the technique utilized for the Rio Vista Army Reserve Center Redevelopment Plan EIR (City of Rio Vista 2011). Assuming no change in the proportions of passenger vehicles, buses, and trucks between existing and existing-plus-project conditions, the change in acoustical contribution from road traffic noise was estimated by using the following expression:

$$\text{dBA Increment (or decrement)} = 10*\text{Log}(ADT_{exist} / ADT_{epp})$$

where ADT_{exist} is the existing annual daily traffic volume for the studied road segment and ADT_{epp} is the existing-plus-project ADT for the same road segment. A traffic noise increase of greater than 5 dBA assessed at a nearby noise-sensitive receiver (e.g., residence) was considered plainly detectable and a significant change. This approach is consistent with that used for the Redevelopment Plan EIR.

14.3.2 Significance Criteria

An alternative would have a significant noise impact if it would result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- Exposure of persons residing or working in the project area to excessive noise levels if located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport; or
- Exposure of persons residing or working in the project area to excessive noise levels, for a project within the vicinity of a private airstrip.

The RVARC site is located within approximately 4 miles of the Rio Vista Municipal Airport. There are no airports within the immediate vicinity of the Ryde Avenue site in Stockton. It is anticipated that there would be no impacts associated with airports or private airstrips; therefore, noise exposure from either of these source types is not discussed further in this chapter.

14.3.3 Environmental Impacts and Mitigation Measures

Impact NOI-1: Potential for Proposed Project Construction Activities to Expose Persons to a Temporary Increase in Ambient Noise Levels.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no construction activities; therefore, there would be no potential for increased ambient noise levels adjacent to sensitive land uses. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As indicated in Table 14-2, noise levels in the area during daytime hours range from 45 to 57 dBA, and during nighttime and evening hours from 42 to 53 dBA. The surrounding land uses are categorized as primarily agricultural and residential; residential land uses would be sensitive to short-term temporary increases in noise. The nearest noise-sensitive receptor in the vicinity is the park ranger's home at Sandy Beach County Park campground, which is located approximately 440 feet south of the RVARC property line.

Table 14-5 summarizes the anticipated land-based construction activities required for construction of the ERS and FTC facilities at the RVARC site.

6 summarizes the marina construction activities, duration, and equipment.

Table 14-5. Land-Based Construction Activities, Estimated Durations, and Associated Construction Equipment–Alternative 2

Phase	Duration	Alternative 2
Demolition	4 weeks	3 excavators, 2 rubber-tired dozers, 1 concrete/industrial saw
Site Preparation	2 weeks	4 tractors/loaders/backhoes, 3 rubber tired dozers
Grading	6 weeks	1 rubber-tired dozers, 2 tractors/loaders/backhoes, 1 grader, 2 excavators, 2 scrapers
Building Construction	60 weeks	1 crane, 3 forklifts, 3 tractors/loaders/backhoes, 1 welder, 1 generator set
Architectural Coating	4 weeks	1 air compressor
Paving	4 weeks	2 pavers, 2 rollers, 2 paving equipment

Table 14-6. Partially Excavated Marina Construction Activities, Estimated Durations, and Associated Construction Equipment–Alternative 2

Phase	Duration	Alternative 2
Demolition (In-water Structures Only)	16 weeks	Tug, crane barge, vibratory hammer, flat deck barge, work skiff
Pile Driving	5 weeks	Crane barge, impact pile hammer, flat deck barge, tug, work skiff
Float Installation	5 weeks	Crane (land based or barge mounted depending on dock delivery method), work skiff, generator, air compressor
Marina Excavation and Rock Slope Protection	12 weeks	Excavator, dozer, work skiff
Sheet Pile Installation	4 weeks	Land-based crane, vibratory hammer

Table 14-7 shows the noise levels of typical pieces of equipment that would be used during the different phases of construction. This analysis presumes that construction equipment could be located anywhere within the limits of the site. The two loudest pieces of equipment were used as a conservative approach for determining the highest noise levels that would be experienced at the sensitive receptor sites per FTA methods. It is anticipated that pile driving and the use of a scraper would generate the highest noise levels with reference levels of 101 dBA and 89 dBA, respectively. Using the park ranger's residence at 440 feet from the site as the nearest noise sensitive receptor, noise levels from construction activity would reach 82 dBA. This is presuming that pile driving for marina construction and grading work could occur simultaneously.

Table 14-7. Construction Equipment Noise Emissions Levels

Equipment	Typical Noise Level (dBA) 50 feet from Source
Air compressor	81
Backhoe	80
Compactor	82
Dozer	85
Grader	85
Loader	85
Paver	89
Pile Driver (Impact)	101
Roller	74
Tie Cutter	84
Truck	88
Scraper	89

Source: FTA 2006

The City of Rio Vista does not include specific noise standards for construction activities and does include exceptions for construction activity within the Municipal Code between 7:00 a.m. and 7:00 p.m. This analysis uses the FTA threshold of 90 dBA for sensitive receptors as the standard for determining construction impacts. With the use of pile driving equipment, noise at the nearest sensitive receptor would be well below the thresholds.

Despite the fact that noise would be below FTA thresholds and would not occur outside of the hours identified in the Municipal Code, given the current rural environment within the area, construction activity might cause annoyance within the area, specifically when pile drivers are being used. For this reason, the temporary increase in ambient noise levels associated with construction of the facility is considered substantial and a significant impact.

Implementation of **Mitigation Measure NOI-1 (Comply with Local Noise Regulations during Construction and Provide Advanced Notification to Nearby Residences)**, which includes standard noise measures that would reduce impacts on nearby residences would reduce impacts associated with construction of Alternative 2 to a level that is **less than significant with mitigation**.

Mitigation Measure NOI-1: Comply with Local Noise Regulations during Construction and Provide Advanced Notification to Nearby Residences (Alternative 2, 3, and 4)

DWR and USFWS or the contractor(s) shall notify residences within 0.25 mile of the construction site at least 1 week before the onset of noise-generating construction activities. In addition, DWR and USFWS shall require the contractor(s) to implement the following noise control measures to reduce impacts associated with construction:

- Best available noise control techniques (including mufflers, intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds) shall be used for all equipment and trucks to minimize construction noise impacts.
- If impact equipment (e.g., concrete/rock breaker, rock drill) is used during project construction, hydraulic- or electric-powered equipment shall be used to avoid the noise associated with compressed-air exhaust from pneumatically powered tools; however, where use of pneumatically powered tools is unavoidable, an exhaust muffler on the compressed-air exhaust shall be used (a muffler can lower noise levels from the exhaust by up to 10 dBA). External jackets on the tools themselves shall be used, which could achieve a reduction of 5.0 dBA. Quieter procedures, such as drilling or vibratory methods rather than impact equipment, shall be used.
- Stationary noise sources shall be located away from sensitive receptors. If the sources must be located near receptors, adequate muffling (with enclosures where appropriate) shall be used to ensure that performance standards are met. Enclosure openings or vents shall face away from

sensitive receptors. If any stationary equipment (pumps, ventilation fans, generators) is operated beyond the ordinance time limits, this equipment shall conform to the affected jurisdiction's noise limits.

- A project liaison shall be designated to be responsible for responding to noise complaints during construction. The name and phone number of the liaison shall be conspicuously posted at construction areas and on all advanced notifications. The liaison shall take steps to resolve complaints, including the arrangement of periodic noise monitoring, if necessary.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, construction activities and equipment used at the RVARC site would be similar to those under Alternative 2. It is anticipated that Alternative 3 would require a construction period that is approximately 1 month longer than that under Alternative 2. Similar to Alternative 2, pile driving is anticipated to generate the greatest noise source during construction. **Table 14-8 and Table 14-9** summarize the type of equipment that would be used and the estimated durations associated with each construction phase. Based on the site plan presented in Figure 3-2, during construction of the marina, there would be pile driving activity approximately 250 feet away from the closest residence located at 780 Beach Drive.

Despite the fact that noise levels would be below FTA thresholds and would not occur outside of the hours identified in the Municipal Code, given the current rural environment within the area, it is anticipated that although the thresholds established by FTA would not be exceeded, construction activity might cause annoyance within the area, specifically when pile drivers are being used. For this reason, the temporary increase in ambient noise levels associated with construction of the facility is considered substantial and a significant impact.

Implementation of Mitigation Measure NOI-1 would reduce impacts on nearby residences associated with construction of Alternative 3 to a level that is **less than significant with mitigation**.

Table 14-8. Land-Based Construction Activities, Estimated Durations, and Associated Construction Equipment–Alternative 3

Phase	Duration	Alternative 3
Demolition	4 weeks	3 excavators, 2 rubber-tired dozers, 1 concrete/industrial saw
Site Preparation	2 weeks	4 tractors/loaders/backhoes, 3 rubber-tired dozers
Grading	7 weeks	1 rubber-tired dozers, 2 tractors/loaders/backhoes, 1 grader, 2 excavators, 2 scrapers
Building Construction	74 weeks	1 crane, 3 forklifts, 3 tractors/loaders/backhoes, 1 welder, 1 generator set
Architectural Coating	4 weeks	1 air compressor

Phase	Duration	Alternative 3
Paving	4 weeks	2 pavers, 2 rollers, 2 paving equipment

Table 14-9. Off-Channel Marina Construction Activities, Estimated Durations, and Associated Construction Equipment–Alternative 3

Phase	Duration	Alternative 3
Excavation	22 weeks	Scrapers and dozers, excavator, work skiff
Pile Driving	4 weeks	Crane, impact pile hammer
Float installation	4 weeks	Crane, work skiff, generator, air compressor
Rock Slope Protection	1 week	Scrapers and dozers, excavator, work skiff
Basin Breach	1 week	Excavator, trucks for off-haul

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Construction activities and equipment used for Alternative 4 at the Ryde Avenue site in Stockton would be similar to those of both Alternatives 2 and 3. Pile driving would be required for construction of the marina. As compared with Alternatives 2 and 3, sensitive receptors are located closer to the footprint of Alternative 4 because nearby residences (City Gardens Mobile Home Park) are approximately 100 feet away (located north of Fremont Street).

Under this alternative, because residences are closer to the Alternative 4 footprint as compared with those of the other alternatives, impacts from both land-based and water-based activities from construction of ERS and FTC were calculated. **Table 14-10 and Table 14-11** summarize the type of equipment that would be used and the estimated durations of each construction phase.

Using the same methods as used for the previous alternatives, noise from two of the loudest pieces of equipment was calculated. **Table 14-12** shows the noise levels generated by both land-based construction activities (use of scraper and paver) and marina construction (use of pile driver and scraper). Marina construction would be 400 feet from the City Garden Mobile Home Park. Table 14-10 shows the noise levels at the two different distances. Noise levels would not exceed the FTA threshold of 90 dBA and construction activities would comply with local noise regulations.

Despite the fact that noise would be below FTA thresholds and would comply with the Municipal Code, it is anticipated that although the thresholds established by FTA would not be exceeded, construction activity might cause annoyance within the area. For this reason, the temporary increase in ambient noise levels associated with construction of the facility is considered substantial and a significant impact. Implementation of Mitigation Measure NOI-1 would reduce impacts on nearby residences associated with construction of Alternative 4 to a level that is **less than significant with mitigation**.

Table 14-10. Land-Based Construction Activities, Estimated Durations, and Associated Construction Equipment–Alternative 4

Phase	Duration	Alternative 4
Demolition	4 weeks	3 excavators, 2 rubber-tired dozers, 1 concrete/industrial saw
Site Preparation	2 weeks	4 tractors/loaders/backhoes, 3 rubber-tired dozers
Grading	6 weeks	1 rubber-tired dozers, 2 tractors/loaders/backhoes, 1 grader, 2 excavators, 2 scrapers
Building Construction	60 weeks	1 crane, 3 forklifts, 3 tractors/loaders/backhoes, 1 welder, 1 generator set
Architectural Coating	4 weeks	1 air compressor
Paving	4 weeks	2 pavers, 2 rollers, 2 paving equipment

Table 14-11. Off-Channel Marina Construction Activities, Estimated Durations, and Associated Construction Equipment – Alternative 4

Phase	Duration	Alternative 4
Excavation	26 weeks	Scrapers and dozers, excavator, work skiff
Pile Driving	4 weeks	Crane, impact pile hammer
Float Installation	4 weeks	Crane, work skiff, generator, air compressor
Rock Slope Protection	1 week	Scrapers and dozers, excavator, work skiff
Basin Breach	1 week	Excavator, trucks for off-haul

Table 14-12. Construction Activity, Associated Construction Equipment, and Estimated Noise Levels

Equipment	Noise Levels 100 Feet from Land Side Improvements	Noise Levels 400 Feet from Water Side Improvements
Scraper and Paver	86 dBA	–
Scraper and Pile Driver	–	83 dBA
Logarithmic Combination at Receiver	88 dBA	

Impact NOI-2: Potential for Project Construction to Expose Persons to Excessive Ground-borne Vibration or Ground-borne Noise Levels.

Table 14-13 shows the vibration levels associated with Proposed Project construction equipment that are expected to have the largest vibration source magnitudes (i.e., L_V at 25 feet reference distance from the indicated vibration source). Using an FTA manual algorithm, these reference vibration levels are used to predict L_V at the nearest sensitive receptor for each alternative.

The following analysis focuses on vibration impacts associated with pile driving in terms of annoyance and damage.

Table 14-13. Construction Equipment Vibration Levels

Equipment	Reference L_V (VdB)/PPV at 25 feet	Approximate L_V (VdB)/PPV		
		Alternative 2 Sensitive Receptors (440 feet)	Alternative 3 Sensitive Receptors (250 feet)	Alternative 4 Sensitive Receptors (400 feet)
Vibratory ("sonic") pile driver (upper)	105/0.73	68/0.009	75/0.0232	69/0.0115
Vibratory ("sonic") pile driver (typical)	93/0.17	56/0.0023	63/0.0054	57/0.0027

VdB = vibration decibels

Source: FTA 2006

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no construction activities; therefore, there would be **no impacts** related to construction-related vibration.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2, pile driving for marina construction would generate vibration. The park ranger's residence, located approximately 440 feet south of the RVARC site, is the nearest sensitive receptor. As shown in Table 14-13, predicted levels for annoyance would not be expected to exceed 68 VdB and 0.009 inch per second PPV, which is well below FTA thresholds of 94 VdB and 0.2 inch per second PPV; therefore, vibration impacts associated with Alternative 2 construction would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, the area where pile driving would take place would be approximately 250 feet from the ranger station. As shown in Table 14-13, predicted pile-driving vibration levels would not be expected to exceed 75 VdB and 0.023 inch per second PPV. Because these vibration levels are below FTA thresholds of 94 VdB and 0.2 inch per second PPV, vibration impacts associated with Alternative 3 would be **less than significant**.

Alternative 4: Ryde Avenue Site in Stockton

Under Alternative 4, impacts would be similar to those of Alternatives 2 and 3. The area where pile driving would take place would be located about 400 feet from the nearest residence on W. Fremont St. At 400 feet from the nearest sensitive receptor, pile-driving vibration levels would not be expected to exceed 69 VdB and 0.011 inch per second PPV. Because these vibration levels are below FTA thresholds of 94 VdB and 0.2 inch per second PPV, vibration impacts associated with Alternative 4 would be **less than significant**.

Impact NOI-3: Increase in Ambient Noise Levels in the Project Vicinity above Existing Conditions from Project Operations.

Alternative 1: No Project Alternative

Under Alternative 1, the DRS would not be built and there would be no long-term changes in ambient noise levels. There would be **no impact**.

Alternative 2: Rio Vista Army Reserve Center, Configuration 1

New buildings, parking areas, and a marina at the site would not be anticipated to generate new noise sources that would significantly alter the existing ambient noise environment for nearby sensitive receptors. Buildings that would be located at the northern portion of the RVARC site would also help shield nearby sensitive receptors from potential activities associated with research at the facilities.

During Proposed Project operations, landscaping and maintenance activities would include the use of mechanical equipment but would be temporary and occur during daytime hours. Mechanical equipment used for HVAC and pumps associated with storing and circulating water for FTC operations would incorporate standard noise control/sound abatement features. For example, equipment installed external to DRS buildings or on their rooftops (i.e., not within a penthouse or interior mechanical room but exposed to the outdoors) would feature typical factory-provided double-wall sound-insulated casings and sound-attenuated air intakes and discharges (e.g., with acoustical louvers), and/or would be installed behind solid screens or acoustical louvers so that noise from unit casings, intakes, and discharges would be linearly occluded (i.e., line of sight is blocked between the noise source and a nearby receiver offsite, meaning that the direct sound path would be attenuated through the barrier effect). Such sound-absorbing barriers or housings would not impede equipment performance or service access and would be designed and implemented to be less than 45 dBA L_{50} at the nearest residence to comply with the applicable City of Rio Vista noise limits. This 45-dBA L_{50} level is also comparable to the 41- to 47-dBA L_{50} range of measured nighttime levels presented in Table 14-2; hence, under Alternative 2, aggregate operational noise emission designed not to exceed this level would result in a detectable but less than a 5-dBA increase in the ambient nighttime noise level. The City of Rio Vista's daytime noise limit is 55 dBA L_{50} and, compared with nighttime limits, thus allows more equipment (or the same equipment operating at higher capacity levels) to operate in support of facility and research needs.

In conclusion, operational noise would comply with local noise ordinances and would not be anticipated to generate a substantial increase in ambient noise levels at the nearest sensitive receptor (approximately 400 feet away). The impact associated with temporary, periodic, or permanent increases above the existing ambient noise environment would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Operation of Alternative 3 would include the same noise-generating activities as described under Alternative 2. Although the configuration of the DRS facilities would be slightly different, operations would not be substantially different from those under Alternative 2. Operational noise impacts would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

The Ryde Avenue site is located in a more urban environment compared to Alternatives 2 and 3, but impacts would be similar. Noise control and sound abatement would be incorporated as part of the design of Alternative 4. As described in Section 14.2.3, outdoor noise emission goals would be 45 dBA L_{eq} at night and 55 dBA L_{eq} during the day per City of Stockton noise thresholds. This 45-dBA L_{eq} nighttime level is less than the 49-to 61-dBA L_{eq} range of measured nighttime levels presented in Table 14-4; therefore, the noise emissions from the operation of Alternative 4 would most likely result in an undetectable and less than 1-dBA increase in the ambient nighttime noise level. Impacts on noise levels associated with Alternative 4 would be **less than significant**.

Impact NOI-4: Increase in Ambient Noise Levels in the Project Vicinity above Existing Conditions due to Project-related Changes in Nearby Road Traffic.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the DRS would not be built and there would be no changes in ambient noise levels due to changes in nearby surface traffic relating to the Proposed Project. There would be **no impact**.

ALTERNATIVES 2 & 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 & 2

As described in Chapter 15, *Transportation and Traffic,* Section 15.4.3, the traffic study intersections were analyzed for Existing-Plus-Project conditions, which assumes no changes to land uses or to the transportation system within the study area other than implementation of Alternative 2 or 3. **Table 14-14** compares the Existing and Existing-Plus-Project daily traffic volumes and shows the Project-related increase in traffic noise for Alternatives 2 and 3. As shown, all study roadways are expected to experience a traffic noise increment less than dBA; this impact would be **less than significant**.

Table 14-14. Existing-Plus-Project Roadway Noise Increment Estimation, Rio Vista (Alternatives 2 and 3)

Roadway Segment	Number of Lanes, Type	Existing Average Daily Traffic (ADT)	Existing Plus Project Average Daily Traffic (ADT)	Change in Average Daily Traffic (ADT)	Estimated Traffic Noise Increment (dBA)
1. SR 12 West of Hillside Terrace	2, Arterial	18,210	18,529	319	0.1
2. SR 12 East of River Road (SR 84)	2, Arterial	18,980	19,259	279	0.1
3. Main Street between SR 12 and Front Street	2, Res. Collector	3,970	4,369	399	0.4
4. Front Street between North Front Street and Main Street	2, Res. Collector	4,190	4,549	359	0.4
5. 2nd Street between Main Street and St. Gertrudes Avenue	2, Res. Collector	1,510	2,069	559	1.4
6. 2nd Street between St. Gertrudes Avenue and Beach Drive	2, Res. Collector	1,030	1,708	678	2.2
7. Montezuma Hills Road South of Beach Drive	2, Res. Collector	650	650	0	0.0

Notes:
ADT = average daily traffic; dBA = A-weighted decibels; SR = State Route.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

As described in Chapter 15, Section 15.4.3, the study intersections were analyzed under Existing-Plus-Project conditions, which assumes no changes to land uses or to the transportation system within the study area other than implementation of Alternative 4. **Table 14-15** compares the Existing and Existing-Plus-Project daily traffic volumes and presents the Project-related increase in traffic noise for Alternative 4. As shown, all study roadways are expected to experience a traffic noise increment less than 3 dBA; this impact would be **less than significant**.

Table 14-15. Existing-Plus-Project Roadway Noise Increment Estimation, Stockton (Alternative 4)

Roadway Segment	Number of Lanes, Type	Existing Average Daily Traffic (ADT)	Existing Plus Project Average Daily Traffic (ADT)	Change in Average Daily Traffic (ADT)	Estimated Traffic Noise Increment (dBA)
1. Monte Diablo Avenue between Ryde Avenue and I-5 South Ramps	2, Collector	5,600	6,162	562	0.4
2. Ryde Avenue between Monte Diablo Avenue and Fremont Street	2, Collector	1,370	2,011	641	1.7
3. Fremont Street between Ryde Avenue and Queen Avenue	2, Collector	920	1,076	156	0.7
4. Fremont Street between Pershing Avenue and I-5 North Off-Ramp	2, Arterial	8,980	8,996	16	0.0
5. Pershing Avenue between Fremont Street and Park Avenue	4, Arterial	13,630	13,646	16	0.0

Notes:

ADT = average daily traffic; dBA = A-weighted decibels; SR = State Route.

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Chapter 15
Transportation and Traffic

15.1 Introduction

This chapter describes the environmental setting; regulatory context for transportation and traffic at the proposed ERS/FTC project sites; the potential project impacts related to transportation and traffic; and the measures that would be employed to avoid, reduce, or mitigate these impacts.

The following information was used to prepare this chapter:

- Conceptual site plans for the three action alternatives.
- Freeway ramp, freeway mainline segment, intersection, and roadway segment traffic count data collected by Fehr & Peers and Caltrans (see discussion below); and
- Intersection signal timings provided by Caltrans and the City of Stockton.

A description of key concepts and methods is provided below; this information provides the basis for the environmental setting.

15.1.1 Key Concepts and Methodology

Each study roadway facility was analyzed using the concept of Level of Service (LOS). LOS is a qualitative measure of traffic operating conditions whereby a letter grade, from A (the best) to F (the worst), is assigned. These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving. In general, LOS A represents free-flow conditions with no congestion, and LOS F represents severe congestion and delays under stop-and-go conditions.

Traffic operations at the study intersections were analyzed using procedures and methods contained in the Highway Capacity Manual (HCM) 2000 (Transportation Research Board [TRB] 2000) and the HCM 2010 (TRB 2010). All of the intersections in the study area were analyzed using the Synchro software package developed by Trafficware. **Table 15-1** displays the delay range associated with each LOS category for signalized and unsignalized intersections.

Table 15-1. Intersection Level of Service Definitions

Level of Service	Average Control Delay (Seconds per Vehicle)	
	Signalized	Unsignalized
A	0–10.0	0–10.0
B	10.1–20.0	10.1–15.0
C	20.1–35.0	15.1–25.0
D	35.1–55.0	25.1–35.0
E	55.1–80.0	35.1–50.0
F	>80.0	>50.0

Note: Control delay includes initial deceleration delay, queue move-up time, stopped delay, and acceleration delay.

Source: TRB 2000, 2010.

Where traffic from a project causes the operations of an unsignalized study intersection to decline from acceptable to unacceptable according to either the City of Rio Vista's or the City of Stockton's thresholds of significance, a signal warrant analysis is conducted to determine whether the installation of a traffic signal is warranted. A warrant describes a threshold condition based on average or normal conditions that, if found to be satisfied as part of an engineering study, shall result in analysis of other traffic conditions or factors to determine whether a traffic control device or other improvement is justified. The Peak Hour Signal Warrant from the California Manual on Uniform Traffic Control Devices (MUTCD) (Caltrans 2014a) is used to determine whether the installation of a traffic signal is warranted. The Peak Hour Signal Warrant accounts for traffic volume, area type, speed limit, roadway number of lanes, and minor-street vehicle delay.

Roadway segments were analyzed by comparing the average daily traffic volume to daily traffic volume thresholds that were developed based on information presented in HCM 2000. **Table 15-2** displays the daily traffic volume thresholds for roadway segments in Rio Vista (Alternatives 2 and 3). **Table 15-3** displays the daily traffic volume thresholds for roadway segments in Stockton (Alternative 4).

1 **Table 15-2**. Roadway Segment Daily Volume Thresholds, Rio Vista (Alternatives 2 and 3)

Facility Type	Number of Lanes	Daily Volume Thresholds				
		LOS7 A	LOS B	LOS C	LOS D	LOS E
Residential	2	600	1,200	2,000	3,000	4,500
Residential collector with driveways	2	1,600	3,200	4,800	6,400	8,000
Residential collector without driveways	2	6,000	7,200	8,000	9,000	10,000
Arterial – Low access control[1]	2	9,000	10,500	12,000	13,500	15,000
	4	18,000	21,000	24,000	27,000	30,000
	6	27,000	31,500	36,000	40,500	45,000
Arterial – Moderate access control[2]	2	10,800	12,600	14,400	16,200	18,000
	4	21,600	25,200	28,800	32,400	36,000
	6	32,400	37,800	43,200	48,600	54,000
Arterial – High access control[3]	2	12,000	14,000	16,200	18,000	20,000
	4	24,000	28,000	32,000	36,000	40,000
	6	36,000	42,000	48,000	54,000	60,000
Rural 2-lane roadway, paved shoulders[4]	2	2,200	4,300	7,100	12,200	20,000
Rural 2-lane roadway, no shoulders[5]	2	1,800	3,600	5,900	10,100	17,000
Rural 2-lane highway[6]	2	2,400	4,800	7,900	13,500	22,900

2 **Notes:**
3 Low access control roads generally have frequent driveways and speeds of 25–35 mph.
4 Moderate access control roads generally have limited driveways and speeds of 35–45 mph.
5 High access control roads generally have no driveways and speeds of 45–55 mph.
6 Assumed to consist of 24–36 feet of pavement with paved shoulders.
7 Assumed to consist of 24–36 feet of pavement with no paved shoulders.
8 Assumed to consist of 12-foot lanes, 6-foot shoulders, and 60-mph design speed.
9 LOS = Level of Service.
10 *Source: TRB 2000 and City of Rio Vista 2011.*

Table 15-3. Roadway Segment Daily Volume Thresholds, Stockton (Alternative 4)

Facility Type	Number of Lanes	Area Type	Daily Volume Thresholds				
			LOS A	LOS B	LOS C	LOS D	LOS E
Freeway	4	All Areas	27,600	45,200	63,600	77,400	86,400
	6	All Areas	41,400	67,800	95,400	116,100	129,600
	8	All Areas	55,200	90,400	127,200	154,800	172,800
	10	All Areas	69,000	113,000	159,000	193,500	216,000
Arterial	2	Existing	8,400	9,300	11,800	14,700	17,300
	2	New	10,000	11,100	14,000	17,500	20,600
	4	Existing	18,600	20,600	26,000	32,500	38,200
	4	New	23,300	25,800	32,600	40,700	47,900
	6	Existing	28,800	32,000	40,300	50,400	59,300
	6	New	33,300	37,000	46,600	58,300	68,600
	8	Existing	38,100	42,300	53,300	66,600	78,400
	8	New	41,100	45,700	57,600	72,000	84,700
Collector	2	Existing	6,400	7,100	9,000	11,300	13,200
	2	New	6,400	7,100	9,000	11,300	13,200
	4	Existing	17,600	19,600	24,700	30,900	36,300
	4	New	21,100	23,500	29,600	37,000	43,500

Notes: "Existing" roadways are those that have not been upgraded to current design guidelines, while new roadways have been upgraded.

LOS = level of service.

Source: Transportation Research Board 2000, City of Stockton 2007b.

Freeway operations were analyzed using the procedures and methods contained in HCM 2010 for basic freeway segments, ramp merge/diverge areas, and weaving sections. **Table 15-4** presents HCM 2010 LOS criteria for freeway mainline segments, freeway ramp junctions, and freeway weaving sections.

A merge area is a location where two or more traffic streams combine to form a single traffic stream, such as an on-ramp. A diverge area is a location where a single traffic stream divides to form two or more separate traffic streams, such as an off-ramp. When a freeway merge area (on-ramp) is closely followed by a diverge area (off-ramp), a weave section is created when the traffic streams to and from the ramps must cross each other.

Table 15-4. Freeway Level of Service Definitions

Level of Service	Density (Passenger Cars per Mile per Lane)		
	Basic Freeway Segments	Ramp Merge/Diverge	Weave
A	< 11	< 10	< 10
B	> 11–18	> 10–20	> 10–20
C	> 18–26	> 20–28	> 20–28
D	> 26–35	> 28–35	> 28–35
E	> 35–45	> 35	> 35
F	> 45 or any vd/c ratio > 1.00[1]	Demand exceeds capacity[2]	Demand exceeds capacity[2]

Notes:

vd/c = demand flow rate divided by the capacity of a given segment.

Occurs when freeway demand exceeds upstream (diverge) or downstream (merge) freeway segment capacity, or if off-ramp demand exceeds off-ramp capacity.

Source: TRB 2010, Exhibits 10-7, 13.2, and 12-10.

15.1.2 Traffic Counts

For the existing conditions analysis, counts of intersection turning movements during morning (AM, 7:00–9:00) and evening (PM, 4:00–6:00) peak periods were conducted by National Data and Surveying Services on Wednesday, November 12, 2014.

For the existing conditions analysis, daily roadway-segment counts were conducted by National Data and Surveying Services on Tuesday, January 27, 2015, and Wednesday, February 4, 2015.

On the count days, weather conditions were dry and local schools were in session, which are indicators that the counts were representative.

15.2 Environmental Setting

This section describes the environmental setting, which is the baseline scenario on which impacts associated with each alternative are evaluated. The baseline for this study represents conditions observed in November 2014. The environmental setting for transportation includes baseline descriptions for the roadway, transit, and bicycle/pedestrian systems.

15.2.1 Existing Roadway Network — Regional Access

Both sites considered in this analysis are located in the Central Valley of California. The regional setting relevant to transportation and transportation activities resulting from the alternatives includes trips to and/or through Solano, San Joaquin, Stanislaus, Sacramento, Yolo, and Contra Costa Counties. Facilities of regional significance to both sites are described below.

- I-5 is the primary highway of the West Coast, running from Blaine, Washington, south to San Ysidro, California. It passes within 0.25 mile of the Ryde Avenue Site in Stockton and provides access to both Stockton and Sacramento from the RVARC Site. The number of travel lanes fluctuates between four and eight, although there are most often four lanes between Sacramento and Stockton. There are six travel lanes at the I-5/SR 12 interchange (exit 485) and eight travel lanes at the I-5/Monte Diablo Avenue interchange in Stockton (exits 473 and 474A). The I-5 North Stockton Project is currently under construction and will convert mixed-flow lanes on I-5 to high-occupancy vehicle lanes between Charter Way and Country Club Boulevard.
- I-80 is a transcontinental highway that connects San Francisco, California, to Teaneck, New Jersey. Within the Central Valley, it connects San Francisco with Sacramento and continues northeast toward Reno, Nevada. The segment between the East Bay and Sacramento is generally six travel lanes, three in each direction. At its closest points to the two alternative sites, I-80 is approximately 20 miles northwest of Rio Vista and approximately 50 miles north of Stockton.
- SR 4 travels east from I-80 in the San Francisco Bay Area across the Central Valley to SR 89 in the Sierra Nevada. It is generally two travel lanes, but widens to three lanes—two travel lanes and a center turn lane—as it approaches Stockton. West of the I-5 interchange, SR 89 widens to four travel lanes with turning lanes on each side to access the interstate. East of the I-5 interchange, SR 4 has six to eight travel lanes. SR 4 passes through Stockton and is located approximately 15 miles south of Rio Vista.
- SR 12 travels east–west in Northern California between SR 49 near San Andreas and SR 116 in Sebastopol. It is known as the Rio Vista Highway from I-80 to SR 160. SR 12 is the major east–west regional access through the City of Rio Vista. It is approximately 1 mile north of the RVARC site. Throughout its length, SR 12 generally has two travel lanes. Within Rio Vista there is a center turn lane between Drouin Drive and Front Street, just before the bridge over the Sacramento River. SR 12 passes approximately 15 miles north of Stockton.
- SR 84 has two sections. The relevant section is a north–south roadway between SR 12 in Rio Vista and I-80 in West Sacramento. North of Rio Vista, a ferry is used to cross the Sacramento River onto Ryer's Island. The SR 84/SR 12 intersection is approximately 1 mile from the RVARC site. SR 84 generally has two travel lanes except for its most northern section between Marshall Road in West Sacramento and I-80 where it widens to four travel lanes.
- SR 99 is a north–south highway that runs the length of the Central Valley from SR 36 near Red Bluff to I-5 near Wheeler Ridge. Between Sacramento and Stockton. SR 99 runs parallel to I-5 a few miles to the east, and provides north–south access to the east side of Stockton. The number of travel lanes varies between four and eight. Between Sacramento and Stockton, SR 99 has two travel lanes in each direction with a planted median.

- SR 113 is a relatively short (60 miles) north–south route that connects SR 12 10 miles west of Rio Vista to I-80 in Dixon. Its entire route is two travel lanes, with some additional turning lanes at its southern terminus.
- SR 160 has two sections. The relevant section runs north–south between Sacramento and SR 4 in Antioch. SR 160 is a scenic and winding route between Rio Vista and Sacramento, and connects with SR 12 across the Sacramento River from Rio Vista. It is generally two travel lanes north of the San Joaquin River.

In addition to the roadway network, there are rail and waterways of regional significance. Water routes used for shipping freight include the Bay–Delta, Sacramento DWSC, and the Stockton DWSC. The Amtrak passenger rail passes through Stockton, providing access to Sacramento, San Francisco, and other locations throughout California and the U.S. Amtrak has an existing station in Suisun City (at Main Street) and plans to build a station in Fairfield/Vacaville (at Peabody/Vanden/Manual Campos Roads). Railroads used for shipping freight in this region include the Union Pacific Railroad and the Burlington Northern and Santa Fe Railway.

15.2.2 Rio Vista Army Reserve Center Site

The RVARC site (Alternatives 2 and 3) is located east of Beach Drive in Rio Vista. Regional access to the RVARC site would be provided from 2nd Street, Main Street, and Front Street, which provide connectivity to SR 12 through Rio Vista. Access to the site would be off of Beach Drive.

Existing Roadway Network — Local Access

- **Front Street** is a two-lane local roadway north of the project site. On-street parking is allowed on the majority of the street. Front Street runs between SR 12 to the north and Hamilton Avenue to the south. This is a route for trips to the Proposed Project site coming from SR 12.
- **Main Street** is a two-lane local roadway north of the Proposed Project site that runs from a northwestern terminus with SR 12, southeast through downtown to the Sacramento River. Main Street has parallel parking between SR 12 and 5th Street and angled parking east of 5th Street on both sides of the street. Main Street is a route for trips between the Proposed Project site and SR 12, and provides access to 2nd Street, which connects with Beach Drive and the Proposed Project access point.
- **2nd Street** is a two-lane local roadway running north–south through Rio Vista. On-street parking is permitted. It is the primary route connecting the streets south of Rio Vista to both downtown and SR 12. Trips to and from the Proposed Project site would use 2nd Street to access either Main Street or Front Street.

Study Area

The study area shown in **Figure 15-1** was selected based on the Proposed Project's expected travel characteristics (i.e., location and amount of trips), as well as the facilities susceptible to being affected by the ERS and FTC. The following is a list of intersections, roadway segments, and freeway facilities selected for analysis.

STUDY INTERSECTIONS

1. SR 12/Main Street
2. SR 12/North Front Street/River Road
3. North Front Street/North Front Street
4. Main Street/2nd Street
5. Main Street/Front Street
6. Bruning Avenue/2nd Street
7. St. Gertrude’s Avenue/2nd Street
8. Montezuma Hills Road/2nd Street/Beach Drive

STUDY ROADWAY SEGMENTS

1. SR 12 west of Hillside Terrace
2. SR 12 east of River Road (SR 84)
3. Main Street between SR 12 and Front Street
4. Front Street between North Front Street and Main Street
5. 2nd Street between Main Street and St. Gertrudes Avenue
6. 2nd Street between St. Gertrudes Avenue and Beach Drive
7. Montezuma Hills Road south of Beach Drive

STUDY FREEWAY FACILITIES

There are no study freeway facilities associated with the RVARC site.

Transit System

Public transportation is provided in Rio Vista in the form of the Delta Breeze transit system, a deviated fixed-route bus service. Deviated fixed-route service operates along a fixed route and keeps to a timetable, but the vehicle can deviate from the route to go to a specific location (such as a house or employment site). It takes passengers to destinations within the City of Rio Vista and among Rio Vista, Isleton, Fairfield, Suisun City, Pittsburg/Bay Point BART, and Antioch.

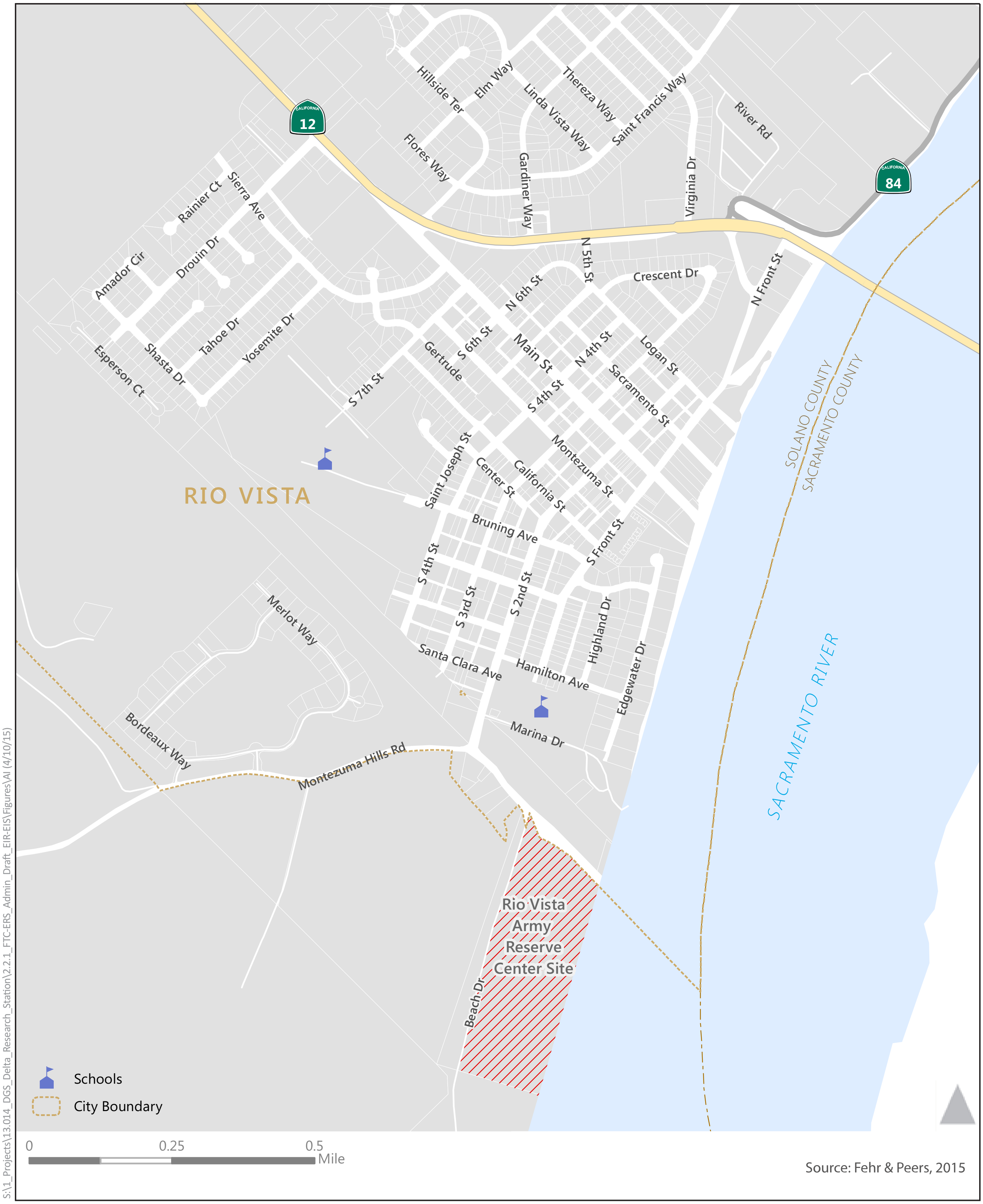

Figure 15-1

Horizon WATER and ENVIRONMENT

Alternatives 2 and 3
Study Area & Existing Roadway Facilities
Rio Vista

Bicycle and Pedestrian System

Few of the roadways in the RVARC study area have bicycle accommodations, such as bike lanes or bike paths. There is only a short segment of bike lanes along Front Street south of SR 12 and another short segment along the Sacramento River south of SR 12; however, bicycle facilities are proposed throughout Rio Vista in the Solano Countywide Bicycle Transportation Plan, as shown in **Figure 15-2**. Most of the streets in the study area have sidewalks on both sides, with the exception of SR 12 and Front Street, which have segments of sidewalk on only one side of the street.

Truck Routes

SR 12 through Rio Vista is designated as a State Terminal Access truck route under the National Network for Service Transportation Assistance Act (STAA) of 1982. This is the only designated truck route in the study area.

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Figure 15-2

Alternatives 2 and 3
Existing & Proposed Bicycle Facilities
Rio Vista

Existing Levels of Service

Figure 15-3 shows existing peak-hour traffic volumes and lane configurations at study area intersections in Rio Vista. **Table 15-5** summarizes the existing peak-hour intersection operations at the study area intersections in Rio Vista. As shown, all study area intersections operate with an average LOS of C or better.

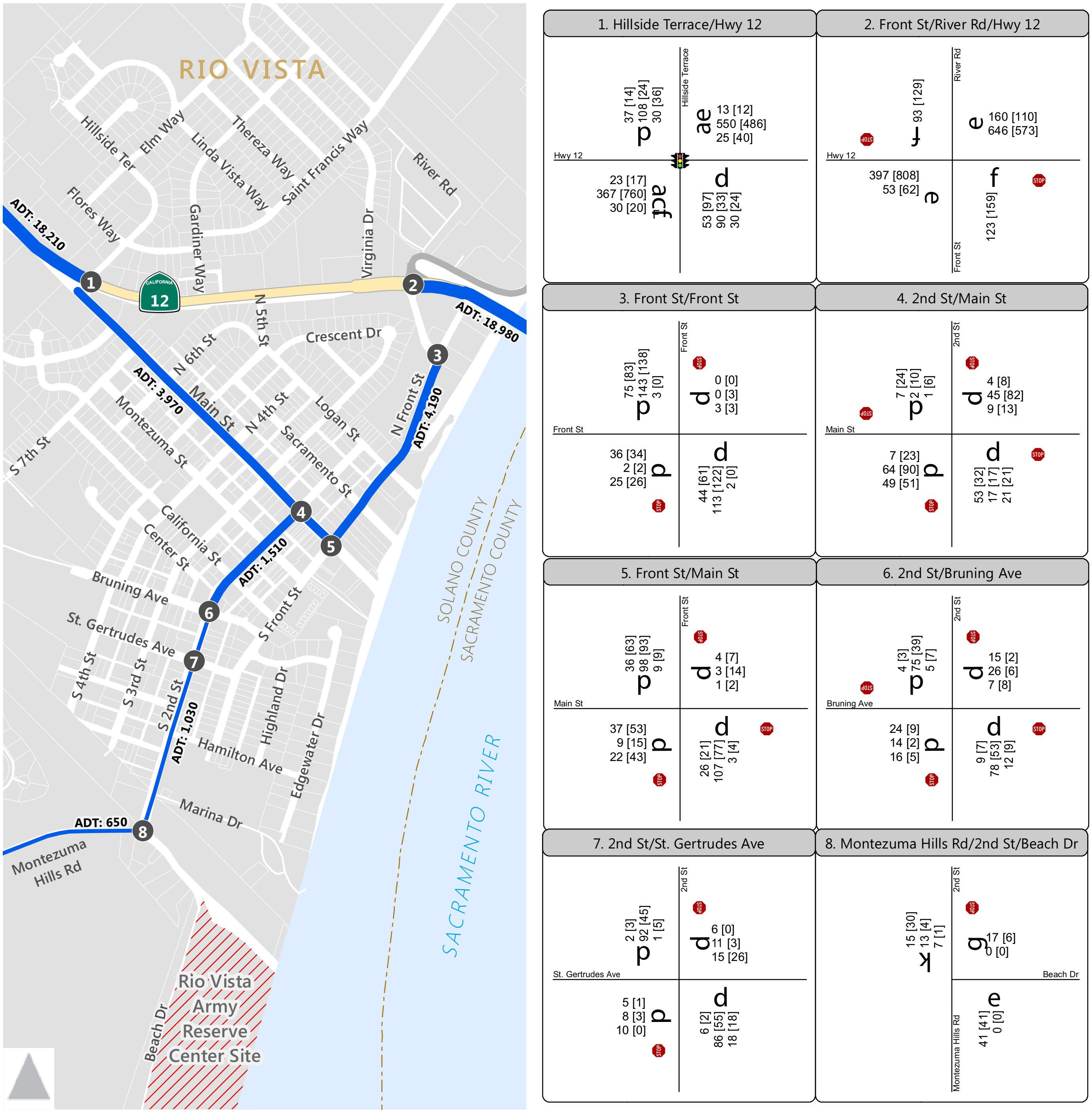
Table 15-5. Existing Delay/Level of Service, Rio Vista

Intersection	Control	Peak Hours	Delay (Seconds)	Level of Service
1. SR 12/Main Street	Traffic Signal	AM PM	10.5 10.4	B B
2. SR 12/North Front Street/River Road	Side-Street Stop	AM PM	2.3 (15.2) 3.6 (24.9)	A (C) A (C)
3. North Front Street/Front Street	Side-Street Stop	AM PM	2.6 (12.9) 2.7 (13)	A (B) A (B)
4. Main Street/2nd Street	All-Way Stop	AM PM	8.3 8.6	A A
5. Main Street/Front Street	All-Way Stop	AM PM	8.7 8.3	A A
6. Bruning Avenue/2nd Street	All-Way Stop	AM PM	8.4 7.5	A A
7. St. Gertrudes Avenue/2nd Street	Side-Street Stop	AM PM	2.6 (11.8) 2.3 (9.8)	A (B) A (A)
8. Montezuma Hills Road/2nd Street/Beach Drive	Side-Street Stop	AM PM	1.6 (8.9) 0.6 (8.6)	A (A) A (A)

Notes:

For side street–stop intersections, the average delay is reported with worst approach or movement in parentheses.

AM = morning (7:00–9:00 a.m.); PM = evening (4:00–6:00 p.m.); SR = State Route



Average Daily Traffic Volume (ADT)

650 - 1,500

1,501 - 6,000

6,001 - 18,980

#	Intersection Locations
a	Turn Lane
AM [PM]	Peak Hour Traffic Volume
	Traffic Signal
STOP	Stop Sign

Source: Fehr & Peers, 2015

Figure 15-3

Horizon WATER and ENVIRONMENT

Alternatives 2 and 3
Peak Hour Traffic Volumes & Lane Configurations
Existing Conditions
Rio Vista

Table 15-6 summarizes the existing daily traffic volumes and the corresponding LOS according to the thresholds shown in Table 15-2. As shown, all study area roadway segments currently operate at LOS C or better with the exception of SR 12, which operates at LOS F.

Table 15-6. Existing Roadway Capacity Utilization, Rio Vista

Road Segment	Existing Conditions			
	Number of Lanes	Type	Average Daily Traffic	LOS
1. SR 12 west of Hillside Terrace	2	Arterial	**18,210**	**F**
2. SR 12 east of River Road (SR 84)	2	Arterial	**18,980**	**F**
3. Main Street between SR 12 and Front Street	2	Res. Collector	3,970	A
4. Front Street between North Front Street and Main Street	2	Res. Collector	4,190	C
5. 2nd Street between Main Street and St. Gertrudes Avenue	2	Res. Collector	1,510	A
6. 2nd Street between St. Gertrudes Avenue and Beach Drive	2	Res. Collector	1,030	A
7. Montezuma Hills Road south of Beach Drive	2	Res. Collector	650	A

Notes:

The arterials are presumed to have moderate access control, Front Street, 2nd Street, and Montezuma Hills Road are presumed to be residential collectors with driveways, Main Street is considered to be a residential collector without driveways as described in Table 15-2.

Boldface type indicates unacceptable level of service.

SR = State Route

15.2.3 Ryde Avenue Site

The Ryde Avenue site (Alternative 4) is located south of West Fremont Street near its intersection with Ryde Avenue. Regional access to the Ryde Avenue site would be provided from Monte Diablo Avenue, West Fremont Street, and Pershing Avenue, all of which have interchanges with I-5. Access to the site would be from West Fremont Street.

Existing Roadway Network — Local Access

- **Ryde Avenue** is a two-lane local roadway running north from the Proposed Project site to Smith Canal. It is identified as an arterial in the Stockton General Plan. There is no on-street parking. Ryde Avenue intersects Monte Diablo Avenue, which carries trips between the site and I-5.
- **Monte Diablo Avenue** is a two-lane arterial that runs east–west from the Haggin Museum to Atherton Island on the San Joaquin River. It provides access to both I-5 northbound and I-5 southbound. There is on-street parallel parking on both sides of the street.

- **Fremont Street** is minor arterial with two travel lanes. There are additional turning lanes where it intersects Pershing Avenue and the I-5 ramps. From its western terminus at Ryde Avenue, it proceeds east underneath I-5 towards downtown Stockton. East of SR 99, Fremont Street becomes SR 26. It provides access to the Ryde Avenue site in Stockton, connecting to I-5 south of the site. On-street parking is allowed on both sides of the street.
- **Pershing Avenue** is an arterial running north–south from Thornton Road to Fremont Street just south of I-5. It generally has four travel lanes, but some segments feature a center turn lane. On-street parking is allowed on the west side within certain segments, such as the bock between Argonne Drive and Picardy Drive adjacent to the Haggin Museum. Pershing Avenue provides access to the I-5 northbound on- and off-ramps.

Study Area

The study area shown in **Figure 15-4** was selected based on the Proposed Project's expected travel characteristics (i.e., location and amount of trips) as well as facilities susceptible to being affected by the ERS and FTC. The following is a list of intersections, roadway segments, and freeway facilities that were selected for analysis.

STUDY INTERSECTIONS

1. Ryde Avenue/Monte Diablo Avenue
2. Monte Diablo Avenue/I-5 southbound ramps
3. Monte Diablo Avenue/I-5 northbound on-ramp
4. Monte Diablo Avenue/I-5 northbound off-ramp
5. West Fremont Street/I-5 southbound ramps
6. West Fremont Street/Pershing Avenue

STUDY ROADWAY SEGMENTS

1. Monte Diablo Avenue east of Ryde Avenue
2. Ryde Avenue south of Monte Diablo Avenue
3. Fremont Street east of Ryde Avenue
4. Fremont Street east of Pershing Avenue
5. Pershing Avenue north of Fremont Street

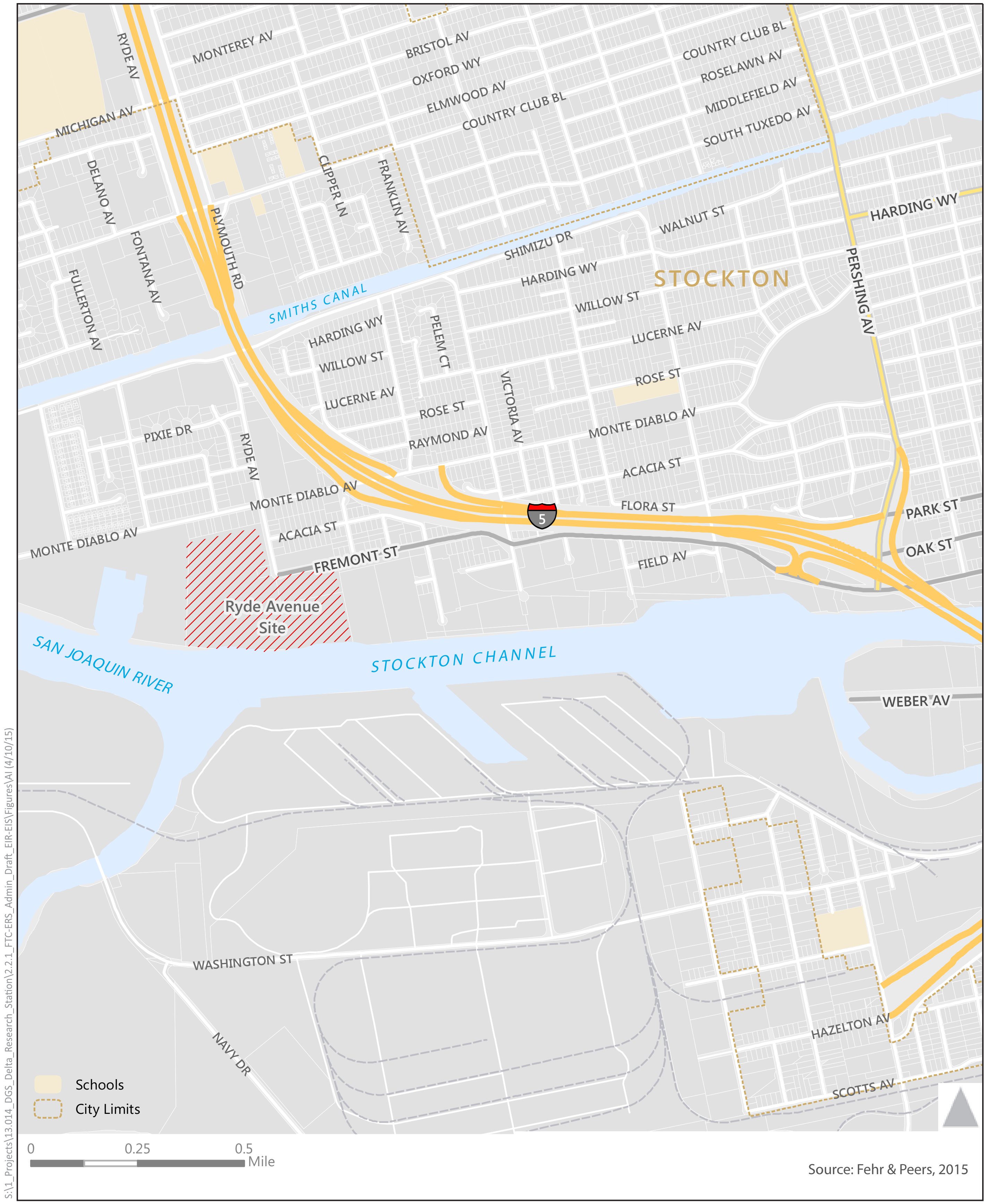


Figure 15-4

Horizon WATER and ENVIRONMENT

Alternative 4
Study Area & Existing Roadway Facilities
Stockton

STUDY FREEWAY FACILITIES

1. I-5 north of Monte Diablo Avenue
2. I-5 between Monte Diablo Avenue and West Fremont Street/North Pershing Avenue
3. I-5 south of Monte Diablo Avenue and West Fremont Street/North Pershing Avenue
4. I-5 at the Monte Diablo Avenue ramps
5. I-5 at the West Fremont Street ramps
6. I-5 at the North Pershing Avenue ramps

Transit System

The San Joaquin Regional Transit District (RTD) provides public transit service in the study area, including one bus route, Route 60, within the vicinity of the Proposed Project site. This route has two stops in the study area, one near the Monte Diablo Avenue/Ryde Avenue intersection (0.1 mile from Proposed Project site) and another near the Fremont Street/ Pershing Avenue intersection (0.9 mile from Proposed Project site). Posted signs mark the stops in the study area. Some stops include a bench located on the sidewalk. **Figure 15-5** shows the location of existing RTD routes near the study area.

Bicycle and Pedestrian System

None of the roadways in the Ryde Avenue site study area have bicycle accommodations, such as bike lanes or bike baths. The City of Stockton Bicycle Master Plan (2007a) proposes two facilities in the study area: a bike route on Monte Diablo Avenue and a bike path along the north shore of the San Joaquin River. **Figure 15-6** shows existing and proposed bicycle accommodation in Stockton. The sidewalk facilities in the study area vary. Sidewalks have been constructed on some segments of Ryde Avenue but not others. Monte Diablo Avenue has sidewalks on at least one side of the street throughout the study area. No sidewalks have been constructed on Fremont Street near the project site's proposed access locations; however, a sidewalk has been constructed on at least one side of the street between Wilshire Street and Pershing Avenue. Pershing Avenue has sidewalks on both sides of the street throughout the study area.

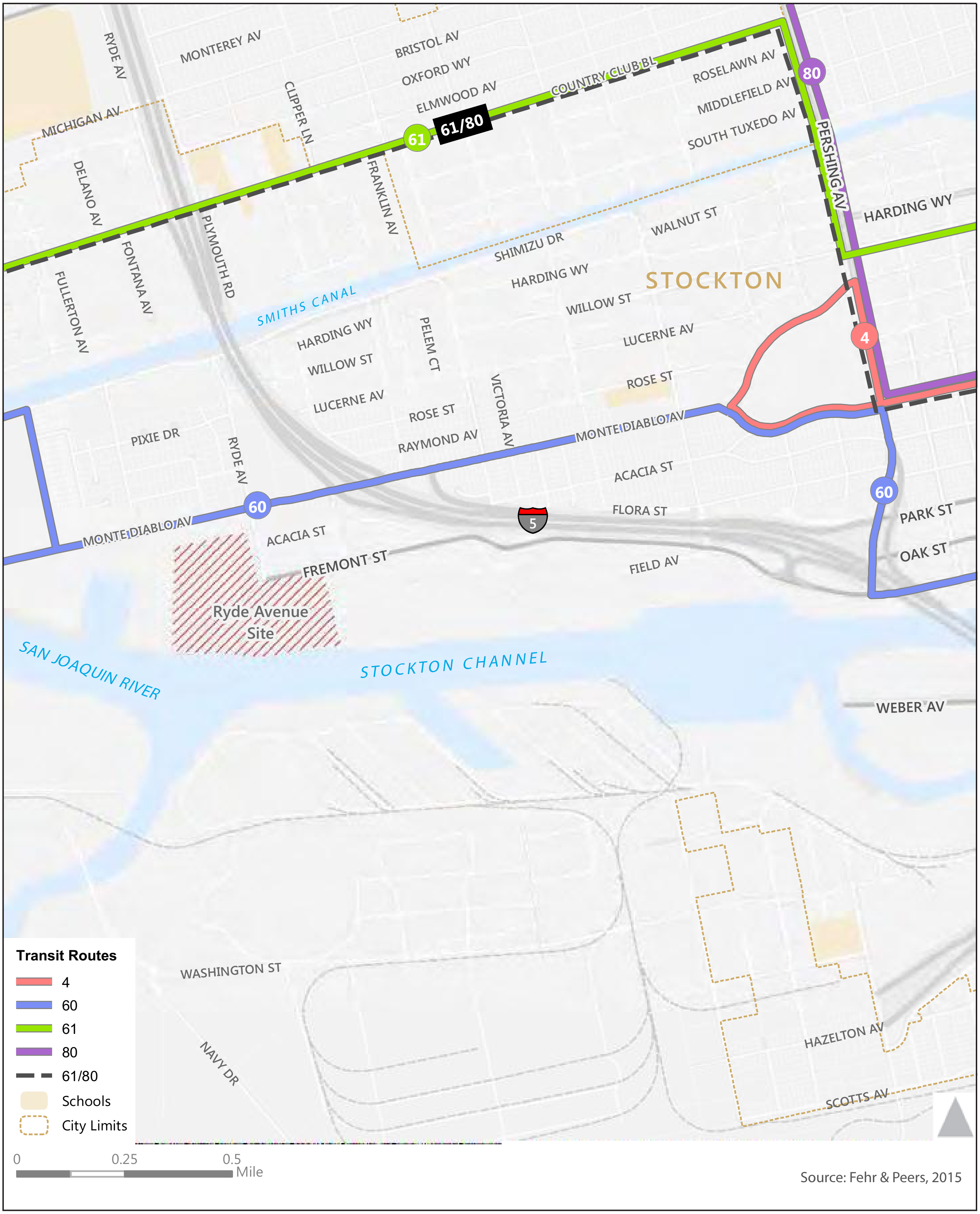


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Figure 15-5

Horizon WATER and ENVIRONMENT

Alternative 4
Existing Transit Facilities
Stockton

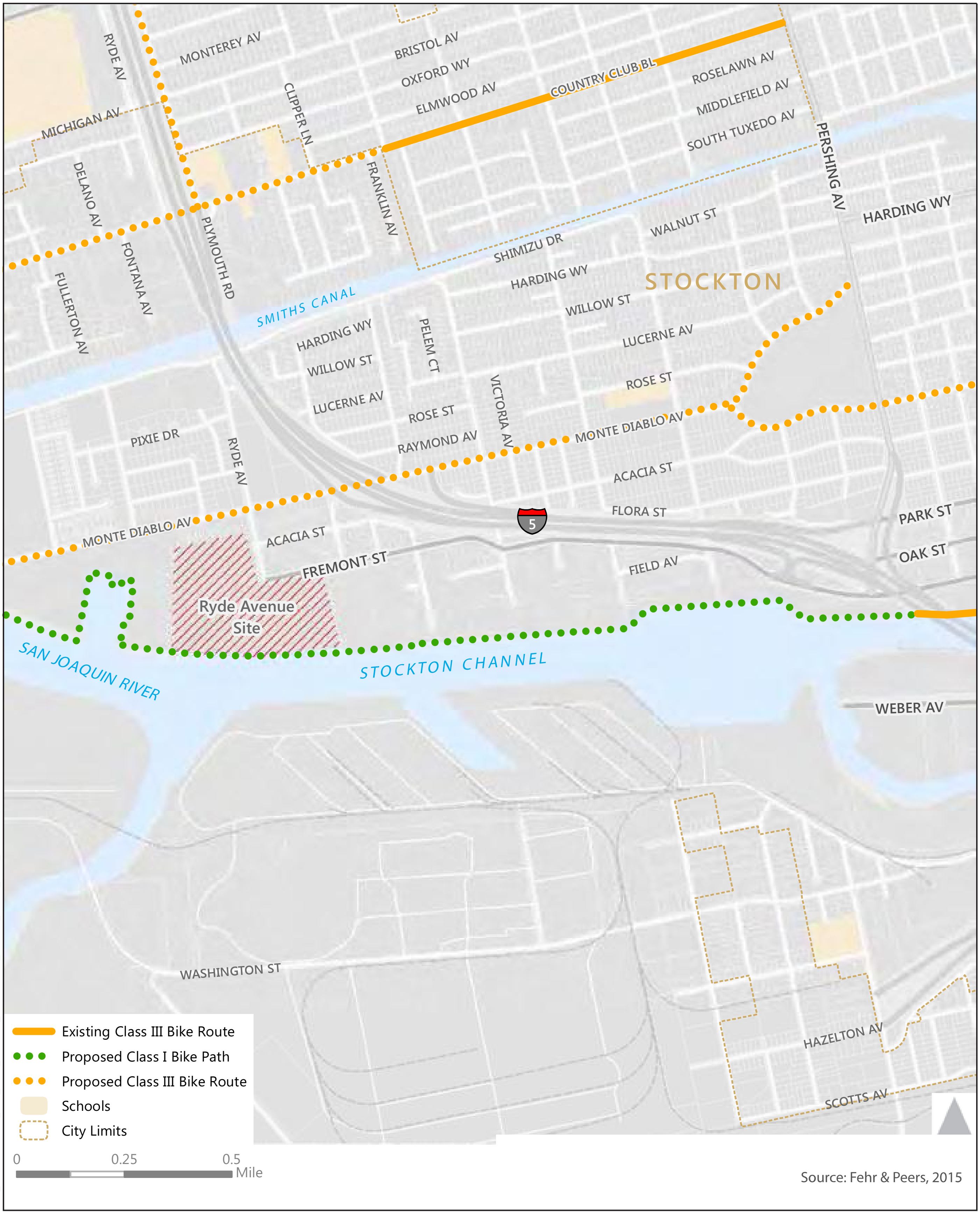

Figure 15-6

Horizon WATER and ENVIRONMENT

Alternative 4
Existing & Proposed Bicycle Facilities
Stockton

Truck Routes

I-5 is designated as a truck route by Caltrans and is included in the STAA. In addition, the roadway segments of Monte Diablo Avenue, Ryde Avenue, Fremont Street, and Pershing Avenue are designated as city truck routes by the City of Stockton.

Existing Levels of Service

Figure 15-7 shows existing peak-hour traffic volumes and lane configurations at study area intersections in Stockton. **Table 15-7** summarizes the existing peak-hour intersection operations at the study area intersections in Stockton. As shown, all study intersections operate with an average LOS of B or better, with the exception of the West Fremont Street/Pershing Avenue intersection, which operates at LOS F.

Table 15-7. Existing Delay/Level of Service, Stockton

Intersection	Control	Peak Hour	Delay (Seconds)	Level of Service
1. Ryde Avenue/Monte Diablo Avenue	All-Way Stop	AM PM	8.9 9.0	A A
2. Monte Diablo Avenue/ I-5 Southbound Ramps	Side-Street Stop	AM PM	7.7 (13.7) 4.6 (11)	A (B) A (B)
3. Monte Diablo Avenue/ I-5 Northbound On-Ramp	Side-Street Stop	AM PM	1.6 (3.3) 1.5 (3.5)	A (A) A (A)
4. Monte Diablo Avenue/ I-5 Northbound Off-Ramp	Side-Street Stop	AM PM	3 (11.3) 3.7 (12.6)	A (B) A (B)
5. West Fremont Street/ I-5 Southbound Ramps	Side-Street Stop	AM PM	0 (11) 0 (9)	A (B) A (A)
6. West Fremont Street/Pershing Avenue	Traffic Signal	AM PM	**104.3** **117.8**	**F** **F**

Notes:
AM = morning (7:00–9:00 a.m.); PM = evening (4:00–6:00 p.m.)
For side street–stop intersections, the average delay is reported with worst approach or movement in parentheses.
Boldface type indicates unacceptable Level of Service.

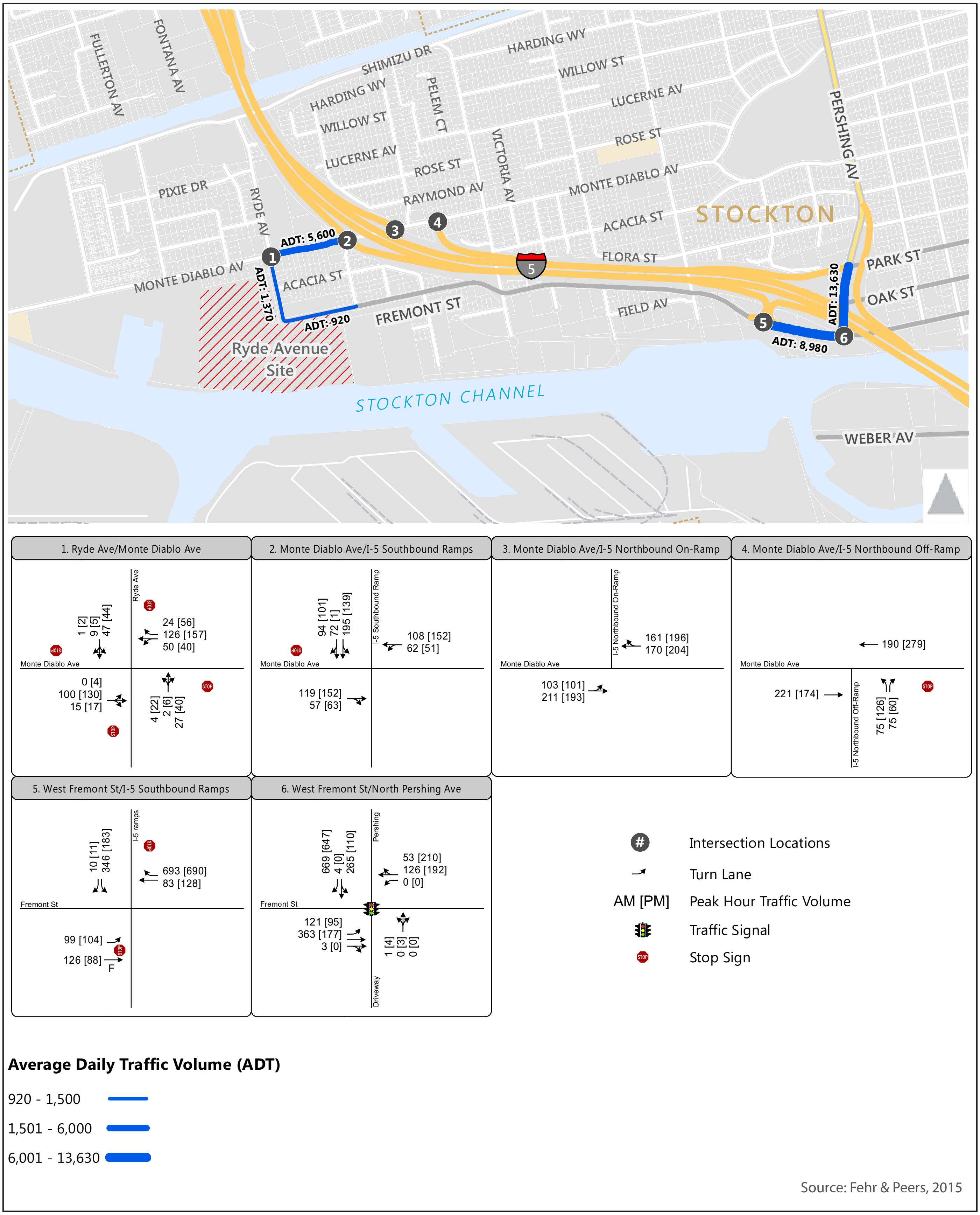

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Figure 15-7

Alternative 4
Peak Hour Traffic Volumes & Lane Configurations
Existing Conditions
Stockton

Horizon WATER and ENVIRONMENT

Table 15-8 summarizes the existing daily traffic volumes and the corresponding LOSs according to the thresholds shown in Table 15-3. As shown, all study roadway segments currently operate at LOS B or better.

Table 15-8. Existing Roadway Capacity Utilization, Stockton (Alternative 4)

Roadway Segment	Existing Conditions			
	Number of Lanes	Type	Average Daily Traffic	Level of Service
1. Monte Diablo Avenue between Ryde Avenue and I-5 South Ramps	2	Collector	5,600	A
2. Ryde Avenue between Monte Diablo Avenue and Fremont Street	2	Collector	1,370	A
3. Fremont Street between Ryde Avenue and Queen Avenue	2	Collector	920	A
4. Fremont Street between Pershing Avenue and I-5 North Off-Ramp	2	Arterial	8,980	B
5. Pershing Avenue between Fremont Street and Park Avenue	4	Arterial	13,630	A

Freeway facility operations were analyzed using the following data:

- AM and PM peak-hour on-ramp and off-ramp counts collected as part of the intersection turning movement counts conducted at all ramp terminal intersections within the study area.
- AM and PM peak-hour I-5 mainline volumes obtained from Caltrans' Performance Measurement System (PeMS; Caltrans 2014b).

According to the 2011 Average Annual Daily Truck Traffic on California State Highways (Caltrans 2011), heavy vehicles represent 23 percent of the daily traffic volume on I-5 within the study area. Thus, for analysis purposes, a heavy vehicle percentage of 23 percent was assumed for the peak-hour freeway analysis, reflecting a conservative assumption as truck traffic is typically a lower proportion of the overall peak-hour traffic flows as compared to off-peak hours.

The AM and PM peak-hour freeway operations are presented in **Table 15-9**. As shown, all study freeway facilities currently operate at LOS D or better with the exception of the I-5 northbound weave segment which operates at LOS E during the PM peak hour.

Table 15-9. Existing Freeway Facility Level of Service, Stockton (Alternative 4)

Freeway Segment	Direction of Travel	Type	AM Peak Hour			PM Peak Hour		
			Volume	Density	LOS	Volume	Density	LOS
1. Country Club Boulevard to Monte Diablo Avenue	Southbound	Weave	5,790	33.4	D	3,940	20.2	C
2. Monte Diablo Avenue On-Ramp	Southbound	Merge	5,430	22.2	C	3,700	15.1	B
3. Freeway between Monte Diablo Avenue and Fremont Avenue	Southbound	Basic	5,620	24.7	C	3,810	16.1	B
4. Fremont Avenue Off-Ramp	Southbound	Diverge	5,620	29.4	D	3,810	20.4	C
5. Fremont Avenue to SR 4	Southbound	Weave	6,050	32.9	D	4,410	23.1	C
6. Freeway between Fremont Avenue and Monte Diablo Avenue	Northbound	Basic	4,190	17.8	B	6,370	29.2	D
7. Monte Diablo Avenue Off-Ramp	Northbound	Diverge	4,190	22.3	C	6,370	32.1	D
8. Monte Diablo Avenue to Country Club Boulevard	Northbound	Weave	4,310	21.6	C	**6,480**	**35.3**	**E**

Notes: AM = morning (7:00–9:00 a.m.); LOS = level of service; PM = evening (4:00–6:00 p.m.).**Boldface** type indicates unacceptable Level of Service.

15.3 Regulatory Setting

There are no federal regulations pertinent to the Proposed Project. This section describes the state and local laws, regulations, and policies pertaining to transportation and traffic that might be relevant to the Proposed Project.

15.3.1 State Laws, Regulations, and Policies

Caltrans has Corridor System Management Plans (CSMPs) for both SR 12 in Rio Vista (the SR 12 Corridor System Management Plan; Caltrans 2010a) and I-5 in Stockton (the I-205/I-5 Corridor System Management Plan; Caltrans 2010b). A CSMP is a long-range comprehensive planning document that presents an analysis of existing and future traffic conditions and proposes traffic management strategies and capital improvements to maintain and enhance mobility within the corridor.

According to the Guide for the Preparation of Traffic Impact Studies (Caltrans 2002), if a state highway currently operates at an unacceptable LOS (e.g., LOS E or F), the existing LOS should not be further reduced. A potentially significant impact occurs if the addition of project trips exacerbates existing LOS F conditions and leads to a perceptible increase in density on freeway mainline segments or ramp junctions, or a perceptible increase in service volumes in a weaving area. In addition, a potentially significant impact occurs when the addition of project trips causes a queue on the off-ramp approach to a ramp terminal intersection, such that it extends beyond its storage area and onto the freeway mainline.

According to the SR 12 CSMP, within the study area, SR 12 currently has two lanes with a center turn lane. The Concept Facility for SR 12, which describes the 20- to 25-year capital facility for SR 12, is a two- to three-lane conventional highway.

According to the I-205/I-5 CSMP, within the study area, I-5 currently has eight lanes (four in each direction). The Concept Facility for I-5 is 10 lanes; however, more lanes are necessary to meet Concept LOS C and LOS D.

15.3.2 Local Laws, Regulations, and Policies

The Solano Transportation Authority (STA) is the Congestion Management Agency of Solano County. It is responsible for countywide transportation planning; financing of priority projects; and programming of federal, state, and regional transportation funds. The following discussion summarizes STA's objectives and strategies relevant to Alternatives 2 and 3. In addition, STA studies and reports that pertain to SR 12 are summarized below.

- **LOS Objective.** One of the objectives in STA's Arterials, Highways, and Freeway Element (2005a) is to encourage member jurisdictions and Caltrans to maintain LOS E or better conditions during the AM and PM peak hours on roadways of countywide (or regional) significance. Routes of Regional Significance in Solano County include the State highway system plus local arterials that provide major points of access to the State highway system or provide regional connections between communities and key transportation facilities. Within Rio Vista, SR 12 is a Route of Regional Significance.
- **SR 12 East Prioritization and Implementation Strategy.** In 2005, STA prepared the SR 12 East Prioritization and Implementation Strategy (STA 2005b) to address needed roadway improvements to SR 12 between the Sacramento River and I-80. Initially, the Highway 12 Major Investment Study (STA 2001), recommended widening SR 12 in Rio Vista to four lanes with other safety and intersection improvements by 2025. The SR 12 East Prioritization and Implementation Strategy refined the roadway improvement timeline, recommending that road widening begin 2017. The STA board adopted a funding policy for those improvements that would split the cost to 50 percent local and 50 percent regional. Road widening of SR 12 to four lanes does not currently have funding and is not identified in the SR 12 Corridor System Management Plan (Caltrans 2010a); therefore, these improvements are not presumed in the cumulative scenario.
- **SR 12 Realignment/Rio Vista Bridge Preliminary Study.** The SR 12 Realignment/Rio Vista Bridge Preliminary Study was initiated by STA at the request of the City of Rio Vista. This report documents the first step in identifying feasible corridor alternatives for an improved SR12 through Rio Vista and across the Sacramento River. In addition, the study reassesses alternatives that were

previously considered as part of a 1994 Project Study Report with respect to potential impacts on existing and planned development. This 1994 study also evaluated environmental, river navigation, and engineering constraints, and investigated revised routes to minimize these impacts.

- **SR 12 Comprehensive Evaluation and Corridor Management Plan (2012).** The SR 12 Comprehensive Evaluation and Corridor Management Plan (Caltrans et al. 2012) report summarizes an evaluation conducted for SR 12 as it passes through the four counties of Napa, Solano, Sacramento and San Joaquin. The report outlines a short-term and long-term plan for the corridor and addresses questions such as whether SR 12 should be widened to four lanes, whether movable bridges at Rio Vista and Mokelumne be replaced, and the timing of when major improvements could be implemented. As SR 12 traverses multiple jurisdictions, the study was supported by various agencies including Caltrans (Districts 4, 3, and 10), MTC, STA, and SJCOG.

The following goals and policies of the Rio Vista 2001 General Plan (2002) are relevant to transportation and traffic and to Alternatives 2 and 3:

Goal 8.1 To provide a mix of land uses close to each other and at sufficient intensities to support walking, bicycling, and other alternative modes of transportation.

Policy 8.1.E The City shall require sidewalks on public streets in all new developments, as shown in Figures 8-6 through 8-11.

Policy 8.1.G The City shall ensure that individual properties or development sites are not viewed as self-contained islands.

Goal 8.2 To build and maintain a safe and efficient local street and highway system.

Policy 8.2.B The City shall ensure that future development and roadway capacities are in balance.

Policy 8.2.C The City shall ensure that new and upgraded arterial streets and their intersections are designed and built to function at least at level of service (LOS) "D," (acceptable delay) during peak traffic periods.

Policy 8.2.D The City shall maintain a level of service (LOS) "D" as the target LOS for all major street intersections not specified as LOS "E" by Policies 8.2.F and 8.2.G.

Policy 8.2.E The City shall maintain a level of service (LOS) "E" for the downtown, neighborhood commercial areas, and other areas where vitality, pedestrian activity, and transit accessibility are or will be primary considerations as the community grows.

Policy 8.2.F The City shall maintain a level of service (LOS) "E" for Main and Front Streets between Main Street and Highway 12.

Policy 8.2.I The City shall ensure that new development is responsible for funding and construction of necessary improvements that are directly attributable to the impacts generated by that project.

Policy 8.2.J The City shall require that new development projects mitigate their share of offsite traffic impacts (outside the boundaries of the specific development properties) in order to maintain the level of service standards of Policies 8.2.D, 8.2.E, 8.2.F, and 8.2.G.

Policy 8.2.K The City shall ensure improvements are provided prior to the deterioration of levels of service below the standards of Policies 8.2.D, 8.2.E, 8.2.F, and 8.2.G.

Policy 8.2.P The City shall require new development to provide signals or other improvements at appropriate intersections in a timely manner, to prevent the deterioration of service levels.

Policy 8.2.R The City shall ensure that intersection improvements, including signals, are provided prior to meeting any necessary Caltrans warrants, to prevent deterioration of service levels.

Goal 8.3 To develop a comprehensive pedestrian and bicycle system over time that is coordinated with the city's roadway system.

Policy 8.3.A The City shall provide a continuous system of sidewalks along streets.

Policy 8.3.B The City shall complete the comprehensive pedestrian and bicycle systems, including offstreet multipurpose paths and trails linking major new development areas with the waterfront.

Policy 8.3.C The City shall develop pedestrian and bicycle paths in the trail corridor and along the waterfront.

Policy 8.3.E The City shall separate bikeways from streets wherever possible. Where off-road bicycle paths are not possible, the City shall designate on-street bicycle lanes.

Policy 8.3.G The City shall require nonresidential developments to build clearly identified internal walkways that are distinct from roadways and directly connect building entrances to public sidewalks and transit stops.

Policy 8.3.M The City shall ensure the provision of secure bicycle parking at centers of public and private activity. The City shall require new commercial development to provide bicycle parking.

Goal 8.6 To provide fast, convenient, comprehensive, and dependable transit and paratransit service as Rio Vista grows.

Policy 8.6.B The City shall ensure that the physical design of new development projects facilitates transit use.

Goal 8.8 To reestablish Rio Vista's waterfront as a regional destination for both recreational and commercial water transportation activities.

Policy 8.8.A The City shall provide for additional private boat berths, public access, and support facilities on the waterfront in order to allow residents of the City and region to enjoy water-oriented recreation, public transportation, and commercial opportunities on the Sacramento River.

Policy 8.8.B The City shall use any eligible sources of local, state, and federal funding to accomplish the dredging, shoreline stabilization, public access, and construction of recreational facilities.

The City of Stockton 2035 General Plan sets forth goals and policies to guide development within the city, including policies regarding the operation of the road system. The following goals and policies provide relevant guidance with respect to this analysis:

Goal TC-1 To develop an integrated transportation system that provides for the safe and efficient movement of people and goods.

Policy TC-1.2 *Integrated Transportation System.* The City shall continue to work cooperatively with the various local, State, and Federal transportation agencies (i.e., San Joaquin County, SJCOG, Caltrans, San Joaquin Regional Transit District, the Altamont Commuter Express, and Amtrak) to maintain a multimodal transportation system that is well-integrated and interconnected in terms of service, scheduling, and capacity, and that effectively accommodates planned land uses and related transportation needs, and that promotes the safe movement of people and goods and the efficient use of limited public resources.

Policy TC-1.3 *Multi-Modal Network.* The City shall work with its transportation partners to create and maintain a transportation system as a multi-modal network design to effectively accommodate planned land uses and related transportation needs.

Policy TC-1.4 *Transportation Improvement Financing.* The City shall continue to utilize the City's capital improvement program, developer dedications and the City's public facilities fees and other mechanisms to finance transportation needs and improvements.

Policy TC-1.7 *Road Improvements.* Land use planning and transportation decisions shall be correlated so that planned land uses are supported by the appropriate types of circulation service, levels of service, and the timing of transportation improvements. Wherever practicable, road improvements shall complement regional needs and initiatives. The City's highest priority for road improvement funding shall be regional and local roads servicing infill development, existing community areas, and other areas shown on the General Plan for urban development, which are designed to achieve the City's regional housing allocation and affordable housing goals.

Policy TC-1.8 *Improvement of Existing Roadways.* The City shall prioritize improvements to the roadway system, ensuring that allocation of funding for transportation, maintenance and improvement projects serving anticipated growth areas as specified by applicable environmental documents.

Policy TC-1.9 *Demand Reduction and Capacity Expansion.* Strategies to reduce vehicle demand on City roadways shall be given consideration in conjunction with planned vehicle capacity expansion projects where they are demonstrated to achieve the same or similar outcome. The City shall plan and consider financial assistance for Bus Rapid Transit and other non-auto related circulation systems as a way to address peak hour congestion within the City. The City shall ensure that all planned arterial and regional road capacity projects (including lane widening) are justified based on environmental documentation in compliance with CEQA and cost efficiency.

Policy TC-1.10 *Provision of Transportation Infrastructure and Cost Sharing.* All new development projects shall be required to pay their fair share of the cost of constructing needed transportation and transit facilities, and contributing to ongoing operations and services. This shall include costs associated with mitigating new development impacts on the capacity of existing transportation facilities and services. All essential facilities and services will be installed prior to or concurrent with such new development or phased as specified in the applicable environmental documents. This requirement shall be made a condition of project approval.

Goal TC-2 To develop a street and highway system that promotes safe, efficient and reliable movement of people and goods by multiple transportation modes and routes, and that reduces air quality impacts.

Policy TC-2.1 *Level-of-Service Standards.* To assist in ensuring efficient traffic operating conditions, evaluating the effects of new development, determining mitigation measures and impact fees, and developing capital improvement programs, the City shall require that Level of Service (LOS) D or better be maintained for both daily and peak hour conditions.

Policy TC-2.3 *Roadway Standards.* The City shall require City-maintained streets and roads to be designed and constructed according to the standards set out in this General Plan and City of Stockton Standard Plans and Specifications.

Policy TC-2.4 *Dual Access.* The City shall require at least two (2) independent access routes for all major development areas1.

Policy TC-2.5 *Multiple Transportation Modes.* The City shall require that significant trip-generating land uses be served by roadways and transit

[1] According to the City of Stockton General Plan, a major development area is an area of substantial development activity as determined by the City.

connections adequate to provide efficient access by multiple transportation modes with a minimum of delay.

Policy TC-2.10 *Freeway Interchanges.* The City shall seek to improve freeway interchanges along State Route 99, State Route 4, and Interstate 5 to current design standards as required by the traffic demands of new development, within funding constraints.

Policy TC-2.13 *Environmental Impacts of Roadway Projects.* The City shall ensure that construction of new roadways and expansion of existing streets mitigates impacts on air quality, noise, historic resources, sensitive biological areas, and other resources.

Policy TC-2.14 *Roadway Dedications.* The City shall require right-of-way dedications for major public streets and highways, highway interchanges, and other major roadway improvements (i.e., arterial and collector streets and related bridges or railroad crossings) at the initial stage of development.

Policy TC-2.20 *Parking Supply.* The City shall require a sufficient supply of off-street parking for all land uses in order to reduce congestion, improve overall operation, and ensure land use compatibility.

Policy TC-2.21 *Shared Parking.* To minimize land consumption and paving, the City shall promote shared parking among land uses whose demand for parking peaks at different times.

15.4 Environmental Impacts

15.4.1 Methods of Analysis

This transportation impact analysis examines the roadway, transit, bicycle, pedestrian, and construction components of the overall transportation system under the following scenarios or conditions:

- Existing Conditions (reflects the existing physical conditions observed in 2014)
- Existing-Plus-Project Scenario (reflects the existing conditions scenario plus implementation of the ERS and FTC)
- Existing-Plus-Approved-Projects Scenario (reflects the existing conditions scenario plus implementation of already approved development projects near the ERS and FTC)
- Cumulative Scenario (reflects the existing conditions scenario plus implementation of already approved development projects and probable future projects)
- Cumulative-Plus-Project Scenario (reflects the cumulative conditions scenario plus implementation of the ERS and FTC)

For the "plus project" scenarios, significant impacts as defined by the CEQA Guidelines are identified, and mitigation measures are identified to offset those impacts.

Methodology for Construction Impact Analysis

For construction traffic, the assessment considers whether construction vehicles (comprising vehicles removing or delivering cut/fill material, bulldozers, and other heavy machinery) associated with site construction would generate temporary project impacts and whether workers required for construction of the new facilities would generate additional traffic impacts. A construction-related impact could occur if the number of construction vehicles required to prepare the site would exceed the number of operational automobile trips generated by the project, construction activity substantially increases hazards or congestion because of a design feature (e.g., sharp curves) or incompatible uses (e.g., farm equipment or construction vehicles), or the number of workers employed on-site would generate more peak-hour trips than the number of operational automobile trips generated by the project.

Methodology for Operational Impact Analysis

The following subsections describe the methodology used for evaluating the Proposed Project's operational effects on transportation and traffic.

TRIP GENERATION

Table 15-10 shows gross trip generation associated with build-out of the alternatives. Although DRS is planned to have only approximately 185 employees, 200 employees were presumed to provide a conservative analysis. Fitted-curve equations from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition (ITE 2012) were used to estimate the trips generated by DRS employees. The general office building rate was used for these calculations (ITE land use code 710) because the DRS facilities are anticipated to have employment characteristics similar to those of an office building.

Table 15-10. Proposed Project Trip Generation

Land Use	ITE Land Use Code	Quantity	AM Peak Hour Trips			PM Peak Hour Trips			Daily Trips
			In	Out	Total	In	Out	Total	
General Office	710	200 employees	107	14	121	23	111	134	800

Notes: AM = morning (7:00–9:00 a.m.); ITE = Institute of Transportation Engineers; PM = evening (4:00–6:00 p.m.)

Source: Fehr & Peers 2015.

As shown in Table 15-10, the DRS is estimated to generate approximately 800 daily trips, of which there would be 121 AM peak-hour trips and 134 PM peak-hour trips.

<u>TRIP DISTRIBUTION/ASSIGNMENT</u>

The distribution of Proposed Project trips was estimated using a variety of sources and analytical techniques, including project-only traffic assignment using the Napa-Solano Travel Demand Model, the City of Stockton Travel Demand Model, and the Tri-County (San Joaquin County, Stanislaus County, and Merced County) Travel Demand Model, review of existing traffic count data, and the relative ease of travel on various routes. The various travel demand models were used to establish regional trip patterns at study area gateways. Existing traffic count data and the relative ease of travel (which accounts for route directness, roadway classification, speed limit, intersection control, and other factors) were used to distribute Proposed Project trips between the Proposed Project site and study area gateways.

Figure 15-8 shows the expected trip distribution for Alternatives 2 and 3 at the RVARC site; **Figure 15-9** shows the expected trip distribution for Alternative 4 at the Ryde Avenue site.

15.4.2 Significance Criteria

This section outlines the CEQA significance criteria and other criteria established by the cities of Rio Vista and Stockton, and Caltrans, which were used to determine transportation impacts. The criteria listed for the cities of Rio Vista and Stockton are based on State CEQA Guidelines, guidelines from the cities of Rio Vista and Stockton, guidance from STA and SJCOG, and guidance from Caltrans.

NEPA requires that alternatives be treated and discussed in substantially equal detail. The below guidelines and standard practices from the cities of Rio Vista and Stockton were developed and have been refined to ensure that proper consideration is given to potentially significant impacts or effects to the local environment. To ensure that each alternative is treated and discussed in equal detail and that significant impacts or effects to the local environments are disclosed, the respective transportation impact analysis guidelines and standard practices were applied for each jurisdiction.

CEQA Significance Criteria

According to the CEQA Guidelines (Appendix G), the Proposed Project would have a significant impact if it would:

- Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;
- Conflict with an applicable congestion management program, including but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- Result in inadequate emergency access or interfere with an adopted emergency evacuation plan; or
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

These criteria are described further in the context of the more specific criteria adopted by the Cities of Rio Vista and Stockton.

City of Rio Vista

The Proposed Project would be considered to have a significant adverse impact related to transportation if it would:

- Result in a roadway operating at an acceptable LOS (LOS D or better) to deteriorate to LOS E or worse (General Plan Policies 8.2.C, 8.2.F and 8.2.G). In the downtown area, result in a roadway operating at an acceptable LOS (LOS E or better) to deteriorate to LOS F.
- Increase the volume-to-capacity (V/C) ratio by more than 0.05 at a roadway that is operating at LOS E or worse without the project.
- Result in a signalized intersection or unsignalized intersection movement/approach operating at an acceptable LOS (LOS D or better) to deteriorate to LOS E or worse, or result in a signalized intersection or unsignalized intersection operating at an acceptable LOS (LOS E) or better to deteriorate to LOS F for intersections on Main Street and Front Street between Main Street and SR 12 (General Plan Policies 8.2.D, 8.2.F and 8.2.G).
- Increase the delay by more than 5.0 seconds at a signalized intersection or movement/approach at an unsignalized intersection that is operating at LOS E or worse without the project for an unsignalized intersection that meets a signal warrant, or increase the delay by more than five seconds at a signalized intersection or movement/approach at an unsignalized intersection that is operating at LOS F for intersections on Main Street and Front Street between Main Street and SR 12 (Regional Standard).
- Eliminate or substantially and adversely affect existing transit facilities (bus stops, etc.).
- Eliminate or substantially and adversely affect existing or planned transit operations.
- Eliminate or substantially and adversely affect an existing bikeway or pedestrian facility in a way that would discourage its use.
- Substantially interfere with the implementation of a planned bikeway or pedestrian facility.
- Result in unsafe conditions for bicyclists or pedestrians, including unsafe bicycle/pedestrian, bicycle/motor vehicle, or pedestrian/motor vehicle conflict.

City of Stockton

The following thresholds of significance have been developed by and used in the City of Stockton for transportation impact studies. Conditions without and with the Proposed Project are compared to identify significant impacts on city facilities according to the following criteria:

- Would the Proposed Project conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

- If a signalized intersection is projected to operate acceptably (i.e., LOS D or better with an average control delay of equal to or less than 55 seconds per vehicle) without the project and the project is expected to cause the facility to operate at an unacceptable LOS (LOS E or F), the impact is considered significant.
- If an intersection is projected to operate unacceptably (i.e., LOS E or F) without the project, and the project is expected to increase the average control delay by more than 5 seconds, the impact is considered significant.
- If the operations of an unsignalized study intersection is projected to decline from acceptable to unacceptable with the addition of Project traffic, and if the installation of a traffic signal based on the Manual on Uniform Traffic Control Devices (MUTCD) Peak Hour Signal Warrant (Warrant 3) would be warranted, the impact is considered significant;

▪ Would the Proposed Project conflict with an applicable congestion management program, including but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads and highways?

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Figure 15-8

Horizon WATER and ENVIRONMENT

Alternatives 2 and 3 Trip Distribution Rio Vista

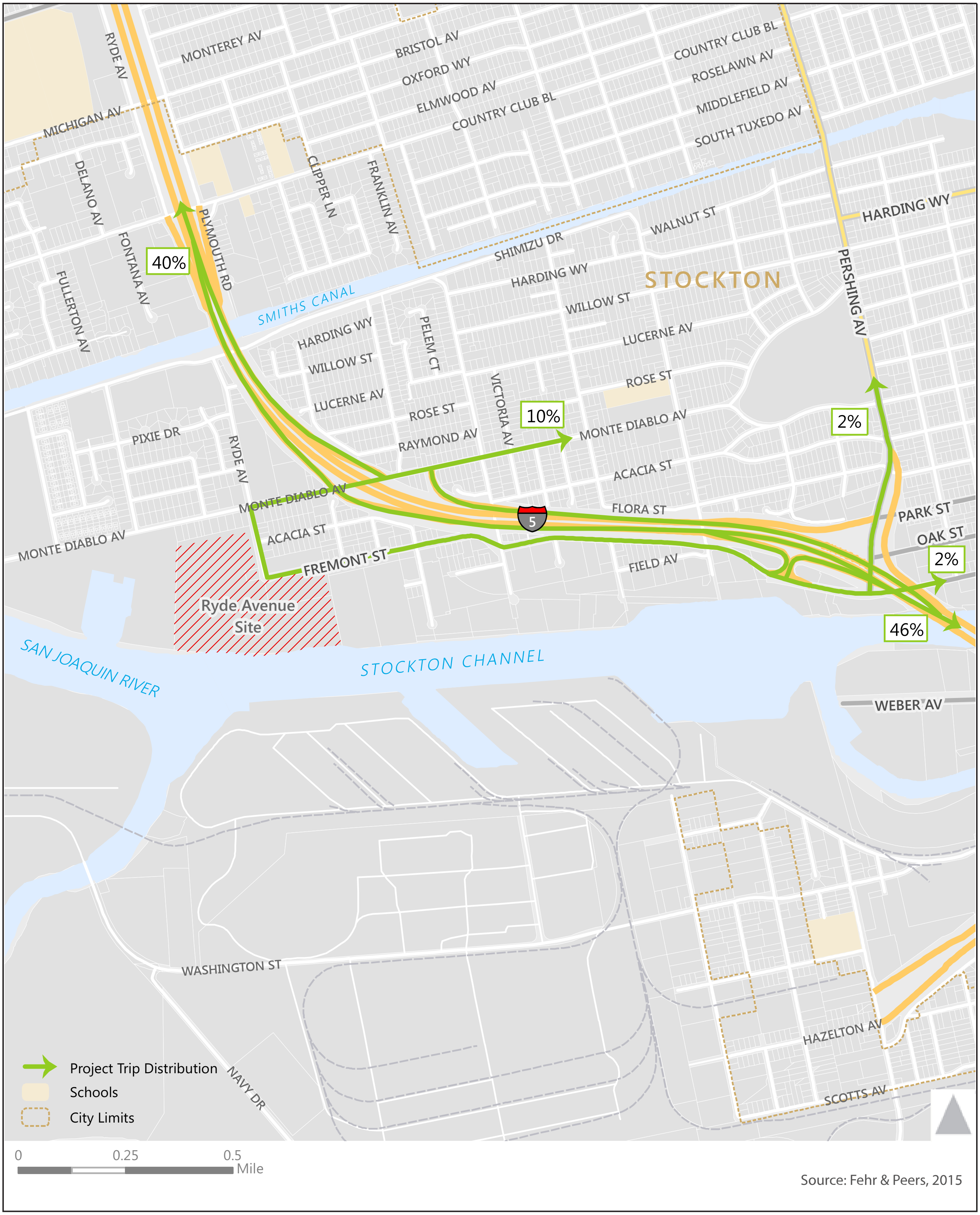

Figure 15-9

Alternative 4
Trip Distribution
Stockton

Horizon WATER and ENVIRONMENT

- Would the Proposed Project result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risks;
- Would the Proposed Project substantially increase traffic hazards due to a design feature (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment)?
- Would the Proposed Project result in inadequate emergency access?
- Would the Proposed Project conflict with adopted policies, plans, or programs regarding public transit, bicycle or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

Because none of the alternatives would result in a change in air traffic patterns, this effect is not addressed in this section. Consistency with the airport land use compatibility plan, and associated safety hazards is addressed in Chapter 11, *Hazards and Hazardous Materials*.

Caltrans Facilities

Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on State Highway facilities (Guide for the Preparation of Traffic Studies, Caltrans, December 2002); however, Caltrans recognizes that achieving LOS C/LOS D might not always be feasible. Consistent with Rio Vista and Stockton LOS policies for the intersections in the study area, a standard of LOS D or better on a peak-hour basis was used as the planning objective for the evaluation of the potential impacts on State highways from this development. The following criteria were used to evaluate those potential impacts:

- If a Caltrans facility (intersection, freeway mainline, ramp merge/diverge area) is projected to operate acceptably (i.e., LOS D or better) without the Proposed Project and the Proposed Project is expected to cause the facility to operate at an unacceptable service level (i.e., LOS E or worse), the impact is considered significant.
- If a Caltrans facility is projected to operate unacceptably (i.e., LOS E or worse) without the Proposed Project and the Proposed Project is expected to increase delay or density, the impact is considered significant.

15.4.3 Existing-Plus-Project Conditions

Existing-Plus-Project peak-hour traffic volumes were developed by applying the Proposed Project's expected trip generation and distribution to the existing traffic counts. **Figure 15-10** and **Figure 15-11** show the Existing-Plus-Project peak-hour traffic volumes for Rio Vista and Stockton, respectively.

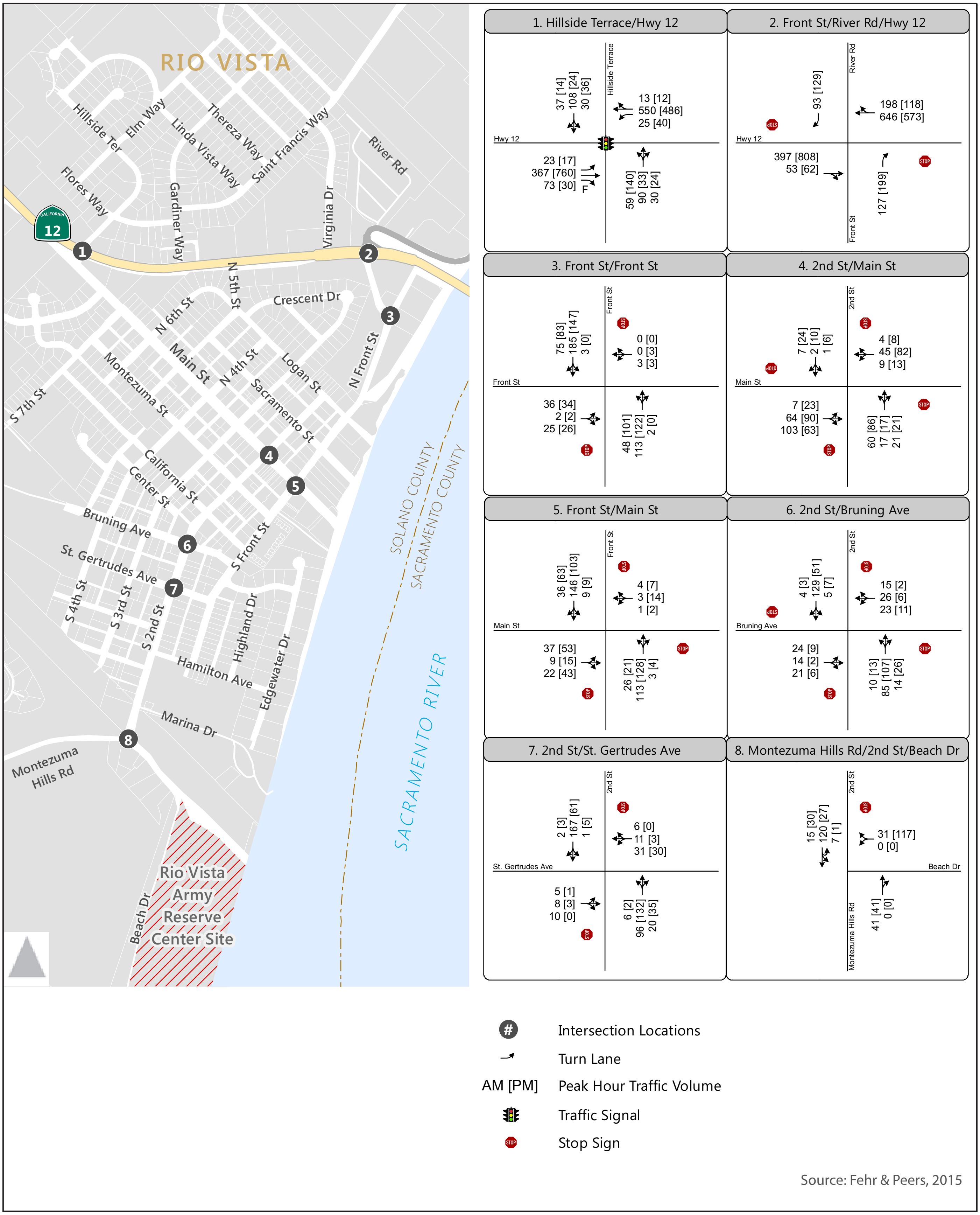

Figure 15-10

Alternatives 2 and 3
Peak Hour Traffic Volumes & Lane Configurations
Existing Plus Project Conditions
Rio Vista

Horizon WATER and ENVIRONMENT

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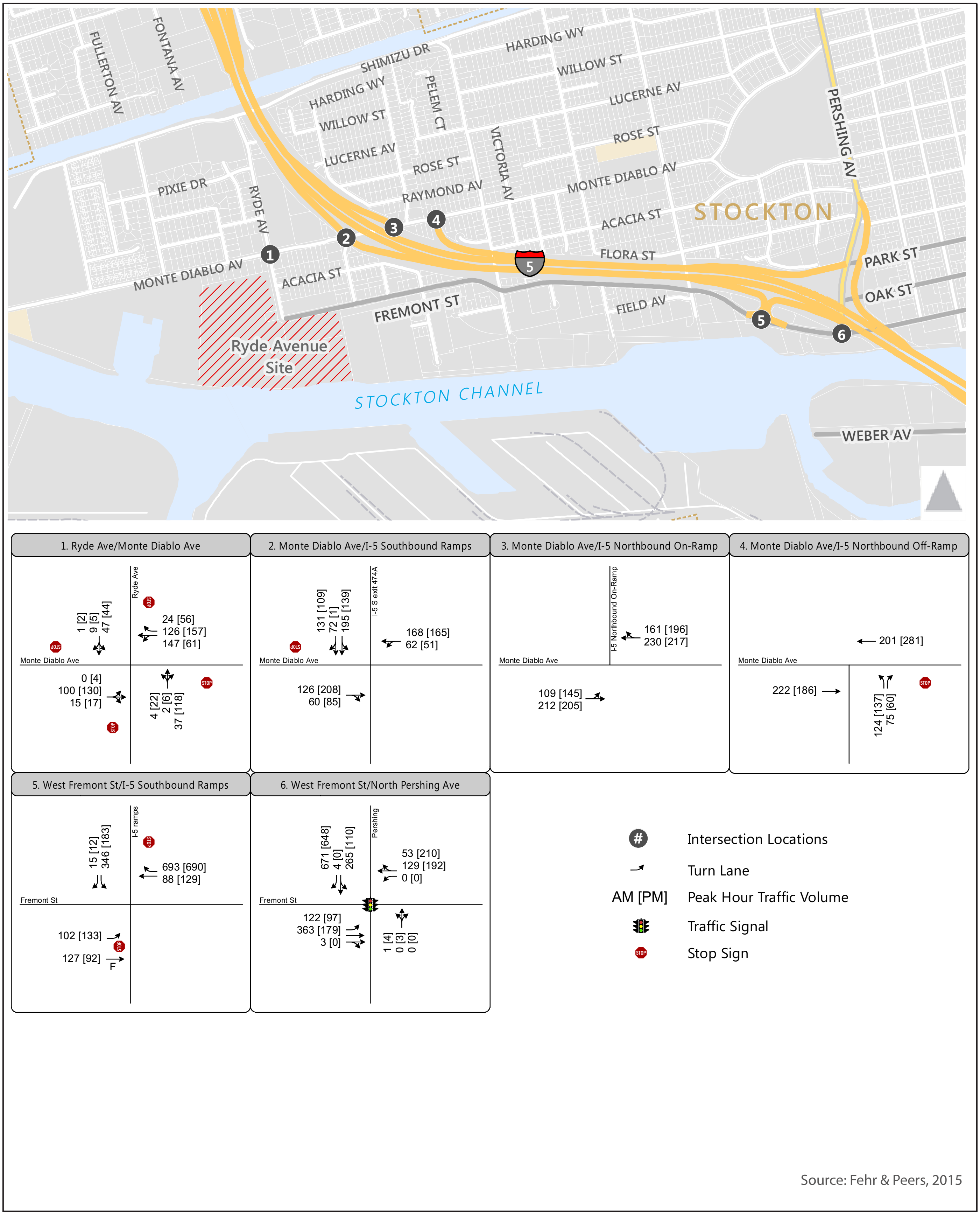

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Figure 15-11

Horizon WATER and ENVIRONMENT

Alternative 4
Peak Hour Traffic Volumes & Lane Cofigurations
Existing Plus Project Conditions
Stockton

Alternatives 2 and 3: Rio Vista Army Reserve Center Configurations 1 and 2

The study intersections were re-analyzed under Existing-Plus-Project conditions, which include no changes to land uses or to the transportation system within the study area other than implementation of Alternative 2 or 3. **Table 15-11** summarizes the results. As shown, all study intersections except the SR 12/North Front Street/River Road intersection operate at LOS C or better. LOS for the northbound right turn at the SR 12/North Front Street/River Road intersection decreases from C to D during the PM peak hour; LOS D is considered acceptable according to the thresholds of significance.

Table 15-11. Existing-Plus-Project Delay/Level of Service, Rio Vista (Alternatives 2 and 3)

Intersection	Control	Peak Hour	Existing		Existing Plus Project	
			Average Delay (Seconds)	LOS	Average Delay (Seconds)	LOS
1. SR 12/Main Street	Traffic Signal	AM PM	10.5 10.4	B B	10.6 12.0	B B
2. SR 12/North Front Street/River Road	Side-Street Stop	AM PM	2.3 (15.2) 3.6 (24.9)	A (C) A (C)	2.3 (15.2) 4.7 (30.5)	A (C) A (D)
3. North Front Street/Front Street	Side-Street Stop	AM PM	2.6 (12.9) 2.7 (13)	A (B) A (B)	2.6 (13.8) 3.2 (14.5)	A (B) A (B)
4. Main Street/2nd Street	All-Way Stop	AM PM	8.3 8.6	A A	8.7 9.1	A A
5. Main Street/Front Street	All-Way Stop	AM PM	8.7 8.3	A A	9.3 8.7	A A
6. Bruning Avenue/ 2nd Street	All-Way Stop	AM PM	8.4 7.5	A A	9.3 8	A A
7. St. Gertrudes Avenue/2nd Street	Side-Street Stop	AM PM	2.6 (11.8) 2.3 (9.8)	A (B) A (A)	2.8 (14.5) 1.2 (10.2)	A (B) A (B)
8. Montezuma Hills Road/2nd Street/Beach Drive	Side-Street Stop	AM PM	1.6 (8.9) 0.6 (8.6)	A (A) A (A)	1.3 (9) 4.9 (9.1)	A (A) A (B)

Notes: AM = morning; PM = evening; SR = State Route

For side-street–stop intersections, the average delay is reported with the worst approach or movement in parentheses.

Table 15-12 summarizes the Existing-Plus-Project daily traffic volumes and the corresponding LOSs. As shown, all study roadways operate at LOS C or better with the addition of Alternative 2 or 3 traffic, with the exception of SR 12, which continues to operate at LOS F.

Table 15-12. Existing-Plus-Project Roadway Capacity Utilization, Rio Vista (Alternatives 2 and 3)

Roadway Segment	Existing				Existing Plus Project	
	Number of Lanes	Type	Average Daily Traffic	LOS	Average Daily Traffic	LOS
1. SR 12 West of Hillside Terrace	2	Arterial	**18,210**	**F**	**18,529**	**F**
2. SR 12 East of River Road (SR 84)	2	Arterial	**18,980**	**F**	**19,259**	**F**
3. Main Street between SR 12 and Front Street	2	Res. Collector	3,970	A	4,369	A
4. Front Street between North Front Street and Main Street	2	Res. Collector	4,190	C	4,549	C
5. 2nd Street between Main Street and St. Gertrudes Avenue	2	Res. Collector	1,510	A	2,069	B
6. 2nd Street between St. Gertrudes Avenue and Beach Drive	2	Res. Collector	1,030	A	1,708	B
7. Montezuma Hills Road South of Beach Drive	2	Res. Collector	650	A	650	A

Notes:

The arterials are presumed to have moderate access control, Front Street, 2nd Street, and Montezuma Hills Road are presumed to be residential collectors with driveways, Main Street is considered to be a residential collector without driveways, as described in Table 15-2

Boldface type indicates an unacceptable level of service.

SR = State Route.

Alternative 4: Ryde Avenue Site in Stockton

The study intersections were reanalyzed under Existing-Plus-Project conditions, which include no changes to land uses or to the transportation system within the study area other than implementation of Alternative 4. **Table 15-13** summarizes the results. As shown, all study intersections except the West Fremont Street/Pershing Avenue intersection would operate at LOS B or better. The West Fremont Street/Pershing Avenue intersection would continue to operate at LOS F.

1 **Table 15-13.** Existing-Plus-Project Delay/Level of Service, Stockton (Alternative 4)

Intersection	Control	Peak Hour	Existing Average Delay (Seconds)	Existing LOS	Existing Plus Project Average Delay (Seconds)	Existing Plus Project LOS
1. Ryde Avenue/Monte Diablo Avenue	All-Way Stop	AM	8.9	A	10.5	B
		PM	9	A	9.5	A
2. Monte Diablo Avenue/ I-5 Southbound Ramps	Side-Street Stop	AM	7.7 (13.7)	A (B)	7.9 (14.9)	A (B)
		PM	4.6 (11)	A (B)	4.4 (11.7)	A (B)
3. Monte Diablo Avenue/ I-5 Northbound On-Ramp	Side-Street Stop	AM	1.6 (3.3)	A (A)	1.6 (3.6)	A (A)
		PM	1.6 (3.5)	A (A)	2.0 (4.4)	A (A)
4. Monte Diablo Avenue/ I-5 Northbound Off-Ramp	Side-Street Stop	AM	3 (11.3)	A (B)	3.9 (12.3)	A (B)
		PM	3.7 (12.6)	A (B)	3.9 (13)	A (B)
5. West Fremont Street/ I-5 Southbound Ramps	Side-Street Stop	AM	0 (11)	A (B)	0 (11.1)	A (B)
		PM	0 (9)	A (A)	0 (9)	A (A)
6. West Fremont Street/Pershing Avenue	Traffic Signal	AM	**104.3**	**F**	**105.9**	**F**
		PM	**117.8**	**F**	**118.8**	**F**

2 **Notes:**
3 AM = morning (7:00–9:00 a.m.); I = Interstate; PM = evening (4:00–6:00 p.m.)
4 For side-street–stop intersections, average delay is reported with the worst approach or movement in parentheses.
5 **Boldface** type indicates an unacceptable level of service.

Table 15-14 summarizes the Existing-Plus-Project daily traffic volumes and the corresponding LOSs. As shown, all study roadways operate at LOS B or better with the addition of Alternative 4 traffic.

Table 15-14. Existing-Plus-Project Roadway Capacity Utilization, Stockton (Alternative 4)

Roadway Segment	Existing				Existing Plus Project	
	Number of Lanes	Type	Average Daily Traffic	LOS	Average Daily Traffic	LOS
1. Monte Diablo Avenue between Ryde Avenue and I-5 South Ramps	2	Collector	5,600	A	6,162	A
2. Ryde Avenue between Monte Diablo Avenue and Fremont Street	2	Collector	1,370	A	2,011	A
3. Fremont Street between Ryde Avenue and Queen Avenue	2	Collector	920	A	1,076	A
4. Fremont Street between Pershing Avenue and I-5 North Off-Ramp	2	Arterial	8,980	B	8,996	B
5. Pershing Avenue between Fremont Street and Park Avenue	4	Arterial	13,630	A	13,646	A

Note: I = Interstate.

Table 15-15 summarizes the Existing-Plus-Project freeway facility densities and the corresponding LOSs. As shown, the addition of Alternative 4 traffic would not change LOS at any of the study freeway facilities; however, Alternative 4 would increase density on a freeway facility that operates unacceptably without the Proposed Project (the I-5 northbound weave between Monte Diablo Avenue and Country Club Boulevard).

Table 15-15. Existing-Plus-Project Freeway Facility Level of Service, Stockton (Alternative 4)

		Existing AM Peak Hour			Existing PM Peak Hour			Existing-Plus-Project AM Peak Hour			Existing-Plus-Project PM Peak Hour		
Freeway Segment	**Type**	**Volume**	**Density**	**LOS**	**Volume**	**Density**	**LOS**	**Volume**	**Density**	**LOS**	**Volume**	**Density**	**LOS**
1. Country Club Boulevard to Monte Diablo Avenue (SB)	Weave	5,790	33.4	D	3,940	20.2	C	5,830	33.8	D	3,950	20.3	C
2. Monte Diablo Avenue On-Ramp (SB)	Merge	5,430	22.2	C	3,700	15.1	B	5,430	22.2	C	3,700	15.3	B
3. Freeway between Monte Diablo Avenue and Fremont Avenue (SB)	Basic	5,620	24.7	C	3,810	16.1	B	5,630	24.7	C	3,840	16.2	B
4. Fremont Avenue Off-Ramp (SB)	Diverge	5,620	29.4	D	3,810	20.4	C	5,630	29.4	D	3,840	20.5	C
5. Fremont Avenue to SR 4 (SB)	Weave	6,050	32.9	D	4,410	23.1	C	6,060	33	D	4,470	23.5	C
6. Freeway between Fremont Avenue and Monte Diablo Avenue (NB)	Basic	4,190	17.8	B	6,370	29.2	D	4,240	18	B	6,380	29.3	D
7. Monte Diablo Avenue Off-Ramp (NB)	Diverge	4,190	22.3	C	6,370	32.1	D	4,240	22.8	C	6,380	32.3	D
8. Monte Diablo Avenue to Country Club (NB)	Weave	4,310	21.6	C	**6,480**	**35.3**	**E**	4,310	21.6	C	**6,520**	**35.8**	**E**

Notes:

AM = morning (7:00–9:00 a.m.); LOS = level of service; NB = northbound; PM = evening (4:00–6:00 p.m.); SB = southbound

Boldface type indicates an unacceptable LOS.

15.4.4 Project-Specific Impacts and Mitigation Measures

Impact TRA-1: Impacts on Study Intersections from Delta Research Station Operational Traffic.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the DRS would not be constructed or operated; therefore, there would be **no impact** on study area intersections.

ALTERNATIVES 2 AND 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 AND 2

The Existing-Plus-Project intersection operations analysis provided in Table 15-11 shows no significant impacts on study intersections. The addition of Alternative 2 or 3 traffic would not cause an intersection operating at an acceptable LOS to operate at an unacceptable LOS; therefore, this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE

The Existing-Plus-Project intersection operations analysis provided in Table 15-13 shows no significant impacts on study intersections. The addition of Alternative 4 traffic would not cause an intersection operating at an acceptable LOS to operate at an unacceptable LOS. Although the West Fremont Street/Pershing Avenue intersection operates at LOS F without Alternative 4, this alternative would increase delays at this intersection by less than 5.0 seconds. Given that the West Fremont Street/Pershing Avenue intersection is already operating at an unacceptable LOS, this impact would be **less than significant**.

Impact TRA-2: Impacts on Study Roadway Segments from Delta Research Station Operational Traffic.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, no ERS or FTC facilities would be constructed or operated; therefore, there would be **no impact** on study area roadway segments.

ALTERNATIVES 2 AND 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 AND 2

Under RVARC, the Existing-Plus-Project daily traffic volume analysis provided in Table 15-12 shows no significant impacts on study roadway segments. The addition of project traffic does not cause a roadway segment operating at an acceptable LOS to operate at an unacceptable LOS. SR 12 roadway segments operate at LOS F without the Proposed Project; the V/C on SR 12 west of Hillside Terrace increases from 1.01 to 1.03 and the V/C on SR 12 east of River Road increases from 1.05 to 1.08. The Proposed Project does not increase the roadway's V/C by more than 0.05; therefore, the impact is **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Under Alternative 4, the Existing-Plus-Project daily traffic volume analysis provided in Table 15-14 shows no significant impacts on study area roadway segments. The addition of

Proposed Project traffic does not cause a roadway segment operating at an acceptable LOS to operate at an unacceptable LOS; therefore, the impact is **less than significant**.

Impact TRA-3: Impacts on Study Area Freeway Segments from Delta Research Station Operational Traffic.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, no ERS or FTC facilities would be constructed or operated; therefore, there would be **no impact** on study area freeway segments.

ALTERNATIVES 2 AND 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 AND 2

Under Alternatives 2 and 3, there are no freeway segments within the study area of the RVARC site; therefore, there would be **no impact** on study area freeway segments.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Under Alternative 4, the Existing-Plus-Project freeway facility analysis provided in Table 15-15 shows that the I-5 northbound weave between Monte Diablo Avenue and Country Club Boulevard operates unacceptably without Alternative 4 and that Alternative 4 would increase the density within the weave. To reduce weave density to acceptable levels, additional freeway lanes are necessary; however, additional freeway lanes on I-5 are not planned. The I-5 North Stockton Project is currently underway and is scheduled for completion by late 2015. This project converts mixed-flow lanes to high-occupancy vehicle lanes between Charter Way and Country Club Boulevard; therefore, this impact would be potentially significant. **Mitigation Measure TRA-3 (Pay Fair Share toward Regional Transportation Roadway Network Improvements),** requires that DWR and USFWS or the Proposed Project developer contribute a fair share toward regional transportation roadway network improvements; however, additional freeway lanes on I-5 are not yet planned and this impact would be **significant and unavoidable**.

Mitigation Measure TRA-3: Pay Fair Share toward Regional Transportation Roadway Network Improvements (Alternative 4)

DWR and USFWS, or the Proposed Project developer shall contribute their fair share to the appropriate entity (most likely San Joaquin Council of Governments) toward regional transportation roadway network improvements. Separate payments shall be made for each facility (ERS and FTC), and the payment shall be proportionate to the total cost of the roadway improvements given each facility's relative contribution to the impact in light of all traffic causing the impact. Such fair-share contributions shall be made when an application for a building permit is filed. The contributions shall be held in escrow and returned in the event that a given facility (either ERS, FTC, or the roadway improvement) is not constructed.

Impact TRA-4: Impacts on Public Transit Facilities from Delta Research Station Operational Traffic.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, no ERS or FTC facilities would be constructed or operated; therefore, there would be **no impact** on public transit facilities.

ALTERNATIVES 2 AND 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 AND 2

Construction and operation of Alternatives 2 and 3 would not eliminate or substantially and adversely affect any existing or planned transit facilities or operations. Within the study area, transit service in Rio Vista uses Main Street and Front Street. Alternative 2 and 3's impacts on study area intersections and roadway segments, including intersections and roadway segments on Main Street and Front Street, are less than significant. In addition, no major transit facilities or services are planned within the study area; therefore, this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Construction and operation of Alternative 4 would not conflict with the adopted policies contained in the City of Stockton General Plan or any programs, or decrease the performance or safety of public transit in Stockton. Within the study area, transit service in Stockton uses Monte Diablo Avenue and Pershing Avenue. Alternative 4's impacts on study intersections and roadway segments, including intersections and roadway segments on Monte Diablo Avenue and Pershing Avenue, are less than significant. In addition, no major transit facilities or services are planned within the study area; therefore, this impact would be **less than significant**.

Impact TRA-5: Impacts on Pedestrian Facilities from Delta Research Station Operational Traffic.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, no ERS or FTC facilities would be constructed or operated; therefore, there would be **no impacts** on pedestrian facilities.

ALTERNATIVES 2 AND 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 AND 2

Construction and operation of Alternatives 2 and 3 will enhance the existing trail along the Proposed Project's frontage for use by pedestrians. These improvements would result in improved conditions for pedestrians along the frontage, minimizing the potential for pedestrian/motor vehicle conflicts; therefore, this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

As a part of the design review/approval process for Alternative 4, sidewalks would be required on Ryde Avenue and West Fremont Street along the Proposed Project's frontage. These improvements would result in improved conditions for pedestrians along the frontage, reducing the potential for pedestrian/motor vehicle conflicts; therefore, this impact would be **less than significant**.

Impact TRA-6: Impacts on Bicycle Facilities from Delta Research Station Operational Traffic.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, no ERS or FTC facilities would be constructed or operated; therefore, there would be **no impact** on bicycle facilities.

ALTERNATIVES 2 AND 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 AND 2

Construction and operation of Alternatives 2 and 3 would not eliminate or substantially and adversely affect an existing bikeway, substantially interfere with the implementation of a planned bikeway, or result in unsafe conditions for bicyclists. Alternatives 2 and 3 would not eliminate or substantially and adversely affect any existing bikeways. Class III bike routes are proposed on Montezuma Hills Road and 2nd Street near the RVARC site; the Proposed Project would not interfere with the implementation of this proposed bikeway. By not altering existing roadway alignments or intersection traffic controls, construction and operation of Alternatives 2 and 3 would not result in unsafe conditions for bicyclists; therefore, this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Construction and operation of Alternative 4 would conflict with an adopted plan regarding bicycle facilities. The City of Stockton Bicycle Master Plan proposes a Class I bike path along the north shore of the Stockton DWSC, which traverses through the southern portion of the Ryde Avenue site. **Mitigation Measure TRA-6 (Revise Ryde Avenue Site Plan So As Not To Preclude Bike Path),** requires that DWR and USFWS, or the developer, design the Ryde Avenue site plan so as not to preclude this Class I bike path; implementation of the Class I bike path is the responsibility of the City of Stockton. Implementation of Mitigation Measure TRA-6 would reduce this impact to a level that would be **less than significant with mitigation**.

Mitigation Measure TRA-6: Revise Ryde Avenue Site Plan So as Not to Preclude Bike Path (Alternative 4)

DWR and USFWS, or the Proposed Project developer in consultation with the City of Stockton, shall design the site plan so as not to preclude construction of the Class I bike path. This might involve rerouting the bike path around the site to avoid DRS facilities, such as the channel connecting the marina with the Stockton DWSC.

Impact TRA-7: Impacts on Traffic Hazards from Delta Research Station Operational Traffic.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, no ERS or FTC facilities would be constructed or operated; therefore, there would be **no impact** on traffic hazards.

ALTERNATIVES 2 AND 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 AND 2

Construction and operation of Alternatives 2 and 3 would not substantially increase traffic hazards from a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment). Alternatives 2 and 3 would not change the alignment of Beach Drive or the Montezuma Hills Road/2nd Street/Beach Drive intersection. According to the Transportation Injury Mapping System (TIMS, Safe Transportation Research and Education Center at the University of California, Berkeley), which maps data from the Statewide Integrated Traffic Records System (SWITRS, California Highway Patrol), no traffic collisions that resulted in an injury occurred on Beach Drive near the RVARC or at the Montezuma Hills Road/2nd Street/Beach Drive intersection between 2008 and 2012. In addition, Alternatives 2 and 3 would enhance the existing trail along the Proposed Project's frontage on Beach Drive so as to not increase traffic hazards from incompatible uses; therefore, this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Construction and operation of Alternative 4 would not substantially increase traffic hazards from a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment). Alternative 4 would not change the alignment of Ryde Avenue or West Fremont Street or the Monte Diablo Avenue/Ryde Avenue intersection. According to TIMS (Safe Transportation Research and Education Center at the University of California, Berkeley), there was one collision that resulted in a complaint of pain injury on West Fremont Street between 2008 and 2012. In addition, plans for Alternative 4 would require frontage improvements that include sidewalks on Ryde Avenue and West Fremont Street as a part of Stockton's building permit application process. The construction of sidewalks would serve to reduce traffic hazards from incompatible uses; therefore, this impact would be **less than significant**.

Impact TRA-8: Impacts on Emergency Access from Delta Research Station Operational Traffic.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, no ERS or FTC facilities would be constructed or operated; therefore, there would be **no impact** on emergency access.

ALTERNATIVES 2 AND 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 AND 2

Alternatives 2 and 3 are located outside the existing City limits served by the City of Rio Vista Police Department and Rio Vista Fire Department. Alternative 2 and 3's impacts on study area intersections, roadway segments, and freeway segments would be less than significant; therefore, there would be minimal increases to police and fire response times resulting from DRS operational traffic. Alternatives 2 and 3 would require that the Proposed Project applicant pay development impact fees for police and fire service to the City of Rio Vista; therefore, this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 is located within the existing City limits served by the City of Stockton Police Department and Stockton Fire Department. Alternative 4's impacts on study area intersections, roadway segments, and freeway segments are less than significant; therefore, there would be minimal increases to police and fire response times resulting from DRS operational traffic. Alternative 4 would require that the Proposed Project applicant pay development impact fees for police and fire service to the City of Stockton; therefore, this impact would be **less than significant**.

Impact TRA-9: Impacts on Roadway and Intersection Operating Conditions from Construction-related Traffic.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, no DRS or FTC facilities would be constructed or operated; therefore, there would be **no impact** on roadway or intersection operations.

ALTERNATIVES 2 AND 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 AND 2

Construction of Alternatives 2 and 3 would result in short-term increases in traffic volumes on local roadways, including Beach Drive. The addition of construction vehicle traffic to existing roadway volumes could disrupt traffic flows and result in increased congestion and delays for vehicles on area roadways.

Construction-related vehicle trips would include construction workers traveling to and from the RVARC site, haul-truck trips necessary for materials and equipment deliveries, and haul-truck trips associated with the transport of excavated materials. The number of construction-related vehicles traveling to and from the site would vary on a daily basis depending on the construction phase, activity, and materials needed. In particular, the number of truck trips on Beach Drive associated with the disposal of excess soil materials would vary and would depend on the amount that would be reused on-site. Because the disposition of excess material is unknown, it is conservatively estimated that all cut material would be off-hauled.

Table 15-16 indicates the maximum number of construction truck and construction worker vehicle trips generated by the Alternatives 2 and 3 on a daily basis. For Alternative 2, it is expected that 40,200 CY of cut would be exported from the site. Based on the CalEEMod modeling assumptions used in Chapter 6, *Air Quality and Greenhouse Gas Emissions,* it is estimated that approximately 14,082 truck trips would be necessary for hauling cut-and-fill materials. Haul-truck trips for land-based hauling during the grading and site preparation phases are expected to occur over a 6.0-month period, which equates to approximately 74 haul-truck trips per day. Based on the excavation volumes for marina construction, a total of 5,295 haul trips would be necessary. Because the phasing of construction is unknown, this analysis conservatively presumed that marina construction could overlap with on-land activities. When considering the number of construction worker and vendor trips, the maximum number of daily trips would be approximately 300.

Table 15-16. Daily Construction Vehicles Associated with Construction Activities

Alternative	Construction Type	Maximum Daily Trips			
		Construction Worker Trips	Vendor Trips	Hauling Trips	Total
Alternative 2	Land-based construction[d]	134	56	74	300
	Marina	10	0	26[a]	
Alternative 3	Land-based construction[d]	148	62	121	421
	Marina	10	0	80[b]	
Alternative 4	Land-based construction[d]	150	63	46	327
	Marina	10	0	81[c]	

Notes: The number of trips shown include inbound and outbound vehicle trips.

[a] Under Alternative 2, marina construction is estimated to occur over 205 days.

[b] Under Alternative 3, marina construction is estimated to occur over 115 days.

[c] Under Alternative 4, marina construction is estimated to occur over 135 days.

[d] Hauling-truck trips for all land-based construction work is expected to be spread out across 6 months.

For Alternative 3, it is expected that 58,110 CY of cut would be exported from the site. As under Alternative 2, some of this material could be reused on-site; however, for the purposes of this analysis, it is conservatively presumed that all cut material would be off-hauled. It is estimated that approximately 14,528 total truck trips would be necessary for off-haul and on-haul of cut-and-fill materials. These trips are estimated to occur over a 6.0-month period, resulting in approximately 121 truck trips per day. Based on the excavation volumes for marina construction, 9,915 haul-truck trips would be necessary. When considering the number of construction worker and vendor trips, the maximum number of daily trips would be approximately 396.

Under both Alternatives 2 and 3, the level of traffic during the excavation phase is expected to be lower than the number of operational automobile trips generated by the Proposed Project. Truck trips would be spread out over the course of a construction workday (7:00 a.m. to 5:00 p.m.) and it is expected that most of the truck trips would occur outside the peak periods and that truck traffic would follow designated truck routes. Project construction would most likely stage any large vehicles (i.e., earth-moving equipment, cranes, etc.) on the site before beginning site work and remove these vehicles at completion. As such, a daily influx of construction equipment is unlikely.

Under Alternative 2, approximately 70 construction workers per day are expected to be on-site during construction, and under Alternative 3, approximately 68 workers per day would be on-site during construction.

The impact of construction-related vehicles and haul trucks on local roadways was qualitatively assessed and compared to the operational analysis conducted for the Proposed

Project. The number of trips generated by excavation activities and the number of construction worker trips are expected to be less than the number of operational automobile trips. The expected number of construction workers on-site would be less than the operational number of employees on-site; however, the presence of large construction vehicles sharing the roadway with normal vehicle traffic could create potential conflicts between incompatible uses. Although construction impacts would be temporary, this impact is considered potentially significant. With implementation of **Mitigation Measure TRA-9 (Construction Management Plan),** which requires preparation and implementation of a construction management plan, this impact would be reduced to a level that is **less than significant with mitigation**.

Mitigation Measure TRA-9: Construction Management Plan (Alternatives 2, 3, and 4)

DWR and USFWS shall require that the construction contractor(s) develop a construction management plan to reduce the potential for construction vehicle conflicts with other roadway users. The plan shall include a project staging plan to maximize on-site storage of materials and equipment; a set of comprehensive traffic control measures, including scheduling of major truck trips and deliveries to avoid peak hours, lane closure proceedings; signs, cones, and other warning devices for drivers, pedestrians, and bicyclists, and designation of construction access routes (e.g., Montezuma Hills Road or 2nd Street in Rio Vista); permitted construction hours; location of construction staging; identification of parking areas for construction employees, site visitors, and inspectors, including on-site locations; and provisions for street sweeping to remove construction-related debris on public streets.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Similar to Alternatives 2 and 3, construction traffic would result in short-term increases in traffic volumes on local roadways, except that these increases would occur on Ryde Avenue and West Fremont Avenue. The addition of construction vehicle traffic to existing roadway volumes could disrupt traffic flows on local roads, and could result in increased congestion and delays for vehicles on area roadways.

As shown in Table 15-16, it is expected that 58,110 cy of cut would be exported from the site. Although some of this material could be reused on-site, for the purposes of this analysis, it is presumed that all cut material would be off-hauled. It is estimated that approximately 5,534 truck trips would be necessary for off-haul and on-haul of cut-and-fill materials. Haul-truck trips for land-based hauling during the grading and site preparation phases are expected to occur over a 6-month period, which equates to approximately 46 haul truck trips per day. Based on the excavation volumes for marina construction, 5,534 haul trips would be necessary. Approximately 70 construction workers per day are expected to be on-site during construction of Alternative 4. Because the phasing of construction is unknown, this analysis conservatively presumes that marina construction could overlap with on-land activities. When considering the number of construction worker and vendor trips, the maximum number of daily trips is approximately 327.

Under Alternative 4, the level of traffic during the excavation phase is expected to be lower than the number of operational automobile trips generated by the Proposed Project. Truck trips would be spread out over the course of a construction workday and it is expected that most of the truck trips would occur outside the peak periods and that truck traffic would follow designated truck routes. Proposed Project construction would most likely stage any large vehicles (i.e., earth-moving equipment, cranes, etc.) on the site before beginning site work and remove these vehicles at completion. As such, a daily influx of construction equipment is unlikely.

Construction-related traffic impacts on local roads would be similar to those described above for Alternatives 2 and 3. The number of trips generated by excavation activities and worker trips are expected to be lower than the number of operational automobile trips; therefore, construction traffic would not cause any impacts on study area roadways beyond those identified for operational traffic. However, during the construction phase, potential conflicts with normal vehicle traffic might arise from large construction vehicles sharing the roadway. With implementation of Mitigation Measure TRA-9, this impact would be reduced to a level that is **less than significant with mitigation**.

Impact TR-10: Effects on Vessel Traffic.

As described above, the Sacramento and Stockton DWSCs are major shipping routes and popular recreational boating thoroughfares. The Proposed Project could have adverse effects on shipping and boating traffic if it were to generate substantial numbers of vessel trips during construction and/or operation.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, no DRS facilities would be constructed and IEP activities would continue at their current locations. IEP activities currently involve vessel trips throughout the Delta region for research purposes, and these trips would continue. The No Project Alternative would have **no impacts** on boat traffic relative to existing conditions.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

The RVARC site is located immediately adjacent to the Sacramento River/Sacramento DWSC. Shipping vessels routinely pass through this portion of the channel on their way northeast to docks in Sacramento or southwest to the San Francisco Bay and Pacific Ocean. This portion of the Sacramento River is also a popular location for windsurfers, sailors, and other water-based recreationalists.

Under Alternative 2, the ERS would include a partially excavated marina within the main channel of the Sacramento River/Sacramento DWSC, as shown in Figure 3-1. Construction of the marina would require work within the Sacramento River/Sacramento DWSC and along the shoreline, including work from barges. The finished marina would protrude up to approximately 165 feet into the river. In-channel construction activities and barge trips could adversely affect vessel traffic in the vicinity of the marina work area to some degree; however, marina construction would be confined to the portion of the river near the shoreline and would not be anticipated to generate a large number of barge trips. Near the

RVARC site, the Sacramento River/Sacramento DWSC is approximately 0.45 mile wide. Given the size of the marina construction work area relative to the width of the channel and because most equipment would most likely remain on-site throughout the work period, construction of the marina would not substantially affect vessel traffic.

During operation, the ERS would generate vessel trips from various water-based programs and activities with varying rates of vessel traffic. Table 3-1 summarizes the estimated number and field work locations of all proposed IEP activities at the DRS. Forty-eight vessels would be used at the DRS at varying frequencies. These vessel trips could potentially increase congestion in the Sacramento River/Sacramento DWSC to some degree; however, when comparing the number of vessels operated at the DRS with the overall volume of ship traffic in the area, the Proposed Project's contribution is not anticipated to be substantial. In addition, the majority of the vessels used for IEP activities are approximately 20–40 feet long, substantially smaller than the standard vessels traveling on the Sacramento River.

In addition, the FTC would involve construction of a process-water intake and outfall in the Sacramento River/Sacramento DWSC. The intake and outfall would be close to shore and would not generate barge trips during construction.

In conclusion, the DRS would include construction of a partially excavated marina, boat ramp, intake, outfall, and potentially other ancillary in-water facilities. During operation, the DRS would generate vessel trips as described above for the ERS. None of these activities are anticipated to cause substantial adverse impacts on vessel traffic and transportation in the Sacramento River/Sacramento DWSC; therefore, this impact would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

One of the primary differences between Alternative 3 and Alternative 2 is that the configuration under Alternative 3 would not feature a partially excavated marina. The marina for the ERS under Alternative 3 would be excavated off-channel from the Sacramento River/Sacramento DWSC (see Figure 3-2) and would be connected to the river only during the final part of construction. Construction of this off-channel marina would not generate any barge trips within the main channel of the Sacramento River/Sacramento DWSC. Operations under Alternative 3 would generate the same number of vessel trips as for ERS under Alternative 2, described above. Construction of the process-water intake and outfall outfall in the Sacramento River would also be the same as that described above for Alternative 2 and would not generate any barge trips. As such, this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

The Stockton DWSC is adjacent to the Ryde Avenue site. Shipping vessels routinely pass through this area on their way to docks in Stockton or en route to the San Francisco Bay and Pacific Ocean. As under Alternative 3, the site layout for Alternative 4 would not include a partially excavated marina (see Figure 3-3); the proposed marina would be completely inland from the Stockton DWSC and would be connected to the river only during the final part of construction. As under Alternative 3, construction of the marina would not generate any barge trips. Construction of the process-water intake and outfall for the FTC under Alternative 4 also would be similar to that described under Alternatives 2 and 3 and would not generate any barge trips.

Under Alternative 4, operation of DRS would generate the same amount of vessel traffic as that under Alternatives 2 and 3 described above. For these reasons, this impact would be **less than significant**.

15.4.5 Existing-Plus–Approved-Projects Conditions

The City of Stockton Transportation Impact Analysis Guidelines require an Existing-Plus-Approved-Projects analysis, which reflects changes to existing traffic volumes from relevant approved developments. The City of Rio Vista does not require an Existing-Plus-Approved-Projects analysis as a part of transportation impact analysis, and so no such analysis was performed.

Based on coordination with City of Stockton staff, there are no approved or pending projects within the vicinity of the Ryde Avenue site study area; therefore, peak-hour intersection turning movement volumes and daily roadway segment traffic volumes on City of Stockton roadways and peak-hour traffic volumes on freeway ramps would not appreciably change from approved developments. However, freeway mainline peak-hour traffic volumes are expected to increase as regional growth occurs from approved developments outside the immediate study area. From 2002 to 2007, a time period with a robust economy during which Northern California experienced significant growth, daily traffic volumes on I-5 grew by 3.2 percent per year according to Caltrans' traffic counts. Project construction is expected in 2017; therefore, through-movements on I-5 were increased by 3.2 percent per year to reflect 2017 conditions.

Table 15-17 summarizes the Existing-Plus-Approved-Projects freeway facility densities and the corresponding LOSs (with and without the Proposed Project). As shown, the addition of Alternative 4 traffic would not change LOS at any of the study freeway facilities; however, Alternative 4 would increase density on two freeway facilities that operate unacceptably without the Proposed Project (the I-5 southbound weave between Country Club Boulevard and Monte Diablo Avenue and the I-5 northbound weave between Monte Diablo Avenue and Country Club Boulevard).

Table 15-17. Existing-Plus-Approved-Projects Freeway Facility Level of Service, Stockton (Alternative 4)

Freeway Segment	Type	EPAP AM Peak Hour			EPAP PM Peak Hour			EPAP Plus Project AM Peak Hour			EPAP Plus Project PM Peak Hour		
		Volume	Density	LOS	Volume	Density	LOS	Volume	Density	LOS	Volume	Density	LOS
1. Country Club Boulevard to Monte Diablo Avenue (SB)	Weave	**6,150**	**36.2**	**E**	4,190	21.8	C	**6,200**	**36.8**	**E**	4,200	21.9	C
2. Monte Diablo Avenue On-Ramp (SB)	Merge	6,350	23.5	C	4,260	16.0	B	6,370	23.6	C	4,280	16.2	B
3. Freeway between Monte Diablo Avenue and Fremont Avenue (SB)	Basic	5,970	26.7	D	4,050	17.2	B	5,980	26.8	D	4,070	17.2	B
4. Fremont Avenue Off-Ramp (SB)	Diverge	6,350	31.1	D	4,260	21.6	C	6,370	31.2	D	4,280	21.7	C
5. Fremont Avenue to SR 4 (SB)	Weave	**6,430**	**35.6**	**E**	4,690	24.9	C	**6,430**	**35.6**	**E**	4,740	25.3	C
6. Freeway between Fremont Avenue and Monte Diablo Avenue (NB)	Basic	4,460	18.9	C	6,770	32.2	D	4,510	19.2	C	6,780	32.2	D
7. Monte Diablo Off-Ramp (NB)	Diverge	4,620	23.5	C	6,970	34.0	D	4,720	24.0	C	6,990	34.1	D
8. Monte Diablo Avenue to Country Club (NB)	Weave	4,580	23.2	C	**6,890**	**38.3**	**E**	4,590	23.3	C	**6,930**	**38.8**	**E**

Notes: AM = morning (7:00–9:00 a.m.); EPAP = Existing Plus Approve Projects; LOS = level of service; PM = evening (4:00–6:00 p.m.)

Boldface type indicates an unacceptable LOS.

15.4.6 Existing-Plus-Approved-Projects Impacts and Mitigation Measures

Impact TRA-11: Impacts on Study Area Freeway Segments from Delta Research Station Operational Traffic.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, no DRS facilities would be constructed or operated; therefore, there would be **no impact** on study area freeway segments.

ALTERNATIVES 2 AND 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 AND 2

There are no freeway segments within the study area of the RVARC site; therefore, construction and operation of Alternatives 2 and 3 would have **no impact** on freeway segments.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

The Existing-Plus-Approved-Projects freeway facility analysis provided in Table 15-17 shows that three weave facilities operate unacceptably without Alternative 4 and that Alternative 4 would increase density within the following weaves: I-5 southbound between Country Club Boulevard and Monte Diablo Avenue, I-5 southbound between Fremont Avenue and SR 4, and I-5 northbound between Monte Diablo Avenue and Country Club Boulevard. To reduce weave density to acceptable levels, additional freeway lanes are necessary; however, additional freeway lanes on I-5 are not planned. The I-5 North Stockton Project is underway and is scheduled for completion by late 2015. This project will convert mixed-flow lanes into high-occupancy vehicle lanes between Charter Way and Country Club Boulevard; therefore, this impact would be potentially significant. Mitigation Measure TRA-3 requires that DWR and USFWS or the Proposed Project developer contribute their fair share toward regional transportation roadway network improvements through the payment of applicable local and regional transportation impact fees; however, additional freeway lanes on I-5 are not planned and, as such, this impact would be **significant and unavoidable**.

15.4.7 Cumulative Scenario

Traffic Forecasts

The most recent versions of the Napa-Solano Travel Demand Model, the City of Stockton Travel Demand Model, and the Tri-County (San Joaquin County, Stanislaus County, and Merced County) Travel Demand Model were used to forecast cumulative year traffic volumes within the study areas.

The Napa-Solano Travel Demand Model produces the cumulative year forecasts for 2030; therefore, 2030 was used as the cumulative year in Rio Vista. The cumulative year of the Napa-Solano Travel Demand Model accounts for planned land use growth within Rio Vista according to the City's General Plan (2002), as well as within the surrounding region. The model also accounts for planned improvements to the surrounding transportation system.

Analysis of the City of Stockton Travel Demand Model and Tri-County Travel Demand Model's base years showed that the Tri-County Travel Demand Model reflects existing roadway and traffic conditions more accurately than the City of Stockton Travel Demand Model. In addition, growth on study area roadways forecasted by the Tri-County Travel Demand Model was more valid based on expected changes in land use in the study area; therefore, the Tri-County Travel Demand Model was used to produce cumulative year forecasts. The Tri-County Travel Demand Model produces cumulative year forecasts for 2035; therefore, 2035 was used as the cumulative year in Stockton. The cumulative year of the Tri-County Travel Demand Model accounts for planned land use growth within Stockton according to the City's General Plan (2007), as well as within the surrounding region. The model also accounts for planned improvements to the surrounding transportation system.

The difference method, which adds the increment of growth between the base and future year models to existing traffic counts, was used to develop cumulative year traffic forecasts for intersection turning movements, roadway segments, and freeway facilities; however, the Napa-Solano Travel Demand Model forecasted growth on Rio Vista study area state highways (SR 12 and SR 84) that exceeded historical growth on these facilities. From 2002 to 2007, a time period with a robust economy during which Northern California experienced significant growth, daily traffic volumes on SR 12 grew by 3.3 percent per year according to Caltrans' traffic counts; therefore, through movements on SR 12 and turning movements to/from SR 84 were increased by a maximum of 3.3 percent per year. Elsewhere in Rio Vista, the difference method was applied to develop traffic forecasts. **Figure 15-12** shows peak-hour traffic volumes and lane configurations for cumulative conditions in Rio Vista.

The Stockton General Plan 2035 includes a Future Roadway Network that identifies the number of lanes on arterial and collector roadways within city limits. This Future Roadway Network was studied in the Stockton General Plan 2035 Final Environmental Impact Report (FEIR). In Stockton, cumulative impacts resulting from the Proposed Project would be from project traffic necessitating more lanes on arterial and collector roadways than provided by the Future Roadway Network and studied in the Stockton General Plan 2035 FEIR. The City of Stockton uses roadway segment daily volume thresholds to determine the required number of lanes on roadways and to establish consistency with the Stockton General Plan 2035 FEIR; therefore, only daily roadway segment forecasts were produced for Stockton.

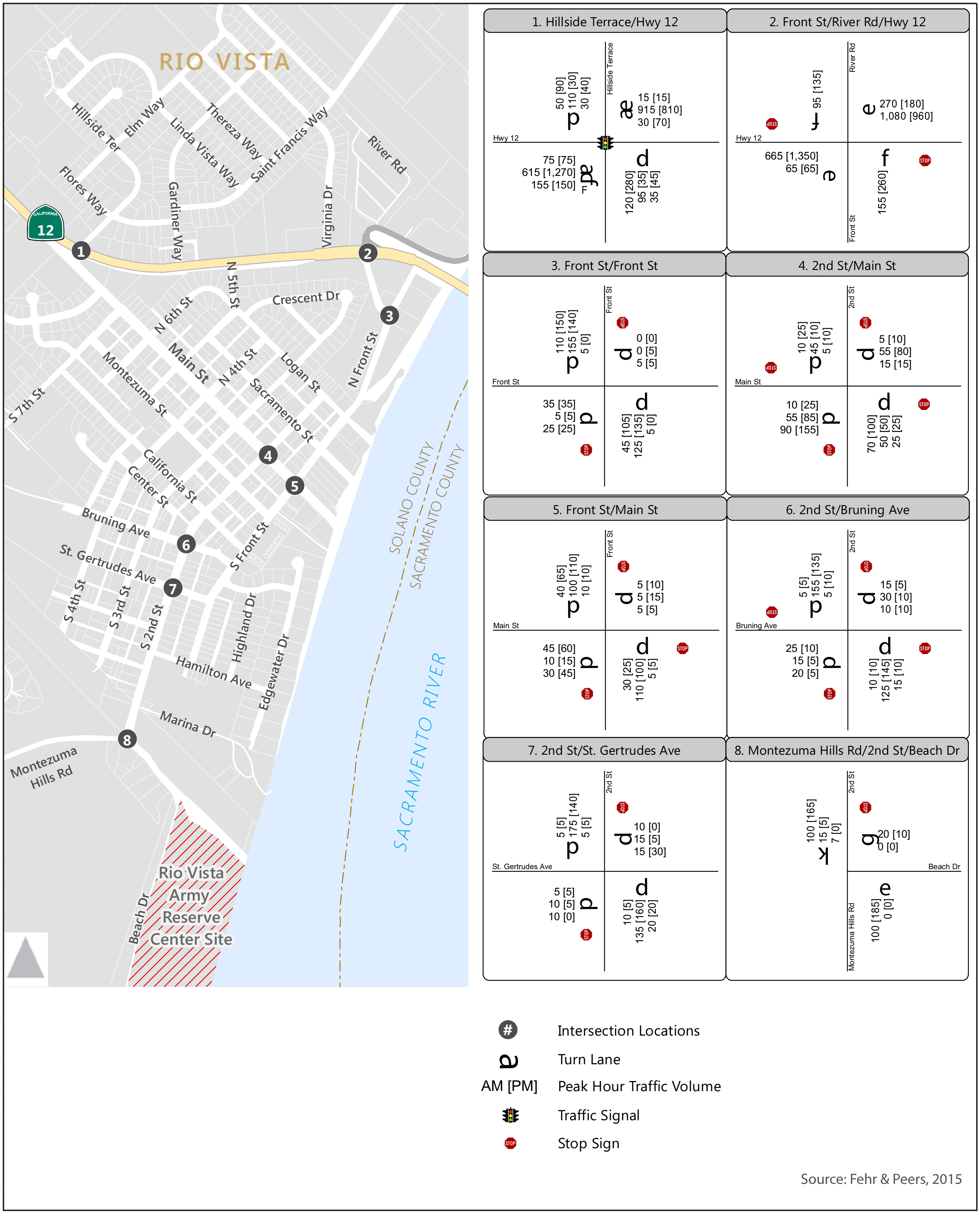

Figure 15-12

Alternatives 2 and 3
Peak Hour Traffic Volumes & Lane Configurations
Cumulative Conditions
Rio Vista

Cumulative Conditions under the No Project Alternative

RIO VISTA ARMY RESERVE CENTER SITE

Table 15-18 summarizes the cumulative peak-hour intersection operations at the study area intersections in Rio Vista. As shown, most of the study intersections operate with an average LOS of C or better, with the exception of the SR 12/Main Street and SR 12/North Front Street/River Road intersections. The SR 12/Main Street intersection and the northbound right-turn at the SR 12/North Front Street/River Road intersection operate at LOS F during PM peak hours.

Table 15-18. Cumulative No Project Delay/Level of Service, Rio Vista

Intersection	Control	Peak Hour	Average Delay (seconds)	LOS
1. SR 12/Main Street	Traffic Signal	AM	29.3	C
		PM	81.9	F
2. SR 12/North Front Street/River Road	Side-Street Stop	AM	2.8 (29)	A (D)
		PM	41.9 (420.3)	**E (F)**
3. North Front Street/Front Street	Side-Street Stop	AM	2.5 (13.9)	A (B)
		PM	3.2 (15.8)	A (C)
4. Main Street/2nd Street	All-Way Stop	AM	9.6	A
		PM	10.6	B
5. Main Street/Front Street	All-Way Stop	AM	9	A
		PM	8.7	A
6. Bruning Avenue/2nd Street	All-Way Stop	AM	9.9	A
		PM	8.6	A
7. St. Gertrudes Ave/2nd Street	Side-Street Stop	AM	2.6 (15.3)	A (C)
		PM	1.6 (11.7)	A (B)
8. Montezuma Hills Road/2nd Street/Beach Drive	Side-Street Stop	AM	0.8 (9.5)	A (A)
		PM	0.4 (9.5)	A (A)

Notes:

AM = morning (7:00–9:00 a.m.); PM = evening (4:00–6:00 p.m.); SR = State Route.

For side-street–stop intersections, the average delay is reported with the worst approach or movement in parentheses

Boldface type indicates an unacceptable level of service.

Table 15-19 summarizes the cumulative daily traffic volumes and the corresponding LOS according to the thresholds shown in Table 15-2. As shown, all study roadway segments are projected to operate at LOS C or better with the exception of SR 12, which operates at LOS F.

Table 15-19. Cumulative No Project Roadway Capacity Utilization, Rio Vista (Alternatives 2 and 3)

Roadway Segment	Cumulative Conditions			
	Number of Lanes	Type	Average Daily Traffic	LOS
1. SR 12 West of Hillside Terrace	2	Arterial	**33,930**	**F**
2. SR 12 East of River Road (SR 84)	2	Arterial	**31,940**	**F**
3. Main Street between SR 12 and Front Street	2	Collector	7,990	C
4. Front Street between North Front Street and Main Street	2	Collector	4,750	C
5. 2nd Street between Main Street and St. Gertrudes Avenue	2	Collector	2,900	B
6. 2nd Street between St. Gertrudes Avenue and Beach Drive	2	Collector	2,310	B
7. Montezuma Hills Road South of Beach Drive	2	Collector	2,730	B

Notes: SR = State Route.

The arterials are presumed to have moderate access control; Front Street, 2nd Street, and Montezuma Hills Road are presumed to be residential collectors with driveways; Main Street is considered to be a residential collector without driveways, as described in Table 15-2.

Boldface type indicates an unacceptable level of service.

RYDE AVENUE SITE IN STOCKTON

Table 15-20 summarizes the cumulative daily traffic volumes and the corresponding LOSs according to the thresholds shown in Table 15-3. As shown, all study roadway segments are projected to operate at LOS B or better with the exception of I-5, which is projected to operate at LOS E.

Table 15-20. Cumulative No Project Roadway Capacity Utilization, Stockton

Roadway Segment	Cumulative Conditions			
	Number of Lanes	Type	Average Daily Traffic	LOS
1. Monte Diablo Avenue between Ryde Avenue and I-5 South Ramps	2	Collector	5,950	A
2. Ryde Avenue between Monte Diablo Avenue and Fremont Street	2	Collector	1,540	A
3. Fremont Street between Ryde Avenue and Queen Avenue	2	Collector	930	A
4. Fremont Street between Pershing Avenue and I-5 North Off-Ramp	2	Arterial	10,340	B
5. Pershing Avenue between Fremont Street and Park Avenue	4	Arterial	16,330	A
6. I-5 between Monte Diablo Avenue and Fremont Avenue	8	Freeway	**175,680**	**E**

Note: I = Interstate.

Cumulative-Plus-Project Conditions

Cumulative-Plus-Project peak-hour traffic volumes were developed by applying the Proposed Project's trip generation and distribution to the cumulative traffic forecasts. **Figure 15-13** shows the Cumulative-Plus-Project peak-hour traffic volumes and lane configurations.

ALTERNATIVES 2 AND 3: RIO VISTA ARMY RESERVE CENTER SITE, CONFIGURATIONS 1 AND 2

The study area intersections were reanalyzed under Cumulative-Plus-Project conditions. **Table 15-21** summarizes the results. As shown, all study intersections operate at LOS C or better except the SR 12/Main Street and SR 12/North Front Street/River Road intersections, which operate at LOS F during the PM peak hours. The addition of Alternative 2 or 3 traffic increases delays at both intersections.

1 **Table 15-21.** Cumulative-Plus-Project Delay/Level of Service, Rio Vista (Alternatives 2 and 3)

Intersection	Control	Peak Hour	Cumulative Conditions		Cumulative-Plus-Project Conditions	
			Average Delay (seconds)	LOS	Average Delay (seconds)	LOS
1. SR 12/Main Street	Traffic Signal	AM	29.3	C	30.4	C
		PM	**81.9**	**F**	**89.2**	**F**
2. SR 12/North Front Street/River Road	Side-Street Stop	AM	2.8 (29)	A (D)	2.8 (29)	A (D)
		PM	**41.9 (420.3)**	**E (F)**	**60.3 (537.6)**	**F (F)**
3. North Front Street/Front Street	Side-Street Stop	AM	2.5 (13.9)	A (B)	2.4 (14.9)	A (B)
		PM	3.2 (15.8)	A (C)	3.7 (17.9)	A (C)
4. Main Street/2nd Street	All-Way Stop	AM	9.6	A	10.1	A
		PM	10.6	B	11.8	B
5. Main Street/Front Street	All-Way Stop	AM	9	A	9.6	A
		PM	8.7	A	9.1	A
6. Bruning Avenue/2nd Street	All-Way Stop	AM	9.9	A	11.7	B
		PM	8.6	A	9.6	A
7. St. Gertrudes Ave/2nd Street	Side-Street Stop	AM	2.6 (15.3)	A (C)	3.4 (21.4)	A (C)
		PM	1.6 (11.7)	A (B)	1.4 (13.1)	A (B)
8. Montezuma Hills Road/2nd Street/Beach Drive	Side-Street Stop	AM	0.8 (9.5)	A (A)	0.9 (9.6)	A (A)
		PM	0.4 (9.5)	A (A)	2.9 (10.4)	A (B)

2 **Notes:** AM = morning (7:00–9:00 a.m.); PM = evening (4:00–6:00 p.m.); SR = State Route.
3 For side-street–stop intersections, average delay is reported with the worst approach or movement in parentheses.
4 **Boldface** type indicates an unacceptable level of service.

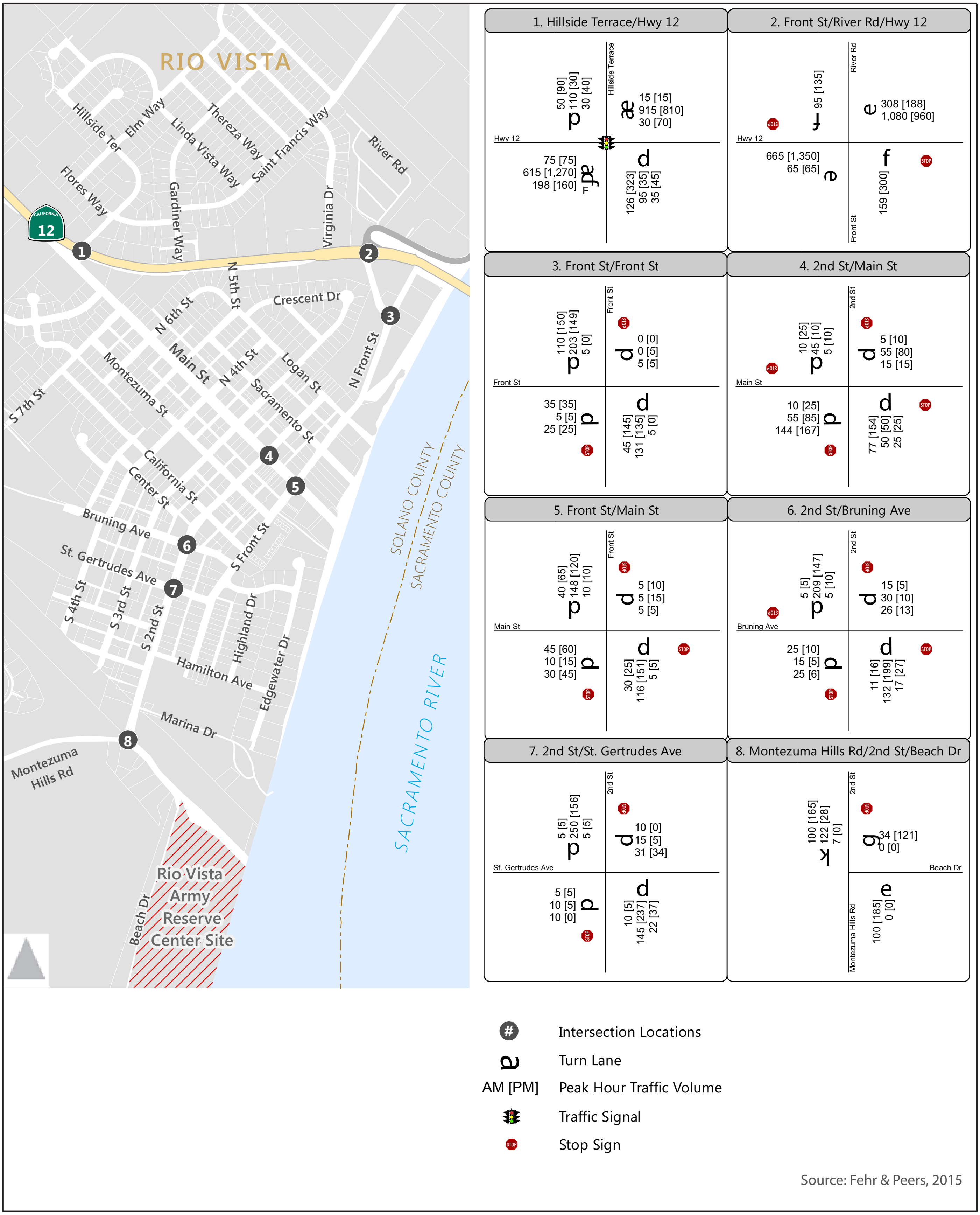

Figure 15-13

Horizon WATER and ENVIRONMENT

Alternatives 2 and 3
Peak Hour Traffic Volumes & Lane Configurations
Cumulative Plus Project Conditions
Rio Vista

Table 15-22 summarizes the Cumulative-Plus-Project daily traffic volumes and the corresponding LOSs. As shown, 2nd Street and Montezuma Hills Road would operate at LOS C or better. SR 12 would operate at LOS F with and without the addition of Alternative 2 or 3 traffic. Proposed Project traffic decreases LOS from C to D on Front Street and Main Street.

Table 15-22. Cumulative-Plus-Project Roadway Capacity Utilization, Rio Vista (Alternatives 2 and 3)

	Cumulative Conditions				Cumulative-Plus-Project Conditions	
Roadway Segment	**Number of Lanes**	**Type**	**Average Daily Traffic**	**LOS**	**Average Daily Traffic**	**LOS**
1. SR 12 West of Hillside Terrace	2	Arterial	**33,930**	**F**	**34,249**	**F**
2. SR 12 East of River Road (SR 84)	2	Arterial	**31,940**	**F**	**32,219**	**F**
3. Main Street between SR 12 and Front Street	2	Collector	7,990	C	8,390	D
4. Front Street between North Front Street and Main Street	2	Collector	4,750	C	5,110	D
5. 2nd Street between Main Street and St. Gertrudes Avenue	2	Collector	2,900	B	3,460	C
6. 2nd Street between St. Gertrudes Avenue and Beach Drive	2	Collector	2,310	B	2,990	B
7. Montezuma Hills Road South of Beach Drive	2	Collector	2,730	B	2,730	B

Notes: SR = State Route

The arterials are assumed to have moderate access control, Front Street, 2nd Street and Montezuma Hills Road are assumed to be residential collectors with driveways, Main Street is considered to be a residential collector without driveways as described in Table 15-2

Boldface type indicates an unacceptable level of service.

<u>ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON</u>

Table 15-23 summarizes the Cumulative-Plus-Project daily traffic volumes and the corresponding LOSs. As shown, all study roadway segments would operate at LOS B or better with the exception of I-5, which operates at LOS E with and without the addition of Alternative 4 traffic.

Table 15-23. Cumulative-Plus-Project Roadway Capacity Utilization, Stockton (Alternative 4)

Roadway Segment	Cumulative Conditions				Cumulative-Plus-Project Conditions	
	Number of Lanes	Type	Average Daily Traffic	LOS	Average Daily Traffic	LOS
1. Monte Diablo Avenue between Ryde Avenue and I-5 South Ramps	2	Collector	5,950	A	6,600	B
2. Ryde Avenue between Monte Diablo Avenue and Fremont Street	2	Collector	1,540	A	2,190	A
3. Fremont Street between Ryde Avenue and Queen Avenue	2	Collector	930	A	1,090	A
4. Fremont Street between Pershing Avenue and I-5 North Off-Ramp	2	Arterial	10,340	B	10,360	B
5. Pershing Avenue between Fremont Street and Park Avenue	4	Arterial	16,330	A	16,350	A
6. I-5 between Monte Diablo and Fremont Avenue	8	Freeway	**175,680**	**E**	**176,450**	**E**

Notes: I = Interstate
Boldface type indicates an unacceptable level of service.

15.4.8 Cumulative Impacts and Mitigation Measures

Impact TRA-12: Cumulative Impacts on Study Intersections in Rio Vista.

<u>ALTERNATIVE 1: NO PROJECT ALTERNATIVE</u>

Under Alternative 1, the DRS would not be constructed or operated; therefore, this alternative would make no contribution to any cumulative impacts. Accordingly, there would be **no impact** on study intersections in Rio Vista or Stockton.

<u>ALTERNATIVES 2 AND 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 AND 2</u>

The Cumulative-Plus-Project intersection operations analysis provided in Table 15-21 shows that the addition of Alternative 2 or 3 traffic increases delays by more than 5.0 seconds at both the SR 12/Main Street and SR 12/North Front Street/River Road intersections. For this increase in delays to be considered a significant impact, the intersection must meet the MUTCD's peak-hour signal warrant. The SR 12/North Front Street/River Road intersection meets the MUTCD's peak-hour signal warrant; therefore, this cumulative impact is considered significant and either alternative's contribution would be cumulatively considerable. Implementation of **Mitigation Measure TRA-12a (Pay Fair Share to the City of Rio Vista Toward Construction of a Northbound Left-Turn Lane at the SR 12/Main Street Intersection)** and **Mitigation Measure TRA-12b (Pay Fair Share to the City of Rio Vista Toward the Construction of a Traffic Signal at the SR 12/North Front/River Road Intersection)** would require that DWR and USFWS contribute their fair-share toward construction of a new left-turn lane at SR 12/Main Street and a new signal at SR 12/North Front/River Road intersection.

With respect to the SR 12/Main Street intersection, without the DRS, this movement is forecasted to carry 280 vehicles per hour during PM peak hours. The addition of DRS traffic would increase this movement to 323 vehicles per hour during PM peak hours. With construction of the northbound left-turn lane and signal optimization, operations at the intersection would improve, especially for the northbound left lane, which is the primary movement affected by either Alternative 2 or 3. The intersection would still operate at LOS F. Additional through lanes on SR 12 are necessary to reduce overall intersection delays to an acceptable level; however, according to the SR 12 CSMP, the Concept Facility for SR 12 is a two- to three-lane conventional highway. SR 12 is already three lanes within the study area, and Caltrans has no plans to widen it. Therefore, because Mitigation Measure TRA-12a would not reduce the intersection's LOS to acceptable levels, the fact that DWR and USFWS cannot ensure that roadway improvement would be constructed or its timing, and because no other feasible mitigation has been identified to address this impact, the impact would remain significant and unavoidable.

Similarly, with the construction of the traffic signal at SR 12/North Front Street/River Road, operations at the intersection would improve, especially for the northbound right-turn lane, which is the primary movement affected by either Alternative 2 or 3. The intersection would still operate at LOS F. Additional through lanes on SR 12 are necessary to reduce overall intersection delays to an acceptable level. As noted above, according to the SR 12 CSMP, the Concept Facility for SR 12 is a two- to three-lane conventional highway. SR 12 is already three lanes within the study area and Caltrans has no plans to widen it; therefore, because Mitigation Measure TRA-12b would not reduce the intersection's LOS to acceptable levels, the fact that DWR and USFWS cannot ensure that the roadway improvement would be constructed or its timing, and because no other feasible mitigation has been identified to address this impact, the impact would remain significant and unavoidable.

In conclusion, because neither Mitigation Measure TRA-12a nor Mitigation Measure TRA-12b would reduce LOS at the above-described intersections to acceptable levels, cumulative impacts on study area intersections would remain **significant and unavoidable**.

Mitigation Measure TRA-12a: Pay Fair Share to the City of Rio Vista Toward Construction of a Northbound Left-turn Lane at the SR 12/Main Street Intersection (Alternatives 2 and 3)

DWR and USFWS, or the project developer, will pay their fair share towards the construction of a northbound left-turn lane at the SR 12/Main Street intersection. Separate payments shall be made for each facility (ERS and FTC), and the payment shall be proportionate to the total cost of the roadway improvements given each facility's relative contribution to the impact in light of all traffic causing the impact. Such fair-share contributions shall be made at the time a building permit is applied for. The contributions shall be held in escrow and returned in the event that a given facility (either the ERS, FTC, or the roadway improvement) is not constructed.

Mitigation Measure TRA-12b: Pay Fair Share to the City of Rio Vista toward the Construction of a Traffic Signal at the SR 12/North Front/River Road Intersection (Alternatives 2 and 3)

DWR and USFWS will pay their fair share toward the construction of a traffic signal at the SR 12/North Front Street/River Road intersection. Separate payments shall be made for each facility (ERS and FTC), and the payment shall be proportionate to the total cost of the roadway improvements given each facility's relative contribution to the impact in light of all traffic causing the impact. Such fair-share contributions shall be made at the time a building permit is applied for. The contributions shall be held in escrow and returned in the event that a given facility (either the ERS, FTC, or the roadway improvement) is not constructed.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

The City of Stockton only requires daily roadway segment analysis for Cumulative-Plus-Project conditions; therefore, consistent with City of Stockton requirements, no intersection analysis was performed for these conditions at the Ryde Avenue site.

Impact TRA-13: Cumulative Impacts on Study Area Roadway Segments.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the DRS would not be constructed or operated; therefore, this alternative would make no contribution to any cumulative impacts. Accordingly, there would be no cumulative impacts on study area roadway segments in Rio Vista or Stockton. There would be **no impact**.

ALTERNATIVES 2 AND 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 AND 2

The Cumulative-Plus-Project daily traffic volume analysis provided in Table 15-22 shows no significant impacts on study area roadway segments. The addition of Alternative 2 or 3 traffic would not cause a roadway segment operating at an acceptable LOS to operate at an unacceptable LOS. Although the SR 12 roadway segment operates at LOS F without DRS, Alternatives 2 and 3 would not increase the roadway's V/C by more than 0.05, Therefore, under Alternatives 2 and 3; therefore, the Proposed Project's contribution to this cumulative impact would not be considerable, and the impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

The Cumulative-Plus-Project daily traffic volume analysis provided in Table 15-23 shows no significant impacts on study roadway segments. The addition of Alternative 4 traffic would ot cause a roadway segment operating at an acceptable LOS to operate at an unacceptable LOS. Although the I-5 freeway segment operates at LOS E without Alternative 4, this alternative would not increase the roadway's V/C by more than 0.05. Therefore, under Alternative 4; therefore, the Proposed Project's contribution to this cumulative impact would not be considerable, and the impact would be **less than significant**.

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Chapter 16
Public Services, Utilities, and Energy

This chapter describes the existing public services, utilities, and energy resources in the vicinity of the RVARC and Ryde Avenue sites, the regulatory setting, and the potential impacts on these resources as a result of construction and operation of the Proposed Project alternatives. Topics analyzed in this chapter include fire and police protection services, schools, water supply, wastewater service, solid waste, and energy services. See Chapter 12, *Hydrology and Water Quality,* for a discussion of the existing stormwater drainage facilities at the two alternative sites and the potential impacts on stormwater resources as a result of construction and operation of the action alternatives.

16.1 Environmental Setting

16.1.1 Rio Vista Army Reserve Center Site

Fire Protection and Emergency Medical Services

The City of Rio Vista Fire Department provides fire protection, emergency response, and limited hazardous materials response services for Rio Vista. The fire department is a single-engine force consisting of three full-time paid staff on duty at any given time and a fire chief, plus volunteer/reserve staff (Williams and Hartford, pers. comm., 2015). One fire station, located at 350 Main Street, serves the community. The fire department also provides emergency medical services and transport; the closest hospitals are located in Antioch, Lodi, and Fairfield, with distances ranging from 19 to 24 miles. In 2014, the fire department responded to 1,409 calls for service, up from 1,349 in 2013. The department's average response time for all calls is 5 minutes 43 seconds. One unique issue facing the fire department is a relatively large number of calls from a senior community located by SR 12, across town from the RVARC site (Williams and Hartford, pers. comm., 2015).

The City of Rio Vista Fire Department has mutual aid agreements with neighboring departments and other fire departments in Solano County. Such agreements were developed to ensure that the Rio Vista department has sufficient support during emergency events. The nearest department with which Rio Vista has a mutual aid agreement is the Montezuma Fire Protection District. This district's average response time to Rio Vista depends on the time of day, but is generally 4-5 minutes longer than the Rio Vista department's response time (Williams and Hartford, pers. comm., 2015).

Law Enforcement

The Rio Vista Police Department (RVPD) provides law enforcement services to the community and handles emergency and non-emergency calls for service. The RVPD has one police station located at 50 Poppy House Road, approximately 2 miles from the RVARC site. The RVPD has eight vehicles: one community service officer truck, two unmarked patrol cars, and five black–and-white patrol cars. The department has 13.5 full- and part-time employees: one full-time police chief, three full-time patrol sergeants, eight full-time patrol officers, one half-time community service/code enforcement officer, and one full-time records clerk (City of Rio Vista Police Department 2013). The RVPD also has three reserve officers and additional volunteers.

The RVPD has a response time goal of 3 minutes or less for 911 emergency calls and 10 minutes or less for non-emergency calls. In 2013, RVPD officers responded to 3,130 calls for service (up from 2,731 calls in 2012 and 2,437 calls in 2011) and maintained the following average response times (City of Rio Vista Police Department 2013):

- Priority 1 (emergency incident): 2 minutes
- Priority 2 (urgent but not life threatening): 3.5 minutes
- Priority 3 (no present threat): 7.5 minutes

Schools

The River Delta Unified School District (RDUSD) service area extends along the Sacramento River in Sacramento and Yolo Counties and, in addition to Rio Vista, encompasses the communities of Birds Landing, Clarksburg, Collinsville, Courtland, Hood, Isleton, Locke, Ryde, and Walnut Grove. The RDUSD is managed by and is a part of the Sacramento County Office of Education. The school district serves approximately 2,299 students (California Department of Education [CDE] 2014).

The RDUSD operates five elementary schools, two middle schools, two high schools, a continuation high school, an independent study high school, and an adult school. Schools located in Rio Vista are Rio Vista High School, Riverview Middle School, and D.H. White Elementary School. Capacity and enrollment information for these schools are summarized in **Table 16-1**, below.

Table 16-1. Capacity and Enrollment for Rio Vista Schools

School	Grades	Capacity	2013-2014 Enrollment
D.H. White Elementary School	K-5	450	110
Riverview Middle School	6-8	476	254
Rio Vista High School	9-12	729	363

Source: Gaston, pers. comm., 2015.

Water Supply

The City of Rio Vista Public Works Department provides water to residents and businesses in Rio Vista. Water used in the city comes from eight groundwater wells at various locations within the city. According to the City of Rio Vista Urban Water Management Plan 2010 (City of Rio Vista 2011a), these wells have a combined capacity of 7,200 gpm, or the equivalent of 10.4 mgd or 11,626 AFY. Operational use of several of the city's wells is limited, however, because of arsenic contamination issues. The total capacity of the city's operational wells is 5,700 gpm (8.2 mgd or 9,184 AFY). Water supply infrastructure includes more than 18 miles of pipes and two reservoir tanks, each with a capacity of 2 million gallons (City of Rio Vista 2014b).

In 2010, the City of Rio Vista delivered 2,419 AF of water to residents and projected that water deliveries would increase along with population to 2,916 AF in 2015 and 3,412 AF in 2020 (City of Rio Vista 2011a). Although Rio Vista does not import water at this time, potential supplemental water sources include the Sacramento River and the North Bay Aqueduct (NBA). The City of Rio Vista has an agreement with Solano County Water Agency, which manages the NBA water in Solano County, allowing access to the NBA water source. However, because Rio Vista is located a substantial distance from the NBA facility and is directly adjacent to the Sacramento River, it is more likely that the City of Rio Vista would trade its entitlement under the Solano County Water Agency contract to instead divert Sacramento River water if needed (City of Rio Vista 2011a).

In the RVARC area, water supply is distributed through an 8-inch PVC line within Beach Drive, an 8-inch PVC line within Second Street, and a 12-inch PVC line along Montezuma Road (City of Rio Vista 2011b). Existing water supply infrastructure on the RVARC site includes a private well, an elevated storage tank, water distribution pipelines, a river-intake fire flow pump, nine fire hydrants, and fire flow pipelines. According to the 1998 Rio Vista Army Base Reuse Plan, however, this existing infrastructure is inadequate to serve new development and would need to be replaced (City of Rio Vista 2011b).

Wastewater

The City of Rio Vista Public Works Department provides sanitary sewer and wastewater treatment services for Rio Vista. The department operates two wastewater treatment plants: the Beach Drive Wastewater Treatment Plant and the Northwest Wastewater Treatment Facility. The two plants have separate collection systems that are not interconnected, and a combined capacity of 2.25 mgd (Melilli, pers. comm., 2015a). The Beach Drive plant is located on Beach Drive next to the Sacramento River adjacent to the U.S. Coast Guard station, south of the RVARC. This plant has a treatment capacity of 1.25 mgd and treats wastewater from the City of Rio Vista's downtown area and older neighborhoods, Homecoming development, business park, and Vineyards Bluff development (City of Rio Vista 2011b). The Beach Drive plant has approximately 0.25 mgd of remaining capacity, although this amount depends on the volume of wet-weather flows and other factors (Melilli, pers. comm., 2015a). The Beach Drive plant has experienced issues with sanitary sewer overflows in the past and has had episodes of non-compliance with its NPDES permit. However, since 2005, when Veolia Water took over operation and maintenance of the plant, the number of permit violations has diminished (Solano County Grand Jury 2011). According to the City, the potential to expand the Beach Drive plant is limited by its location, constrained by the Sacramento River to the east, the U.S. Coast Guard station to the north, and Sandy Beach County Park to the south and west (Melilli, pers. comm., 2015a).

The Northwest Wastewater Treatment Facility is located on Airport Road in the northern portion of the city, southeast of the municipal airport. The Northwest facility has been in operation since 2006 and has a treatment capacity of 1.0 mgd, with additional piping in place to accommodate expansion to 2 mgd (Melilli, pers. comm., 2015b). The facility is owned by the City of Rio Vista and operated by the Public Works Department. However, the Trilogy, Liberty, Riverwalk, and Del Rio Hills development projects have rights to its existing treatment capacity (City of Rio Vista 2011b). The Northwest facility does not have capacity to serve the Proposed Project because its current capacity was paid for by the developers of these projects (Mellili, pers. comm., 2015c). Currently, the facility is only treating wastewater from the Trilogy development (approximately 0.25 mgd); the other development projects have not yet been built. Construction of the Riverwalk development project may commence in 2016. Other residential projects that have been entitled by the City of Rio Vista, including Liberty and Brann Ranch, may move forward in the future. The Del Rio Hills development project has not been entitled by the City of Rio Vista and therefore has no current official status (Rio Vista Army Base Steering Committee 2015).

Sanitary sewer collection infrastructure in Rio Vista includes sewer connections, gravity-fed and pressurized lines, and pump stations that convey wastewater to the two treatment plants. The sewer collection system is mostly separated from the stormwater collection system, but some facilities are combined (Melilli, pers. comm., 2015a). Collection facilities in the RVARC area include sewer lines within Beach Drive and pump stations at the Beach Drive crossing of Marina Creek and at the east end of Marina Drive, which convey sewage to the Beach Drive plant. According to the Rio Vista Army Reserve Center Redevelopment Plan Draft EIR, the sanitary sewer collection system is in need of upgrades, including rerouting gravity mains and eliminating pump stations to allow flows to be directed to the Northwest facility (City of Rio Vista 2011b).

Solid Waste Disposal

The Rio Vista Sanitation Service provides garbage collection and recycling services in the city. Solid waste from Rio Vista is disposed at the Potrero Hills Landfill in Suisun City, approximately 18 miles to the west. In addition to municipal waste, this landfill accepts agricultural, ash, construction/demolition, and industrial waste, biosolids, and tires. The landfill has a permitted capacity of 83.1 million cy (California Department of Resources Recycling and Recovery [CalRecycle] 2014a). As of 2006, the landfill had a remaining capacity of 13.9 million CY and its closure date was estimated to be February 2048 (CalRecycle 2014a).

The nearest hazardous waste disposal facility to the RVARC site is the Kettleman Hills facility in Kettleman City, CA, approximately 196 miles southeast of the RVARC site. The Kettleman Hills facility has a maximum permitted capacity of 8,000 tons per day

(CalRecycle 2015a). The facility is currently operating close to capacity, but the Department of Toxic Substances Control has finalized a permit modification to allow expansion of the facility by 5 million cy (DTSC 2014). Other landfills in California that accept hazardous waste include the Clean Harbors Buttonwillow facility in Buttonwillow, CA (approximately 246 miles southeast of the RVARC site), and the Clean Harbors Westmorland facility in Westmorland, CA (approximately 555 miles southeast of the RVARC site). The Clean Harbors Buttonwillow facility has a maximum permitted throughput of 10,500 tons/day and an estimated closure date of 2040 (CalRecycle 2015b). The Clean Harbors Westmorland landfill has a design capacity of 5 million cy and an annual receiving capacity of 440,000 cy (Clean Harbors, 2013). Information on remaining capacity and estimated closure date was not available for the Westmorland facility.

Energy Sources and Consumption

Rio Vista is located within PG&E's service area (PG&E 2015a). PG&E obtains and delivers electricity from various sources; its 2012 electric power mix is shown in Table 16-2.

Table 16-2. PG&E's 2012 Electric Power Mix Delivered to Retail Customers

Power Source	Percent of Total Electric Power Delivered
Natural Gas	27
Nuclear Power	21
Large Hydropower	11
Renewable Energy	19
Unspecified	21
TOTAL	**100**

Source: PG&E 2015b.

The area surrounding Rio Vista is a regional center for wind power generation. The Sacramento Municipal Utility District operates a wind farm located in the Montezuma Hills near Rio Vista. The wind farm was developed in 1994 and expanded to a capacity of 102 megawatts (MW) in 2006 (Sacramento Municipal Utility District 2015). The wind farm was expanded again in 2012 to a total capacity of 230 MW (Turner 2012).

According to the City of Rio Vista General Plan 2001, electrical service requires approximately 1 MW per 1,000 people (City of Rio Vista 2002). When the general plan was prepared, Rio Vista's total energy demands were approximately 4-5 MW. The general plan projected that demand would eventually grow to 20 MW. However, several planned development projects have not yet been completed, and population growth has been slower than projected (Melilli, pers. comm., 2015a).

16.1.2 Ryde Avenue Site in Stockton

Fire Protection and Emergency Medical Services

The City of Stockton Fire Department provides fire protection and emergency medical services for Stockton. The fire department has 181 sworn personnel and 24 civilian employees. There are a total of 12 fire stations throughout the city (City of Stockton 2014a). In 2014, the fire department responded to 35,814 calls for service (Miller, pers. comm., 2015). The department's average response time for the first arriving unit is 5.5 minutes.

Law Enforcement

The City of Stockton Police Department provides law enforcement services for Stockton. The department has one chief of police, 266 police officers, 15 police lieutenants, 5 captains, 41 police telecommunicators, 146 civilian personnel, and 127 volunteers (City of Stockton 2015). The Stockton Police Department ranks calls from highest to lowest priority as follows: emergencies, accidents with injury, Priority 1, Priority 2, and Priority 3. The average response time for all calls was 26.9 minutes in February 2009, and 26 minutes in August 2009. Emergency calls (highest priority) had a much shorter average response time of 6.3 minutes, while calls for accidents with injury had an average response time of 12.9 minutes, and Priority 1 calls (44 percent of all calls) had an average response time of 19.3 minutes (International City/County Management Association [ICMA] 2010). In 2009, the Stockton Police Department received an average of 497 calls per day (ICMA 2010). The Ryde Avenue site is located within the Civic Center Police District.

Schools

Stockton is served by the Stockton Unified School District (SUSD). The Ryde Avenue site is located in SUSD's Zone J, which includes Hoover, Tyler, and Madison Elementary Schools (SUSD 2015). Areas adjacent to Zone J and the Ryde Avenue site are Zone I and Zone A. Students living in the northwestern portion of Stockton (including Ryde Avenue) attend Stagg High School, while students from the southwestern portion attend Edison High School (SUSD 2015). The Ryde Avenue site is in the northwestern portion of the city, in the area served by Stagg High School.

Table 16-3. Enrollment for Stockton Unified School District Schools near the Ryde Avenue Site

School	Grades	2013-2014 Enrollment
Hoover Elementary	K-8	582
Tyler Skills Elementary	K-8	503
Madison Elementary	K-8	753
Cleveland Elementary	K-8	678
Wilson Elementary	K-8	409

School	Grades	2013-2014 Enrollment
El Dorado Elementary	K-8	605
Victory Elementary	K-8	525
George Washington Elementary	K-8	230
San Joaquin Elementary	K-8	871
John Marshall Elementary	K-8	576
Taylor Leadership Academy	K-8	515
Stagg High School	9-12	1,473
Edison High School	9-12	1,964

Note: *Capacity information for these schools was not available during preparation of this report.*

Source: CDE 2015.

Water Supply

The City of Stockton's Municipal Utilities Department provides water service to residents and businesses in the northern and southern portions of Stockton. The Ryde Avenue site receives water from CalWater, a private company that provides water to most of central Stockton.

Water supply in Stockton comes from a combination of groundwater and surface water sources. Most water is purchased from the Stockton East Water District (SEWD) and comes from either the New Hogan Reservoir on the Calaveras River or the New Melones Reservoir on the Stanislaus River. The City of Stockton also receives water through the Delta Water Supply Project, which was recently completed. This project is expected to supply 30 MGD of drinking water to Stockton residents and reduce the amount of groundwater pumped.

With regards to SEWD's New Hogan water supply, according to the original 1970 contract with Calaveras County Water District, SEWD is entitled to 56.5% of water from the New Hogan Reservoir. In normal years, a maximum of 80,000 AFY has been available to SEWD. This contract was modified by a 1982 Memorandum of Understanding to maximize yield by diverting water when it is available. SEWD and Central San Joaquin Water Conservation District contracted with U.S. Bureau of Reclamation for 155,000 AFY of New Melones water. Of the New Melones water supply, SEWD was contracted to receive 75,000 AFY (10,000 AFY for municipal and industrial uses; remainder for agricultural use).

SEWD also has transfer agreements with the U.S. Bureau of Reclamation for water from both of these reservoirs, as well as a short-term agreement with South San Joaquin Irrigation District and Oakdale Irrigation District. The water from both of these sources is conveyed through SEWD's extensive conveyance system. Raw water from these sources is treated at SEWD's treatment plant (CalWater 2011). The plant was built in 1977 and has capacity to treat up to 60 mgd and may be approved for expansion to 65 mgd in the near future. SEWD's Long Term Water Supply Study is evaluating the possibility of expanding the treatment plant to a capacity of 72 mgd (CalWater 2011). Once treated, the water is pumped to CalWater's distribution system in central Stockton. In 2010, CalWater's deliveries in Stockton were 25,461 AF (or approximately 22.72 mgd). CalWater projects deliveries of 30,375 AF in 2015 and 29,150 AF in 2020 (CalWater 2011).

Groundwater in Stockton is provided by 23 active groundwater wells, and seven additional wells are on standby status. The active wells were designed to provide approximately 28,225 gpm but, due to storage capacity constraints, full operation of these groundwater production wells is not always feasible. The groundwater basin underlying Stockton is also substantially overdrawn; DWR estimates the annual overdraft at 70,000 AF (CalWater 2011).

Wastewater

Wastewater is treated at the City of Stockton Regional Wastewater Control Facility (RWCF), which is located at 2500 Navy Drive, approximately 4 miles from the Ryde Avenue site. The RWCF processes approximately 32 mgd of wastewater (City of Stockton 2012). The RWCF currently has 450 acres of treatment ponds and 190 acres of wetlands and can treat up to 55 mgd, and the City of Stockton has plans to upgrade its capacity to 110 mgd (Niemann, pers. comm., 2015). The RWCF is currently operating in compliance with its NPDES permit.

Solid Waste Disposal

Sunrise/Allied Waste provides garbage collection and recycling services for the Ryde Avenue site. Sunrise/Allied Waste operates the Forward Landfill, located at 9999 South Austin Road in Manteca. The Forward Landfill has a maximum permitted capacity of 51.04 million cy (CalRecycle 2015c). As of May 2008, the Forward Landfill had 23.7 million cy of capacity remaining. Its estimated closure date is January 2020.

The Lovelace Materials Recovery Facility (approximately 11.5 miles south of the Ryde Avenue site) and the North County Recycling Center and Sanitary Landfill (approximately 21 miles northeast of the Ryde Avenue site) are also accessible from the site. The Lovelace facility has a maximum permitted throughput of 1,300 tons per day (CalRecycle 2015d). As of 2009, the North County Recycling Center and Sanitary Landfill had 35.4 million cy of remaining capacity and an estimated closure date of December 2048 (CalRecycle 2015e).

The nearest hazardous waste disposal facility is the Kettleman Hills facility in Kettleman City, CA, approximately 167 miles southeast of the Ryde Avenue site. Other landfills in California that accept hazardous waste include the Clean Harbors Buttonwillow facility in Buttonwillow, CA (approximately 217 miles southeast of the Ryde Avenue site), and the Clean Harbors Westmorland facility in Westmorland, California (approximately 526 miles southeast of the Ryde Avenue site). See Section 16.1.1 above for further description of these facilities.

Energy Sources and Consumption

PG&E would provide electricity and natural gas to the Ryde Avenue site. PG&E already serves land uses surrounding the site. As described for the RVARC site in Section 16.1.1, PG&E obtains and delivers electricity from various sources; its 2012 electric power mix is shown in Table 16-2.

16.2 Regulatory Setting

16.2.1 Federal Laws, Regulations, and Policies

Energy Policy Act of 2005

The Energy Policy Act of 2005 was enacted to reduce reliance on non-renewable energy sources. The act provides loan guarantees or tax credits for entities that develop or use fuel- and/or energy-efficient technologies (USEPA 2014). The act also increases the amount of biofuel that must be mixed with gasoline sold in the U.S. (USEPA 2014).

16.2.2 State Laws, Regulations, and Policies

Underground Utility Excavation Regulations

Under California Government Code Section 4216 *et seq.*, owners and operators of underground utilities are required to become members of and participate in a regional notification center, so that they will receive notification of planned excavation reports from public and private excavators.

California Integrated Waste Management Act of 1989

The California Integrated Waste Management Act of 1989 (Pub. Res. Code Division 30), enacted through Assembly Bill (AB) 939 and modified by subsequent legislation, required all California cities and counties to implement programs to reduce, recycle, and compost at least 50 percent of wastes by 2000 (Pub. Res. Code Section 41780). A jurisdiction's diversion rate is the percentage of its total waste that a jurisdiction diverts from disposal through reduction, reuse, and recycling programs. The state, acting through the California Integrated Waste Management Board (CIWMB), determines compliance with this mandate. Per capita disposal rates are used to determine if a jurisdiction's efforts are meeting the intent of the act. In 2006, the last year that required reporting of diversion data, both Rio Vista and Stockton diverted 67 percent of their waste from landfills (CalRecycle 2014b, 2014c).

California Solid Waste Reuse and Recycling Access Act of 1991

The California Solid Waste Reuse and Recycling Access Act of 1991 (Pub. Res. Code Sections 42900-42911) requires that any development project for which an application for a building permit is submitted must include adequate, accessible areas for collecting and loading recyclable materials.

Delta Protection Act

The 1992 Delta Protection Act created the Delta Protection Commission to protect the Delta's irreplaceable natural resources, and required the commission to prepare and adopt a long-term resource management plan for land uses within the Primary Zone of the Delta (Pub. Res. Code Section 29760). The Utilities and Infrastructure Element of the Delta Protection Commission's Land Use and Resource Management Plan (2014) contains the following goal and policy related to utilities and are relevant to the Proposed Project:

Goal. Ensure that the construction of new utility and infrastructure facilities is appropriate and the impacts of such new construction on the integrity of levees, wildlife, recreation, agriculture and Delta communities are avoided, minimized and mitigated.

Policy P-7 Encourage the provision of infrastructure for new water, recreational, and scientific research facilities.

California Integrated Energy Policy

Senate Bill 1389, passed in 2002, requires the California Energy Commission (CEC) to prepare an Integrated Energy Policy Report every 2 years and transmit it to the Governor and State Legislature (CEC 2015). The report analyzes data and provides policy recommendations on trends and issues concerning electricity and natural gas, transportation, energy efficiency, renewable energy, and public interest energy research (CEC 2015). The 2014 Draft Integrated Energy Policy Report Update was released in November 2014 (CEC 2014). The report includes several policy recommendations, including increasing investments in electric vehicle charging infrastructure at workplaces, multi-unit dwellings, and public sites (CEC 2014).

Title 24 – California Building Energy Efficiency Standards

California's Title 24 Building Energy Efficiency Standards are intended to ensure that building construction, system design, and system installation achieve energy efficiency and preserve outdoor and indoor environmental quality. The standards are updated on an approximate 3-year cycle. The 2013 standards went into effect on July 1, 2014.

Title 8 CCR Section 1541: Excavations

Section 1541 of the California Code of Regulations requires excavators to determine the approximate locations of subsurface installations, such as sewer, telephone, fuel, electric, and water lines, before opening an excavation.

Urban Water Management Planning Act

California Water Code Section 10610 *et seq.* requires that all public water systems providing water for municipal purposes to more than 3,000 customers, or supplying more than 3,000 AFY, must prepare an urban water management plan (UWMP). UWMPs identify anticipated demands and supplies over a 25-year period, as well as drought contingency plans and other information to ensure that water supplies meet demands.

16.2.3 Local Laws, Regulations, and Policies

City of Rio Vista General Plan 2001

The City of Rio Vista General Plan 2001 (City of Rio Vista 2002) sets forth goals and policies to guide land use and development decisions within the City. The following goals and policies from the City's general plan are applicable to public services, utilities, and energy resources and are relevant to the Proposed Project.

Goal 10.8 To encourage the optimal use of available energy resources.

Policy 10.8.A The City shall promote energy conservation programs for all utility users.

Policy 10.8.B The City shall encourage active and passive solar energy design in building and site development.

P**olicy 10.8.C** The City shall encourage the development and use of alternative energy sources.

Goal 11.5 To protect against the loss of life, property, and the environment by appropriate prevention and suppression measures.

Policy 11.5.A The City shall continue to pursue fire prevention programs and standards.

Policy 11.5.B The City shall strive to maintain its existing service levels. The City shall periodically evaluate service levels as population increases under this General Plan.

Policy 11.5.C The City shall require that timing of construction of fire stations be phased to be ready to serve development as it occurs.

Goal 12.3 To provide the best available educational opportunities for all students and to provide for cost-effective, multiple use of public facilities wherever feasible.

Policy 12.3.H The City shall require that new and expanded facilities funded by development fees be constructed in the service area from which the fees were raised, to ensure that adequate facilities are located where the demand is created. Fees paid by residents of new homes in Rio Vista shall be used to provide school facilities in Rio Vista.

Goal 12.4 To ensure that adequate gas and electric service is provided in a timely manner for residents and businesses in Rio Vista.

Policy 12.4.B The City shall require the provision of necessary utility easements in all new developments.

Policy 12.4.C The City shall require utility providers and developers to plan and construct uses and equipment in a manner consistent with adopted land use policies and design guidelines, to the extent feasible.

Goal 12.5 To maintain a water system that adequately serves the existing community, to provide water services to all existing and future development, and to ensure that safe drinking water standards are met.

Policy 12.5.B The City shall provide adequate water treatment capacity and infrastructure.

Goal 12.6 To provide adequate wastewater services to all existing and future development.

Policy 12.6.A The City shall expand treatment capacity to adequately accommodate projected new growth and the population estimated at the end of the planning period of this General Plan (2020). The City shall develop the new Northwest Wastewater Treatment Plant expansion as soon as financially feasible.

Goal 12.7 To ensure that a healthy, safe, and economical solid waste collection system is provided to Rio Vista citizens.

Policy 12.7.A The City shall review and update the franchise agreement with the current and potential future solid waste franchisers every 5 years.

Goal 12.8 To encourage and provide for water and energy conservation efforts balanced with increases in supplies.

Policy 12.8.A The City shall develop and implement water conservation standards.

City of Rio Vista Municipal Code Section 3.36.020: Municipal Facilities Fee

Section 3.36.020 of the City of Rio Vista Municipal Code requires new development to pay development impact fees reasonably related to impacts on City-provided facilities and public improvements from development. Such fees include a municipal facilities fee, which provides for police, fire, and general facilities and equipment to serve the needs of, and address impacts from, new residential, industrial, commercial, office, and other development. The municipal facilities fee has three components. One component of this fee provides for police protection, covering the costs associated with a police facilities building and equipment to serve additional demand for police services, fire protection, paramedic services, and other governmental facilities such as recreation centers, libraries, and City Hall.

City of Rio Vista Army Base District Design Guidelines

The Army Base District Design Guidelines provide guidance for development of the former RVARC (MIG 2011). The ABD design standards and guidelines apply to all new public and private development on the 28-acre former RVARC site and supplement design criteria contained in the General Plan Community Character and Design Element. The ABD Zoning Standards and Design Guidelines contain the following goals and policies related to public services and utilities and relevant to the Proposed Project:

Policy F.8.4 Energy-efficient lighting alternatives, such as light-emitting diodes (LEDs), shall be used.

Policy F.9.1 Utilities should be placed underground and be consolidated within circulation corridors.

Policy F.9.2 Utilities required to be above ground should be located inconspicuously and away from pathways, gathering areas, site entries, and building entries.

Goal H.4. **Waste.** Increase the diversion of construction and demolition waste, and operational solid waste from landfill disposal.

Policy H.4.1 The CalGreen requirement of recycling 50 percent of construction and demolition waste in all new construction projects should be exceeded and also applied to rehabilitation projects and tenant improvements.

Policy H.4.2 Through careful methods of planned deconstruction, materials from the existing buildings and structures on the site should be salvaged and reused in new construction on the site to the greatest extent possible.

Policy H.4.3 Recycling facilities shall be provided at all facilities and uses on the site.

City of Stockton 2035 General Plan

The City of Stockton 2035 General Plan (City of Stockton 2007) guides land use and development decisions within the city. The general plan contains the following goals and policies related to public services, utilities, and energy and relevant to the Proposed Project:

Goal NCR-8 To reduce consumption and reliance upon non-renewable energy sources and to encourage energy conservation in new and existing developments.

Policy NCR-8.1 *Energy Conservation for Development.* All new development, including major rehabilitation, renovation, and redevelopment, shall incorporate energy conservation and green building practices to the maximum extent feasible and as appropriate to the project proposed. Such practices include, but are not limited to: building orientation and shading, landscaping, and the use of active and passive solar heating and water systems. The City may implement this policy by adopting and enforcing a green Building Ordinance.

Policy NCR-8.4 *Local and State Programs*. The City will promote local and State programs that strive to reduce the consumption of natural or man-made energy sources.

Policy NCR-8.6 *Incentives*. The City will work with the California Energy Commission and other public and non-profit agencies to promote the use of programs that encourage developers to surpass Title 24 Energy Efficiency standards by utilizing renewable energy systems and more efficient practices that conserve energy, including, but not limited to natural gas, hydrogen or electrical vehicles.

Policy NCR-8.9 *Alternative Fuels Vehicle Parking*. The City shall require prioritized parking within commercial and retail areas for electric vehicles, hybrid vehicles, and alternative fuel vehicles as well as provide electric charging stations.

Policy NCR-8.10 *Passive and Active Solar Devices*. The City shall encourage the use of passive and active solar devices such as solar collectors, solar cells, and solar heating systems into the design of local buildings.

Policy NCR-8.11 *Solar Orientation and Building Site Design*. The City shall encourage building and site design that takes into account the solar orientation of buildings during design and construction. The incorporation of energy-efficient site design shall be incorporated into City-wide master planning efforts when feasible.

Policy NCR-8.12 *Energy-Efficient Buildings*. The City will encourage the development of energy-efficient buildings and communities.

Policy NCR-8.13 *Solar Photovoltaic Systems*. The City will promote voluntary participation in incentive programs to increase the use of solar photovoltaic systems in new and existing residential, commercial, institutional, and public buildings.

Policy NCR-8.14 *California Title 24 Energy Efficiency Standards*. The City will explore offering incentives such as density bonus, expedited process, fee reduction/waiver to property owners and developers who exceed California Title 24 energy efficiency standards.

Goal PFS-1 To ensure the provision of adequate facilities and services that maintain service levels are adequately funded and allocated strategically.

Policy PFS-1.1 *Maintain Existing Levels of Services*. The City shall give priority to providing services to existing urban areas in order to prevent the deterioration of existing levels-of-service.

Policy PFS-1.4 *Development Impacts to Existing Infrastructure*. The City shall ensure that proposed developments do not create substantial adverse impacts on existing infrastructure and that the necessary infrastructure will be in place to support the development.

Policy PFS-1.5 The City shall continue to utilize developer fees, the City's public facilities fees, and other methods (i.e., grant funding and assessment districts) to finance public facility design, construction, operation, and maintenance.

Policy PFS-1.8 *Impact Mitigation*. The City shall review development proposals for their impacts on infrastructure (i.e., sewer, water, fire stations, libraries, streets) and require appropriate mitigation measures if development reduces service levels.

Goal PFS-2 To ensure the adequate, reliable, and safe provision of water to all existing and future City of Stockton development, even through drought periods.

Policy PFS-2.6 *Level of Service*. The City shall maintain adequate levels of water service by preserving, improving, and replacing infrastructure as necessary.

Policy PFS-2.7 *Water Supply for New Development*. The City shall ensure that water supply capacity and infrastructure are in place prior to granting building permits for new development.

Goal PFS-3 To ensure adequate collection, treatment, and safe disposal of wastewater.

Goal PFS-4 To manage stormwater in a manner that is safe and environmentally sensitive to protect people and property and to maintain the quality of receiving waters.

Goal PFS-5 To ensure the safe and efficient disposal or recycling of solid and hazardous waste.

Policy PFS-5.1 *Solid Waste Reduction*. The City shall promote the maximum feasible use of solid waste reduction, recycling, and composting of wastes and strive to reduce commercial and industrial waste on an annual basis.

Policy PFS-5.2 *Recycling Program*. The City shall continue to require recycling in public and private operations to reduce demand for solid waste disposal capacity.

Policy PFS-5.6 *Recycling of Construction Debris*. The City shall require the recycling of construction debris.

Policy PFS-5.7 The City shall ensure that all new development has appropriate provisions for solid waste storage, handling, and collection pickup.

Policy PFS-7.1 *Police Response Time*. The City shall maintain an average response time of five minutes or less for priority one calls.

Policy PFS-7.2 *Staffing Ratios*. The City shall maintain a minimum ratio of 1.5 sworn officers per 1,000 residents served.

Policy PFS-8.1 *Fire Response Time*. The City shall work to maintain a fire response time as indicated in General Plan Table 9-1, which shall be used to determine future fire station needs.

General Plan Table 9-1. Criteria to Determine Fire Department Station Location

Choices	Distance	Response Time	Percent of Calls	Building Inventory
Maintain Status Quo	All risks within 1.5 miles	First due company is within 4 minutes total travel time, 90 percent of time	100 percent in City	Existing inventory and infill
Needed Temporary Facilities and Minimal Staffing	Risk 1.5 to 3.0 miles from existing station	First due company exceeds four minutes travel time 10 percent of the time, but never exceeds 8 minutes	More than 10 percent of calls are in adjacent area	New area has 25 percent of same risk distribution as in initial area
Permanent Station Needed	Risk locations exceeding 4 miles from the station	First due company exceeds four minutes travel time, 20-25 percent of the time; some calls less than 8 minutes	More than 20-25 percent of calls are in outlying areas	New area has 35 percent of same risk distribution as in initial area of coverage
Permanent Station Essential	Outlying risk locations exceeding 5 miles from the first station	First-due company exceeds 4 minutes travel time 30 percent of the time; some calls less than 10 minutes	More than 30 percent of calls are in outlying areas	New area has 50 percent of same risk distribution as in initial area

Source: City of Stockton 2007.

City of Stockton Municipal Code Sections 8.28.020-8.28.070: Construction and Demolition Debris Waste Reduction Ordinance

In effort to meet California's 50 percent diversion goal, the City of Stockton has adopted a construction and demolition debris waste reduction ordinance (City of Stockton Municipal Code Sections 8.28.020 through 8.28.070). The ordinance requires that all permit applicants (e.g., contractors and developers) identify the debris that they will generate with their projects and recycle at least 50 percent of the construction and/or demolition debris that is generated. A final disposal and recycling report must be submitted within 14 days after the project is completed (City of Stockton 2014b).

City of Stockton Standard Specifications

The City of Stockton Standard Specifications contain requirements for construction and installation of sewer, water, and stormwater facilities, as well as other public works projects (City of Stockton 2003). The Standard Specifications identify the types of materials that may be used in different applications; procedures for excavation, fill mixing and placement, pipe installation, and other construction methods; and testing and disinfection of installed facilities. The Standard Specifications apply to all public works installations within the city. Any deviation from the specifications must be approved by the City Engineer.

16.2.4 Other Standards or Guidelines

Leadership in Energy & Environmental Design

The LEED program is a green building certification program operated by the USGBC that recognizes energy-efficient and/or environmentally friendly components of building design (USGBC 2015). To receive LEED certification, building projects must satisfy prerequisites and earn points related to different aspects of green building and environmental design. Four levels of LEED certification are available, related to the number of points a project earns: certified (40-49 points); silver (50-59 points); gold (60-79 points); and platinum (80+ points).

Points or credits may be obtained for a variety of criteria, such as indoor and outdoor water use reduction, and construction and demolition waste management planning. Indoor water use reduction entails reducing water consumption of building fixtures and fittings by at least 20 percent from the calculated baseline and requires all newly installed toilets, urinals, lavatory faucets, and showerheads that are eligible for labeling to be WaterSense labeled (USGBC 2013). Outdoor water use reduction may be achieved either by showing that the landscape does not require a permanent irrigation system beyond a maximum 2-year establishment period, or by reducing the project's landscape water requirement by at least 30 percent from the calculated baseline for the site's peak watering month. Construction and demolition waste management points may be obtained either by diverting at least 50 percent of total construction and demolition material and three material streams, or generating less than 2.5 pounds of construction waste per square foot of the building's floor area.

National Fire Protection Association 1710 Standard: Minimum Requirements

The National Fire Protection Association (NFPA) is an international nonprofit organization dedicated to reducing the worldwide burden of fire and other hazards through the provision of codes and standards, research, training, and education (NFPA 2014a). NFPA develops and disseminates numerous codes and standards related to fire protection, including NFPA 1710.

The NFPA 1710 standard outlines minimum requirements relating to the organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public by almost all career fire departments (NFPA 2014b). Among other measures, the NFPA 1710 standard requires that a fire department's suppression resources be deployed to provide for the arrival of an engine company within a 240-second (4-minute) travel time to 90 percent of incidents (NFPA 2014b). The NFPA 1710 standard further requires that a fire department have the capacity to deploy an initial full-alarm assignment within a 480-second (8-minute) travel time to 90 percent of incidents (NFPA 2014b).

16.3 Environmental Impacts

16.3.1 Methods of Analysis

Potential impacts related to public services, utilities and energy were evaluated qualitatively by considering potential impacts of the DRS alternatives in relation to the significance criteria shown in Section 16.3.2 below.

16.3.2 Significance Criteria

An alternative would have a significant impact related to public services, utilities, and energy if it would:

- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:
  - Fire protection
  - Police protection
  - Schools
  - Parks
  - Other public facilities
- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board;
- Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;

- Have insufficient water supplies available to serve the project from existing entitlements and resources;
- Result in a determination by the wastewater treatment provider that serves or may serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments;
- Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs;
- Fail to comply with federal, state, and local statutes and regulations related to solid waste;
- Cause wasteful, inefficient, and unnecessary consumption of energy during construction, operation, and/or maintenance; or
- Cause a substantial increase in energy demand and the need for additional energy resources.

Refer to Chapter 17, *Recreation*, for a discussion regarding the Proposed Project's effects on parks.

Construction-related impacts were dismissed from analysis for several of the significance criteria listed above because it was determined that no impacts had the potential to occur. Specifically, it was determined that no significant effects would occur on performance objectives of schools during construction of the Proposed Project, as no schools would be closed or otherwise affected during construction of any of the action alternatives. Likewise, it was determined that no construction-related impacts on water supply or wastewater treatment would result during construction of the Proposed Project because water trucks would be used during construction to meet water supply needs at the project site and portable sanitary restrooms would be used for construction workers.

The effects of construction of new water and sewer connections for the Proposed Project and the on-site treatment plant for process water at the FTC are also not evaluated in this chapter because they are part of the Proposed Project and as a result, their environmental effects are analyzed elsewhere throughout this document.

16.3.3 Environmental Impacts and Mitigation Measures

Impact UTIL-1: Adverse Effects on Performance Objectives of Fire Protection Services.

The addition of commercial buildings and people to an area may increase the workload of the local fire department by increasing the number of calls the department receives during a given period. Fire departments must maintain adequate response times in accordance with the applicable general plan or other planning documents or standards. Impairment of the performance objectives of the local fire department would be significant if they are of sufficient magnitude to require or result in the provision of new fire protection facilities to maintain adequate response times.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, existing IEP programs and activities would continue at their current locations and no ERS or FTC facilities would be constructed at the RVARC or Ryde Avenue site. Because existing demands on fire protection needs would not change, this alternative would have **no impact** on fire protection services relative to existing conditions.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As described in "Environmental Setting" above, the City of Rio Vista Fire Department has an adequate response time of 5 minutes, 43 seconds and has mutual and automatic aid agreements with neighboring departments, including the Montezuma Fire Protection District, which can respond to calls from Rio Vista in 10-11 minutes, or roughly 4-5 minutes longer than the City of Rio Vista Fire Department's average response time.

The DRS would accommodate approximately 180 employees. Activities at the DRS would include laboratory and aquaculture work, boat maintenance and repair, woodwork and metalwork, and battery storage. Some flammable materials would be stored on-site, including fuel tanks, outboard motors, engines, solvents, oil, and fuel. The battery storage area would provide space for approximately 100 marine and heavy-duty vehicle batteries. Construction of the facility would also involve use of some spark-generating equipment and flammable materials. Any or all of these activities and materials could increase fire risk to some degree and could result in calls for service to the City of Rio Vista Fire Department.

All DRS buildings and activities would be constructed and operated in compliance with all applicable regulations for fire safety. Consistent with local and state fire codes and environmental regulations, the battery storage facility would be located at least the required minimum distance from any flammable material storage area and would be equipped with appropriate ventilation, explosion-proof lighting fixtures, and personnel wash-down facilities for emergency preparedness. The fire department's current response time is adequate, and the City of Rio Vista's mutual aid agreements with neighboring departments (e.g., Montezuma Fire Protection District) would ensure available support in the event of any serious incident.

In conclusion, under the Preferred Alternative, the DRS could affect fire protection service response times to some degree, but not to a level that would require construction of additional fire protection facilities. Further, according to Section 3.36.020 of the City of Rio Vista Municipal Code, DWR and USFWS would pay the City of Rio Vista's municipal facilities fee toward the development of adequate fire protection and emergency medical service facilities and equipment. Therefore, because the DRS buildings would be constructed and operated in compliance with relevant regulations pertinent to fire safety, given the fire department's adequate response times and the relatively small contribution that the DRS would make to demands on the department, and through payment of the City of Rio Vista's municipality fee, the impact on the City of Rio Vista Fire Department's performance objectives would be **less than significant.**

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The impact on fire protection services from Alternative 3 would be the same as described for Alternative 2 above, and would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

This alternative would be located in Stockton instead of Rio Vista; nevertheless, the impacts of this alternative on fire protection services would be anticipated to be similar to those of Alternatives 2 and 3. As described in "Environmental Setting" above, the City of Stockton Fire Department is currently meeting NFPA standards for response time. The average response time for the first arriving unit of approximately 5.5 minutes, with average travel time at less than 4 minutes. The fire department responds to a relatively large number of calls for service (35,814 in 2014), but it is a large department with 181 sworn personnel and 12 stations throughout the city. Any potential impairment of fire protection service performance objectives from Alternative 4 would be unlikely to require provision of additional fire protection facilities. This impact would be **less than significant.**

Impact UTIL-2: Adverse Effects on Performance Objectives of Law Enforcement Service.

As described for fire protection service, the addition of buildings and people to an area can affect the performance objectives (e.g., response time) of local law enforcement service by increasing the number of service calls during a given period. Impairment of law enforcement performance objectives would be significant if it requires construction of additional law enforcement facilities to maintain acceptable response times.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, existing IEP programs and activities would continue at their current locations and no ERS or FTC facilities would be constructed at the RVARC or Ryde Avenue site. Because existing demand for law enforcement protection would not change, this alternative would have **no impact** on law enforcement services.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As described in "Environmental Setting" above, the City of Rio Vista Police Department has a larger staff than the fire department (13.5 full- and part-time employees) and has acceptable average response times (2 minutes for Priority 1 calls and 3.5 minutes for Priority 2 calls). The buildings and outdoor storage areas at the DRS under the Preferred Alternative would be secured with locks and/or security fencing (as shown in Figure 3-1), and security guards may be posted on-site during both construction and operation. Nonetheless, thieves could target these facilities, which would contain expensive equipment, and the facilities could require law enforcement service at some point during DRS operation. Traffic and other incidents on the Proposed Project grounds could also require law enforcement service. While these potential calls for service could increase demands on the police department, the Sacramento County Sheriff, or the U.S. Coast Guard (responsible for law enforcement on Delta waterways) to some degree, the number of calls generated by the Preferred Alternative would be unlikely to require construction of new law enforcement facilities. Given the basic characteristics of the DRS, the RVPD Chief of Police indicated that the Preferred Alternative would not substantially affect police response times or require construction of any new facilities or expansion of existing facilities (Bowman, pers. comm., 2015). In addition, by complying with Section 3.36.020 of the City of Rio Vista Municipal Code, DWR and USFWS would pay the City of Rio Vista's municipal facilities fee toward the development of adequate police facilities and equipment to serve additional demands for police services. For these reasons, this impact would be **less than significant.**

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The impact on law enforcement services from Alternative 3 would be the same as described for Alternative 2, and would be **less than significant.**

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

This alternative would be located in Stockton instead of Rio Vista; nevertheless, the impact of this alternative on law enforcement services would be anticipated to be similar to those of Alternatives 2 and 3. As described in "Environmental Setting" above, the City of Stockton Police Department has relatively poor average response times (e.g., 19.3 minutes for high-priority calls, 12.9 minutes for accidents with injury), although the department maintains a better average response time for emergency calls (6.3 minutes). The police department's relatively poor response times increase the likelihood that the impact of the Proposed Project on performance objectives could require provision of additional police protection facilities; however, with all facilities being secured, the construction and operation of the DRS would be unlikely to generate enough calls for service that additional police protection facilities would be needed. Therefore, this alternative's effects on law enforcement performance objectives would be **less than significant**.

Impact UTIL-3: Adverse Effects on Performance Objectives of Schools during Project Operation.

The addition of people to an area can increase enrollment in local schools and may affect performance objectives of schools (e.g., teacher-to-student ratio). Effects on schools depend in part on existing enrollment relative to capacity of area schools and the number of schools available nearby.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, existing IEP programs and activities would continue at their current locations and would not result in a population increase that could substantially affect school enrollment. There would be **no impact** on schools.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As discussed in "Environmental Setting" and shown in Table 16-1, relatively few children are enrolled in Rio Vista schools relative to the schools' available capacities. All three schools in the Rio Vista area are at 50 percent or less of capacity. This low enrollment may be attributed in part to the fact that population growth in Rio Vista has not occurred at the pace expected, and several development projects have been cancelled or delayed.

Under the Preferred Alternative, the DRS would require approximately 180 employees. Most of these prospective staff members are already employed by the state or federal government and involved in IEP activities throughout the Delta. Some of them may choose to relocate to the Rio Vista area, while others may choose to commute to Rio Vista from their current residences. Over time, it is reasonable to assume that more employees would relocate to Rio Vista and enroll their children in local schools. Given that Rio Vista schools have sufficient capacity to accept new students for the foreseeable future, any increase in enrollment from the DRS under the Preferred Alternative would not require construction of new school facilities. This impact would be **less than significant.**

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The impact on schools from Alternative 3 would be the same as described for Alternative 2, and would be **less than significant.**

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Under Alternative 4, DRS facilities would be located at the Ryde Avenue site in Stockton. The facilities would accommodate the same number of employees (approximately 185) as described for Alternative 2: Rio Vista Army Reserve Center, Configuration 1. As discussed in "Environmental Setting" above and shown in **Table 16-3**, 13 SUSD schools are located near the Ryde Avenue site. Potential impacts on SUSD schools from the ERS, FTC and the DRS overall would be essentially the same as described for Alternative 2: Rio Vista Army Reserve Center, Configuration 1. Any increase in enrollment attributable to the Proposed Project would be small and unlikely to result in the need for additional school facilities. This impact would be **less than significant.**

Impact UTIL-4: Exceedance of Wastewater Treatment Capacity and/or NPDES Permit Requirements during Project Operation.

The wastewater treatment requirements of the NPDES and Porter-Cologne Act under the Clean Water Act are discussed under "Regulatory Setting" in Chapter 12, *Hydrology and Water Quality.*

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, existing IEP programs and activities would continue at their current locations and wastewater generation would not change. There would be **no impact** related to wastewater treatment compared to existing conditions.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

According to the City of Rio Vista, wastewater generated at the DRS would be treated at the Beach Drive plant (Melilli pers. comm., 2015a). No conveyance facilities are in place to transport wastewater from the DRS site to the Northwest Wastewater Treatment Facility, and there is no available capacity at the Northwest facility because the current capacity is reserved for other development (Mellili, pers. comm., 2015c). Additionally, the general plan EIR states that development south of SR 12 would be treated by the Beach Drive plant (City of Rio Vista 2011b). However, in 2011, the Solano County Grand Jury issued a report finding that operating two wastewater treatment plants in a city the size of Rio Vista is a burden for the taxpayers of the City (Solano County Grand Jury, 2011). The Grand Jury's report recommended that the City consider developing a plan to connect the Beach Drive plant's collection system to the Northwest facility's wastewater treatment system. In 2011, the City responded to the Grand Jury's report and stated that the Grand Jury's recommendation required further analysis (City of Rio Vista 2011c). The City stated that there were steps being taken to consolidate the two facilities, such as including language in development agreements requesting oversizing of certain sewer lines to accommodate larger flows in anticipation of connecting existing Beach Drive Plant flows to the Northwest facility, but it would be a long-term project. The City also stated that alternatively, it would consider the possibility of re-directing a subdivision (Homecoming) from the Beach Drive plant's collection system to the Northwest facility's collection system, so as to reduce the flow going to the Beach Drive plant and provide it with extended capacity and reduced pressure. As of now, however, there is no connection from the Beach Drive plant and the RVARC site to the Northwest facility.

The Beach Drive plant would treat wastewater generated from potable uses and potentially stormwater runoff at the RVARC site. The plant has relatively limited remaining capacity (approximately 0.25 mgd, depending on wet-weather flows and other factors) and limited potential to expand its capacity because its footprint is constrained by adjacent land uses. The Beach Drive plant also has a history of issues with CSOs (before its capacity was upgraded) and has at times been in non-compliance with its NPDES permit requirements, although it is currently in compliance.

Estuarine Research Station

The ERS would include the following components that would generate wastewater: restrooms, an employee lunch/break room (with a kitchen sink), a locker room and shower, a boat/equipment wash-down area, and a wet laboratory. Based on the approximate square footage of the ERS buildings, the amount of wastewater generated by the ERS has been estimated at a maximum of 0.06 mgd (City of Rio Vista 2015). This wastewater would be conveyed to the Beach Drive plant. Given the Beach Drive plant's relatively limited remaining capacity, especially in wet weather, wastewater generated by the ERS could contribute to CSOs at the plant and exceedance of NPDES permit requirements. This impact is considered significant. Implementation of **Mitigation Measure UTIL-4 (Coordinate with City of Rio Vista Regarding Existing Wastewater Treatment Capacity and Contribution of Fair Share Funding toward Any Necessary System Improvements)**, which requires that DWR and USFWS coordinate with the City of Rio Vista Public Works Department to plan for the RVARC site's sanitary sewer system and contribute to any necessary system upgrades, would reduce this impact to a level that is less-than-significant with mitigation.

Mitigation Measure UTIL-4: Coordinate with City of Rio Vista Regarding Existing Wastewater Treatment Capacity and Contribution of Fair Share

Funding toward Any Necessary System Improvements (Alternatives 2 and 3 – ERS)

DWR and USFWS, their contractor(s), and/or the site developer shall coordinate with the City of Rio Vista to determine whether the Proposed Project, in combination with other anticipated increases in wastewater generation, could exceed the treatment capacity of the Beach Drive Wastewater Treatment Plant. If it is determined that the Proposed Project could contribute to exceedance of the plant's capacity, DWR and USFWS shall contribute a fair share of funding toward any necessary system improvements. The Proposed Project's fair share will be proportionate to its contribution to the need for additional facilities or facility upgrades. Such facility upgrades may involve modifications to or expansion of the Beach Drive plant and/or installation of infrastructure to allow for treatment at the Northwest Wastewater Treatment Facility.

Fish Technology Center

The FTC would have a small number of employees and visitors, and would be unlikely to generate sufficient wastewater to measurably affect capacity at the Beach Drive plant. This domestic wastewater would be generated from employee and visitor hand washing and restroom use and other typical domestic activities.

Process water related to aquacultural activities would be treated by an on-site effluent treatment system and discharged to the Sacramento River. The treatment system would consist of drum filters, an underground holding tank between the rearing tanks and drum filters, and evaporation ponds (approximately 10,800 square feet). If necessary, either a portable system to treat the effluent from specific individual rearing tanks or a centralized holding tank and activated carbon filtration system could be installed to remove aquaculture chemical residuals from the process water effluent. These systems would be designed to ensure that discharges comply with NPDES treatment requirements, and they would obtain appropriate NPDES permit coverage. The underground holding tank would prevent peak flows, which typically occur during tank cleaning, from exceeding the capacity of the drum filters and causing them to overflow.

The on-site treatment system at the FTC is anticipated to be adequate, and the small amount of municipal wastewater generated by the FTC would not be sufficient to exceed the treatment capacity of the Beach Drive plant. This impact would be less than significant.

Delta Research Station

Overall, the impact of the DRS related to wastewater treatment capacity and NPDES permit requirements would encompass those described above for the ERS and FTC. Although the FTC is not anticipated to result in significant impacts related to wastewater treatment, wastewater generated by the ERS could exceed the relatively limited remaining capacity at the Beach Drive plant; therefore, impacts of the Preferred Alternative (specifically, the ERS) are considered significant. Implementation of Mitigation Measure UTIL-4, would reduce this impact to a level that is **less than significant with mitigation**.

<u>ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2</u>

The impacts on wastewater treatment capacity and NPDES permit requirements from Alternative 3 would be the same as described for Alternative 2, and are considered significant. Implementation of Mitigation Measure UTIL-4 would reduce this impact to a level that is **less than significant with mitigation**.

<u>ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON</u>

As described in "Environmental Setting" above, wastewater generated in Stockton is treated at the City of Stockton RWCF. The RWCF has the capacity to treat up to 55 mgd of wastewater, and currently treats an average of 32 mgd. The City of Stockton plans to upgrade the RWCF in the future to increase its capacity to 110 mgd. Wastewater generation at the ERS and FTC at the Ryde Avenue site in Stockton under Alternative 4 would be the same as described at the RVARC site under Alternative 2: Rio Vista Army Reserve Center, Configuration 1. All wastewater generated at the ERS and FTC (approximately 0.06 mgd) would be routed to the RWCF. Process water effluent generated at the FTC would be treated by an on-site effluent treatment system. Because the RWCF has sufficient capacity to accept wastewater from the Proposed Project, there would be no potential for CSOs or exceedance of NPDES permit requirements, and the City of Stockton would not need any new or expanded wastewater treatment facilities to serve the Proposed Project. On-site treatment of process water effluent generated by the FTC would be adequate to meet NPDES wastewater treatment requirements for aquaculture facilities. This impact would be **less than significant**.

Impact UTIL-5: Effects on Water Supply from Project Operations.

Discussion of the potential impacts of using process water at the FTC, and related effects on water supply, are addressed in Chapter 12, *Hydrology and Water Quality.* This discussion focuses on potable water use.

<u>ALTERNATIVE 1: NO PROJECT ALTERNATIVE</u>

Under Alternative 1, existing IEP programs and activities would continue at their current locations and no increase in water demand would result. There would be **no impact** on water supply.

<u>ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1</u>

As described in "Environmental Setting" above, the City of Rio Vista obtains its water supply from eight groundwater wells at various locations within the city, some of which are not currently operational because of arsenic contamination. The operational wells have the capacity to produce 9,184 AFY, and actual 2010 deliveries, as reported in Rio Vista's most recent Urban Water Management Plan, were 2,419 AF (City of Rio Vista 2011a). The City of Rio Vista also has an agreement with SCWA, which allows for access to water from the NBA. The Solano sub-basin, from which Rio Vista draws water, is not considered by DWR to be in overdraft.

The DRS would require potable water for use in restrooms, locker room and shower, lunch/break room, boat/equipment wash facility, wet laboratory, landscaping, and other typical domestic uses. Water used at the FTC would primarily be for aquaculture activities and would be obtained primarily from on-site groundwater wells. Small quantities of surface water may also be blended with the well water for temperature assimilation or for acclimation of the fish. Consistent with the City of Rio Vista's Water Conservation Ordinance (Chapter 17.68 of the municipal code), the DRS would feature drought-tolerant landscape plants and efficient irrigation systems to reduce water usage. The estimated total water demand of the DRS is 0.08 mgd or 89.7 AFY. This amount would represent only a small portion of the available water supplies, and the City of Rio Vista has sufficient existing entitlements and resources to supply the DRS. This impact is **less than significant.**

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, the estimated water demand of the ERS, FTC, and overall DRS facilities would be the same as described for Alternative 2: Rio Vista Army Reserve Center. For the reasons described above for Alternative 2, the impacts of the DRS on potable water supplies would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

As described in "Environmental Setting" above, the City of Stockton's water supply comes from a combination of groundwater and surface water sources. The Stockton water treatment plant has capacity to treat up to 60 mgd, but 2010 water deliveries to customers were only 22.72 mgd and 2015 demand was projected at 27.1 mgd (City of Rio Vista 2011a). Although the City of Stockton has 23 active groundwater wells, which collectively have the capacity to provide approximately 28,225 gpm or 40.6 mgd, full operation is not always feasible because of storage constraints. In addition, the groundwater basin underlying Stockton is substantially overdrawn, with an estimated annual overdraft of 70,000 AF (CalWater 2011).

Under Alternative 4, the estimated potable water demand of the DRS would be the same as described for Alternative 2. The DRS facilities would obtain potable water from the City of Stockton's municipal system. The facilities' estimated potable water demand of 0.08 mgd would be a small fraction of remaining capacity at the water treatment plant and groundwater wells. Given that the City of Stockton has sufficient supplies from existing entitlements to supply the DRS and has adequate remaining capacity at its water treatment facility, this impact would be **less than significant**.

Impact UTIL-6: Potential for Exceedance of Landfill Capacity or Non-Compliance with Regulations Related to Solid Waste.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, existing IEP programs and activities would continue at their current locations and no change in the rate of solid waste generation would occur. Over time, solid waste generated at existing IEP locations would contribute to landfill capacity issues. However, existing IEP activities generate relatively minor quantities of solid waste, and cities and counties anticipate landfill capacity issues through the general plan process. This impact would be **less than significant.**

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As described in "Environmental Setting" above, solid waste generated in Rio Vista is disposed of at the Potrero Hills Landfill. As of 2006, the landfill had a remaining capacity of 13.9 million CY and its estimated closure date was February 2048 (CalRecycle 2014a).

The Preferred Alternative would require site grading and demolition of several structures at the RVARC site. In addition, Alternative 2 would include the construction of a partially excavated marina. Excavation at the upland portion of the site would generate approximately 35,000 CY of fill material. For the purposes of this analysis, it is assumed that the majority of this soil would be re-used on-site as backfill. Approximately 32,000 CY of material would be excavated for the marina. Some portion of this material would be spread on-site, with excess material disposed of off-site at the Potrero Hills Landfill. If all of the excavated material were reused, the elevation of the site would be raised by approximately 1.4 feet. If all excavated material from marina construction were used as cover material at the Potrero Hills Landfill, Alternative 2 would account for 0.2 percent of the landfill's remaining capacity as of 2006. Other types of debris generated during construction of DRS facilities would involve much smaller quantities, which would be well within the capacity of the Potrero Hills Landfill. Any hazardous waste generated or encountered during construction would be removed in compliance with applicable regulations and disposed of at a licensed facility with sufficient capacity.

During operation, the DRS facilities would generate solid waste from employee trash and other typical domestic sources. Consistent with Policy H.4.3 of the City of Rio Vista ABD design standards and guidelines (MIG 2011), recycling collection facilities would be included at all DRS facilities and, consistent with the Solid Waste Reuse and Recycling Access Act, all DRS facilities would have adequate areas for collecting and loading recyclable materials. The City of Rio Vista provides curbside recycling service to commercial buildings. In 2006, the last year for which reporting of diversion data was required, the City of Rio Vista diverted 67 percent of its waste from landfills (CalRecycle 2014b). The DRS would have recycling facilities, and it is anticipated that the per-capita diversion rate at these facilities would exceed 50 percent, in compliance with the Integrated Waste Management Act. The amount of solid waste requiring landfill disposal would be relatively small compared to the capacity of Potrero Hills Landfill. Hazardous waste generated during operation (e.g., laboratory waste, formalin-preserved samples) would be disposed of in compliance with applicable regulations at a licensed facility with sufficient capacity.

The DRS would also generate solid waste from periodic dredging of the marina to maintain adequate depth. Maintenance dredging would be conducted as needed, approximately every 10-15 years. The volume of dredged material for the Preferred Alternative is estimated to be 10,000 CY. Some of this dredged material could be re-used on-site or potentially at a nearby upland site. However, due to the uncertainty of re-use options, for the purposes of this analysis, it is conservatively assumed that excavated soil and sediment would be off-hauled to a nearby landfill.

The quantity of waste that would be generated during construction and operation of the DRS facilities would be within existing landfill capacity, and disposal activities would comply with applicable solid waste regulations. This impact would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Construction of Alternative 3 would generally involve similar sources of solid waste as Alternative 2. However, Alternative 3 differs from Alternative 2 in several respects. First, Alternative 3 would involve reuse or demolition of buildings that are outside the footprint of Alternative 2. However, the amount of debris generated as a result of this additional reuse or demolition would not be anticipated to result in a meaningful difference between Alternative 2 and Alternative 3 with regard to use of existing landfill capacity.

Alternative 3 would also include an inland marina, similar but larger in scale than the partially excavated marina proposed for Alternative 2. Construction of an inland marina would require excavation of approximate 71,000 CY of additional material. Similar to Alternative 2, some portion of this material would be spread on-site. If all of the excavated material were reused, the elevation of the site would be raised by up to approximately 4 feet. Some of this excavated material could be sent to the Potrero Hills Landfill for use as cover material; if all of the excavated material were used in this way, only 0.5 percent of the landfill's remaining capacity as of 2006 would be accounted for. Dredged material from marina construction that would be disposed of off-site would require testing for contamination, and any materials not meeting the landfill's standards would be taken to another licensed facility with sufficient capacity.

During operation, solid waste generation would be similar to that described for Alternative 2. The estimated volume of dredged material from the marina for Alternative 3 is 7,000-11,000 CY every 10-15 years, or as needed. As described above for Alternative 2, some of the dredged material could be re-used on-site or potentially at a nearby upland site. However, due to the uncertainty of re-use options, for the purposes of this analysis, it is conservatively assumed that excavated soil and sediment would be off-hauled to a nearby landfill.

The quantity of solid waste that would be generated during construction and operation of the DRS facilities would be within existing landfill capacity, and disposal activities would comply with applicable solid waste regulations. This impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

As described in "Environmental Setting," the Forward Landfill serves the Stockton area. As of May 2008, the Forward Landfill had 23.7 million CY of remaining capacity and its estimated closure date was January 2020 (CalRecycle 2015c). The Lovelace Materials Recovery Center and North County Recycling Center and Sanitary Landfill (35.4 million CY remaining capacity; estimated closure 2048) could also serve the Proposed Project (CalRecycle 2015d, 2015e).

This alternative would generate solid waste volumes similar to those described for Alternatives 2 and 3. No structures are located on the Ryde Avenue site that would require demolition, reducing the amount of construction debris requiring disposal. As with Alternative 3, this alternative would involve an inland marina, which would require 86,000 CY of initial excavation (approximately 15,000 CY more than Alternative 3) due to site topography. If disposed of off-site, this dredged material would occupy a very small percentage of available landfill capacity. Approximately 11,000 CY of material would be dredged from the marina every 10-15 years to maintain adequate depth. Some of the dredged material could be re-used on-site or potentially at a nearby upland site. However, due to the uncertainty of re-use options, for the purposes of this analysis, it is conservatively assumed that excavated soil and sediment would be off-hauled to a nearby landfill.

Consistent with the Stockton Municipal Code, construction wastes would be recycled to the maximum extent feasible, with a minimum 50 percent recycling rate. During operation, consistent with the City of Stockton general plan policies, the DRS facilities would include recycling collection facilities and promote solid waste reduction. As of 2006, the City of Stockton diverted 67 percent of its solid waste from the landfill, well above the Integrated Waste Management Act's required level of 50 percent. The quantity of waste that would be generated during construction and operation of Alternative 5 would be within existing landfill capacity and disposal activities would comply with applicable solid waste regulations. As described under Alternative 2 above, the DRS would include recycling facilities and would have adequate access for collecting and loading recyclable materials. This impact would be **less than significant**.

Impact UTIL-7: Potential for Wasteful, Inefficient, or Unnecessary Energy Use.

Fossil fuels remain the principal source of energy in California and numerous laws, regulations, and statutes have been enacted to reduce its wasteful, inefficient, or unnecessary use. This discussion focuses on the potential for wasteful, inefficient, or unnecessary energy use as it relates to utilities and available energy sources. Chapter 6, *Air Quality and Greenhouse Gases,* discusses energy use and production for the various project alternatives as it relates to generation of air contaminants and greenhouse gases.

Alternative 1: No Project Alternative

Under the No Project Alternative, existing IEP programs and activities would continue at their current locations and no DRS facilities would be constructed. Energy consumption would continue at current rates, and IEP programs and activities would not increase wasteful, inefficient, or unnecessary energy use. There would be **no impact.**

Alternative 2: Rio Vista Army Reserve Center, Configuration 1

Energy use during construction of DRS facilities would include direct and indirect energy consumption. Direct energy consumption would include use of fuel to power equipment and generators, while indirect energy consumption would include use of building materials containing embodied energy (i.e., energy used in resource extraction, processing, and material manufacturing). As described in Chapter 3, *Description of Alternatives*, numerous pieces of gas- or diesel-powered equipment would be used during project construction, such as excavators, dump trucks, bulldozers, and graders. Other equipment would be powered by electricity produced by gas- or diesel-powered generators. Wasteful and/or unnecessary use of energy could occur during construction if equipment and vehicles were left idling unnecessarily, or if construction debris and excess building materials were not reused or recycled. As described in **Mitigation Measure AQ/GHG-6 (Implement DWR Climate Action Plan BMPs and Mitigation for Construction)**, DWR and USFWS would not permit contractors to idle trucks or equipment for prolonged periods during construction to reduce wasteful or unnecessary energy use, as well as the resulting air pollutant emissions. Likewise, as described in Impact UTIL-6: Potential for Exceedance of Landfill Capacity or Non-Compliance with Regulations Related to Solid Waste, construction debris and excess building materials would be reused and recycled to the extent feasible.

DRS facilities would use energy during operation of vehicles and boats; building lighting, heating, and cooling; operation of appliances and equipment in buildings (e.g., refrigerators, equipment for laboratory activities, and computers), and water pumps (e.g., for FTC water supply and process water treatment). Wasteful, inefficient, and/or unnecessary energy use could occur during operation of the marina if boats were allowed to idle unnecessarily, or if lighting and appliances/equipment were not energy efficient. Most boats that would be used at the DRS would be relatively small craft without auxiliary power engines; however, the DRS would also use several larger boats, which would require auxiliary power. To minimize use of relatively inefficient auxiliary engines, shore power connections would be provided for larger boats at dock. Consistent with California's Title 24 Building Energy Efficiency Standards and Goal 10.8 of the City of Rio Vista General Plan 2001, the DRS facilities would be designed to be energy-efficient. Also, consistent with Policy F.8.4 of the ABD zoning standards and design guidelines, energy-efficient lighting alternatives such as LEDs would be used. Other appliances and equipment used at the DRS would also be energy efficient in design to the extent feasible, in compliance with state policy.

Given the various measures described above to prevent wasteful, inefficient, and/or unnecessary energy use during construction and operation of the Proposed Project, this impact would be **less than significant with mitigation.**

<u>ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2</u>

The energy use associated with construction of Alternative 3 may differ slightly from that of Alternative 2 due to the larger volumes of excavated material and disposal associated with construction of the inland marina and the additional demolition and renovation of existing buildings on-site. Operations would have nearly identical energy consumption to that described for Alternative 2. Overall, Alternative 3 would have similar potential for wasteful, inefficient, or unnecessary energy use as described for Alternative 2; as with Alternative 2, all of the measures (including Mitigation Measure AQ/GHG-6) and project design features to avoid or reduce wasteful, inefficient, and/or unnecessary energy would be implemented. This impact would be **less than significant with mitigation**.

<u>ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON</u>

Energy use under Alternative 4 would be similar to that described for Alternatives 2 and 3. Construction of the inland marina would require slightly more fill handling than under Alternative 3, and no existing buildings on the site would require demolition or renovation. All measures to avoid or reduce wasteful, inefficient, and/or unnecessary energy use described under Alternatives 2 and 3 (e.g., Mitigation Measure AQ/GHG-6) would also be implemented under Alternative 4. Energy-efficient design features (e.g., energy-efficient lighting) would be consistent with Goal NCR-8 and Policy NCR-8.1 of the City of Stockton 2035 General Plan. For these reasons, this impact would be **less than significant with mitigation**.

Impact UTIL-8: Effects on Energy Demand.

This discussion focuses on energy consumption as it relates to utilities and available supplies; Chapter 6, *Air Quality and Greenhouse Gas Emissions,* discusses energy consumption of the Proposed Project as it relates to air pollutant emissions. Construction would not involve appreciable use of utility-provided electricity and so is not considered further.

<u>ALTERNATIVE 1: NO PROJECT ALTERNATIVE</u>

Under the No Project Alternative, existing IEP programs and activities would continue and no DRS facilities would be constructed. Energy consumption would continue at current rates and DRS activities would not affect energy demand or supply compared to existing conditions. There would be **no impact.**

<u>ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1</u>

As described in “Environmental Setting” above, Rio Vista’s electricity and natural gas needs are served by PG&E. Because of the recent economic recession and other factors, several planned development projects in the city have not been constructed, and the city’s total energy demands have not grown as projected in the general plan.

As described in Impact UTIL-7, DRS facilities would use energy for a variety of purposes. The total annual estimated electricity consumption of the DRS is 1.68 megawatt-hours. Total natural gas consumption is estimated at 3.67 million British thermal units. The DRS would be developed to LEED silver standards and building design and appliances would be energy efficient as required by California Title 24 Building Energy Efficiency Standards and City of Rio Vista General Plan policies. Given that the City of Rio Vista has planned for growth that has not yet been realized, the DRS facilities would be unlikely to require any new energy supplies or construction of any new energy production facilities that have not already been envisioned to accommodate the growth projected in the general plan. The energy demand from the DRS facilities is not expected to contribute to any need for additional energy sources. This impact would be **less than significant**.

<u>Alternative 3: Rio Vista Army Reserve Center, Configuration 2</u>

The impacts of Alternative 3 on local energy supplies would be the same as described for Alternative 2: Rio Vista Army Reserve Center, Configuration 1. This impact would be **less than significant**.

<u>Alternative 4: Ryde Avenue Site in Stockton</u>

Similar to Rio Vista, Stockton obtains electricity and natural gas from PG&E. DRS facility energy consumption during operation under Alternative 4 would be approximately the same as described for Alternative 2: Rio Vista Army Reserve Center, Configuration 1. As mentioned above, the DRS would be developed to LEED Silver standards and would include energy-efficient design and appliances, in accordance with the City of Stockton's general plan policies promoting energy efficiency and conservation. Given that Stockton has planned for population growth and associated growth in energy consumption in its general plan (City of Stockton 2007), and operation of the DRS at the Ryde Avenue site would be consistent with land use anticipated for that site in the general plan, the DRS is unlikely to contribute to a need for construction of any new, unplanned energy production facilities. The impacts of Alternative 4 on local energy supplies would be the same as described for Alternative 2: Rio Vista Army Reserve Center, Configuration 1 and 3. This impact would be **less than significant**.

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Chapter 17
Recreation

This chapter describes existing recreational resources in the vicinity of the RVARC site and the Ryde Avenue site in Stockton, the regulatory setting, and the potential impacts on recreational resources as a result of construction and operation of each Proposed Project alternative.

17.1 Environmental Setting

17.1.1 Regional Setting

Both the RVARC site in Rio Vista (Alternatives 2 and 3) and the Ryde Avenue site in Stockton (Alternative 4) are located in or immediately adjacent to the Delta. The Delta is one the state's major recreation areas. Recreational activities in the Delta include boating, fishing, sailing, windsurfing, biking, kiteboarding, canoeing, kayaking, wildlife viewing, sightseeing, walking, picnicking, and camping (U.S. Bureau of Reclamation et al. 2013; California Department of Parks and Recreation 1997). Windsurfing and kiteboarding are especially popular on the Sacramento River from Rio Vista to Sherman Island, an area inclusive of the RVARC site (U.S. Bureau of Reclamation et al. 2013; California Department of Parks and Recreation, Division of Boating and Waterways [DBW] 2003). The RVARC site is located on the southern boundary of Rio Vista, approximately 8 miles northeast of Sherman Island. Peak times of year for recreation in the Delta are generally the summer months.

17.1.2 Rio Vista Army Reserve Center Site

The RVARC site is closed to the public and there are no existing recreational facilities on the majority of the site. An unimproved trail, a paved path, is located along Beach Drive on the western border of the site (see Figure 1-2 in Chapter 1, *Introduction*). Existing parks and recreational facilities in the vicinity of the RVARC site and the recreational activities they support are described below.

Parks and Recreational Facilities

Rio Vista has seven parks, a skateboard park, a basketball court, a boat launch, and a picnic area (City of Rio Vista 2015a). The city's parks and recreational facilities are operated and maintained by the City of Rio Vista Parks Department (City of Rio Vista 2015a). Solano County also operates a park just outside city limits south of the RVARC site. **Table 17-1** provides information on city- and county-owned parks and recreational facilities near the RVARC site.

Several other recreational facilities exist in Rio Vista in addition to the facilities listed in Table 17-1. First, three public schools provide additional space for recreation (City of Rio Vista 2011). Second, Trilogy, an active resort community, has a golf course and Sir Flair's Restaurant, which are open to the general public. The rest of the community facilities are open only to Trilogy residents (City of Rio Vista 2007). Finally, the Delta Marina Yacht Harbor, a private marina within the city (City of Rio Vista 2007), is located immediately adjacent to the northeast portion of the RVARC site on the Sacramento River.

According to the most recent (2007) *Parks Master Plan*, the City of Rio Vista contains 15.7 acres of "traditional" developed parkland, excluding specialized recreational facilities such as open space, golf courses, marinas, regional parks, and school property that are not available for public use on a consistent basis (City of Rio Vista 2007). Using the U.S. Census Bureau's 2013 population estimate of 7,736 residents for the City of Rio Vista, this translates to approximately 2 acres of parkland per 1,000 residents (U.S. Census Bureau 2014).

Rio Vista currently has no developed trails or recreation corridors (City of Rio Vista 2011). An unimproved trail that runs along Beach Drive is shown on the City's self-guided walking tour map (City of Rio Vista 2015b) and connects from the southwestern edge of the RVARC site to areas north of the site and the city's downtown area. The City of Rio Vista refers to this trail as "The Bridge to Beach Trail." As described in Chapter 1, *Introduction,* and described further in Chapter 20, *Cumulative Impacts*, the *Rio Vista Army Reserve Center Redevelopment Plan* (City of Rio Vista 2011) includes plans for other recreational amenities, such as a park, recreation and community facilities (e.g., community center, outdoor sports fields, children's park, and picnic area), a riverfront promenade, and a small public marina.

1 **Table 17-1.** Parks and Recreational Facilities near the Rio Vista Army Reserve Center Site

Park/Facility Name	Location	Ownership	Size (acres)	Distance from RVARC Site (miles, by road)	Features
Bruning Park	On Bruning Avenue between 3rd Street and 4th Street	City of Rio Vista	1.5	0.6	City swimming pool, large grassy recreation area, children's playground equipment, drinking fountain, picnic tables, benches, restroom
Sandy Beach County Park	South end of Beach Drive	Solano County	N/A	0.6	Boat launch, campsites with RV hookups, picnic grounds, sand beach
Boat Launch/ Picnic Area	Behind city hall off Front Street	City of Rio Vista	N/A	0.7	Dock with moorings, two-lane boat launch, parking for vehicles and boat trailers, picnic area with tables, drinking fountain, restrooms
Crescent Park	On Crescent Drive just off Logan Street	City of Rio Vista	0.25	0.8	Children's playground equipment, drinking fountain, picnic table, BBQ, basketball court
Waterfront Promenade	On the Sacramento River adjacent to the Rio Vista Bridge	City of Rio Vista	N/A	0.9	Promenade along Sacramento River waterfront, nearby fishing dock, fish-cleaning station, picnic tables, BBQs, restrooms, drinking fountain
Drouin Park	On Drouin Drive between Sierra and Amador Circles	City of Rio Vista	1.1	1.2	Picnic tables, children's playground equipment
Memorial Park	West end of town on SR 12	City of Rio Vista	1.5	1.4	Fenced grassy area
Val de Flores Park	Behind D.H. White Elementary School on Scott Street	City of Rio Vista	3	1.4	ADA-accessible restrooms, soccer fields, picnic tables, off-street parking, bike rack
Egbert Field	On St. Francis Street between Rolling Green Drive and Poppy House Road	City of Rio Vista	5	1.5	Baseball fields, bleachers, restrooms, bike rack, picnic tables, drinking fountain
Harris DeSilva Skateboard Park	Next to police department on Poppy House Road	City of Rio Vista	N/A	2	Picnic tables; structures, ramps and rails
City of Rio Vista Basketball Courts	Poppy House Road and Sullivan Street	City of Rio Vista	N/A	2.1	One complete basketball court, picnic table, benches

Park/Facility Name	Location	Ownership	Size (acres)	Distance from RVARC Site (miles, by road)	Features
Homecoming Park	Corner of Madere Way and Fisher Street	City of Rio Vista	1	2.2	Grassy play area with picnic tables, benches, drinking fountain, bike racks, BBQs, children's play structure

Sources: City of Rio Vista 2015a; Solano County 2015.

Recreational Activities

Boating and fishing are popular activities on the Sacramento River near the RVARC site. Sailing, windsurfing, and kiteboarding are popular activities in the area. Sandy Beach County Park, located just south of the RVARC site (see Figure 1-2), is one of the most popular parks/recreation areas in the Delta, with 100,611 visitors in 2010 (U.S. Bureau of Reclamation et al. 2013). As indicated in Table 17-1, recreational activities enjoyed at the park include fishing (from the shoreline or from boats launched from the park's boat launch), jet-skiing, pleasure boating, windsurfing, sailing, camping, picnicking, and sunbathing on the beach.

17.1.3 Ryde Avenue Site in Stockton

No existing recreational facilities are present on the Ryde Avenue site. Although the site is immediately adjacent to the San Joaquin River, no developed public access to the river is available. Existing parks and recreational facilities near the Ryde Avenue site and the recreational activities they support are described below.

Parks and Recreational Facilities

The City of Stockton Community Services Department, Parks Division, maintains and operates 63 parks in the city (City of Stockton Parks Division 2012). Parks range from 2-acre neighborhood sites to 64-acre community parks (City of Stockton Parks Division 2012). **Table 17-2** shows parks and recreational facilities in Stockton near the Ryde Avenue site.

In addition to the parks and recreational facilities described above, the City of Stockton also maintains several marinas that provide boat storage as well as other boat-related services (e.g., boat repair) (City of Stockton 2007a).

Recreational Activities

According to the City of Stockton's general plan, the various Delta waterways within and near Stockton are used extensively for activities such as boating, water-skiing, swimming, and fishing (City of Stockton 2007b). Stockton Bass is an open bass tournament circuit held in Buckley Cove in Stockton throughout the year (City of Stockton 2007b).

As indicated in Table 17-2, Louis Park is the closest public recreational facility to the Ryde Avenue site. Recreational facilities available at this park include picnic tables, tennis courts, softball and baseball fields, handball courts, BBQ pits, and a boat launch. The boat launch, which is located at the west end of Monte Diablo Avenue, is one of two public boat launch facilities in Stockton.

1 **Table 17-2.** Parks and Recreational Facilities in the Vicinity (3-mile Radius) of Ryde Avenue Site in Stockton

Park/Facility Name	Location	Ownership	Size (acres)	Distance from Ryde Avenue Site (miles, by road)	Features
Louis Park	Monte Diablo Avenue/Occidental Avenue	City of Stockton	60.1	0.9	Picnic tables, group picnic areas, tot lot/play equipment, tennis courts, softball fields, baseball field, basketball courts, handball courts, horseshoes, boat launch, BBQs, restrooms
Victory Park	Pershing Avenue/Argonne Drive	City of Stockton	22.45	1.5	Picnic tables, group picnic areas, tot lot/play equipment, tennis courts, softball fields, basketball court, BBQs, restrooms
Madison Park	2001 Michigan Avenue	San Joaquin County	4.42	1.6	Baseball fields, little league field, children's playground
Weber Square	Park Street/Van Buren Street	City of Stockton	2.2	2.1	Picnic tables, tot lot/play equipment
North Seawall	Madison/Deep Water Ship Channel	City of Stockton	2.1	2.3	None
King Plaza	El Dorado Street/Fremont Street	City of Stockton	1.7	2.4	N/A
McLeod	Center Street/Fremont Street	City of Stockton	3.5	2.4	N/A
South Seawall	Weber Avenue/Center Street	City of Stockton	0.83	2.7	None
American Legion Park	Bedford Road/Baker Street	City of Stockton	21.12	2.7	Picnic tables, tot lot/play equipment, basketball court, BBQs/campfires, restroom
Eden Square	El Dorado Street/Acacia Street	City of Stockton	2.11	2.7	Picnic tables, tot lot/play equipment
Caldwell Park	Allston Way/Alpine Avenue	City of Stockton	3.49	2.8	Picnic tables, tot lot/play equipment, basketball court, restroom
Fremont Square	Fremont Street/Sutter Street	City of Stockton	2.11	2.8	None

Park/Facility Name	Location	Ownership	Size (acres)	Distance from Ryde Avenue Site (miles, by road)	Features
DeCarli Place	Weber Avenue and Center Street	City of Stockton	2.11	2.8	Unknown
Weber Point Events Center	Center Street/Miner Avenue	City of Stockton	9.7	2.9	Picnic tables, BBQ

Source: City of Stockton 2014; San Joaquin County 2015a.

17.2 Regulatory Setting

17.2.1 Federal Laws, Regulations, and Policies

U.S. Coast Guard

The U.S. Coast Guard has enforcement authority over recreational boating in federally navigable waters, including inland waters such as the Sacramento DWSC (between Suisun Bay and West Sacramento), which is adjacent to the RVARC site in Rio Vista, and the Stockton DWSC (between Suisun Bay and Stockton), which is adjacent to the Ryde Avenue site in Stockton (U.S. Bureau of Reclamation et al. 2013). Title 33 CFR Chapter 1, Subchapter E contains rules for inland navigation, including steering and sailing rules (e.g., safe speed, actions to avoid collision, overtaking), lights and shapes (for communication/signaling), and sound and light signals (e.g., maneuvering and warning signals, sound signals in restricted visibility).

17.2.2 State Laws, Regulations, and Policies

California Department of Parks and Recreation, Division of Boating and Waterways

DBW operates several programs related to boating law enforcement to meet its major objective of protecting the public's right to safe and enjoyable boating on the waterways of California (DBW 2014). DBW's Enforcement Unit provides grants to local governments to fund boating enforcement activities and equipment purchases, and to train boating law enforcement officers. DBW's programs are the Boating Accident Program, Boating Law Enforcement Equipment Grant Program, Boating Law Enforcement Training Program, and Boating Safety and Enforcement Financial Aid Program.

California's boating laws are described in various instruments of state law, including the California Harbors and Navigation Code, Vehicle Code, Penal Code, and CCR, among others (U.S. Bureau of Reclamation et al. 2013). Although California's boating laws and regulations apply uniformly on all waters of the state, they do not replace or supersede federal regulations on federally navigable waters (see U.S. Coast Guard discussion above) (U.S. Bureau of Reclamation et al. 2013).

Delta Protection Act

As described in Chapter 13, *Land Use and Planning*, the 1992 Delta Protection Act created the Delta Protection Commission and required that it prepare and adopt a resource management plan for land uses within the primary zone of the Delta. Goals and policies contained in the Delta Protection Commission's *Land Use and Resource Management Plan for the Primary Zone of the Delta* (2010) related to recreation are as follows:

Goal To promote continued recreational use of the land and waters of the Delta; to ensure that needed facilities that support such uses are constructed, maintained, and supervised; to protect landowners from unauthorized recreational uses on private lands; and to maximize public funds for recreation by promoting public-private partnerships and multiple use of Delta lands.

Policy P-2 Encourage expansion of existing privately-owned, water-oriented recreation and access facilities that are consistent with local General Plans, zoning regulations and standards.

Policy P-8 Ensure, for the sake of the environment and water quality, the provision of appropriate restroom, pump-out and other sanitation and waste management facilities at new and existing recreation sites, including marinas; encourage the provision of amenities including but not limited to picnic tables and boat-in destinations.

Policy P-10 Promote and encourage Delta-wide communication, coordination, and collaboration on boating and waterway-related programs including but not limited to marine patrols, removal of debris and abandoned vessels, invasive species control and containment, clean and safe boating education and enforcement, maintenance of existing anchorage, mooring and berthing areas, and emergency response in the Delta.

17.2.3 Local Laws, Regulations, and Policies

City of Rio Vista General Plan

The *City of Rio Vista General Plan 2001* (2002) contains the following goals and policies related to recreation in the context of Proposed Project Alternatives 2 and 3.

Goal 9.1 To provide public access and view opportunities on the Sacramento River to the maximum extent feasible.

Policy 9.1.A As development and redevelopment occur, the City shall require public access to the Sacramento River from the nearest public street and walkways.

Policy 9.1.D Public access shall be provided to the River through the former Army Reserve Base site.

Policy 9.1.E The City shall pursue a pedestrian connection between the former Army Reserve Base site and Sandy Beach Regional Park.

Goal 9.2 To create an open space system in Rio Vista that serves the needs of the community, preserves key scenic corridors, and links activity centers.

Policy 9.2.D All new development shall be required to provide direct or alternative linkages to existing and planned open space systems where feasible.

Goal 9.3 To develop a comprehensive and unified trails and pathways system that addresses the recreation and transportation aspects of bicycle and pedestrian travel.

Policy 9.3.B Floodways, and floodplains as needed, shall be reserved and/or acquired in fee or by easement for trails and passive recreation to accommodate the facilities shown on the adopted Trails & Pathways Map in the Circulation & Mobility element.

Goal 9.7 To provide parks in the City, consistent with the rate of residential development.

Policy 9.7.A The City shall provide sufficient acreage of parks needed to meet the active and passive recreation demands of the community.

Policy 9.7.G The City's minimum standard for required parkland per 1,000 residents shall be as shown in [General Plan] Table 9-4.

General Plan Table 9-4. Jurisdictional Parkland Dedication Requirements for Comparable Communities (Acres per 1,000 Population)

City	Neighborhood Park	Community Parks	Specialized (e.g., Trails)	Total Ac Standard
Rio Vista	1.0 Ac[a]	1.6 Ac[a]	N/A[b]	2.6 Ac/1000
Suisun City	5.0 Ac	2.5 Ac	N/A[b]	7.5 Ac/1000
Fairfield	3.0 Ac	2.0 Ac	N/A[b]	5.0 Ac/1000
Merced	3.5 Ac	1.5 Ac	N/A[b]	5.0 Ac/1000+
West Sacramento	2.0 Ac	3.0 Ac	N/A[b]	5.0 Ac/1000
Petaluma	2.0 Ac	3.0 Ac	N/A[b]	5.0 Ac/1000+
Davis	1.8 Ac	1.8 Ac	1.2 Ac	4.8 Ac/1000+
Vacaville	1.8 Ac	1.7 Ac	1.0 Ac	4.5 Ac/1000+
Pleasanton	---	---	---	5.0 Ac/1000+
Livermore	2.0 Ac	2.0 Ac	3.0 Ac	8.0 Ac/1000+
Dixon	1.2 Ac	3.8 Ac	---	5.0 Ac/1000+
Lodi	---	---	---	8.0 Ac/1000+
San Ramon	4.5 Ac	2.0 Ac	---	6.5 Ac/1000
Dublin	1.5 Ac	3.5 Ac	---	5.0 Ac/1000

[a] Facilities planned but no specific number of acres specified as a standard.
[b] Plus regional/special use.

City of Rio Vista Parks Master Plan

The City of Rio Vista's *Parks Master Plan* is a long-range planning document that "guides the development, operation, and maintenance of the City's park and open space system" (City of Rio Vista 2007). The recommendations in the *Parks Master Plan* are developed based on the policies contained in the City's general plan (City of Rio Vista 2007). In its discussion of opportunities and assets, the *Parks Master Plan* states:

> The Sacramento River is the most significant open space resource in the City today. People are naturally attracted to the water's edge. In Rio Vista, the water is both a scenic resource and one that is used for a number of recreational activities, including boating, fishing, swimming, and windsurfing. However, opportunities to enjoy the river are hampered by the lack of developed public access facilities. Provision of convenient and safe public river access that is sensitive to the natural environment and economic development of the downtown is a key opportunity (City of Rio Vista 2007: page 3).

The *Parks Master Plan* contains the following goals and objectives related to Proposed Project Alternatives 2 and 3.

- Acquire and develop parks to meet the standard of 3 acres of neighborhood park and 2 acres of community park per each 1,000 residents.
- Develop a City-wide trail system to link the park system and provide additional recreation opportunities.
- Provide improved river access for boating, fishing, and passive enjoyment.

Army Base District Design Guidelines

The *Army Base District Design Guidelines* (MIG 2011) provide guidance for developing the former RVARC. The guidelines are described in detail in Chapter 13, *Land Use and Planning*. The guidelines state that "use of the site shall be limited to recreational uses, and limited commercial activities that support recreational uses." They also list the following recreational uses as particularly desirable and appropriate at the RVARC site: children's play area or destination; fishing facilities and public river access; interpretive center or multipurpose center; multiuse trail; picnic areas and unprogrammed open space and recreational fields; and riverfront promenade. The guidelines also generally promote or encourage public access to the river or waterfront.

City of Stockton General Plan

The *Stockton General Plan 2035* (2007b) contains the following goals and policies related to recreation in the context of Proposed Project Alternative 4.

Goal RW-1 To provide a full range of recreational facilities and services where they are accessible to the public and are compatible with the area in which they are located.

Goal RW-2 To provide a variety of recreational facilities to meet the diverse needs of Stockton's residents, workers, and visitors.

Policy RW-2.1 The City shall ensure that park and recreation facilities be provided at a level that meets the standards (net acres/1,000 residents, minimum net acres/park, service radius) for neighborhood parks, community parks, and regional parks shown in [General Plan] Table 10-1.

General Plan Table 10-1. Park Standards

Type of Park	Net Acres/1,000 Residents	Minimum Net Acres/Park	Service Radius
Neighborhood Park	2	5	Up to ½ mile radius
Community Park	3	15	Up to 1 mile radius
Regional Park	3	30+	Region-wide
Public Golf Courses	1 course/40,000	160-230	Region-wide

Goal RW-3 To provide community centers, bikeways and trails that meet the needs of Stockton's residents, workers, and visitors.

Policy RW-3.3 *Development of Bikeways and Trails*. The City shall construct bikeways and trails in existing public areas wherever feasible (i.e., Calaveras River path, EBMUD [East Bay Municipal Utility District] right-of-way).

Goal RW-5 To preserve and enhance waterways for recreation and open space.

Policy RW-5.1 *Incorporate Waterways into Design of Parks and Trails*. The City shall endeavor to preserve and restore the natural values of the San Joaquin and Calaveras Rivers, the Delta, and other local waterways, and incorporate them in the City's parks, trails, and open space system.

Policy RW-5.2 *Improve Riparian Corridors*. The City shall endeavor to protect, preserve, and improve riparian corridors and incorporate them in the City's parks, trails, and open space system.

17.3 Environmental Impacts

17.3.1 Methods of Analysis

Potential impacts of the Proposed Project on recreation were assessed qualitatively in the context of the significance criteria listed below. The analysis used the significance criteria contained in the CEQA Guidelines as well as additional criteria developed to address potential impacts relevant to NEPA that are not captured by the CEQA significance criteria.

17.3.2 Significance Criteria

An alternative would have a significant impact related to recreation if it would:

- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated;

- Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment;
- Cause hazardous conditions for recreationalists; or
- Substantially reduce or displace recreational opportunities.

The Proposed Project does not include construction of any recreational facilities, although Alternatives 2 and 3 (see Figures 3-1 and 3-2) would allow public access through certain portions of the RVARC site. Under Alternatives 2 and 3, construction of the ingress and egress driveways would affect the existing path along Beach Drive, and the affected portions of the path would be repaved subsequent to construction of the driveways. The environmental effects resulting from construction of this path are described throughout this document, and the impact related to temporary reduction or displacement of the path is described in Impact REC-4, below. Because the Proposed Project does not include recreational facilities or require the new construction or expansion of such facilities, the second criterion listed above is not addressed further.

17.3.3 Environmental Impacts and Mitigation Measures

Impact REC-1: Increased Use of Existing Recreational Facilities in the Proposed Project Vicinity during Project Operations.

An increase in the number of workers or residents in an area might result in an increase in use of local recreational facilities because some of these additional people might use recreational facilities during their free time. As described in Section 17.3.2 above, such an increase in use would be significant if it resulted in substantial physical deterioration of the facility.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, no actions would be taken that could increase use of recreational facilities; therefore, **no impacts** would result on existing recreational facilities in the vicinity of the RVARC site or Ryde Avenue site.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As described in Section 17.1.2 a number of recreational facilities are within the Rio Vista area. In particular, Sandy Beach County Park is located 0.6 mile south of the RVARC site (see Figure 1-2).

The DRS would accommodate approximately 180 staff members. As described in Chapter 19, *Population and Housing,* it is reasonable to presume that more staff members would relocate over time to the Rio Vista area. Commuting workers might use nearby recreational facilities, such as Sandy Beach County Park, thus increasing the overall use of these facilities. DRS staff members and/or their families living in or near Rio Vista would also be expected to use local recreational facilities during their free time. Such increased use could potentially accelerate the physical deterioration of recreational facilities over time to some degree; however, Sandy Beach County Park receives thousands of visitors each year (Solano County 2015b) and any additional visitors generated by the DRS would be a small fraction of that. Similarly, visitation of other nearby recreational facilities could increase but, because of the limited number of employees that are expected to relocate, any such deterioration would most likely not be substantial and the contribution from operations at the DRS would be small. This impact would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The number of staff members who might relocate to the Rio Vista area and/or use existing recreational facilities under Alternative 3 would be the same as under Alternative 2: Rio Vista Army Reserve Center, Configuration 1. The potential impacts on recreational facilities from Alternative 3 would therefore be the same as those described above for Alternative 2: Rio Vista Army Reserve Center, Configuration 1 and would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

As described in Section 17.1.2, a number of parks and recreational facilities are within the vicinity of the Ryde Avenue site in Stockton, the nearest being Louis Park, which is 0.9 mile from the site (by road). As described under Alternative 2: Rio Vista Army Reserve Center, Configuration 1, DRS staff members and their families, especially those living in or near Stockton, could potentially use the recreational facilities in the Stockton area. The number of people who would be employed at the DRS under Alternative 4 is the same as that under Alternative 2: Rio Vista Army Reserve Center, Configuration 1. As under Alternative 2, any physical deterioration of the recreational facilities in Stockton from increased use caused by the DRS facilities would not be expected to be substantial. This impact would be **less than significant**.

Impact REC-2: Potential for Creation of Hazardous Conditions for Water-based Recreationists during Project Construction.

In-water construction activities within a river channel could potentially create hazardous conditions for boaters and other water-based recreationists. Pilings and construction equipment in the water might not be seen by recreationists without adequate marking and/or signage, potentially resulting in accidents or injury.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no construction and hence **no impact** related to hazardous conditions for water-based recreationists.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As described in Section 17.1.2, boating, fishing, sailing, windsurfing, and kiteboarding are popular activities on the Sacramento River in the area of the RVARC site. Sandy Beach County Park is a popular destination for recreationists and a launching point for boats and other water craft.

Estuarine Research Station

Development of the ERS facilities under Alternative 2 would include construction of a partially excavated marina within the main channel of the Sacramento River adjacent to the RVARC site. Marina construction is estimated to require demolition and removal of existing piles/moorings, excavation of approximately 32,000 cubic yards, installation of 15–20 concrete piles, and securing approximately 8,000–13,000 square feet of floating docks. Construction would involve using a vibratory hammer, work skiff, generator, and air compressor, each of which would be operated from a barge. The finished marina would extend up to approximately 160 feet into the river channel. As described above, these in-channel activities could potentially create hazardous conditions for recreational boaters, sailors, or fishers in the vicinity of the work area because there could be periods during construction when structures are partially submerged or incomplete and/or equipment is operated within the channel. This impact would be potentially significant.

Implementation of **Mitigation Measure REC-1 (Marking Marina In-channel Construction Areas and Posting Signage for Boater and Recreational Safety)**, would reduce potential conflicts with recreationists. This mitigation measure would require that in-channel structures and equipment be clearly marked and that signage be posted at Sandy Beach County Park to warn recreationists of hazardous conditions. Hazard markings would be consistent with U.S. Coast Guard regulations and signage would be posted at high-traffic areas within the park. With implementation of Mitigation Measure REC-1, the potential for in-channel marina construction to create hazardous conditions for water-based recreationists would be reduced to a level that is less than significant with mitigation.

Mitigation Measure REC-1: Marking Marina In-channel Construction Areas and Posting Signage for Boater and Recreational Safety (Alternative 2 - ERS)

During marina construction, all equipment and/or structures within the Sacramento River channel shall be clearly marked to alert boaters and other water-based recreationists of their presence and of potential hazards. Marking shall follow U.S. Coast Guard recommendations and guidelines for inland navigation. Signage shall be posted at nearby recreational facilities to inform recreationists of the potential for hazardous construction conditions in the river. Signage shall be posted at Sandy Beach County Park, the City of Rio Vista's boat launch, and any other location where boaters or recreationists in the area may enter the water.

Fish Technology Center

Development of the FTC facilities would include construction of a process water outfall and possibly a raw water intake in the Sacramento River, involving equipment similar to that of marina construction for the ERS, albeit on a much smaller scale. These facilities would be located close to shore and not in an area that would be likely to expose water-based recreationists to substantial hazards; therefore, this impact would be less than significant.

Delta Research Station

Development of the DRS facilities would include construction of several in-channel facilities. As described above for the FTC, the outfall would not be anticipated to create a substantial hazard for water-based recreationists during construction; however, the construction of the marina would be on a larger scale and could create substantial hazardous conditions for water-based recreationists, a potentially significant impact. With implementation of Mitigation Measure REC-1, this impact would be **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

One of the primary differences between Alternatives 2 and 3 is that the configuration under Alternative 3 would not feature a partially excavated marina. The marina for the ERS under Alternative 3 would be excavated off-channel from the Sacramento River (see Figure 3-2 in Chapter 3, *Alternatives Description*) and would be connected to the river only during the final part of construction. It is anticipated that the marina would be isolated from the Sacramento River throughout the majority of the construction period. A controlled breach of an earthen barrier would be made between the river and marina once the marina grades have been established. The breach would be close to shore and not in an area that would be likely to expose water-based recreationists to substantial hazards. Similarly, the outfall associated with the FTC would not expose recreationists to substantial hazards for the same reasons as described under Alternative 2. This impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

As described in Section 17.1, the San Joaquin River near the Ryde Avenue site in Stockton is a popular area for boaters, fishers, sailors, windsurfers, kiteboarders, and other water-based recreationists. As under Alternative 3, the site layout for Alternative 4 would not include a partially excavated marina (see Figure 3-3). The proposed marina under Alternative 4 would be inland from the San Joaquin River and would be connected to the river only during the final stage of construction. The construction methods for Alternative 4 would be the same as those for Alternative 3. After the marina grades have been established, a controlled breach of an earthen barrier would be made between the river and marina. The breach would be made close to shore and not in an area that would be likely to expose water-based recreationists to substantial hazards. Similarly, the outfall and/or raw water intake associated with the FTC would not expose recreationists to substantial hazards for the reasons described under Alternative 2. This impact would be **less than significant**.

Impact REC-3: Potential Disruption of Water-based Recreationists from Increased Vessel Traffic during Project Operations.

Increased vessel traffic in an area frequently used by recreationists could have an adverse impact on recreational enjoyment and opportunities. The degree of impact could be determined, in part, by the characteristics of the river or waterbody and the type of vessel traffic.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be no change in vessel traffic and hence **no impact** on recreationists from increased vessel traffic.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As described in Section 17.1.2, the Sacramento River is a popular destination for boaters, fishers, sailors, windsurfers, kiteboarders, and other water-based recreationists. This section of the Sacramento River is also part of the Sacramento DWSC and has a relatively high level of existing vessel traffic, including very large shipping vessels.

The DRS would include the construction of a marina and boat storage area and the use of vessels for field research activities. The proposed marina would accommodate up to 20 power boats ranging from 21 to 60 feet long. The dry covered boat–storage facility would accommodate up to 30 vessels ranging from 14 to 25 feet long. As described in Chapter 3, *Alternatives Description*, various water-based programs and activities would be conducted out of the DRS, with varying amounts of vessel traffic. For example, the Estuarine and Marine Fish Abundance and Distribution Survey would involve 84 vessel trips per year. Table 3-1 in Chapter 3 summarizes the estimated number and field work locations of all proposed IEP activities at the DRS. In total, 48 vessels at the DRS would take trips to and from the facilities with varying frequency. These vessel trips could potentially increase congestion to some degree on the Sacramento River in the Rio Vista area; however, relative to the overall volume of ship traffic in the area, the Proposed Project's contribution would not be anticipated to be substantial. In addition, for most trips, only smaller vessels would be used for IEP activities, and recreational boaters and other water-based recreationists in the area should be accustomed to navigating ship traffic; therefore, any impact from increased vessel traffic generated by the DRS under Alternative 2 would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would include construction of the same facilities and would involve the same activities as Alternative 2, but in a different configuration. The potential impacts on recreationists as a result of increased vessel traffic under Alternative 3 would be the same as those described for Alternative 2: Rio Vista Army Reserve Center, Configuration 1; therefore, the impacts of the DRS under Alternative 3 would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would include construction of the same facilities and would involve the same activities as Alternative 2. Similar to the Sacramento River, the San Joaquin River in the area of the Ryde Avenue site is a popular location for boaters and other water-based recreationists. The DRS under Alternative 4 would generate the same number and types of trips as described for Alternative 2: Rio Vista Army Reserve Center, Configuration 1. As such, the potential impacts on recreationists as a result of increased vessel traffic would be the same as for Alternatives 2 and 3; therefore, impacts of the DRS under Alternative 4 would be **less than significant**.

Impact REC-4: Temporary Reduction or Displacement of Existing Recreational Uses.

Existing recreational uses could be reduced or displaced if any existing trails or recreational facilities were reduced or displaced by Proposed Project features. Such displacement would decrease available recreational opportunities in the area and could constitute a significant impact.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, there would be **no impact** on existing recreational facilities from reduced or displaced uses.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As described in Section 17.1.2, an "unimproved trail" or paved path exists along Beach Drive on the RVARC site's western border. Over the long term, the path might be repaved and landscaped. Retaining and improving the path would be consistent with Policy 9.1.E of the City of Rio Vista General Plan (2002), which states the following: "The City shall pursue a pedestrian connection between the former Army Reserve Base site and Sandy Beach Regional Park." During construction of the driveways at the DRS, a portion of the path would be temporarily closed to the public. Use of this path would be temporarily reduced and displaced by construction activities; however, given that pedestrians and bicyclists would still have access to the bicycle lane on Beach Drive, this impact would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, the potential impacts of the DRS on recreationists from reduced and displaced uses of recreational facilities would be the same as those under Alternative 2: Rio Vista Army Reserve Center, Configuration 1; this impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

As described in Section 17.1.3, the Ryde Avenue site is currently closed to the public and there are no existing recreational facilities on the site. There are no trails, paths, or bicycle lanes along Ryde Avenue or Fremont Drive. As such, there would be **no impact** on existing recreational uses at the site.

Chapter 18
Socioeconomics and Environmental Justice

This chapter describes the demographic and socioeconomic characteristics of the communities and populations potentially affected by the Proposed Project; these characteristics serve as the foundation of the socioeconomic and environmental justice analyses.

The socioeconomic analysis evaluates the expected effects on the local and regional (county-wide) economies from project-related spending changes. These potential changes could include both temporary new spending from project construction and longer-term effects of employee and resident relocations.

Environmental justice focuses on minority and low-income populations, typically identified by comparison of data from surrounding census tracts. The topics addressed in the environmental justice analysis are race, ethnicity, and relevant economic indicators of social well-being, including income and poverty. The geographic area considered for the environmental justice analysis covers the resident populations living within 2 miles of the RVARC and Ryde Avenue sites.

18.1 Environmental Setting

18.1.1 Regional Setting

Two alternative sites for the Proposed Project are evaluated in this Draft EIR/EIS. The RVARC site is located in Rio Vista, Solano County. The Ryde Avenue site is located in Stockton, San Joaquin County. The socioeconomic analysis provided below focuses on population and economic data from these cities and their respective counties; regional information incorporates data from neighboring Sacramento and Yolo Counties.

Population

Table 18-1 shows the past and current population for each of the four counties and major cities within the region surrounding the two alternative sites for the Proposed Project (U.S. Census Bureau 2000, 2014; California Department of Finance 2014a). In 2000, Solano County's population was 394,541. Since then the County's population has increased at a 0.5-percent average annual growth rate. Solano County's growth rate has been lower than the rates of neighboring counties (San Joaquin, Sacramento, and Yolo Counties), which grew on average between 1.3 and 1.9 percent per year between 2000 and 2014. San Joaquin County has experienced the strongest population growth over the last 15 years in the four-county region,[1] with an average annual growth rate of 1.9 percent.

In contrast to Solano County's limited population growth over the last 15 years, Rio Vista has experienced rapid population growth. Since 2000, Rio Vista's population has increased 73.6 percent, equivalent to a 5.3-percent average annual growth rate. During that period, it was one of the fastest growing cities in Solano County and the four-county region.

Stockton grew at a similar rate as greater San Joaquin County; its rate of growth was approximately 23 percent between 2000 and 2014. Stockton's population has increased at an average rate of 1.7 percent per year during that period, which is comparable to its neighboring counties' and cities' growth rates.

Table 18-1. Population for the Project Region, 2000–2014

County/City	2000	2010	2014	Average Annual Growth (2000–2014)
Solano County	394,542	413,344	424,233	0.5%
Fairfield	96,178	105,321	110,018	1.0%
Rio Vista	4,571	7,360	7,934	5.3%
San Joaquin County	563,598	685,306	710,731	1.9%
Stockton	243,771	291,707	300,899	1.7%
Lodi	56,999	62,134	63,651	0.8%
Sacramento County	1,223,499	1,418,788	1,454,406	1.3%
Sacramento	407,018	466,488	475,122	1.2%
Yolo County	168,660	200,849	206,381	1.6%
Davis	60,308	65,622	66,656	0.8%
West Sacramento	31,615	48,744	50,836	4.3%

Source: U.S. Census 2000, 2010; California Department of Finance 2014a

[1] The four-county region includes the counties of Solano, San Joaquin, Sacramento and Yolo. These counties were chosen due to their geographic proximity, and potential for DRS employees to live in the region and commute to the facility.

Table 18-2 shows the most recent population growth projections for Solano, San Joaquin, Sacramento, and Yolo Counties (California Department of Finance 2014b). During the last 15 years (2000–2014), Solano County grew at an average annual rate of 0.5 percent. However, over the next 25 years, it is estimated to grow at an annual rate of 1.1 percent. A comparable rate of growth is also expected for Sacramento and Yolo Counties.

San Joaquin County's population is expected to increase by 1.7 percent annually between 2015 and 2040, which is comparable to the past rate of population growth. With Stockton as the largest metropolitan center in San Joaquin County, most of the county's growth is expected to take place in this area (San Joaquin County 2004).

Table 18-2. Population Forecasts for the Project Four-County Region (2015-2040)

County	2014 (Actual)	2015	2020	2030	2040	Average Annual Growth (2015-40)
San Joaquin	710,731	723,506	766,644	893,354	1,037,761	1.7%
Sacramento	1,454,406	1,475,381	1,554,022	1,730,276	1,912,838	1.2%
Yolo	206,381	209,647	219,415	241,898	267,268	1.1%
Solano	424,233	432,921	454,800	501,456	548,046	1.1%

Source: California Department of Finance 2014b

Housing

Table 18-3 shows the current (2014) number of households and housing units for the four project-area counties (California Department of Finance 2014c). In 2014, Solano County had an average of 2.87 persons per household, 154,782 housing units, and a vacancy rate of 7.0 percent. Solano County's vacancy rate was comparable to those of neighboring counties. Rio Vista's housing vacancy rate is higher than the Solano County average and is the highest of the major cities in the four-county region.

In 2014, San Joaquin County had 18,987 vacant housing units and an 8.0 percent housing vacancy rate. The average number of persons per household in San Joaquin County was 3.20, which is the highest in the four-county region. Stockton has approximately half of the county's vacant housing units and a vacancy rate of 9.1 percent.

Table 18-3. Housing and Occupancy Rates for the Project Four-County Region (2014)

	HOUSEHOLDS		HOUSING UNITS		
Area	**Total**	**Persons per Households**	**Total**	**Occupied**	**Vacancy Rate**
Solano County	143,909	2.87	154,782	143,909	7.0%
Fairfield	35,502	3.03	38,045	35,504	6.7%
Rio Vista	3,668	2.16	4,132	3,668	11.2%
San Joaquin County	217,956	3.20	236,943	217,956	8.0%
Stockton	90,954	3.23	100,025	90,958	9.1%
Lodi	22,112	2.85	23,809	22,114	7.1%
Sacramento County	519,107	2.76	561,460	519,107	7.5%
Sacramento	175,209	2.66	191,558	175,216	8.5%
Yolo County	70,716	2.80	74,920	70,716	5.6%
Davis	25,025	2.61	26,031	25,029	3.8%
West Sacramento	17,819	2.83	19,109	17,820	6.7%

Source: California Department of Finance 2014c

According to the U.S. Census Bureau's most recent 2013 American Community Survey, more than 57 percent of Rio Vista's residents commute to work at locations outside the Rio Vista area, with an average commute time of 38 minutes. Fifty-three percent of residents have a commute time of 30 minutes or more, with 27 percent commuting 60 minutes or more (U.S. Census Bureau 2013a). This trend is similar for Solano County as a whole, likely because the region's lower housing costs and excellent commuter access has attracted new residents to the area.

The average commute time for Stockton residents is 27 minutes, with 70 percent of residents commuting 30 minutes or less; approximately 28 percent of residents have commute times of 14 minutes or less (U.S. Census Bureau 2013a). According to the American Association of State Highway and Transportation Officials (AASHTO) Census Transportation Planning Products (CTPP), the relatively short average commute time for Stockton residents is likely attributable to the fact that most residents (95 percent) in the greater Stockton area also work within the area (AASHTO 2010).

Income

In 2013, California had a statewide median household income of $61,094. The unemployment rate was 6.7 percent, and 12.0 percent of families had income below the poverty level (US Census Bureau 2013a). Solano County's economic and employment status in 2013 was comparable to or better than the state average. As shown in **Table 18-4**, Solano County's median household income of $67,177 is higher than the state average, as well as the average incomes of neighboring San Joaquin, Sacramento, and Yolo Counties. Solano

County has a relatively low proportion of residents with incomes below the poverty line (13.0 percent) compared to the other counties in the region.

In the four-county region, San Joaquin County has the lowest median household income of $53,380, below the state average. Stockton's median household income is lower than the San Joaquin County average, and it has one of the highest poverty rates in the four-county region.

Table 18-4. Household Income and Poverty Rates for the Four-County Region (2013)

Area	Median Household Income	Population Below Poverty Line
Solano County	$67,177	13.0%
Fairfield	$64,702	13.6%
Rio Vista	$55,458	11.4%
San Joaquin County	$53,380	18.2%
Stockton	$46,831	24.3%
Lodi	$48,701	18.1%
Sacramento County	$55,064	17.6%
Sacramento	$49,753	21.9%
Yolo County	$55,918	19.1%
Davis	$60,114	26.3%
West Sacramento	$53,394	19.9%
State of California	$61,094	15.9%

Source: U.S. Census Bureau 2013a

18.1.2 RVARC Site in Rio Vista

Table 18-5 provides race and ethnicity data for Solano County, Rio Vista, and Census Tract 2535, which encompasses the City of Rio Vista and surrounding areas (U.S. Census Bureau 2013b). The study area for the RVARC environmental justice analysis consists of Census Tract 2535 surrounding the RVARC site.

Solano County's ethnic composition has changed since 2000, with growth in the Hispanic, Asian, and African-American segments and a decline in the White population (County of Solano 2012). In 2013, 40.5 percent of the county's population is non-Hispanic whites, and Hispanics account for approximately another 24.5 percent of the population.

The key difference between the RVARC study area (and Rio Vista overall) and Solano County as a whole is that the minority population accounts for a much smaller proportion of the study area's population than it does for the entire county. The RVARC study area is predominantly White Non-Hispanic (66.8 percent). The minority population of the RVARC study area comprises approximately 31.2 percent of the total study area population, with the Hispanic segment comprising the largest minority group (13.9 percent). The study area's African-American population is 7.0 percent and its Asian population is 6.7 percent.

Table 18-5. Race and Ethnicity Characteristics for the RVARC Study Area (2013)

Demographics	Solano County	%	Rio Vista	%	RVARC Study Area (a)	%
Total Population	417,258		7,451		8,512	
White (Non-Hispanic)	168,938	40.5%	5,222	70.1%	5,686	66.8%
Black or African American	57,321	13.7%	538	7.2%	597	7.0%
Asian	59,677	14.3%	535	7.2%	568	6.7%
Hispanic or Latino	102,082	24.5%	793	10.6%	1,186	13.9%
Other [(b)]	29,240	7.0%	363	4.9%	422	5.0%
Total Minority[(c)]	248,320	59.5%	2,229	29.9%	2,773	32.6%

Notes:

(a) Study area includes Census Tract 2535, Solano County, CA.

(b) "Other" includes American Indian and Alaskan Native, Native Hawaiian and Other Pacific Islander, Two or More Races, and Other Races.

(c) "Total Minority" includes all races listed in the table except for White (Non-Hispanic).

Source: U.S. Census Bureau 2013b.

Table 18-6 presents the most recent economic and employment data available for the RVARC study area and Solano County (U.S. Census Bureau 2013a; California Employment Development Department [EDD] 2014a, 2014b). The RVARC study area has an average household income comparable to those of Solano County and the state while its poverty rate is lower than both the Solano County and state rates. Management and business jobs are the largest source of employment (38.8 percent) for local residents followed by sales (23.9 percent) and service (16.1 percent) jobs.

In terms of low-income populations (percent of families living below the poverty level), the study area has a lower proportion of its families with income under the poverty level than the City of Rio Vista and Solano County as a whole.

More recent unemployment data is available for Solano County from EDD) (2014a, 2014b). Solano County's annual average unemployment rate in 2014 was 7.4 percent and comparable with the statewide unemployment rate of 7.5 percent. Current unemployment data specifically for the study area was unavailable from the EDD, but based on the past local and county data, the RVARC study area's current unemployment conditions are expected to be comparable to those of City of Rio Vista and higher than the rate for Solano County as a whole.

Table 18-6. Economic and Employment Characteristics for the RVARC Study Area (2013)

	Solano County	Rio Vista	RVARC Study Area[(a)]	State of California
Employment Status [(b)]				
Unemployed (per EDD, 2014) [(c)]	7.4%	14.5%	–	7.5%
Occupation of Residents				
Management, business, science, and arts	33.4%	39.1%	38.8%	36.9%
Service	19.9%	17.2%	16.1%	18.6%
Sales and office	25.2%	23.2%	23.9%	24.4%
Natural resources, construction and maintenance	9.7%	11.2%	11.4%	9.2%
Production, transportation, and material moving	11.6%	9.3%	9.9%	10.9%
Income and Poverty				
Average household income ($2013)	$82,971	$71,512	$71,564	$85,408
Families below poverty level (%)	10.0%	7.1%	6.4%	12.0%

Notes:

(a) Study area includes Census Tract 2535, Solano County, CA

(b) Civilian labor force

(c) Unemployment data from EDD is annual average for 2014, and is only available at state, county and city level.

Source: U.S. Census Bureau 2013a, EDD 2014a, 2014b

18.1.3 Ryde Avenue Site in Stockton

Table 18-7 provides race and ethnicity data for San Joaquin County, Stockton, and the numerous census tracts located within 2 miles of the 845 Ryde Avenue site (U.S. Census Bureau 2013b). The Ryde Avenue study area for the environmental justice analysis consists of Census Tracts 3, 4.01, 8.01, 9, 10, 11.01, 11.02, 12 and 39, which encompass the site and surrounding areas within approximately 2 miles of the Ryde Avenue site.

San Joaquin County has experienced changes in ethnic composition in recent years, as have other counties in California, with decreasing White (Non-Hispanic) and increasing minority population segments. In 2013, 39.3 percent of San Joaquin County's population identified as Hispanic and 35.4 percent identified as White Non-Hispanic. The other substantial minority segments in San Joaquin County are Black (6.8 percent) and Asian (14.0 percent).

The Ryde Avenue study area has similar demographics to San Joaquin County as a whole. The minority population segments make up large percentage of the total population, with

66.1 percent of the study area population identified as Hispanic, Black, Asian, or Other and Hispanic making up the largest minority group in the study area.

Table 18-7. Race and Ethnicity Characteristics for the Ryde Avenue Study Area (2013)

Demographics	San Joaquin County	%	Stockton	%	Ryde Avenue Study Area [(a)]	%
Total Population	693,177		294,406		40,065	
White (Non-Hispanic)	245,469	35.4%	65,559	22.3%	13,582	33.9%
Black or African American	46,840	6.8%	31,909	10.8%	2,539	6.3%
Asian	97,353	14.0%	62,244	21.1%	3,965	9.9%
Hispanic or Latino	272,529	39.3%	120,958	41.1%	18,436	46.0%
Other [(b)]	30,986	4.4%	13,736	4.7%	1,543	3.9%
Total Minority[(c)]	447,708	64.5%	22,8847	77.7%	26,483	66.1%

Notes:

(a) Study area includes Census Tracts 3, 4.01, 8.01, 9, 10, 11.01, 11.02, 12 and 39, San Joaquin County, CA.

(b) "Other" includes American Indian and Alaskan Native, Native Hawaiian and Other Pacific Islander, Two or More Races, and Other Races.

(c) (b) "Total Minority" includes all races listed in the table except for White (Non-Hispanic).

Source: US Census Bureau 2013b

The race and ethnicity characteristics for the nine census tracts that make up the Ryde Avenue study area in Stockton are presented in **Table 18-8** (U.S. Census Bureau 2013a, 2013b). In the Ryde Avenue study area overall, 33.9 percent of the population identified as White Non-Hispanic and 66.1 percent identified as minority populations. Some of the census tracts in the study area had relatively higher percentages of their populations identified as minority populations, such as Census Tract 3 (84.3 percent) and 8.01 (94.1 percent), with Hispanic making up the greatest proportion. Only Census Tract 12 located in central Stockton had a minority population less than 50 percent.

Table 18-9 presents the most recent economic and employment data available for the Ryde Avenue study area, Stockton, and San Joaquin County (U.S. Census Bureau, 2013b, EDD 2014a, EDD 2014b). The Ryde Avenue study area had unemployment and poverty rates that were higher than the county-wide averages and comparable with those of Stockton. With 18.2 percent of families having incomes below the poverty level, the Ryde Avenue study area has a similar proportion of low-income population as Stockton and San Joaquin County overall.

The most recent unemployment data available for San Joaquin County and Stockton were from the California Employment Development Department (EDD) (2014a, 2014b). In 2014, Stockton and San Joaquin County had comparable unemployment rates. EDD unemployment data specific to the Ryde Avenue study area is unavailable for 2014. Based on comparisons between past census unemployment data for Stockton and San Joaquin

County, it is likely that the Ryde Avenue study area's unemployment rate is also comparable with the city and countywide rates of 11.5 and 10.7 percent respectively.

Table 18-8. Race and Ethnicity Characteristics for Ryde Avenue Study Area by Census Tract (2013)

Demographics	Census Tract								
	3	4.01	8.01	9	10	11.01	11.02	12	39
Total Population	1,941	2,945	7,323	5,813	4,686	5,810	4,324	5,445	1,778
White (Non-Hispanic)	15.7%	48.9%	5.9%	29.0%	46.9%	36.7%	39.0%	57.4%	32.2%
Black or African American	7.6%	11.3%	12.7%	5.0%	4.1%	7.4%	1.8%	2.3%	1.1%
Asian	8.7%	5.8%	17.4%	13.1%	4.2%	4.8%	5.9%	15.7%	0.4%
Hispanic or Latino	64.5%	29.0%	62.7%	48.8%	37.3%	46.4%	49.7%	21.2%	65.0%
Other [a]	3.6%	5.0%	1.3%	4.1%	7.5%	4.7%	3.7%	3.4%	1.3%
Total Minorities[b]	84.4%	51.1%	94.1%	71%	53.1%	63.3%	61.1%	42.6%	67.8%

Note:

(a) "Other" includes American Indian and Alaskan Native, Native Hawaiian and Other Pacific Islander, Two or More Races, and Other Races.

(b) "Total Minority" includes all races listed in the table except for White (Non-Hispanic).

Source: U.S. Census Bureau, 2013b

Table 18-9. Economic and Employment Characteristics for the Ryde Avenue Study Area (2013)

	San Joaquin County	**Stockton**	**Ryde Avenue Study Area** [a]	State of California
Employment Status [b]				
Unemployed (per EDD, 2014) [c]	10.7%	11.5%	–	7.5%
Occupation of Residents				
Management, business, science, and arts	28.3%	26.2%	25.7%	36.9%
Services	18.2%	21.5%	21.5%	18.6%
Sales and office	24.7%	24.6%	24.4%	24.4%
Natural resources, construction and maintenance	13.0%	11.4%	13.0%	9.2%
Production, transportation, and material moving	15.9%	16.2%	15.5%	10.9%
Income and Poverty				
Average household income ($2013)	$53,380	$46,831	$57,759	$85,408
Families below poverty level (%)	18.2%	24.3%	18.2%	12.0%

Note:

(a) Study area includes Census Tracts 3, 4.01, 8.01, 9, 10, 11.01, 11.02, 12 and 39, San Joaquin County, CA.

(b) Civilian labor force

(c) Unemployment data from EDD is annual average for 2014, and is only available at state, county and city level.

Source: US Census Bureau 2013a, EDD 2014a, EDD 2014b

Table 18-10 presents the employment and poverty data for all the individual census tracts in the Ryde Avenue study area. Overall, 18.2 percent of the families living in the Ryde Avenue study area in 2013 had incomes below the poverty level. Census Tracts 3 and 8.01 had the greatest proportion of low-income residents, with more than a quarter of their populations having incomes below the poverty level.

Table 18-10. Economic and Employment Characteristics for Ryde Avenue Study Area by Census Tract (2013)

	Census Tract								
	3	4.01	8.01	9	10	11.01	11.02	12	39
Employment Status [a]									
Unemployed	19.1%	11.8%	26.5%	18.1%	20.6%	16.3%	17.3%	8.1%	9.5%
Income and Poverty									
Average household income ($2013)	$28,682	$62,411	$60,212	$54,772	$65,712	$56,066	$45,157	$74,637	$68,777
Families below poverty level (%)	33.3%	14.2%	26.5%	19.8%	12.1%	10.7%	21.7%	10.9%	23.4%

Note:

(a) Civilian labor force

Source: US Census Bureau 2013a, 2013b

18.2 Regulatory Setting

18.2.1 Federal Laws, Regulations, and Policies

Socioeconomics

CEQ regulations (40 CFR Sections 1500-1508) outline the basic decision-making framework and provisions required by NEPA. The principles or essential elements of NEPA decision making are assessment of the social, economic, and environmental impacts of a proposed action (or project). Under NEPA, agencies are required to determine if their proposed actions would have significant environmental effects. This evaluation can require consideration of related social and economic effects of any proposed action. Project effects to be analyzed typically include both direct effects (which would occur at the same time and place as the proposed action) and indirect effects, which would be caused by the action but may occur later in time or farther removed in distance.

CEQ guidance related to social and economic impact assessment notes that the “human environment” assessed under NEPA is to be “interpreted comprehensively” to include “the natural and physical environment and the relationship of people with that environment” (40 CFR Section 1508.14). Furthermore, these regulations require agencies to assess "aesthetic, historic, cultural, economic, social, or health" effects, whether direct, indirect, or cumulative (40 CFR Section 1508.8).

For the socioeconomic analysis in this EIR/EIS, the Proposed Project's expected direct effects on the local and regional economies are the primary focus.

Environmental Justice

In 1994, President Clinton issued EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. EO 12898 requires each federal agency to achieve environmental justice as part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects, including social or economic effects, of programs, policies, and activities on minority and low-income populations of the United States.

CEQ also prepared Environmental Justice Guidance under NEPA to assist federal agencies in meeting their environmental justice commitments under NEPA (CEQ 1997). This guidance defines the terms "minority" and "low income community" in the context of environmental justice analysis. Minority individuals are members of the following population groups: American Indian or Alaskan Native, Asian or Pacific Islander, Black, and Hispanic. A low-income community is one found to be below the poverty thresholds from the U.S. Census Bureau. CEQ has oversight for the federal government's compliance with EO 12898 and NEPA processes, with USEPA serving as the lead agency responsible for implementation of EO 12898.

The U.S. Department of the Interior (DOI), Office of Environmental Policy and Compliance confirms the requirement of EO 12898 for the U.S. Department of the Interior to consider impacts on minority and low-income populations and communities. A letter responding to an earlier request by the Secretary of the Interior states (DOI 1995):

> *[H]enceforth, all environmental documents should specifically analyze and evaluate the impacts of any proposed projects, actions or decisions on minority and low-income populations and communities, as well as the equity of the distribution of the benefits and risks of those decisions.*

18.2.2 State Laws, Regulations, and Policies

Socioeconomics

No specific state laws and regulations apply to socioeconomic resources. In the context of CEQA, economic effects are not considered significant effects on the environment (see CEQA Guidelines Section 15131). CEQA Guidelines Section 15131(a) notes, however, that the chain of cause and effect from economic to environmental impacts can be traced. In addition, Section 15131(b) states that economics can be used to determine the significance of environmental impacts.

Environmental Justice

California was the first state to define environmental justice with Senate Bill (SB) 115. The bill defines environmental justice as "the fair treatment of people of all races, cultures and income with respect to development, adoption and implementation of environmental laws, regulations and policies." SB 115 added this language to California Government Code Section 65040.12 and to Division 34 of the Public Resources Code relating to environmental quality. It also established the Governor's Office of Planning and Research as the coordinating agency for state programs and requested that Cal/EPA establish a model environmental justice policy for its boards, departments, and offices. Cal/EPA consequently developed the Intra-Agency Environmental Justice Strategy (Cal/EPA, 2004). The agency has also established an Environmental Justice Compliance Working Group to advance environmental justice goals and strength the agency's compliance and enforcement initiatives (Cal/EPA, 2014).

18.2.3 Local Laws, Regulations, and Policies

Socioeconomics

Generally, local governments address economic development broadly through general plans and economic development strategies, and as part of project reviews. Through these types of efforts, many local jurisdictions maintain policies intended to protect and expand local and regional economies to benefit local communities and residents, while minimizing adverse environmental effects.

Environmental Justice

There are no known regional or local plans or policies related to environmental justice.

18.3 Environmental Impacts

18.3.1 Methods of Analysis

Given the similarity between the ERS and FTC employment and activities, as well as the comparatively small size of the proposed FTC operations, several of the impact discussions below evaluate the DRS operations collectively. In these cases, the impacts for the individual ERS and FTC would be similar in nature and proportional in magnitude.

Socioeconomics

The socioeconomic impact analysis considers the type, duration, and intensity of economic impacts of the Proposed Project alternatives. Assessments of potential social or economic impacts are based on comparisons with the No Action (i.e., No Project) alternative (in this EIR/EIS, representing existing conditions). Generally, an impact is considered beneficial if it would improve the characteristics of the existing social and/or economic environment, while adverse impacts would instead reduce their quality.

The impact evaluation distinguishes between impacts which are short-term versus long-term in duration. In general, short-term impacts are temporary and transitional effects of implementation of the Proposed Project. For the purposes of this analysis, short-term is considered approximately 2 to 2.5 years (the duration of construction). In contrast, long-term impacts would have a permanent effect on the social and economic environment.

Both the direct and indirect (including induced) economic impacts from future project related spending have been evaluated. Indirect impacts result from the effects of related local economic activity from supplier businesses and induced impacts are generated by increased employee spending (either project or supplier employed) locally. U.S. Bureau of Economic Analysis's Regional Input-Output Multipliers were obtained to estimate the project's indirect and induced economic impacts.

The intensity of an impact has been evaluated in terms of its significance. Negligible or non-significant impacts are effects considered not or barely detectable and are not expected to have an overall effect on the social character and/or economic environment. Significant impacts are expected to have a noticeable and substantial effect on the social and/or economic environment and could be expected to permanently alter those environments.

Environmental Justice

The social and demographic characteristics of the RVARC and Ryde Avenue study areas were evaluated to determine whether any communities of concern exist locally in the context of environmental justice (i.e., minority and low-income populations as defined in the CEQ regulations on EO 12898). Populations with a white non-Hispanic population less than 50 percent are considered minority populations and, with respect to environmental justice, are considered communities of concern.

The environmental justice status of a community can also be determined by comparing selected social and demographic parameters for the alternative study areas relative to the corresponding county populations, which serve as the reference populations. If the low-income population is "meaningfully greater" in the region relative to this reference population (determined in this case as twice the statewide rate), then an environmental justice community of concern is also assumed to be present.

The minority and/or low-income communities of concern within the RVARC and Ryde Avenue study areas have been evaluated to determine if they would be disproportionately affected by any of the Proposed Project's expected adverse socioeconomic or environmental effects. Any such disproportionate impacts would represent environmental justice impacts resulting from the DRS.

RACE AND ETHNICITY (MINORITY POPULATIONS)

CEQ (1997) defines a minority as persons who identify themselves as Black/African American, Asian, Native Hawaiian or Other Pacific Islander, and American Indian or Alaska Native. For the purposes of this analysis, the definition of minority also extends to other non-white categories of race, such as Other Race and Two or More Races. The CEQ guidance also identifies persons of Hispanic ethnicity, regardless of race, as part of minority populations (CEQ 1997). Hispanic origin is considered to be an ethnic category separate from race, according to the U.S. Census Bureau. These definitions apply here even though the minority populations in California, when combined, are greater than 50 percent.

<u>SOCIOECONOMIC INDICATORS OF WELL-BEING (LOW-INCOME POPULATIONS)</u>

For this analysis, persons with income below the poverty threshold established by the U.S. Census Bureau are considered low-income populations. Tables 18-6 and 18-10 (in "Environmental Setting" above) present the average household income and proportion of families living below the poverty threshold for the two alternative study areas based on the most recent American Community Survey 5-year estimate from the U.S. Census Bureau (U.S. Census Bureau 2013a). For the purposes of this environmental justice analysis, any community with a poverty rate at least twice the statewide rate is considered meaningfully greater. Therefore, since the statewide poverty rate in California in 2013 was 12 percent (U.S. Census Bureau 2013a), the low-income threshold used for this analysis is 24 percent. Therefore, any community in which 24 percent of families were living below the poverty line would be considered a community of concern for the impact analysis.

18.3.2 Significance Criteria

An alternative would have a significant impact if it would result in:

- A substantial reduction in employment or labor income;
- A substantial disruption of social and economic patterns within established communities;
- A substantial reduction in local government revenue; or
- Environmental effects on the natural or physical environment that would have a substantial adverse and disproportionate effect on a minority and/or low-income population. Such effects may include ecological, cultural, human health, economic, or social effects on minority communities, low-income communities, or Indian tribes when those effects are interrelated to effects on the natural or physical environment.

With respect to the final significance criterion, an environmental justice effect on a minority population would be significant if substantial environmental effects would disproportionally occur in a location where minorities constitute greater than 50 percent of the population or low-income individuals constitute 24 percent or more of the population (i.e., twice the California statewide poverty rate of 12 percent). Comparison groups for the environmental justice analysis are city- and/or county-level groups corresponding to the specific location being evaluated.

18.3.3 Environmental Impacts and Mitigation Measures

Impact SOC-EJ-1: Potential for Project Construction to Affect Regional Economies and Employment.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under this alternative, no new ERS or FTC construction would take place. Consequently, **no impact** related to construction-related spending or employment would occur.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Full buildout of the ERS facility would consist of 139,000 square feet of combined office space (52,000 square feet), laboratories (14,500 square feet), and storage/workshop areas (72,500 square feet). Full buildout of the FTC facility would result in approximately 50,000 square feet of building construction. Nearly all of the FTC facility would consist of the fish study buildings (48,000 square feet) that would also provide office space. In addition, a 2,000-square-foot water treatment facility would also be built. Full buildout of the complete DRS facility would result in approximately 189,000 square feet of total building construction from the combined development of the ERS (139,000 square feet) and FTC (50,000 square feet). Cost estimates for construction of the facilities have not yet been completed.

The previous Rio Vista Army Reserve Center Reuse Plan analysis projected facility development costs for the site approximately equivalent to a unit cost of $200 per square foot (adjusted to 2015 dollars). However, this cost estimate was considered likely to be too low for the DRS facility based on comparisons with national average construction costs; unit costs of $250 to $300 per square foot was considered a more realistic estimate (RS Means 2014).

For the purposes of the impact analysis, a future construction unit cost of $275 per square foot was used to estimate the Proposed Project's construction costs (RS Means 2015). The estimated total construction cost for the ERS and FTC would be $38.23 million and $13.75 million (in 2015 dollars), respectively, for a total of approximately $52.0 million.

Both the estimated direct economic impacts and the additional indirect and induced impacts for the full DRS project are shown in **Table 18-11**. As described in Chapter 3, Alternatives Description, construction activities for the Preferred Alternative could occur over a two and half-year period. During the construction period, the annual construction spending impact on the region would be $20.8 million (i.e., $52 million over 2.5 years). Given the RVARC site's relative proximity to Stockton (approximately 32 miles away), construction spending and employment spending could be split between Solano and San Joaquin Counties. Given the comparable size of their construction sectors, this impact assessment assumes that the total construction spending would be evenly split between the two counties' economies. Although some construction spending and employment might also be provided by other counties in the region, this two-county assumption provides a reasonable approximation of the construction spending benefits of the Preferred Alternative.

It is reasonable to assume that the construction activity in the Rio Vista area will be primary performed and supplied by Solano or San Joaquin County construction and retail businesses. While neighboring Contra Costa County has a construction sector comparable with Solano and San Joaquin Counties. However, most (91.2 percent) Contra Costa residents work within the County, Alameda County and San Francisco metro area (AASHTO 2010) and its economy is generally more focused on the Bay Area than the Central Valley. Nearby Yolo County has a much smaller construction sector as compared with the other counties in the five-county region. As result it is likely that the construction businesses of Solano and San Joaquin County will be most competitive in providing the necessary services for the development of the DRS facility at Rio Vista.

I-RIMS input-output multipliers are used to estimate the future construction-related economic impacts to both Solano and San Joaquin County economies. The I-RIMS multipliers are based on the U.S. Bureau of Economic Analysis's Regional Input-Output Multipliers II and estimate the total change in output, income and jobs as a result of an initial change in economic activity (such as development of the DRS research facility).

Table 18-11 shows the estimated annual direct output, employment, and income from DRS construction spending. The indirect economic impacts (i.e., from construction-related sales to other businesses in the applicable county) and induced economic impacts (i.e., from employees' spending) are also shown. Differences in the Solano and San Joaquin County economies lead to minor differences in the resulting output, income, and employment numbers generated by each county's $10.4 million in annual construction spending.

Over the two and one-half year construction period, construction of the Preferred Alternative is projected to result in direct employment for 139 workers and add $10.0 million in new income for the region. In addition, the construction spending would support another 114 jobs and generate another $13.2 million in regional economic output activity from supporting businesses' spending (indirect effects) and employees' spending (induced effects). These economic benefits would be shared between Solano and San Joaquin County economies, with San Joaquin County gaining slightly greater employment benefits (136 total jobs) than Solano County (117 total jobs).

Table 18-11. DRS Construction Spending Impacts – Alternative 2 ($ million/yr)

	Economic Impacts		
	Direct	Indirect and Induced	Total
Solano County			
Construction/Output	$13.0	$6.0	$19.0
Earnings Income	$5.3	$2.0	$7.3
Employment/Jobs	67	50	117
San Joaquin County			
Construction/Output	$13.0	$7.2	$20.2

	Economic Impacts		
	Direct	Indirect and Induced	Total
Earnings Income	$4.7	$2.5	$7.2
Employment/Jobs	72	64	136
Total Region			
Construction/Output	$26.0	$13.2	$39.2
Earnings Income	$10.0	$4.5	$14.5
Employment/Jobs	139	114	253

Source: MIG 2015.

These economic benefits from construction would be negligible in magnitude compared to the overall economies of Solano and San Joaquin Counties. Nevertheless, under the Preferred Alternative, construction of the DRS would result in a small **beneficial** short-term economic impact on the local and regional economies.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, facility buildout square footage would be comparable to that proposed for Alternative 2. Consequently, the construction cost for this alternative is expected to be similar to that projected for the Preferred Alternative. As a result, the construction-related spending impacts for Alternative would be comparable to those determined for Alternative 2. DRS construction would result in a small **beneficial** short-term economic impact on the local and regional economies.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Facility buildout square footage for Alternative 4 at the Ryde Avenue site would be comparable to that proposed for the RVARC site (i.e., Alternatives 2 and 3). Consequently, the construction cost for this alternative is expected to be similar to that projected for Alternatives 2 and 3. However, while Alternative 4's direct construction cost impact may be comparable, the Ryde Avenue site in Stockton will likely ensure that a greater proportion of the construction spending occurring within Stockton and San Joaquin County. Similarly, the Alternative 4's construction spending impacts for Alternative 4 would also be expected to result in greater indirect and induced economic benefits to the local economy than Alternatives 2 and 3 in Rio Vista. Given the site's location in Stockton, it is assumed that nearly all construction spending and employment benefits would remain with San Joaquin County businesses and residents.

Table 18-12 shows the estimated annual direct output, employment, and income from DRS construction spending under Alternative 4. The indirect economic impacts (i.e., from construction-related sales to other businesses) and induced economic impacts (i.e., from employees' spending) are also shown.

Over its two and one-half year construction period, DRS construction is projected to result in direct employment for nearly 145 workers over and add $9.35 million in new income to San Joaquin County's economy. In addition, the construction spending would support another 127 jobs and generate another $14.3 million in regional economic output activity from supporting businesses' spending (indirect effects) and employees' spending (induced effects).

The economic benefits from DRS construction would be negligible in magnitude compared to San Joaquin County's overall economy. Nevertheless, DRS construction would result in a small **beneficial** short-term economic impact on the local and regional economies.

Table 18-12. DRS Construction Spending Impacts – Alternative 4 ($ million/yr)

	Economic Impacts		
	Direct	Indirect and Induced	Total
San Joaquin County			
Construction/Output	$26.0	$14.3	$40.3
Earnings Income	$9.4	$4.95	$14.3
Employment/Jobs	144.7	127.2	271.9

Source: MIG 2015.

Impact SOC-EJ-2: Potential for Project Operations to Affect Regional Economies and Employment.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under the No Project Alternative, the existing IEP programs would continue operating at the current locations in Stockton (CDFW facility), Lodi (USFWS facility), and West Sacramento (DWR facility). Program staff would continue to live at their current places of residence, and their commuting patterns would remain unchanged. As a result, no changes in the regional or local economies are anticipated, and there would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under the Preferred Alternative, the ERS facility would consolidate the 145 existing state and federal employees from the different IEP programs currently located in Stockton, Lodi, and West Sacramento. Over time, the ERS would add 20 staff members, resulting in a total of 165 ERS employees. The FTC would operate under a new program and would employ a staff of up to 15. Together, the ERS and FTC facilities would comprise the DRS with a total of 180 employees, of which up to 145 employees would consist of existing agency employees whose workplace would be relocated to Rio Vista. In addition, it is conservatively assumed that at least 35 of the DRS's future new employees would have a higher likelihood of moving to the Rio Vista area.

The DRS staff is expected to consist of approximately 153 (85 percent) professional/scientific employees and 27 (15 percent) administrative and support staff. U.S. Bureau of Labor Statistics (BLS) wage data were used to estimate the total annual earnings income of future DRS employees. **Table 18-13** shows projected DRS employment by job position and estimated payroll, conservatively based on estimated annual wage rates of $86,100 for professional/scientific staff and $38,700 for administrative and support staff (BLS 2013). Overall, the DRS is estimated to add nearly $14.3 million (in 2015 dollars) of annual income earning to the area around the RVARC site.

Table 18-13. DRS Employment and Payroll Estimates by Occupation

	Employees	Payroll (in $2015)
Professional/Scientific Staff	153	$13,215,712
Administrative and Support Staff	27	$1,050,160
Total	180	$14,265,872

Source: BLS 2013

Table 18-14 presents the current office locations of the 145 staff employed in the various IEP programs that would be consolidated to a single office location in Rio Vista.

Table 18-14. Current Location of IEP Staff Employment

Location	Employees
Stockton	55
West Sacramento	13
Lodi	72
Other or Unknown	5
Total	145

The AASHTO 2010 CTPP estimated that 94.4 percent of people employed in the Stockton Metropolitan Statistical Area (MSA) also reside in the Stockton MSA (AASHTO 2010), with most of the remainder living in either the Modesto or Sacramento MSA. In 2013, Stockton and San Joaquin County residents had average commute times of 27 minutes and 29.4 minutes, respectively (U.S. Census Bureau 2013a).

The estimated travel time between Stockton and Rio Vista is 34 minutes, which is comparable to San Joaquin County residents' average commute time. Therefore, even if residents would be required to extend their commute to reach the RVARC site (i.e., by residents living east of Stockton), for most employees the total round-trip commute would average an hour or less. Employees living on Stockton's west side or close to major highways would have commute times more comparable to the current average. Consequently, it is considered likely that most existing employees at the Stockton CDFW facility would continue to live in their current place of residence and commute daily to Rio Vista.

The City of Rio Vista RVARC Plan Supplemental Economic Analysis (City of Rio Vista 2002) estimated that 25 percent of employees would relocate within 5 years and up to 75 percent of the employees would relocate within 10–15 years. Based on that estimate, up to 36 existing ERS employees and 35 new DRS employees (new ERS and FTC employees) would be expected to relocate to Rio Vista and/or the larger Solano County region in the near term (i.e., within 5 years of project completion).[2] Based on a regional average of 2.8 persons per household, up to 71 new households and 198 new residents can be anticipated in the Rio Vista and/or Solano County region as a result of DRS operation. Over the longer term (i.e., within 10–15 years), up to another 80 DRS employees may relocate to Rio Vista and/or the larger Solano County region, which would add another 80 new households and 224 new residents.

Rio Vista has a current housing vacancy rate of 11.2 percent, which is higher than the overall rate for Solano County and the rates of the three neighboring counties. The California Association of Realtors reports that Solano County had a Housing Affordability Index score of 50 in 2014, compared with 30 for California as a whole (California Association of Realtors 2014). Consequently, the Solano County housing market was relatively affordable compared with the state average and other regions, such as Sacramento County and the Bay Area. The vacancy rates and relatively lower housing costs of Rio Vista and Solano County would likely encourage future relocation by DRS employees from the Stockton area.

New Rio Vista/Solano County residents would benefit the local economy through their local retail spending and by renting or purchasing local homes. Other DRS employees would also benefit the local economy through the purchase of meals, fuel, and other items. Regionally, workers relocating from other communities would have a similar adverse effect on their former communities from transferred spending. Any increase in the resident population in Rio Vista, which has approximately 7,000 residents, would have a positive economic impact on that community. The greater Stockton area, with approximately 91,000 households, is much larger than Rio Vista. The potential loss of 71 households from Stockton under Alternative 2 would be negligible in the context of the Stockton area's economy and social character.

The DRS's economic impact on Rio Vista from employment relocation, the addition of new employees, and local spending would be positive. DRS employees that chose to relocate their homes to the area would spend a greater proportion of their annual income locally, which would benefit the local economy.

DRS staff commuting daily to Rio Vista would also increase local spending and sales tax revenues. Using the Supplemental Economic Analysis (2002) estimate of an average $13.20 per day of per capita local spending, DRS employees' local retail spending would total $359,700 annually. Rio Vista's sales tax rate is 8.375 percent, so the estimated sales tax revenue from local retail spending by DRS employees would be approximately $30,100 annually.

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[2] DRS staff who relocate to work at the facility could choose to live elsewhere nearby (e.g. in Contra Costa County). However, for the purpose of the analysis it is assumed that all relocating DRS staff would select to live in Rio Vista or elsewhere in Solano County (such as Vallejo, Fairfield and Vacaville). Consequently, the findings may represent upper estimates of the actual future economic impacts.

As discussed above, up to 71 DRS employees are expected to relocate to Rio Vista (and/or Solano County) within the first five years after the facility's completion. These new residents would be expected to add $1.8 million in local retail sales that would generate $152,200 in annual new sales taxes, of which the Rio Vista and Solano County would receive approximately $13,600 and $2,270, respectively, in additional sales tax revenues.

Overall, the DRS would be expected to result in total of $2.2 million in new employee retail sales for the local economy that would generate approximately a total of $16,300 and $2,720 in sales tax revenues for Rio Vista and Solano County, respectively. The indirect and induced effects from the increased retail spending would be very minor (less than the direct spending and employment effects) and would not change the magnitude of the economic impact.

The Preferred Alternative's economic benefits from future operations would not be substantial compared to Solano County's overall economy. Regardless, under Alternative 2, future DRS operations would result in a small **beneficial** long-term economic impact on the local and regional economies.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

There are no substantial differences between Alternatives 2 and 3 for the purpose of this analysis. The impacts of Alternative 3 can be expected to be comparable to those determined for the Preferred Alternative. Under Alternative 3, future DRS operations would result in a small **beneficial** long-term economic impact on the local economies.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Under Alternative 4, the number of employees would be the same as under Alternatives 2 and 3, except that these jobs would be located in Stockton instead of in Rio Vista. Most of the future DRS employees are currently employed in Stockton and Lodi, as shown in Table 18-14. Based on current average commuting patterns, 95 percent of the people employed in the Stockton MSA are expected to live within the metropolitan area (U.S. Census Bureau 2013a). Therefore, it is estimated that at least 127 of the current 145 state and federal employees reside within the Stockton metropolitan area. Therefore, under Alternative 4, no changes in these employees' future residence are anticipated.

There would be a very small beneficial economic impact from operation of the DRS in Stockton, with 35 new jobs and the possible relocation by some of the 13 DWR employees who currently work in West Sacramento. The distance between the West Sacramento office and the new Ryde Avenue site in Stockton is approximately 50 miles (43 minutes commute distance). This is considerably greater than Yolo County residents' 21 minutes average commute (U.S. Census Bureau 2013a). The combined average commute time would total approximately one and a half hours. Some employees might consider this commute time acceptable, but some relocation by employees currently living in Yolo County may occur in the future.

Based on their current place of work, and assuming that the employees whose location of residence is not known and future IEP staff transfer from non-Stockton MSA locations, up to

18 employees could be non-local commuters to the Ryde Avenue site. Based on the same assumptions used in the Preferred Alternative analysis (25 percent of current commuting employees expected to relocate within 5 years), up to five of these daily commuters might relocate to the Stockton area. Combined with up to 35 new local residents (i.e., new FTC and ERS employees), the total project-related near-term increase in population would be up to 40 new employees and 112 new residents in the Stockton area.

For the purpose of estimating the local economic impact of relocating facilities to the Ryde Avenue site, only 53 employees are facing changes in place of work, as at least 127 employees already work in Stockton or Lodi.

Furthermore, because 127 of the 145 current employees already reside in the Stockton metropolitan area, their retail spending is already captured by San Joaquin County. Consequently, no net spending change or economic benefit would result from relocating these employees' workplace within the area.

Project-related retail spending benefits would be limited to those DRS employees who either would relocate to the Stockton area (up to 40 staff) or currently live outside San Joaquin County and would commute daily to the site (at least 13 staff). The household retail expenditure on local retail for the projected 40 new households is estimated to be $1,024,000, which in turn would generate $92,100 of sales tax revenue, with Stockton and San Joaquin County receiving $10,200 and $5,100, respectively. Annual new local retail sales by the remaining DRS employees commuting daily would be $42,900, which would generate $3,800 of total annual sales tax revenue. Of this, Stockton would receive $430 and San Joaquin County would receive $215 in additional sales tax revenues per year.

Overall, the DRS would be expected to result in approximately $1.1 million in new employee retail sales for the local economy that would generate approximately $10,630 and $5,315 in sales tax revenues for Stockton and San Joaquin County, respectively. The indirect and induced effects from increased retail spending would be minor (less than the direct spending and employment effects) and would not change the magnitude of the economic impact.

Alternative 4's economic benefits from future operations would not be substantial compared to San Joaquin County's overall economy. Regardless, under Alternative 4, the future DRS operations would result in a small **beneficial** long-term economic impact on the local economies.

Impact SOC-EJ-3: Potential for Relocation of Project Operations to Adversely Affect Local Community Character.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Both the RVARC and Ryde Avenue sites are currently vacant. Under the No Project Alternative, there would be no changes to site's use, local employment, or local resident population. In the absence of any such changes, the local community's character would be expected to remain unchanged by any project-related effects. As a result, under Alternative 1, there would be **no impact** on the local community's character.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As shown in Table 18-6 above, most Rio Vista residents are employed in management, office, and administrative jobs similar to the new project-related jobs that would be relocating to the RVARC site. Furthermore, facility operations would be expected to be primarily office and research based that would have limited interactions and environmental effects beyond the site that would potentially disturb or disrupt other local businesses or residents.

Currently, most of Rio Vista's residents (57 percent) commute out of the area for work and more than 38 percent commute out of Solano County (U.S. Census Bureau 2013a). Increased local employment and new business attraction are local government priorities (City of Rio Vista 2010) and the DRS would represent considerable positive progress toward this goal. Furthermore, Rio Vista has been one of the fastest growing cities in Solano County and the four-county region, with an annual average growth rate of 5.3 percent over the past 15 years. As a result, the potential relocation of 71 households to the city within 5 years would be in line with Rio Vista's recent population trends. In addition, the local area also has more than sufficient vacant housing to absorb the projected new residents relocating to the area.

Consequently, the Preferred Alternative's new local employment and operations would not adversely alter Rio Vista's existing character. Overall, Alternative 2 would result in a small **beneficial** long-term impact on the local community character.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

There are no substantial differences between Alternatives 2 and 3 for the purpose of the socioeconomic analysis. Consequently, the socioeconomic impacts for Alternative 3 would be expected to be the same as those identified for the Preferred Alternative. Overall, Alternative 3 would result in a small **beneficial** long-term impact on the local community's character.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Most of the employees who could relocate to the Ryde Avenue site currently work at the CDFW office in Stockton (2109 Arch Airport Road) and USFSW office in Lodi (850 Guild Avenue). The distance between the new Stockton site at 845 Ryde Avenue and the current workplace locations in Stockton and Lodi are approximately 10.5 and 18 miles, respectively.

Given the proximity of the Ryde Avenue site to the existing USFWS and CDFW offices, nearly all of the current 145 ERS employees would be expected to continue to live at their current place of residence. Relocations would be limited to new employees hired for the FTC facility, 15 new future employees anticipated for the ERS, and the few existing employees currently employed in other locations outside the greater Stockton-Lodi area. Consequently, under Alternative 4, there would be a small **beneficial** long-term impact on the Ryde Avenue study area and Stockton's local community character.

Impact SOC-EJ-4: Potential to Result in Adverse Environmental Effects that Would Disproportionately Affect a Minority or Low-income Population.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Because of the absence of any socioeconomic or environmental changes under the No Project Alternative, and because (as discussed above) there are no communities of concern in the RVARC study area, there would be no environmental justice impacts under Alternative 1 in the RVARC study area.

Although the Ryde Avenue study area is recognized as a community of concern for the environmental justice analysis, in the absence of any socioeconomic or environmental changes under the No Project Alternative, no adverse impacts are identified that could disproportionately affect the study area residents.

Overall, there would be **no impact** related to environmental justice under Alternative 1.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Table 18-5 displays the potentially affected minority groups within the RVARC study area based on the most recent decennial census data from the U.S. Census Bureau. The category "total minority" includes all residents except for the non-Hispanic white residents, who are not considered a minority population. As shown in Table 18-5, the minority population within the RVARC study area is less than 50 percent. The RVARC study area's minority population is also not meaningfully greater than that of Solano County. Consequently, for the purposes of the environmental justice analysis, the RVARC study area is not recognized as a community of concern from the perspective of race and ethnicity.

As shown in Table 18-6, only 6.4 percent of resident families in the RVARC study area earn incomes below the poverty line, and the study area's proportion of low-income families is less than that of Solano County. Consequently, for the purposes of the environmental justice analysis, the study area is not recognized as a community of concern from the perspective of low-income status.

As a result, because there are no environmental justice communities of concern within the RVARC study area, there would be **no impact** related to environmental justice under the Preferred Alternative.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

As discussed above, there are no environmental justice communities of concern in the RVARC study area, and consequently there would be **no impact** related to environmental justice under Alternative 3.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Tables 18-7 and 18-8 show the race and ethnicity characteristics for the Ryde Avenue study area and the numerous individual census tracts within its boundaries. Overall, the study area is comprised of 66.1 percent minority populations, and all Stockton census tracts except Census Tract 12 have total minority populations greater than 50 percent. As a conservative assumption for the environmental justice impact analysis, the entire study area (including Census Tract 12) is recognized as a community of concern from the perspective of race and ethnicity.

Tables 18-9 and 18-10 show the poverty status of study area residents as a whole and by individual census tract. Overall, 18.2 percent of the families living within the study area have incomes below the poverty level. Only Census Tracts 3 and 8.01 have low-income populations that exceed CEQ's "meaningfully greater" population threshold which in this case for low-income families is estimated to be 24 percent. Consequently, considered as a whole, the Ryde Avenue study area would not be considered a community of concern from the perspective of low-income status. Only the Census Tract 3 and 8.01 populations are recognized as communities of concern from the perspective of low-income status.

Because the Ryde Avenue study area as a whole is recognized as a community of concern from the perspective of race and ethnicity, Alternative 4 has been evaluated for potential project-related environment justice impacts. As part of this analysis, the other resource analyses and impacts (Chapters 5 through 17 and Chapter 19 of this Draft EIR/EIS) were reviewed to identify which resources could result in substantial adverse impacts.

For those resource topics with substantial adverse impacts, the environmental justice analysis determines whether the impacts to the study area would be disproportional. Most of the other resource topics' impacts were determined to result in no or negligible adverse impacts, and consequently no related environmental justice impacts would be expected to result. The only substantial adverse project-related impacts identified were related to groundwater quantity, site geology and traffic at study area freeway segments.

As described in Chapter 14, *Hydrology and Water Quality,* the Eastern San Joaquin subbasin underlying the Ryde Avenue site is substantially overdrawn, operation of the FTC would result in a potentially significant impact on the subbasin's supplies and groundwater elevations. Given that this subbasin is already overdrawn due to extensive use by other users in the study area for water supply purposes, project-related impacts would be expected to impact the broader community as a whole. As a result, no disproportionate and adverse effects to environmental justice communities are expected to occur.

As described in Chapter 10, *Geology, Soils, and Seismicity*, due to the overdraft conditions of the Eastern San Joaquin subbasin, groundwater use associated with FTC operation could exacerbate regional land subsidence. Because surrounding communities that currently rely on groundwater from this subbasin already contribute to overdraft of this basin, implementation of the Proposed Project would not result in disproportional and adverse effects to the environmental justice communities.

As described in Chapter 15, Transportation and Traffic, under Alternative 4, operation of the DRS would result in increased traffic volumes on the I-5 northbound weave between Monte Diablo Avenue and Country Club Boulevard. However, this segment of I-5 already operates unacceptably and the I-5 North Stockton Project is currently underway to improve operations of this freeway segment. In addition, no significant and unavoidable impacts to pedestrian facilities, study intersections, traffic hazards or emergency access have been determined, and overall cumulative impacts to study area roadway segments have also been determined to be less than significant. As such, no disproportionate and adverse effects to the environmental justice communities are expected. Thus, under Alternative 4, **no impact** that disproportionately affects minority or low-income populations is expected.

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Chapter 19
Population and Housing

This chapter provides a description of population and housing for the RVARC and Ryde Avenue sites, the regulatory setting, and potential impacts on population and housing in the Rio Vista and Stockton areas. For a discussion regarding impacts on regional and local employment, refer to Chapter 18, *Socioeconomics and Environmental Justice*. The information presented in this chapter is based on data obtained from state and local sources.

19.1 Environmental Setting

19.1.1 Rio Vista Army Reserve Center Site

The RVARC site is located on the southern edge of Rio Vista. The site is currently vacant and does not support any homes or populations of people. The former barracks and commander's quarters, which remain on the site, were not used as housing.

Population

Table 19-1 summarizes the City of Rio Vista's and Solano County's change in population, households, and housing units between 2000 and 2014, and the projected number of households and housing units for 2040. In 2000, Solano County's population was 394,542 and had a growth rate of 0.5 percent. By 2040, Solano County's population is projected to reach 548,060.

Rio Vista is a small rural community in Solano County. In 2010, Rio Vista's population was 7,360, and in 2014, its population was approximately 7,934 (California Department of Finance 2014a), representing a 7.8-percent increase from its 2010 population and an annual average increase of 5.3 percent. Rio Vista is anticipated to serve as home to 14,600 people by 2030 (ABAG 2009, as presented in City of Rio Vista 2011).

Table 19-1. Population, Households, and Housing Units—Rio Vista and Solano County

	2000	2010	2014	2040 (Projected)
Rio Vista				
Population	4,571	7,360	7,934	14,600[a]
Households	1,940	3,454	3,668	3,950
Housing Units	1,974	3,890	4,132	4,260
Solano County				
Population	394,542	443,100	424,233	548,046
Households	130,403	148,160	143,909	168,710
Housing Units	134,513	152,698	154,782	175,570

Notes: "Households" refers to occupied housing units.

a. City of Rio Vista projected populations for 2040 were not available; values presented are 2030 population estimates.

Sources: U.S. Census Bureau 2000; ABAG and MTC 2013; California Department of Finance 2014a, 2014b; ABAG 2009, as presented in City of Rio Vista 2011.

Housing

In 2014, Solano County had 154,782 housing units; 93 percent were occupied and 7.0 percent were vacant. As described in Chapter 18, *Socioeconomics and Environmental Justice*, Solano County's vacancy rate is comparable to that of its neighboring communities. Between 2014 and 2040, the number of housing units is expected to increase by 13.4 percent. By 2040, the vacancy rate is expected to be 3.9 percent.

According to the U.S. Census, there were 1,974 housing units in Rio Vista in 2000. Of these, 1,350 were owner occupied, 531 were renter occupied, and 93 were vacant (U.S. Census Bureau 2000). By 2010, the number of housing units had increased to 3,890. The majority of these homes and the projected new housing units are single-family homes associated with the Trilogy, Liberty, Riverwalk, and Del Rio Hills housing developments (City of Rio Vista 2011). According to the California Department of Finance (2014a), Rio Vista has a vacancy rate of approximately 11.2 percent (1,753 units). Between 2014 and 2040, housing development is expected to grow by 3.1 percent, which represents 128 new homes. During this same timeframe, the vacancy rate is projected to be 7.3 percent (310 units).

19.1.2 Ryde Avenue Site in Stockton

Population

Table 19-2 shows the past, current, and projected population, number of households, and number of housing units for Stockton and San Joaquin County. Since 2000, San Joaquin County has grown by 23.4 percent, which represents an annual average growth rate of 1.9 percent.

Stockton is the largest city and urbanized area in San Joaquin County (San Joaquin County 2004). According to the California Department of Finance, Stockton's population in 2014 was 300,899. After slow population growth in the 1990s, Stockton's population has begun to increase over recent years. Between 2000 and 2010, the population grew by approximately 19.6 percent. According to the *Stockton General Plan 2035*, Stockton's population might exceed 400,000 by 2025 and might grow to 700,000 by 2035 (City of Stockton 2007).

Table 19-2. Population, Households, and Housing Units—Stockton and San Joaquin County

	2000	2010	2014	2040 (Projected)
Stockton				
Population	243,771	291,707	300,899	700,000[a]
Households	78,556	90,605	90,958	Not available
Housing Units	82,042	99,637	100,025	Not available
San Joaquin County				
Population	544,827	685,306	710,731	1,037,761
Households	181,629	215,007	217,955	332,245
Housing Units	189,160	233,755	236,943	349,732

Notes: No household or housing unit projection data were publicly available for Stockton.

a. City of Stockton population estimates for 2040 were not available; value presented is for 2035 population estimates.

Sources: U.S. Census Bureau 2000; California Department of Finance 2011, 2014a, 2014b; San Joaquin Council of Governments 2012.

Housing

In 2014, San Joaquin County had 236,943 housing units and 18,987 vacant housing units—a vacancy rate of 8.0 percent. By 2040, housing development is projected to increase to 349,732 units and the vacancy rate is projected to decline to 5.0 percent.

According to the U.S. Census, Stockton had 82,042 housing units in 2000. The number of housing units grew by approximately 21.4 percent between 2000 and 2010. Since 2010, construction of new housing developments has declined substantially and the growth rate (in terms of number of housing units) has declined to approximately 0.3 percent. Of the current housing units, approximately 90,958 are occupied: the vacancy rate in Stockton is 9.1 percent (California Department of Finance 2014a).

19.2 Regulatory Setting

No federal, state, or local regulations are applicable to population and housing in relation to the DRS because the Proposed Project does not include any housing development.

19.3 Environmental Impacts

19.3.1 Methods of Analysis

The methods for this analysis included a review of relevant documents, statistics, and policies about Rio Vista's and Stockton's housing population and employment data. The alternatives were evaluated based on their potential effects on housing and population in Solano County, San Joaquin County, Rio Vista, or Stockton.

Given the similarity between the ERS's and FTC's construction and long-term employment activities, and the comparatively small size of the FTC's operations, the impact analysis evaluates the DRS collectively. The impacts associated with the ERS and FTC would be similar in nature and proportional in magnitude.

19.3.2 Significance Criteria

An alternative would have a significant impact with regard to population and housing if it would:

- Induce substantial population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure);
- Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere; or
- Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

19.3.3 Environmental Impacts and Mitigation Measures

Impact PH-1: Potential to Induce Substantial Population Growth, both Directly and Indirectly, during Construction.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, neither ERS nor FTC facilities would be constructed; therefore, no construction labor would be required at either the RVARC or Ryde Avenue site. This alternative would have **no impact** related to population growth.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

During the approximate 24- to 30-month construction period for the ERS and FTC, approximately 139 construction workers would be employed, and construction-related spending would support another approximately 114 jobs (see Chapter 18, *Socioeconomics and Environmental Justice*, for further discussion of construction employment estimates). It is expected that the regional or local labor force could meet the construction and workforce requirements. Although some workers might temporarily relocate from other areas, the increase would be temporary and negligible in the context of the overall regional population. As described above, Rio Vista has a vacancy rate of 11.2 percent and Solano County has a vacancy rate of 7.0 percent. As such, the existing housing in both Rio Vista and Solano County could accommodate construction personnel; therefore, construction-related effects on Rio Vista's population and housing would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Construction of Alternative 3 would involve the same number of construction workers and same duration as Alternative 2; therefore, the effects on the local population would be the same and the impact would be **less than significant**. Refer to the discussion above for additional details.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Construction of Alternative 4 would involve the same number of construction workers and same duration as Alternative 2. Although some workers might temporarily relocate from other areas, the increase would be negligible and temporary. Given that Stockton has a vacancy rate of 9.1 percent and San Joaquin County has a vacancy rate of 8.0 percent, existing housing in Stockton and San Joaquin County could accommodate construction personnel; therefore, Alternative 4 would not substantially increase Stockton's population and housing and the impact would be **less than significant**.

Impact PH-2: Long-term Inducement of Substantial Population Growth, both Directly and Indirectly.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the ERS and FTC would not be constructed or operated at the RVARC site or the Ryde Avenue site in Stockton; therefore, this alternative would not induce growth, either directly or indirectly, in Rio Vista or Stockton. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Over the long term, the DRS under Alternative 2 would be staffed by approximately 180 employees, including 35 new jobs in the science/research sector. Existing employees associated with the IEP would be relocated to the ERS. Most of the existing employees are based from offices located throughout the Bay–Delta region, including Stockton, Lodi, and Antioch. Initially, after ERS and FTC construction is complete, it is anticipated that most workers would commute to work; however, as described in Chapter 18, *Socioeconomics and Environmental Justice*, it is conservatively presumed that within 5 years, 25 percent of the employees (45 employees) would relocate to Rio Vista. Over 10–15 years, it is estimated that 75 percent of the DRS employees (135 employees) would relocate to Rio Vista. Thus, although Alternative 2 would not involve housing development, it would result in relatively minor population growth over a 5- to 15-year period after construction is complete.

As described in Chapter 13, *Land Use and Planning*, development of the ERS and FTC would be consistent with the land use designations and policies established in the City of Rio Vista General Plan (2002) and zoning designations. Because redevelopment of the RVARC site is within the expected range of development described in the general plan, Alternative 2 would not represent an unexpected amount of growth. Given Rio Vista's current vacancy rate of 11.2 percent, its projected 10-percent increase in housing units (from 2010 to 2040), and Solano County's vacancy rate of 7.0 percent and projected growth in housing development (13.4-percent increase), Alternative 2 would not substantially increase the demand on local housing for new employees. This impact would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Because Alternative 3 would generate the same number of jobs at the RVARC site as Alternative 2, growth-inducement impacts would be the same as those under Alternative 2. Refer to the discussion above for Alternative 2 for detailed information. This impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Staffing level assumptions for Alternative 4 and the proportion of employees that would most likely relocate to Stockton would be similar to those under Alternative 2. See the discussion above for details. As under Alternative 2, Alternative 4 could result in relatively minor population growth in Stockton over a 5- to 15-year period after the ERS and FTC facilities are constructed. During this timeframe, 45–135 employees would relocate to Stockton. Given Stockton's high availability of housing (vacancy rate of approximately 9.1 percent), San Joaquin County's housing availability (vacancy rate of 8.0 percent), and projected growth in housing development in San Joaquin County, this alternative would not substantially increase the demand on local housing for new employees. This impact would be **less than significant**.

Impact PH-3: Displacement of Substantial Numbers of Existing Housing or Substantial Numbers of People, Necessitating Construction of Replacement Housing Elsewhere.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Alternative 1 would not involve development of the ERS or FTC facilities; therefore, this alternative would not result in displacement of a substantial number of people or existing housing. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

There are no housing units within the RVARC site; therefore, Alternative 2 would not displace a substantial number of people or displace existing housing. There would be **no impact**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

This impact would be the same as that under Alternative 2. There would be **no impact**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

This impact would be the same as that under Alternative 2. There would be **no impact**.

Chapter 20
Cumulative Impacts

20.1 Introduction

This chapter describes the requirements for the analysis of cumulative impacts, the cumulative setting, and the analysis of the alternatives' potential to have a significant cumulative effect when considered with other past, present, and reasonably foreseeable future projects.

20.2 Requirements for Cumulative Impact Analysis

20.2.1 CEQA

According to CEQA Guidelines Section 15130(a)(1), a cumulative impact is created by the combination of a proposed project with other past, present, and probable future projects causing related impacts. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time (State CEQA Guidelines Section 15355[b]). Under CEQA, an EIR must discuss the cumulative impacts of a project when the project's incremental contribution to the group effect is "cumulatively considerable." An EIR does not need to discuss cumulative impacts that do not result, in part, from the project evaluated in the EIR.

To meet the adequacy standard established by CEQA Guidelines Section 15130, an analysis of cumulative impacts must contain the following elements:

- an analysis of related past, present, and reasonably foreseeable projects or planned development that would affect resources in the project area similar to those affected by the proposed project;
- a summary of the environmental effects expected to result from those projects with specific reference to additional information stating where that information is available; and
- a reasonable analysis of the combined (cumulative) impacts of the relevant projects.

The cumulative impacts analysis must evaluate a project's potential to contribute to the significant cumulative impacts identified, and it must discuss feasible options for mitigating or avoiding any contributions assessed as cumulatively considerable. The discussion of cumulative impacts is not required to provide as much detail as the discussion of the effects attributable to the project alone. Rather, the level of detail is to be guided by what is practical and reasonable.

20.2.2 NEPA

NEPA defines a cumulative impact as an "impact on the environment which results from the incremental impact of the Action when added to other past, present, and reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR Section 1508.7). Further, a "cumulative impact can result from individually minor but collectively significant actions taking place over a long period of time" (40 CFR Section 1508.7).

20.3 Methods Used in this Analysis

20.3.1 Approach to Analysis: List Approach

The following analysis of cumulative impacts focuses on whether the impacts of each alternative are cumulatively considerable within the context of impacts resulting from the alternative and other past, present, or future projects. The cumulative impact scenario considers other projects proposed within the area defined for each resource that have the potential to contribute cumulatively considerable impacts.

CEQA Guidelines Section 15130 provides the following two alternative approaches for analyzing and preparing an adequate discussion of significant cumulative impacts:

- the list approach, which involves listing past, existing, and probable future projects or activities that have or would produce related or cumulative impacts, including, if necessary, those projects outside the control of the lead agency; or
- the projection approach, which uses a summary of projections contained in an adopted local, regional or statewide plan, or related planning document, that describes or evaluates conditions and their contribution to the cumulative effect.

This Draft EIR/EIS uses the list approach for analyzing potential cumulative impacts. Activities related to the Proposed Project that are included in the cumulative analysis were determined using several factors, including the location and type of activity and the characteristics of the activity related to resources with the potential to be affected by DRS. In addition, regional or global conditions that might lead to cumulative impacts (e.g., GHG emissions) are also described.

20.3.2 Resource Topics Considered and Dismissed

The various alternatives have been determined to have the potential to make a considerable contribution to cumulative impacts related to the following resource topics: aesthetics; air quality and GHG emissions; biological resources; cultural resources; geology, soils and seismicity; hydrology and water quality; noise and vibration; and traffic/transportation;

public services and utilities; and recreation. For all other resource topics, as shown in **Table 20-1**, either significant cumulative impacts do not exist, or the DRS alternatives would not have the potential to make a considerable contribution to any cumulative impacts. These resource topics have been dismissed from consideration in the analysis of cumulative impacts and are not discussed further. In addition, as described in Section 4.4 of Chapter 4, *Introduction to the Environmental Analysis,* mineral resources and agricultural resources and forestry uses were eliminated from this Draft EIR/EIS analysis. Thus, these topics are also dismissed from further consideration in the analysis.

Table 20-1. Resource Topics Dismissed from Further Consideration in the Analysis of Cumulative Impacts

Resource Topic Not Discussed Further	Rationale
Agricultural Resources and Forestry Uses	As described in Section 4.4.1, the Proposed Project would not convert agricultural lands or forest lands to non-agricultural uses; therefore, it would not have potential to contribute to any cumulative impacts on agricultural resources or forestry uses.
Hazards and Hazardous Materials	Information collected during the preparation of this environmental document has not suggested that any significant cumulative impacts exist related to hazards and hazardous materials to which the Proposed Project could contribute.
Land Use and Planning	Under all alternatives, the DRS would not result in impacts that involve the division of an established community. Land use and planning has been dismissed from the cumulative analysis because, similar to the Proposed Project, other projects are subject to planning, environmental review, and a permitting process. Through these processes, inconsistencies with relevant plans and policies would be resolved before project implementation; therefore, consistency with local plans and policies would not apply in the cumulative context.
Mineral Resources	As described in Section 4.4.2, the Proposed Project would not involve any activities that could directly affect mineral production sites or prevent future availability or mineral resources; therefore, the Proposed Project would not have the potential to contribute to any cumulative impacts on mineral resources.
Population and Housing	Information collected during the preparation of this environmental document suggests that substantial population growth is not an issue in the Rio Vista and Stockton areas, and that sufficient housing exists to accommodate DRS employees at either site. As such, there is no cumulative impact to which the Proposed Project could contribute.
Socioeconomics and Environmental Justice	As with DRS, construction and operation of other projects could have beneficial effects on the Solano and San Joaquin County economies from increased spending by future employees and residents. Any new residents in Solano or San Joaquin Counties generated by the cumulative projects would also benefit the local economy through local retail spending and by renting or purchasing local homes. As such, DRS in combination with the

Resource Topic Not Discussed Further	Rationale
	abovementioned projects would not result in an adverse cumulative impact on the local economy. As described in Chapter 18, *Socioeconomics and Environmental Justice,* there are no environmental justice communities of concern within the RVARC study area; therefore, there would be no cumulative environmental justice impact to which DRS could contribute. Nonetheless, the population of the Ryde Avenue area in Stockton comprises 66.1 percent minorities and is recognized as a community of concern from the perspective of race and ethnicity. As described in Chapter 18, Alternative 4 would not result in any disproportionate impacts on such populations; therefore, it would not have the potential to contribute to any cumulative impacts related to environmental justice.

Notes: DRS – Delta Research Station, RVARC – Rio Vista Army Reserve Center

20.3.3 Geographic Scope of Analysis

The level of detail in the analysis of cumulative impacts should consider a proposed project's geographic scope and other factors (e.g., a project's construction or operation activities, the nature of the environmental resource being examined) to ensure that it is practical and reasonable. This section provides a discussion of the geographic extent of possible cumulative impacts by subject area. The discussion focuses on the potential cumulative impacts of the Proposed Project for environmental issues that could be expected to be cumulatively affected by DRS in conjunction with other past, present, and reasonably foreseeable future projects. The defined specific geographic scope for each environmental resource area analyzed in this Draft EIR/EIS to which DRS could contribute to cumulative impacts is provided below in **Table 20-2**.

Table 20-2. Geographic Scope for Resources with Cumulative Impacts Relevant to the Proposed Project

Resource	Geographic Scope	Explanation for the Geographic Scope
Aesthetics	Areas immediately adjacent to the RVARC site and Ryde Avenue site in Stockton	This area covers the viewshed of the two Proposed Project alternative sites and the immediate surroundings that might be affected by the construction and operation of the DRS.
Air Quality and GHG Emissions	SFBAAB, SVAB, SJVAB; State of California, and Global (GHGs)	For air quality, this area covers the air basins where DRS construction and operations could involve the release of air pollutants. For GHG emissions, the geographic scope is the State of California because this is the scope around which GHG policies and regulations have been formed; however, the true impact of GHG emissions is global.

Resource	Geographic Scope	Explanation for the Geographic Scope
Biological Resources–Terrestrial	Wetlands and other waters, riparian habitat, sensitive natural communities, and other habitats within the vicinity of the RVARC site and Ryde Avenue site in Stockton that might support special-status species	This area covers habitats and wildlife species that could be affected by DRS and the cumulative projects identified in **Table 20-3**, including areas that might be disturbed during DRS construction activities.
Biological Resources–Aquatic	Bay–Delta waterways	This includes areas where special-status fish or marine mammals could occur and might be affected during construction and operation of the DRS.
Cultural Resources	RVARC site	This is the location of the potential U.S. Engineers Storehouse Historic District site.
Geology, Soils, and Seismicity	Ryde Avenue site and other locations overlying the San Joaquin subbasin	This is the area where regional land subsidence is an issue resulting from overdraft of the basin.
Hydrology and Water Quality	RVARC site, Ryde Avenue site in Stockton, and nearby waterways, including the Sacramento River and Stockton DWSC, respectively, and areas downstream; also includes the groundwater basins underlying the alternative sites	These are the locations where DRS impacts on hydrology and water quality could occur during construction (including dredging) and during operations (e.g., groundwater extraction, process-water discharges from FTC to nearby waterways).
Noise and Vibration	Locations within approximately ½ mile of the RVARC site or Ryde Avenue site in Stockton.	This represents the farthest extent where the loudest activities at DRS might be audible.
Public Services, Utilities, and Energy	RVARC site, Ryde Avenue site in Stockton, and the areas surrounding these sites	This includes areas served by the same public services and utilities as would serve the DRS.

Resource	Geographic Scope	Explanation for the Geographic Scope
Recreation	RVARC site, Ryde Avenue site in Stockton, and the areas surrounding these sites	This includes recreational uses/facilities that could be affected by the ERS and FTC in combination with other planned projects.
Transportation and Traffic	Study intersections and roadway segments in the vicinity of the RVARC site and Ryde Avenue site in Stockton	This area includes study intersections within the vicinity of the Proposed Project alternative sites where LOS could be adversely affected from ERS and FTC operations in combination with other planned projects.

Notes: DRS = Delta Research Station, DWSC = Deep Water Ship Channel, ERS = Estuarine Research Station, FTC = Fish Technology Center, GHG = greenhouse gas, LOS = Level of Service, RVARC = Rio Vista Army Reserve Center, SFBAAB = San Francisco Bay Area Air Basin, SJVAB = San Joaquin Valley Air Basin, SVAB = Sacramento Valley Air Basin.

Table 20-3 lists projects that would occur throughout Solano and San Joaquin Counties and that could affect resources that would also be affected by the DRS. The list was developed by reviewing sources available on the City of Rio Vista and City of Stockton's websites, Solano County and San Joaquin County websites, and CEQAnet. While it is not likely that every potential cumulative project is listed, the list of cumulative projects is considered comprehensive and representative of the types of impacts that would be generated by other projects related to the DRS. The evaluation of cumulative impacts assumes that the impacts of past and present projects are represented by baseline conditions, and that cumulative impacts are considered in the context of baseline conditions alongside reasonably foreseeable future projects.

Table 20-3.. Reasonably Foreseeable Future Projects that Might Cumulatively Affect Resources of Concern for the Delta Research Station Alternatives

Project Title	Brief Project Description	Distance from Project Alternative Site
Planned Projects near the RVARC site (Alternatives 2 and 3)		
Rio Vista Army Reserve Center Redevelopment Plan	This plan was developed by the former Rio Vista Redevelopment Agency to enable blight elimination and foster a public–private revitalization within the RVARC site. The redevelopment plan anticipated the following activities: site and infrastructure improvements; recreational amenities to serve the entire City, including a park, recreation, and community facilities projects (e.g., community center, outdoor sports fields and courts, children's park, and picnic area), a riverfront promenade, a small public marina/cove, and dry boat storage facility; and affordable housing projects or programs outside of RVARC. The EIR for the redevelopment plan was certified and approved in January 2011 (City of Rio Vista 2011).	Overlaps the RVARC site
Delta Ecology Center	The Delta Ecology Center is envisioned to serve as an interpretive center that provides the public an opportunity to learn about research related to the Delta ecosystem. This interpretive center was envisioned to be constructed in conjunction with the ERS on the RVARC site. The City of Rio Vista has applied for grant funds but has not yet received funding for this project.	Overlaps the RVARC site
Rio Vista Water Front Specific Plan	This plan provides for redevelopment of an area along the waterfront near SR12 to create more commercial development opportunities near the main thoroughfare and improve mixed-use and public amenities along the scenic waterfront (CEQAnet, 2015a).	About 0.75 mile along waterfront
Solano Multispecies Habitat Conservation Plan (Solano HCP)	The Solano HCP would allow for state and federal agencies to issue incidental take permits to local agencies for potential impacts on endangered species to accommodate future urban growth; development of infrastructure; and ongoing operations and maintenance activities associated with flood control, irrigation facilities, and other public infrastructure. .HCP covers incidental take of 37 plant and animal species in compliance with ESA Section 10, and 14 plant species under CESA Section 2081. This plan also prescribes conservation and mitigation measures to protect listed species while allowing development and public agency activities (SCWA, 2012).	Overlaps the RVARC site

Project Title	Brief Project Description	Distance from Project Alternative Site
Arsenic Removal Treatment Plant	The City of Rio Vista Arsenic Treatment project involves the following installations at the Well 10 and Trilogy sites: a new chemical storage/electrical and controls structure that will house two double-walled chemical storage tanks, one each for ferric chloride (1,000 gallons), sodium hypochlorite (6,650 gallons), and a potassium permanganate saturator (55 gallons); a new 42,000-gallon backwash reclaim tank for the Well 10 site and a 63,000-gallon backwash reclaim tank for the Trilogy site; and/or relocation of all associated water, sewer, and storm drain pipeline (CEQAnet, 2015b).	The Trilogy site is approx. 2.5 miles northwest of the RVARC site; Well 10 is approx. 2.0 miles north of the RVARC site
Rio Vista Flood Wall and Public Access Project	This project entails the construction of a floodwall and public promenade to provide flood protection and public access to the waterfront portions of the community (CEQAnet, 2015c). The project proposes construction of a concrete floodwall generally along the shoreline of the Sacramento River from south of Main Street to the State Fishing Pier near the Helen Madere Bridge (SR 12). The project also proposes construction of a promenade in the same area to provide public access to the area (CEQAnet, 2015c).	0.6 mile north of the RVARC site
Rio Vista Climate Action Plan	The Climate Action Plan outlines a course of action to reduce community-wide GHG emissions generated within Rio Vista (CEQAnet, 2015d).	Overlaps the RVARC site
Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project	The Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project proposed by DWR and the U.S. Bureau of Reclamation will address two specific RPA actions set forth in the National Marine Fisheries Service Biological Opinion and Conference Opinion on the Long-term Operation of the Central Valley Project and State Water Project (CEQAnet, 2015e). To comply with the federal ESA, the project will address RPA Action I.6.1: Restoration of Floodplain Rearing Habitat by increasing seasonal inundation within the lower Sacramento River basin; and RPA Action I.7: Reduce Migratory Delays and Loss of Salmon, Steelhead, and Sturgeon by modifying the Fremont Weir and other structures of the Yolo Bypass (CEQAnet, 2015e).	Approx. 7.5 miles northeast of the RVARC site
Del Rio Hills Planned Unit Development	The Del Rio Hills project site is located in Rio Vista on approximately 505 acres immediately west of downtown, south of SR 12, east of Amerada Road, and north of unincorporated Solano County (CEQAnet, 2015f). The project is proposed as a PUD, designed to be a mixed-use community that would include a range of residential uses, commercial uses, public facilities, schools, parks, and open space. A draft EIR was prepared in 2008.	Approx. 2.0 miles northwest of the RVARC site

Project Title	Brief Project Description	Distance from Project Alternative Site
Riverwalk Project	The Riverwalk Project involves construction of approximately 738 single-family homes, 180 units of multifamily homes, and a 9.21-acre commercial center, as well as roadways, parks, open space, and landscaping (CEQAnet, 2015g). A draft EIR was prepared for the project in 2006. As of March 2015, no final environmental documents have been certified and there is no timeline for the project (Melilli, pers. comm., 2015). The City of Rio Vista is still under the assumption that the project will eventually move forward.	Approx. 2.3 miles north of the RVARC site
Sacramento River Deep Water Ship Channel Project	To improve economies of scale and overall navigation safety, the Port and the USACE have proposed widening and deepening the Sacramento River DWSC (CEQAnet, 2015i); therefore, this project involves both deepening portions of the Sacramento River DWSC to a depth of -35 feet MLLW and selective widening from RMs 0.0 to 35.0, completing the construction that was suspended in 1990, and conducting maintenance dredging from RMs 35.0 to 43.4.	Adjacent to the RVARC site
SR 12 Widening Project	The project involves modifications to SR 12 from west of Liberty Island Road to west of Currie Road to allow for standard shoulder widths, a clear recovery zone, left-turn pockets, and improvements to vertical sight distances. The project is located 3.0 miles northwest of Rio Vista in Solano County (CEQAnet, 2015j).	About 0.75 mile north of the RVARC site
BDCP/California Water Fix	The BDCP/California Water Fix Project and other HCP/NCCP Alternatives generally consists of new diversion/intake structures, conveyance facilities (e.g., tunnels) and associated operational criteria and additional conservation components to reduce stressors that affect covered species and their habitats in the BDCP area. The BDCP/California Water Fix and additional alternatives in the partially Recirculated Draft EIR/Supplemental Draft EIS focus on water conveyance under a federal Section 7 ESA permitting process and state Fish & Game Code 2081(b) permit. The BDCP Draft EIR/EIS was published in December 2013; a recirculated draft EIR/EIS that includes the California Water Fix Alternatives (Alternative 4A) is available for public review through October 30, 2015.	Conveyance alternatives, restoration areas and/or mitigation may overlap the RVARC site

Project Title	Brief Project Description	Distance from Project Alternative Site
Planned Projects near the Ryde Avenue site in Stockton (Alternative 4)		
West Complex Development Plan and Rough and Ready Island Redevelopment Plan	The Port of Stockton was the CEQA lead agency for the Port of Stockton's West Complex Development Plan and City of Stockton Redevelopment Agency's Rough and Ready Island Redevelopment Plan EIR (Port of Stockton, 2003). This program-level EIR also assessed the following two project-level components: dredging the Stockton DWSC and the McCloy Avenue, Daggett Road, and Daggett Road Bridge Project. Uses considered in the Development Plan include the redevelopment of marine terminals on the existing developed 500-acre portion of the Island and development of a commercial and industrial park on the existing undeveloped southern 500 acres of the Island (Port of Stockton, 2003).	Approx. 0.4 mile west of the Ryde Avenue site
BNSF/Port of Stockton Navy Drive BNSF Underpass Project (Navy Drive approximately 0.5 mile south of W. Washington Street)	This project will construct a new underpass structure to accommodate a future four-lane roadway, as well as an additional mainline BNSF/Amtrak share track (Port of Stockton, 2014). This project is in progress.	1.0 mile south of the Ryde Avenue site
Port of Stockton 700 Yard Track Improvements (Near Port Roads 21, 22, and 23)	This project consists of approximately 24,700 feet of new track and turnouts, grading, storm drainage facilities, access roads, and associated demolition to support the new tracks (Port of Stockton, 2015a). This project is out to bid.	0.9 mile south of the Ryde Avenue site
Washington Street Widening (Washington Street from Navy Drive to Port Road 13)	This project consists of widening Washington Street by removing and replacing the westbound lane, constructing two new lanes, constructing a rock shoulder, and relocating a drainage ditch and appurtenances (SJCOG, 2014). The project would facilitate heavy truck traffic that must access the Port from the freeways. This project is in the early phases and has not yet secured funding.	0.65 mile south of the Ryde Avenue site
West Complex Access Improvements (Navy Drive from the BNSF Railway undercrossing to Washington Street)	This project consists of widening Navy Drive from two to four lanes, and constructing an undercrossing at the shared railroad tracks leading into the West Complex entrance (SJCOG, 2014). The project would also involve the Navy Drive/Washington Street intersection signal and related improvements. This project is in the early phases and has not yet secured funding.	0.9 mile south of the Ryde Avenue site

Project Title	Brief Project Description	Distance from Project Alternative Site
Stockton DWSC Dredging (throughout length of San Joaquin River within the vicinity of Stockton)	USACE is mandated by Congress to maintain the Stockton DWSC at its navigable depth of 35 feet. DWSC is dredged annually to meet this mandate between August 1 and November 30 (USACE, 2014).	N/A
Class I Recreational Bike Path (north shore of Stockton DWSC from roughly I-5 west to Monte Diablo Avenue)	The City of Stockton Bicycle Master Plan (2007) identified the north shore of the Stockton DWSC as a future location for a Class I bicycle path. The path is shown on the plan's recommended bikeway network figure (City of Stockton, 2007). As of March 2015, there were no plans to construct this particular project in the near-term (City of Stockton, pers. comm. 2015).	Overlaps the southern portion of the Ryde Avenue site
Tuscany Cove (roughly the area of Country Club Blvd. 0.4 mile west of I-5)	This residential subdivision project includes 14 single family units. As of September 2013, the project was 0% complete (City of Stockton, 2013).	0.65 mile northwest of the Ryde Avenue site
SJRRP	SJRRP 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 (SJRRP, 2014).	
Planned Projects near both the RVARC Site (Alternatives 2 and 3) and Ryde Avenue site in Stockton (Alternative 4)		
USFWS Fish Hatchery Project	USFWS is considering the development of a conservation fish hatchery that would be capable of producing fish should supplementation or reintroduction of imperiled species become desirable or necessary for recovery. The hatchery would leverage research conducted at FTC, and would be used to support conservation of imperiled species native to the Bay–Delta. This project is in the early conceptual planning stages and NEPA environmental review phase. Two alternative locations are being considered: (1) a 57.5-acre parcel south of Airport Road and north of Harris Road in Rio Vista, and (2) the vacant area immediately west of the 845 Ryde Avenue site in Stockton which is being considered as the site for the DRS under Alternative 4 of this Draft EIR/EIS.	The Airport Road site is approximately 2.0 miles north of the RVARC site; the 845 Ryde Avenue site is immediately adjacent to Alternative 4 (evaluated in this Draft EIR/EIS).

Project Title	Brief Project Description	Distance from Project Alternative Site
Delta Flood Emergency Facilities Improvements	This project includes two new material storage and transfer facility sites. One is located on West Weber Avenue in Stockton, and the other is located at Brannan Island State Park on Brannan Island (CEQAnet, 2015h). This project would also modify an existing material storage facility located east of Airport Road at St. Francis Way in Rio Vista. The facilities would store quarry rock, sand, soil, and other flood-fighting materials. Site improvements include; parking; utilities; lighting; security facilities; temporary office trailers; and fencing, docking, and loading facilities.	The Rio Vista site is approx. 2.0 miles northeast of the RVARC site; West Weber Avenue is approx. 1.0 mile southeast of the Ryde Avenue site
Levee Repair–Levee Evaluation Program (throughout the Delta)	This is an ongoing program administered by DWR to upgrade levees along the Sacramento and San Joaquin Rivers and Delta waterways (DWR, 2015). No sites are identified for repair in the immediate vicinity of DRS' alternative sites; however, additional sites for levee repairs are in the process of being identified, planned, and prioritized (DWR, 2013a; DWR, 2015).	N/A
Central Valley Flood Management Program (Sacramento and San Joaquin Rivers)	This is an ongoing program to support improvements in flood management structures, including levees and bypasses in the Sacramento and San Joaquin River Valleys. Basin-wide feasibility studies are underway to refine the scope, scale, and location of regional and system improvements (DWR, 2013b).	N/A
ERP (throughout the Delta)	ERP is a multiagency effort aimed at improving and increasing aquatic and terrestrial habitats and ecological function in the Delta and its tributaries (CDFW, 2015). The ERP focus area includes the San Joaquin River below the confluence with the Merced River. ERP projects include fish passage structures and riparian habitat restoration (CDFW, 2015).	N/A

Notes: Bay–Delta = San Francisco Bay–Sacramento–San Joaquin River Delta, BDCP = Bay Delta Conservation Plan, BNSF = Burlington Northern Santa Fe, CDFW = California Department of Fish and Wildlife, CEQA = California Environmental Quality Act, CVP = Central Valley Project, the DRS = Delta Research Station, DWR = California Department of Water Resources, DWSC = Deep Water Ship Channel, EIR = environmental impact report, EIS = environmental impact statement, ERP = Ecosystem Restoration Program, ERS = Estuarine Research Station, ESA = Endangered Species Act, FTC = Fish Technology Center, GHG = greenhouse gas, HCP = habitat conservation plan, I = Interstate, LOS = Level of Service, MLLW = mean lower lower water, NCCP = natural community conservation plan, NEPA = National Environmental Policy Act, NMFS = National Marine Fisheries Service, PUD = Planned Unit Development, RPA = reasonable and prudent alternative, RM = river mile, RVARC = Rio Vista Army Reserve Center, SCWA = Sacramento County Water Agency, SJCOG = San Joaquin Council of Governments, SJRRP = San Joaquin River Restoration Program, SR = State Route, SWP = State Water Project, USACE = U.S. Army Corps of Engineers, USFWS = U.S. Fish and Wildlife Service.

20.4 Cumulative Setting

This section describes the cumulative setting for which the Proposed Project could potentially contribute a cumulative impact.

20.4.1 Aesthetics

Future development within the immediate vicinity of the RVARC site or Ryde Avenue site in Stockton could contribute to cumulative aesthetics impacts. Construction and operation of the DRS, as well as the other adjacent development projects listed in Table 20-3, would result in a cumulative effect on scenic resources and the visual character of the area if they adversely affect the same scenic resources or views from Beach Drive, SR 160, and the Sacramento River near the RVARC site in Rio Vista; or from Ryde Avenue, West Fremont Street, or the Stockton DWSC near the Ryde Avenue site in Stockton. In particular, potential development of uses described in the Rio Vista Army Reserve Center Redevelopment Plan (e.g., park, recreation and community facilities projects; site and infrastructure improvements; and affordable housing projects), in addition to the DRS facilities at the RVARC site, could substantially alter the visual character of the site and could result in a cumulatively considerable aesthetics impact.

20.4.2 Air Quality and Greenhouse Gas Emissions

By their very nature, air pollution and GHG emissions are largely a cumulative impact. No single project, in general, is sufficiently large enough to result in nonattainment of ambient air quality standards or a measurable amount of global climate change. The SFBAAB, SVAB, and SJVAB have been designated as being in nonattainment for several pollutants at both the state and federal levels. In particular, this includes ozone, PM_{10}, and $PM_{2.5}$. As growth occurs in these air basins, increased emissions of these and other pollutants could result in continued nonattainment status or new nonattainment designations.

The Proposed Project's cumulative operation-related criteria for air pollutants, precursor emissions, and GHG emissions are identical to the thresholds listed in Chapter 6, *Air Quality and Greenhouse Gas Emissions*. These thresholds represent the levels at which a project's individual emissions of criteria air pollutants, precursors or GHGs would result in a cumulatively considerable contribution to either the air basins' existing air quality conditions or global climate change.

20.4.3 Biological Resources – Terrestrial

Special-status plant and wildlife species in the Bay–Delta are at risk from ongoing loss of habitat, competition with non-native species, and other human activities. Impacts on biological resources (e.g., wetlands and other waters, natural communities, and sensitive species) would result from the ERS and FTC and the reasonably foreseeable projects listed in Table 20-3. The collective implementation of these projects could degrade habitat and species viability from consequences such as erosion, sedimentation, alteration of hydrology, changes in water quality, disruption of wildlife migration corridors, displacement and fragmentation of habitats and species populations, and the introduction or promotion of non-native predators and competitors.

20.4.4 Biological Resources – Aquatic

Many of the fishes native to the Bay–Delta and the larger Sacramento River and San Joaquin River watersheds have declined precipitously over the past century primarily as a result of water contamination, water diversions, destruction of habitat, altered food supply, and competition and predation by non-native species. Population viability of species such as Winter-run Chinook Salmon and Delta Smelt is in question. Several projects and programs (e.g., BDCP, Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project, SJRRP) are proposed to stem the decline of Bay–Delta fish populations; however, there is considerable uncertainty with regard to the ability of these actions to restore fish populations to self-sustaining levels. Impacts on fish populations would result from the construction of the ERS and FTC facilities and the reasonably foreseeable projects listed in Table 20-3. The collective implementation of these projects could degrade habitat and species viability through consequences such as hydroacoustic effects during construction, direct effects on fish during in-water and shoreline construction activities, alteration of hydrology, erosion, sedimentation, changes in water quality, and the introduction of non-native predators and competitors.

20.4.5 Cultural Resources

No known significant resources exist at either the RVARC site or the Ryde Avenue site in Stockton, with the exception of the potential U.S. Engineers Storehouse Historic District. Projects that could contribute to a cumulative impact on this district include the uses envisioned in the Rio Vista Army Reserve Center Redevelopment Plan (e.g., public recreational uses, interpretive center).

20.4.6 Geology and Soils

The primary issue related to geology and soils that is relevant to cumulative impacts is land subsidence in the area overlying the overdrafted San Joaquin subbasin, which has suffered from unsustainable groundwater extraction for many decades.

20.4.7 Hydrology and Water Quality

A number of activities have adversely affected hydrology and water quality within the vicinity of the Proposed Project, including wastewater discharges; water diversions and flow management; discharges of contaminants from a variety of sources (both point and non-point), such as urban, industrial, and agricultural land uses; and groundwater extraction that has led to overdraft conditions in aquifers such as the San Joaquin subbasin. The waters within the vicinity of the RVARC and Ryde Avenue sites and locations downstream have been listed under CWA 303(d) as impaired for a variety of constituents (see Table 12-1 in Chapter 12, *Hydrology and Water Quality*).

Locally, increased development within the vicinity of the RVARC site or the Ryde Avenue site in Stockton could lead to a variety of impacts on water resources, including potential flooding effects, increased demand for groundwater supplies, new sources of point source and non-point source pollution, and increased area of impervious surface and volume of stormwater runoff. In the event that other construction of projects planned within the immediate vicinity of the Proposed Project alternative sites occurs at the same time as construction of the DRS, there could be cumulative impacts on the same waterbodies (e.g., the Sacramento River and Stockton DWSC). In addition to DRS, specific projects that could result in cumulative construction-related impacts on these waterbodies include public recreational uses or other uses envisioned in the Rio Vista Redevelopment Plan at the RVARC site or the USFWS Fish Hatchery Project at the Ryde Avenue site.

20.4.8 Noise and Vibration

Sensitive receptors, such as residents, might be affected by both the DRS and other projects within the vicinity of the RVARC site or the Ryde Avenue site in Stockton. Additional development that might occur on the undeveloped portion of the RVARC site (e.g., an interpretive center and uses envisioned in the Rio Vista Army Reserve Center Redevelopment Plan), the USFWS Fish Hatchery Project, projects at the Port of Stockton and BNSF Railway, and any other development allowed in the open areas near the Proposed Project alternative sites as allowed by the local general plans could contribute to cumulative noise impacts on the same sensitive receptors. Under Alternatives 2 and 3, if DRS were constructed at the same time as the interpretive center and other uses envisioned in the Rio Vista Army Reserve Center Redevelopment Plan, use of construction equipment for these projects could disturb residences. During operation of the DRS and any other adjacent developments, there might be a combined increase in ambient noise from additional noise-generating activities and from roadway traffic.

20.4.9 Public Services, Utilities, and Energy Resources

As with the DRS, other development projects near the RVARC site and the Ryde Avenue site in Stockton could result in increased demands for public services and utilities, such as schools, electricity, fire protection, police protection, water supply, wastewater treatment, natural gas, and solid waste collection services. The primary cumulative issues related to public services is the limited remaining capacity at the Beach Drive Wastewater Treatment Plant, which would serve the RVARC site, and the inadequate response times for police in the Stockton area. All other public services and utilities operate at acceptable service ratios or have adequate capacity, and the Proposed Project, in combination with other past, present, and probable future projects, is not anticipated to change this circumstance.

20.4.10 Recreation

Similar to the DRS, other development projects that could occur on the RVARC site may include construction of recreational facilities such as sports fields, picnic areas, a public marina community center, outdoor sports fields and courts, children's park, and picnic area, a riverfront promenade, and a small public marina/cove. Under Alternatives 2 and 3, the primary cumulative issue related to recreation is temporary closure of the path along Beach Drive. In addition, in the event that a public marina is constructed adjacent to the DRS, cumulative impacts related to increased congestion on the Sacramento River in the Rio Vista area may occur. Under Alternative 4, the primary cumulative issue pertains to potential conflicts with a bicycle path planned to traverse the Ryde Avenue site, as described in the City of Stockton Bicycle Master Plan.

20.4.11 Transportation and Traffic

Traffic is both local and regional and is directly related to population growth and development. The DRS, in combination with increased development of industrial, commercial, and residential uses, would result in increased traffic in both the Rio Vista and Stockton areas. The following cumulative setting discussion for transportation and traffic was developed based on information available in the Napa–Solano Travel Demand Model, the City of Stockton Travel Demand Model, and the Tri-County Travel Demand Model. See Chapter 15, *Transportation and Traffic,* for details regarding traffic forecasts used for the cumulative traffic analysis. Chapter 15 also describes cumulative conditions under Alternative 1, the No Project Alternative, and each action alternative. Below is a summary of the cumulative conditions for each alternative.

Under Alternative 1, most of the Rio Vista study intersections operate with an average LOS of C or better with the exception of the SR 12/Main Street and SR 12/North Front Street/River Road intersections. The SR 12/Main Street intersection and the northbound right-turn at the SR 12/North Front Street/River Road intersection operate at LOS F during PM peak hours. All study roadway segments are projected to operate at LOS C or better, with the exception of SR 12, which operates at LOS F. At the Ryde Avenue site in Stockton, all study roadway segments are projected to operate at LOS B or better, with the exception of I-5, which is projected to operate at LOS E.

The cumulative-plus-project peak hour traffic volumes were developed for each action alternative. Under Alternatives 2 and 3, all study intersections in Rio Vista operate at LOS C or better, except the SR 12/Main Street and SR 12/North Front Street/River Road intersections, which operate at LOS F during PM peak hours. The addition of Alternative 2 or Alternative 3 traffic would increase the delay at both intersections. With respect to cumulative-plus-project conditions, 2nd Street and Montezuma Hills Road would operate at LOS C or better. SR 12 would operate at LOS F with or without the addition of Alternatives 2 or 3 traffic. Project traffic decreases LOS from C to D on Front Street and Main Street.

Under Alternative 4, all study roadway segments in Stockton would operate at LOS B or better, with the exception of I-5, which would operate at LOS E with or without the addition of Alternative 4 traffic.

20.5 Cumulative Impact Analysis

Impact CUM-1: Cumulative Impacts on Scenic Vistas and the Visual Character and Quality of the Site.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the DRS would not be constructed; therefore, there would be no potential to contribute to a cumulative impact related to aesthetics at either the RVARC site or Ryde Avenue site. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As summarized in Table 20-3, the City of Rio Vista applied for grant funds to support development of a 15,000-square-foot interpretive center at the RVARC site. Past conceptual plans for these projects also include ERS and fish study buildings. Development of DRS along with other facilities envisioned in the Rio Vista Army Reserve Center Redevelopment Plan would substantially alter the visual character of the site and its surroundings to a more-developed condition and would be within the same viewshed as those from Beach Drive, the Sacramento River, and SR 160. If the facilities are not sensitively designed, DRS and other future developments could adversely affect views of the site from nearby areas and could adversely affect the RVARC site's rural character, resulting in a potentially significant cumulative impact; however, implementation of Mitigation Measure AES-2a would require that specific U.S. Army Base District design standards and guidelines be incorporated in the design of the new ERS and FTC facilities and would ensure that the new facilities are responsive to Rio Vista's small-town character and are visually consistent with the surrounding area. With implementation of these measures, the incremental contribution of Alternative 2 would not be cumulatively considerable. This impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Similar to Alternative 2, Alternative 3 and potential development of other facilities envisioned in the Rio Vista Army Reserve Center Redevelopment Plan could adversely affect the RVARC site's rural character, resulting in a potentially significant cumulative impact. For the reasons described above for Alternative 2, implementation of Mitigation Measure AES-2a would ensure that the contribution of Alternative 3 would not be cumulatively considerable. This impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Of the projects listed in Table 20-3, Alternative 4, potential development of the USFWS Fish Hatchery Project, and potential development of a Class I path along the Stockton DWSC's north shore would alter the visual setting of the Ryde Avenue site and its surroundings. Development of Alternative 4 and these two other projects would be visible primarily to recreational boaters from the DWSC. Development of the path and USFWS Fish Hatchery Project and the ERS and FTC facilities would collectively result in a cumulative impact on the visual character of the site and surroundings, as all would convert the site into a more developed condition. The hatchery, Class I path, and DRS would alter the Ryde Avenue site's visual conditions; however, given the site and surrounding area's industrial/maritime character, these projects (including DRS) would not result in a cumulatively significant aesthetics impact to which the Proposed Project would contribute. This impact would be **less than significant**.

Impact CUM-2: Contributions to Non-Attainment Status of Criteria Air Pollutants.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the DRS would not be constructed; therefore, there would be no potential to generate emissions that could contribute to any cumulative impact related to air quality at either the RVARC site or Ryde Avenue site. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

The SVAB, SJVAB and SFBAAB are designated as nonattainment areas for ozone, PM_{10}, and $PM_{2.5}$. For this reason, past, present, and probable future projects, including the DRS, are considered to have a significant cumulative impact on air quality in the project area.

DRS construction and operation activities would emit criteria air pollutants. YSAQMD, the local air district with jurisdiction over the Rio Vista area, has adopted cumulative thresholds of significance for projects of 10 tons per year for ozone precursors (ROG and NO_x) and 80 pounds per day for PM_{10}. As described in Chapter 6, *Air Quality and Greenhouse Gas Emissions*, construction and operations of the DRS would not result in emissions of particulate matter and exhaust gases that would exceed these criteria; therefore, the incremental contribution of the DRS would not be cumulatively considerable. This impact would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Similar to Alternative 2, Alternative 3 and past, present, and probable future projects would have a significant cumulative impact on air quality in the project area.

Operations of the DRS would result in emissions of particulate matter and exhaust gases that would not exceed cumulative significance criteria; however, it is possible that construction activities associated with DRS would exceed the criteria. Implementation of Mitigation Measures AQ/GHG-2a, and a combination of AQ/GHG-2b through AQ/GHG-2d would reduce construction air emissions to levels below YSAQMD's construction significance thresholds. Therefore, with implementation of Mitigation Measure AQ/GHG-2a and a combination of AQ-2b through AQ/GHG-2d, the incremental contribution of the DRS would not be cumulatively considerable. This impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

The Ryde Avenue site is located in SJVAB, which is designated as a nonattainment area for ozone, PM_{10}, and $PM_{2.5}$. Past, present, and probable future projects, including the DRS, are considered to have significant cumulative impact on air quality in the project area.

DRS construction and operation activities would emit criteria air pollutants. As described in Chapter 6, *Air Quality and Greenhouse Gas Emissions*, the SJVAPCD—the local air district with jurisdiction over the project site—has adopted cumulative thresholds of significance for construction, permitted equipment during operations, and non-permitted equipment during operations. Operation of the DRS would result in emissions of particulate matter and exhaust gases that would not exceed these criteria; however, it is possible that construction activities associated with DRS would exceed the criteria. Implementation of a combination of Mitigation Measures AQ/GHG-2a through AQ/GHG-2d would reduce construction air emissions to levels below SJVAPCD's construction significance thresholds. Therefore, with implementation of a combination of Mitigation Measure AQ/GHG-2a through AQ/GHG-2d, the incremental contribution of the DRS would not be cumulatively considerable. This impact would be reduced to a level that is **less than significant with mitigation**.

Impact CUM-3: Contributions to Global Climate Change.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the DRS would not be constructed; therefore, there would be no potential to generate emissions that could contribute to any cumulative impact related to global climate change. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Global GHG emissions are considered to lead to a significant cumulative impact related to climate change.

Although DRS construction and operation activities would emit GHGs, they would be below applicable cumulative impact thresholds (which are the same as project-level thresholds). In addition, DWR would implement Mitigation Measures AQ/GHG-5 and AQ/GHG-11, which require implementation of relevant DWR Climate Action Plan BMPs and mitigation for construction and operations, reducing GHG emissions associated with DRS. As a result, the incremental contribution of the DRS would not be cumulatively considerable. This impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Impacts of Alternative 3 would be the same as those of Alternative 2 (see above for complete details). DWR would implement Mitigation Measures AQ/GHG-5 and AQ/GHG-11, which requires implementation of relevant DWR Climate Action Plan BMPs and mitigation for construction and operations, reducing GHG emissions associated with the DRS. As a result, the incremental contribution of the DRS would not be cumulatively considerable. This impact would be reduced to a level that is **less than significant with mitigation.**

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Impacts of Alternative 4 would be the same as those of Alternatives 2 and 3 (see above for complete details). DWR would implement Mitigation Measures AQ/GHG-5 and AQ/GHG-11, which require implementation of relevant DWR Climate Action Plan BMPs and mitigation for construction and operation, reducing GHG emissions associated with the DRS. As a result, the incremental contribution of the DRS would not be cumulatively considerable. This impact would be reduced to a level that is **less than significant with mitigation.**

Impact CUM-4: Cumulative Impacts on Terrestrial Biological Resources.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the DRS would not be constructed; therefore, there would be no potential to contribute to a cumulative impact related to terrestrial biological resources at either the RVARC site or Ryde Avenue site in Stockton. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 2, past, present, and probable future projects, including the DRS, are considered to have a significant cumulative impact on terrestrial biological resources in the project area.

As discussed in Impact BIO-1, special-status plant species, including Delta Tule Pea and Suisun Marsh Aster, and other special-status plants have the potential to occur at the RVARC site; however, the DRS' impacts on special-status plants would be minimized with implementation of Mitigation Measures BIO-1a, BIO-1b, BIO-1c, and BIO-1d. These measures would protect plants by avoiding known occurrences of special-status plants to the extent feasible, requiring focused surveys, protecting special-status plants during construction, and compensating for permanent impacts on special-status plants. With implementation of these mitigation measures, the DRS' incremental contribution to cumulative impacts on special-status plants would not be considerable.

As described in Impacts BIO-2 through BIO-6, construction of DRS has the potential to impact special-status wildlife species, such as the western pond turtle, and the RVARC site provides marginally suitable habitat for special-status birds and potentially suitable habitat for special-status bat species. The DRS' impacts on special-status wildlife would be reduced with implementation of Mitigation Measures BIO-2 through BIO-6d. These measures would require preconstruction surveys, avoidance and minimization measures, and other protective measures that would reduce construction-related disturbances on special-status species. Implementation of these measures would ensure that the DRS' contribution to cumulative impacts on special-status species would not be considerable.

As described in Impact BIO-7, construction of the marina would result in permanent impacts on riparian habitat and potentially some sensitive natural communities. Mitigation Measures BIO-7a and BIO-7b would ensure that the impacts are minimized and restoration plans are implemented. With implementation of these measures, the incremental contribution of the DRS would not be cumulatively considerable.

As discussed in Impact BIO-8, construction of the marina and FTC would temporarily and permanently affect federally protected wetlands and non-wetland waters; however, implementation of Mitigation Measure BIO-8 would reduce this impact. With implementation of this mitigation measure, the DRS' contribution to cumulative impacts on wetlands and non-wetland waters would not be considerable. This impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would result in impacts similar to those of Alternative 2, but would most likely impact a smaller area of riparian habitat and would result in a net gain of waters of the U.S. by converting uplands to waters. Implementation of Mitigation Measures BIO-1 through BIO-7b listed above for Alternative 2 would reduce these impacts and ensure that the DRS' contribution is not cumulatively considerable. This impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 and past, present, and probable future projects are considered to have a significant cumulative impact on terrestrial biological resources in the project area. Similar to Alternatives 2 and 3, construction of the DRS under Alternative 4 has the potential to impact special-status plants along the shoreline of the Ryde Avenue site. This alternative could also impact marginally suitable habitat for bats, Burrowing Owls, and other special-status birds; however, the DRS' impacts on special-status wildlife would be reduced to a less-than-significant level with implementation of Mitigation Measures BIO-1a through BIO-1d, BIO-3, BIO-4a, BIO-4c, BIO-5, BIO-6c, and BIO-6d. These measures would require preconstruction surveys, avoidance and minimization measures, and other protective measures that would reduce construction-related disturbances on special-status species. Implementation of these measures would ensure that the DRS' contribution to cumulative impacts on special-status species would not be considerable. These impacts would be reduced to a level that is **less than significant with mitigation**.

Impact CUM-5: Cumulative Impacts on Aquatic Biological Resources.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the DRS would not be constructed; therefore, there would be no potential to contribute to a cumulative impact related to aquatic biological resources at the RVARC site or Ryde Avenue site in Stockton. There would be **no impact**.

<u>ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1</u>

As described in the cumulative setting section above, special-status fish species in the San Francisco estuary are at risk from habitat alteration, competition with non-native species, changes in water quality (including changes in salinity, nutrients, and temperature), and other human activities (including shipping and recreational use of waterways). Projects in the Bay–Delta, including the DRS, could result in adverse effects on special-status fish species such as Delta Smelt, Longfin Smelt, Central Valley DPS Steelhead, and marine mammals, which is considered to be a significant cumulative impact.

In Chapter 8, *Biological Resources—Aquatic Resources*, Impacts FISH-1 through FISH-7 and FISH-9 describe the potential for the construction of DRS to impact these species. The DRS' impacts would be reduced with implementation of the following mitigation measures: Mitigation Measure FISH-1a, which would limit the timing of in-water activity; Mitigation Measure FISH-1b, which would limit the intensity of certain activities; Mitigation Measure FISH-1c, which would minimize hydroacoustic effects of pile driving on marine mammals. Mitigation Measures FISH-2 and FISH-9, which include BMPs to protect water quality and minimize the potential spread of invasive species; Mitigation Measures FISH-3a and FISH-3b, which require excluding fish from work areas, as feasible; and Mitigation Measures FISH-3c and FISH-5, which would minimize or compensate for impacts to habitat. Mitigation Measures HYD/WQ-1 and HYD/WQ-3 would also reduce potential adverse effects due erosion, loss of topsoil, and accidental spills. Implementation of these measures would ensure that the DRS' contribution to cumulative impacts on special-status fish species during construction and site development would not be cumulatively considerable.

As described in Impacts FISH-8 through FISH-11, operations and maintenance of the DRS also have the potential to impact special-status fish species. Periodic maintenance dredging of the marina could impact fish and aquatic habitat. These impacts would be minimized or compensated for with implementation of Mitigation Measures FISH-1a, HYD/WQ-2a, HYD/WQ-2b, and FISH-3c, and therefore would not make a considerable contribution to this cumulative impact.

In addition, IEP equipment and FTC aquaculture facilities provide suitable habitat for various forms of aquatic invasive species or diseases that exist in various parts of California. Aquatic invasive species and diseases can dramatically alter aquatic communities in which they establish themselves and cause considerable damage to aquatic habitat and species in the area. The IEP monitoring program and FTC facility would include protocols to prevent the introduction and/or spread of aquatic invasive species and disease such that the Proposed Project would not result in a cumulatively considerable contribution to this impact.

Finally, although various aspects of facility operations could contribute to adverse cumulative impacts, on the whole, DRS activities are expected to benefit sensitive fish populations by providing critical information toward the management of these species. The overall contribution of the DRS to this cumulative impact would be beneficial.

In conclusion, with implementation of the mitigation identified above, the DRS would not make a cumulatively considerable incremental contribution to the decline of aquatic habitat or aquatic species in the Bay–Delta waterways. This impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Alternative 3 would have a potential to contribute to cumulative impacts on fisheries similar to that of Alternative 2; as described for Alternative 2 (see above for a complete details), the operational practices and Mitigation Measures FISH-1a through -1c, FISH-2, FISH-3a through -3d, FISH-5, FISH-9, HYD/WQ-2a, HYD/WQ-2b, HYD/WQ-3, would ensure that, overall, DRS would not make a considerable contribution to this cumulative impact and that the overall contribution would be beneficial. This impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would have the potential to contribute to cumulative impacts on fisheries similar to those of Alternatives 2 and 3. As described for Alternative 2 (see above for complete details), the operational practices and Mitigation Measures FISH-1a, FISH-1b, FISH-3a through FISH-3d, FISH-5, FISH-9, HYD/WQ-2a, HYD/WQ-2b, and HYD/WQ-3 would ensure that, overall, DRS would not make a considerable contribution to this cumulative impact and that the overall contribution would be beneficial. This impact would be reduced to a level that is **less than significant with mitigation**.

Impact CUM-6: Cumulative Impacts on the Potential U.S. Engineers Storehouse Historic District.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the DRS would not be constructed. Several other projects have been proposed at the RVARC site that could have an adverse impact on the potential U.S. Engineers Storehouse Historic District and, similarly, taking no action is likely to result in continued degradation of the district over time. Although these conditions could lead to a significant cumulative impact on this historic resource, this alternative by itself would have no potential to contribute to this impact because it would not affect the potential historic district in any way. There would be **no impact** pursuant to CEQA and **no effect** under NEPA.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Of the projects listed in Table 20-3, potential development of an interpretive center or other uses envisioned in the Rio Vista Army Reserve Center Redevelopment Plan could result directly or indirectly in the demolition or substantial alteration of buildings or contributing elements to the potential U.S. Engineers Storehouse Historic District. This is considered a significant cumulative impact.

Under Alternative 2, with the exception of the debris deflector, construction and operation of DRS facilities would occur entirely outside of the potential Historic District boundary, and would be developed consistent with the ABD Design Guidelines in a manner that would support the historic character of the site. As described in Chapter 9, *Cultural Resources,* removal of a large wooden pier (S-104), which is considered a contributing element of the potential Historic District would be needed prior to constructing the debris deflector. Implementation of Mitigation Measure CUL-2a would avoid impacts on the potential Historic District and application of Mitigation Measure CUL-2b would require additional recordation of the wharf prior to demolition. According to a study completed by JRP (2007), although the wharf is a contributing element to the potential Historic District, the integrity of the wharf was compromised by the addition of elements outside of the period of significance. Removal of the wharf would not render the potential Historic District ineligible for listing in the NRHP or CRHR, as the District would still retain enough of its character-defining features to convey the reasons for its significance. As a result, this alternative's contributions to this cumulative impact would not be considerable. This impact would be **less than significant with mitigation** under CEQA. Because the Historic District is not eligible for the NRHP, under NEPA there would be **no effect**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

As described for Alternative 2, the potential development of an interpretive center or other uses envisioned in the Rio Vista Army Reserve Center Redevelopment Plan could result in a significant cumulative impact on the potential Historic District.

As described in Chapter 9, *Cultural Resources,* Alternative 3 involves reuse of the area within and adjacent to the potential Historic District. Five of the existing buildings that contribute to the CRHR eligibility of the potential Historic District would be retained and rehabilitated (T-7, T-9, T-11, T-27, and T-42); all other buildings associated with the potential Historic District, with the exception of T-43, would be demolished as the result of ERS construction. Implementation of Mitigation Measures CUL-2b and CUL-2c would require preparation of Historic Structures Reports and would ensure that the Secretary of the Interior's Standards for the Treatment of Historic Properties be followed when preserving, rehabilitating, restoring, and reconstructing the historic buildings on the site, and otherwise protect historic structures during construction; implementation of Mitigation Measure CUL-2d would require preparation of interpretive materials, which would help minimize impacts on those buildings that get demolished. As described in Chapter 9, should SHPO determine that the potential Historic District is not eligible for listing in the CRHR, none of these measures would be needed. Nonetheless, because the ERS would involve demolition of contributing elements to the potential Historic District, even with these mitigations, the contribution of Alternative 3 to cumulative impacts on the historic district would considerable. This impact would be **significant and unavoidable** under CEQA. Because the Historic District is not eligible for the NRHP, under NEPA, there would be **no effect.**

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Because this alternative would not be located on the RVARC site, it would have no potential to contribute to impacts on the potential U.S. Engineers Storehouse District because it would not affect the historic district in any way. There would be **no impact** under CEQA and **no effect** under NEPA.

Impact CUM-7: Cumulative Impacts on Land Subsidence.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the DRS would not be constructed; therefore, there would be no potential to contribute to a cumulative impact related to land subsidence at the Ryde Avenue site in Stockton. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Under Alternative 1, the DRS would be constructed at the RVARC site, not the Ryde Avenue site in Stockton; therefore, there would be no potential to contribute to a cumulative impact related to land subsidence at the Ryde Avenue site. There would be **no impact**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, cumulative impacts related to subsidence would be the same as those for Alternative 2 (see above for complete details). There would be **no impact**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Overdraft of the San Joaquin subbasin has led to regional land subsidence in the Stockton area (see Chapter 10, *Geology, Soils, and Seismicity*, for further discussion). This is considered to be a significant cumulative impact.

The FTC's groundwater use could exacerbate regional land subsidence. Implementation of Mitigation Measure HYD/WQ-9 would reduce this impact; however, any use of groundwater for operation of FTC would increase the potential for subbasin subsidence. The contribution of this alternative to cumulative impacts related to subsidence would be considerable. This impact is considered **significant and unavoidable**.

Impact CUM-8: Cumulative Impacts on Hydrology and Water Quality.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, ERS and FTC would not be constructed or operated; therefore, there would be no potential to contribute to a cumulative impact related to hydrology and water quality at the RVARC site or Ryde Avenue site in Stockton. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

The setting section above describes a number of regional conditions and projects within the vicinity of the RVARC site that have, or might in the future, adversely affect hydrology and water quality. Specific projects include the potential development of the interpretive center and/or other uses envisioned in the Rio Vista Army Base District Design Guidelines, the Rio Vista Floodwall and Public Access Project, the BDCP, and the Sacramento DWSC Project. Because of listed impairments under CWA 303(d) and the existing and likely future degradation of beneficial uses in the Sacramento River adjacent to the RVARC site and receiving waters downstream, impacts on hydrology and water quality are considered cumulatively significant.

During DRS construction, DWR and USFWS would be required to comply with CWA Section 402's NPDES General Construction Permit. This permit is overseen by SWRCB and requires development and implementation of a SWPPP. SWPPP identifies BMPs to prevent soil erosion, restrict discharges of soil and water to surface waterbodies, and employ other measures to protect water quality to the maximum extent possible. Compliance with the State's General Construction Permit is required for all ground-disturbing projects over 1.0 acre. In addition, implementation of BMPs described in Mitigation Measure HYD/WQ-1 would reduce impacts of upland construction activities.

In-water construction activities associated with DRS could result in turbidity-related water quality impacts on the surface waters. As discussed in Chapter 12, *Hydrology and Water Quality*, dredging, pile driving, and construction of the FTC outfall could potentially erode the riverbank and result in potential water quality impacts related to turbidity, sediment, or suspended materials. Implementation of Mitigation Measures HYD/WQ-2a and HYD/WQ-2b would reduce these impacts. Similarly, spoils generated by dredging of the marina and other DRS features could result in adverse water quality impacts, which would be reduced by Mitigation Measure HYD/WQ-6, which would require proper handling, storage, transport, and disposal of spoils materials.

DRS construction would also require use of equipment that uses fuels or oils and, in the event of an accidental spill, could result in cumulative impacts on water quality. Implementation of Mitigation Measure HYD/WQ-3 would reduce these impacts.

In the event that other development projects (e.g., the USFWS Fish Hatchery Project, Riverwalk Project, Del Rio Hills Planned Unit Development, and West Complex Redevelopment Plan and Rough and Ready Redevelopment Project) within the vicinity of DRS also require groundwater supplies during operation, the Proposed Project, in combination with these cumulative projects, would result in a cumulative impact on groundwater supplies. Implementation of Mitigation Measure HYD/WQ-9 would address this issue.

Lastly, although various aspects of facility operations could contribute to adverse cumulative impacts, on the whole, the DRS is expected to benefit Bay-Delta water quality through ongoing monitoring and research activities that would occur at this facility. The overall contribution of the DRS to this cumulative impact would be beneficial.

The above-referenced mitigation measures would reduce impacts such that Alternative 2's contribution to cumulative impacts associated with hydrology and water quality would not be considerable. This impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Under Alternative 3, DRS' contribution to cumulative hydrology and water quality impacts would be the same as those of Alternative 2 (see above for complete details), and would not be considerable. Implementation of Mitigation Measures HYD/WQ-2a, HYD/WQ-2b, HYD/WQ-3, HYD/WQ-6, and HYD/WQ-9 would reduce this impact. This impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Impacts on hydrology and water quality within the vicinity of the Ryde Avenue site are considered cumulatively significant for the same reasons as described above for Alternative 2 (see above for complete details). Under Alternative 4, other projects that might influence hydrology and water quality include construction of the USFWS Fish Hatchery Project at the Ryde Avenue site and the Stockton DWSC Dredging Project. The type of construction-related cumulative impacts on water quality would be similar to those described for Alternative 2, except that these effects would occur in the Stockton DWSC. Under Alternative 4, DRS' contribution to cumulative hydrology and water quality impacts would be similar to those for Alternative 2, and would not be considerable. Implementation of Mitigation Measures HYD/WQ-2a, HYD/WQ-2b, HYD/WQ-3, HYD/WQ-6, and HYD/WQ-9 would reduce these impacts. These impacts would be reduced to a level that is less than significant with mitigation.

Operation of FTC would rely on local groundwater supplies. Given that the groundwater basin underlying Stockton is significantly overdrawn (annual overdraft estimated to be 70,000 AF), the operation of FTC could make a considerable contribution to significant cumulative impacts on groundwater supplies. Implementation of Mitigation Measure HYD/WQ-9 would minimize the contribution to this impact, but given the overdraft conditions of the underlying groundwater basin, any additional groundwater use is considerable and accordingly, DRS' contribution would be considerable. This impact would be **significant and unavoidable**.

Impact CUM-9: Cumulative Impacts on Noise.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the DRS would not be constructed; therefore, there would be no potential to contribute to a cumulative impact related to noise at either the RVARC site or Ryde Avenue site in Stockton. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Other projects within the vicinity of the RVARC site, if they were to occur at the same time as DRS, could generate noise that, combined with that generated by the construction and operation of DRS, could exceed noise standards or otherwise expose receptors to substantial temporary or long-term noise levels. This includes redevelopment of the RVARC site by the City of Rio Vista, construction of an interpretive center, and other nearby projects that are listed on Table 20-3. This is considered a significant cumulative impact.

As discussed in Impact NOI-3, noise associated with operation of DRS is not anticipated to be substantial. During construction, implementation of Mitigation Measure NOI-1 would reduce construction-related noise impacts. Incorporation of standard noise control/sound abatement design measures would ensure that the DRS's contribution to cumulative noise impacts related to operation would not be considerable. Future development on the RVARC site and in other nearby locations would also be subject to the same local noise regulations. With implementation of this mitigation measure, the DRS' contribution to cumulative noise impacts would not be considerable. This impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

Cumulative impacts associated with Alternative 3 would be similar to those described for Alternative 2 (see above for complete details). Implementation of Mitigation Measures NOI-1 during construction and incorporation of standard noise control/sound abatement design measures would ensure that DRS' contribution to cumulative noise impacts related to construction and operation would not be considerable. These impacts would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Cumulative impacts associated with Alternative 4 would be similar to those described for Alternatives 2 and 3, but sensitive receptors near the Ryde Avenue site are closer to the Alternative 4 footprint compared with those of the other two alternatives (approximately 100 feet away). Other projects that could also increase ambient noise levels within the vicinity include the USFWS Fish Hatchery Project and the Class I bicycle path project. In the event that these projects and DRS are constructed or operated simultaneously, temporary and long-term ambient noise levels could substantially increase, resulting in a significant cumulative impact.

Similar to Alternatives 2 and 3, implementation of Mitigation Measures NOI-1 and incorporation of standard noise control/sound abatement design measures would ensure that DRS' contribution to cumulative noise impacts related to construction and operation would not be considerable. These impacts would be reduced to a level that is **less than significant with mitigation**.

Impact CUM-10: Cumulative Impacts on Wastewater Treatment.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the DRS would not be constructed; therefore, there would be no potential to contribute to cumulative impacts related to wastewater treatment. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As described in Chapter 16, *Public Services, Utilities, and Energy,* the DRS would generate a maximum of 0.06 mgd of wastewater, which would then be conveyed to the Beach Drive plant for treatment. Because the Beach Drive plant has relatively limited remaining capacity, especially in wet weather, wastewater generated by the DRS and potentially other nearby development projects could contribute to overflows at the plant and exceedance of NPDES permit requirements. This is considered a significant cumulative impact.

Implementation of Mitigation Measure UTIL-4, which requires coordination with the City of Public Works Department for the RVARC site's sanitary sewer system, would ensure that Alternative 2's contribution is not cumulatively considerable. This impact would be reduced to a level that is **less than significant with mitigation**. Other development projects, such as the interpretive center, would most likely require similar coordination efforts.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The impacts of Alternative 3 would be the same as those of Alternative 2 (see above for complete details) Implementation of Mitigation Measure UTIL-4 would ensure that Alternative 3 would not make a considerable contribution to cumulative impacts related to wastewater treatment. This impact would be reduced to a level that is **less than significant with mitigation**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Alternative 4 would not discharge wastewater to the Beach Drive plant; therefore, this alternative would have no potential to contribute to a cumulative impact. There would be **no impact**.

Impact CUM-11: Cumulative Impacts on Police Protection.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the DRS would not be constructed; therefore, there would be no potential to contribute to cumulative impacts related to provision of police protection. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

Police service in Rio Vista meets its performance objectives and Alternative 2 is not anticipated to generate sufficient police protection needs to require construction of additional facilities to continue to meet these objectives. As a result, this alternative would not make a considerable contribution to any cumulative impacts related to police protection services. This impact would be **less than significant**.

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The impacts of Alternative 3 would be the same as those of Alternative 2 (see above for complete details); therefore, this alternative would not make a considerable contribution to cumulative impacts related to police protection. This impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

The City of Stockton's police department does not currently provide acceptable response times. Because this circumstance arises from a collective number of incidents, this is considered to be a cumulatively significant impact.

Alternative 4 is not anticipated to generate sufficient police protection needs to measurably affect response times; therefore, this alternative would not make a considerable contribution to cumulative impacts related to police protection. This impact would be **less than significant**.

Impact CUM-12: Cumulative Impacts on Recreation.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, ERS and FTC would not be constructed; therefore, there would be no potential to contribute to cumulative impacts related to recreation. There would be **no impact**.

ALTERNATIVE 2: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 1

As described in Chapter 17, *Recreation*, construction of the DRS driveways would require temporary closure of the path along Beach Drive. Similarly, other development on the RVARC site (as envisioned in the Rio Vista Redevelopment Plan) could require temporary closure and displacement of this path during construction. However, because pedestrians and bicyclists would still have access to the bicycle lane on Beach Drive and because the path would be repaved upon completion of construction, this alternative would not make a considerable contribution to a cumulative impact related to temporary closure of this path.

In addition, in the event that a public marina gets built adjacent to the DRS, boat trips generated by the public marina and vessel trips associated with the proposed IEP activities could potentially increase congestion on the Sacramento River in the Rio Vista area. As described in Chapter 17, forty-eight vessels would be stored at the DRS, which would be used at varying frequency. Relative to the overall volume of ship traffic in the area, the number of vessel trips generated by the IEP activities would not be substantial. Therefore, this alternative's contribution to this cumulative impact would not be considerable (**less than significant**).

ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATION 2

The impacts of Alternative 3 would be the same as those of Alternative 2 (see above for complete details); therefore, this alternative would not make a considerable contribution to cumulative impacts related to recreation. This impact would be **less than significant**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

Unlike Alternatives 2 and 3, construction of the DRS would not temporarily displace any existing recreational facilities or uses near the Ryde Avenue site and this alternative would not result in cumulative impacts on water-based recreationalists from increased vessel traffic. As described in Chapter 15, *Transportation and Traffic,* Alternative 4 could conflict with the City of Stockton Bicycle Master Plan, which proposes a Class I bike path along the north shore of the Stockton DWSC. There are currently no detailed plans for this bicycle path project. However, in the event that this path gets built, implementation of Mitigation Measure TRA-6, would ensure that DWR, USFWS or the Proposed Project developer design the DRS site plan in coordination with the City of Stockton in a manner that does not preclude construction of the bicycle path. This measure would also ensure that impacts related to displacement of recreational facilities or uses does not occur. Therefore, this alternative would not make a considerable contribution to cumulative impacts related to recreation (**less than significant**).

Impact CUM-13: Cumulative Impacts on Transportation and Traffic.

ALTERNATIVE 1: NO PROJECT ALTERNATIVE

Under Alternative 1, the DRS would not be constructed; therefore, there would be no potential to contribute to a cumulative impact related to traffic at either the RVARC site or Ryde Avenue site in Stockton. There would be **no impact**.

ALTERNATIVES 2 AND ALTERNATIVE 3: RIO VISTA ARMY RESERVE CENTER, CONFIGURATIONS 1 AND 2

As described in Impact TRA-12 in Chapter 15, *Transportation and Traffic*, the SR 12/Main Street and SR 12/North Front Street/River Road intersections do not operate at an acceptable LOS, which is a cumulatively significant impact. The additional traffic generated by Alternative 2 or 3 would increase delays by more than 5.0 seconds at both intersections. Because these delays meet the CA MUTCD's peak hour signal warrant, either alternative's contribution would be cumulatively considerable. Implementation of Mitigation Measures TRA-12a and TRA-12b would require that DWR and USFWS contribute their fair-share toward the construction of a new left-turn lane at SR 12/Main Street and a new signal at SR/12/North Front/River Road intersection.

As described in Impact TRA-12, with construction of the northbound left-turn lane and signal optimization, operations at the intersection would improve, especially for the northbound left-turn lane, which is the primary movement affected by these alternatives, but the intersection would still operate at LOS F. Similarly, construction of the traffic signal at SR 12/North Front Street/River Road would not stop the intersection from operating at LOS F. Additional through lanes on SR 12 are necessary to reduce overall intersection delay to an acceptable level; however, according to the SR 12 CSMP, the Concept Facility for SR 12 is a two- to three-lane conventional highway. Because SR 12 is already three lanes within the study area and Caltrans does not have plans to widen it, Mitigation Measures TRA-12a and TRA-12b would not improve the LOSs at these intersections to acceptable levels. Combined with the fact that DWR and USFWS cannot ensure that the roadway improvements would be constructed or their timing, and because no other feasible mitigation has been identified to address this impact, the contribution of the DRS to cumulative traffic impacts would be considerable. This impact would be **significant and unavoidable**.

ALTERNATIVE 4: RYDE AVENUE SITE IN STOCKTON

As described in Chapter 15, the City of Stockton requires daily roadway segment analysis for cumulative-plus-project conditions. The addition of Alternative 4 traffic would not change the LOS level of a roadway segment from acceptable to unacceptable. Although the I-5 freeway segment operates at LOS E without Alternative 4, this alternative would not increase the roadway's volume to capacity ratio (V/C) by more than 0.05; therefore, under Alternative 4, the Proposed Project's contribution to this cumulative impact would not be considerable. These impacts would be **less than significant**.

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Chapter 21
Other Sections Required by CEQA and NEPA

21.1 Introduction

This chapter describes the irreversible impacts of the Proposed Project as required by State CEQA Guidelines and NEPA requirements, the relationship between short-term uses of the environment and maintenance and enhancement of long-term productivity, significant and unavoidable impacts, growth-inducing impacts, the environmentally superior alternative as required by the State CEQA Guidelines, environmental effects associated with implementation of mitigation measures prescribed in this Draft EIR/EIS, and mitigation measures that require payment of fees.

21.2 Irreversible and Irretrievable Commitments of Resources

State CEQA Guidelines Section 15126.2(c) requires that an EIR must identify any irreversible impacts, also referred to as irreversible environmental changes that might be caused by a proposed project including current or future commitments to using non-renewable resources, or secondary or growth-inducing impacts that commit future generations to similar uses. State CEQA Guidelines Section 15126 states that significant, irreversible environmental changes associated with a proposed project may include the following:

- uses of non-renewable resources during the initial and continued phases of the project that might be irreversible because a large commitment of such resources makes removal or nonuse thereafter unlikely;
- primary impacts and, particularly, secondary impacts, such as highway improvements that provide access to a previously inaccessible area, that commit future generations to similar uses; and
- irreversible damage, that might result from environmental accidents associated with the project.

Similarly, under NEPA, CEQ regulations and the U.S. Department of Interior's (DOI's) NEPA regulations also require that irreversible or irretrievable commitment of resources (40 CFR Section 1502.16; 43 CFR Part 45, Section 46.415[8]) be evaluated. In particular, the CEQ regulations require that an EIS discuss energy requirements and the conservation potential of various alternatives and mitigation measures.

The Proposed Project would result in an irreversible and irretrievable commitment of non-renewable resources. Implementation of the Proposed Project would involve construction of new research facilities (i.e., a marina and other ancillary facilities) that would require the temporary use of heavy equipment and fossil fuels and the permanent use of raw materials, including non-renewable resources.

Operation of the ERS and FTC facilities would result in irreversible changes associated with increased energy demand, energy use, water use, and GHG emissions. As described in Chapter 6, *Air Quality and Greenhouse Gas Emissions,* DWR would implement Mitigation Measure AQ/GHG-11 (Implement DWR Climate Action Plan BMPs and Mitigation Measures for Operation), which requires that the ERS be consistent with DWR's CAP and the GHG reduction goals of AB 32. This mitigation measure includes several BMPs that aim to reduce GHG emissions, including use of energy-efficient pumps, use of renewable energy sources at the ERS facilities, and participation in local utility green energy and/or carbon offset programs.

All three action alternatives would result in the irreversible conversion of undeveloped portions of either the RVARC site or the Ryde Avenue site in Stockton.

21.3 Relationship between Short-Term Uses of the Environment and Maintenance and Enhancement of Long-Term Productivity

CEQ's regulations (40 CFR Section 1502.16) and DOI's NEPA regulations require that an EIS discuss the short-term effects and uses of the environment in the vicinity of the project alternatives in relation to long-term effects and the maintenance and enhancement of long-term productivity. For the purposes of this document, "short term" refers to the total timeframe of construction (approximately 2.5 years); "long term" refers to an indefinite period beyond the construction timeframe and includes longer term mitigation measures such as Mitigation Measure BIO-1d (Compensate for Impacts to Special-Status Plant Species) and Mitigation Measure BIO-8 (Provide Compensatory Mitigation for Permanent Impacts from Work Activities Taking Place in Wetlands and Waters of the United States and the State), as well as ongoing operation and maintenance of the ERS and FTC facilities.

The specific impacts of the Proposed Project alternatives would vary in type, intensity, and duration based on the activities occurring at any particular time. The DRS would require tradeoffs between long-term productivity and short-term uses of the environment.

The DRS would result in attainment of long-term effectiveness and efficiency of scientific efforts related to Bay–Delta rare fish species by consolidating facilities associated with the IEP in one centralized location in the Bay–Delta. The long-term benefits would be attained at the expense of some short-term construction impacts and long-term aesthetic, biological, traffic, and noise impacts. Short-term benefits include increased jobs and revenue generated by construction. Examples of short-term losses include the following:

- Construction impacts, including noise, traffic delays, or detours; and
- Air quality impacts, such as potential exceedances of air district emission thresholds.

Examples of long-term losses include:

- Permanent loss of special-status plant and wildlife resources;
- Alteration of the visual character of either the RVARC site or the Ryde Avenue site;
- Alteration of the potential Historic District at the RVARC site; and
- Use of energy and materials during construction.

The primary long-term gains associated with the DRS are the following:

- Improved efficiencies of scientific research efforts related to imperiled Bay–Delta fish species;
- Reduced redundancies and costs related to operation of the existing IEP facilities; and
- Improved conservation of imperiled Bay–Delta fish species.

21.4 Significant and Unavoidable Impacts

State CEQA Guidelines Section 15126.2(b) requires that an EIR describe any significant impacts that cannot be mitigated to a less-than-significant level. Likewise, under NEPA, DOI's regulations require that adverse environmental effects that cannot be avoided, should a proposal be implemented, be addressed. Consistent with both CEQA and NEPA, the following impacts have been identified as significant and unavoidable environmental effects that cannot be avoided. Refer to Chapters 5 through 20 of this Draft EIR/EIS for a full description of these impacts.

- Impact CUL-2: Potential for a Substantial Adverse Effect on Built Environmental Resources (Alternative 3)
- Impact LU-2: Potential for the Proposed Project to Conflict with Applicable Land Use Plans, Policies, and Regulations (Alternative 3)
- Impact GEO-2: On- or Off-Site Landslide, Lateral Spreading, Subsidence, Liquefaction, or Collapse due to an Unstable Geologic Unit or Soil (Alternative 4)
- Impact HYD/WQ-9: Substantially Deplete Groundwater Supplies from Operational Water Usage (Alternative 4)
- Impact TRA-11: Impacts on Study Area Freeway Segments from DRS Operational Traffic (Existing-Plus-Approved Projects Analysis) (Alternative 4)
- Impact TRA-12: Cumulative Impacts on Study Area Intersections in Rio Vista (Cumulative Analysis) (Alternatives 2 and 3)
- Impact CUM-7: Cumulative Impacts on Land Subsidence (Alternative 4)
- Impact CUM-8: Cumulative Impacts on Hydrology and Water Quality (Alternative 4)

21.5 Growth Inducement

State CEQA Guidelines Section 15126.2(d) requires that an EIR include a detailed statement of a proposed project's anticipated growth-inducing impacts. The analysis of growth-inducing impacts must discuss the ways by which a proposed project could foster economic or population growth or the construction of additional housing in the project area. The analysis must also address project-related actions that, either individually or cumulatively, would remove existing obstacles to population growth. A proposed project is considered growth inducing if it would induce growth directly by constructing new housing or increasing a population, or indirectly by increasing employment opportunities or eliminating existing constraints on development. Under CEQA, growth is not presumed to be either beneficial or detrimental.

The Proposed Project would neither involve the development of new housing that could directly induce population growth, nor involve the extension of infrastructure that could indirectly induce population growth. As described in Chapter 19, *Population and Housing,* construction-related jobs would be available only in the short term, and Solano County, Rio Vista, San Joaquin County, and Stockton could provide and accommodate construction personnel. Although the Proposed Project would not involve construction of new housing, the new research facilities associated with the Proposed Project would generate some new jobs, which could create a demand for additional housing. Thus, the Proposed Project is considered growth inducing; however, for the reasons described in Chapter 19, none of the action alternatives would lead to an unexpected amount of growth that has not been accounted for in relevant planning documents (e.g., Rio Vista and Stockton general plans). Given the vacancy rates of Rio Vista, Solano County, Stockton, and San Joaquin County, none of the action alternatives would substantially increase the demand for local housing to accommodate new employees. In addition, the Proposed Project would not displace any existing housing units or persons. The job growth associated with the Proposed Project is not anticipated to generate sufficient economic activity that it would result in substantial population growth.

21.6 CEQA Environmentally Superior Alternative

State CEQA Guidelines Section 15126.6(e) sets forth the circumstances under which CEQA lead agencies must identify the "environmentally superior alternative" before making a decision on a project. According to State CEQA Guidelines Section 15126(e)(2), if the environmentally superior alternative is the "no project" alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives.

Of the four alternatives, Alternative 1, the No Project Alternative, would avoid most environmental impacts of the DRS, particularly those relevant to construction. The IEP would continue to operate from various locations in the Bay–Delta; however, because the FTC would not be constructed, benefits associated with research on sensitive Bay–Delta fish species that would otherwise occur at the FTC would not be realized. As such, Alternative 1 would not achieve the objectives of the Proposed Project as they relate to this facility.

Tradeoffs exist among the other alternatives, most notably with respect to impacts on potential historic resources, air pollutant and GHG emissions, land use and planning, and groundwater. Considering all aspects on balance, Alternative 2, the Preferred Alternative, is considered the environmentally superior alternative among the three action alternatives carried forward for full analysis in this Draft EIR/EIS. Compared to Alternatives 3 and 4, Alternative 2 would have a smaller construction footprint and would require substantially less sediment excavation for the in-channel marina. As a result, compared to Alternatives 3 and 4, this alternative would have less air pollutant and GHG emissions and less construction traffic. In addition, Alternative 2 would avoid the demolition of most of the existing buildings on the RVARC site. By largely avoiding the eastern portion of the RVARC site, Alternative 2 would avoid direct impacts on the potential Historic District at the site. Conversely, because Alternative 3 would involve demolition or rehabilitation of some of the existing buildings on the RVARC site, it would result in a significant impact on these potential historic resources and would be required to comply with the Secretary of Interior's *Standards for Rehabilitation* when designing the reused structures to reduce such impacts to a less-than-significant level. With respect to land use and planning, when comparing Alternatives 2 and 3, Alternative 2 would also result in reduced potential for conflicts with the Army Base District Design Guidelines and other City of Rio Vista policies that support the development of other public uses on the RVARC site because of its smaller footprint. Finally, this alternative would avoid significant and unavoidable impacts on groundwater that would occur under Alternative 4 at the Ryde Avenue site in Stockton, which overlies the substantially overdrawn Eastern San Joaquin subbasin.

Because Alternative 2 is the Proposed Project for CEQA purposes, other action alternatives were also considered when determining the environmentally superior alternative. Aside from Alternative 2, Alternative 3 is considered environmentally superior to Alternative 4 for several reasons. First, the Solano subbasin's Tehama Formation, which underlies the RVARC site, reportedly has groundwater supplies sufficient to support the FTC; the Eastern San Joaquin subbasin is overdrawn. In addition, Alternative 4 would require more excavation (15,000 cy more) for the marina than Alternative 3. As such, Alternative 4 would result in greater air pollutant and GHG emissions than Alternative 3 during marina construction activities. Furthermore, as described in Chapter 15, *Transportation and Traffic,* Alternative 4 would contribute to unacceptable traffic levels on northbound I-5 between Monte Diablo Avenue and Country Club Boulevard, whereas Alternative 3 would not result in adverse impacts on freeway segments. Alternative 3 would contribute to significant cumulative impacts on the SR 12/North Main Street intersection and would result in more severe impacts on historic resources than Alternative 4; however, when considering the overdraft conditions of the Eastern San Joaquin subbasin, the availability of groundwater supplies underlying the RVARC site, and the differences in air pollutant and GHG emissions, Alternative 3 is considered environmentally superior to Alternative 4.

21.7 Mitigation Measures with the Potential for Environmental Effects

State CEQA Guidelines Section 15126.4(a)(1)(D) states that "[i]f a mitigation measure would cause one or more significant effects in addition to those that would be caused by the project as proposed, the effects of the mitigation measure shall be discussed…" This requirement is also consistent with the general principle under NEPA that requires federal agencies to identify reasonably foreseeable impacts of proposed major federal actions.

The mitigation measures with the potential for significant environmental effects are Mitigation Measure GEO-2 (Conduct a Geotechnical Investigation and Incorporate Report Recommendations into the Design and Construction of the Proposed Project) and Mitigation Measure HYD/WQ-9 (Perform Groundwater Supply Testing and Implement Groundwater Supply and Quality Protection Measures). Mitigation Measure GEO-2 requires that a geotechnical study be conducted and Mitigation Measure HYD/WQ-9 requires that a groundwater study be conducted. Because the environmental effects associated with both mitigation measures would be similar, they are described jointly. Certain activities that would be carried forward as part of both of these studies could cause environmental effects through ground disturbance, construction noise, interaction with groundwater, and the release of hazardous materials.

Drilling and sampling soil borings and installing groundwater monitoring wells would create ground disturbances. Depending on where these activities occur, such ground-disturbing activities could adversely affect special-status plants. For example, use of drilling rigs could result in short-term disturbance or loss of special-status plants. Implementation of Mitigation Measures BIO-1 (Design Project to Avoid or Minimize Impacts on Special-Status Plants), BIO-1b (Perform Focused Surveys for Special-status Plants), BIO-1c (Avoid or Minimize Impacts on Special-Status Plant Species during Construction), and BIO-1d (Compensate for Impacts on Special-Status Plant Species) would minimize potential adverse effects on special-status plants.

The geotechnical and groundwater studies would require drilling, which has the potential to expose sensitive receptors (e.g., residents) and sensitive species (e.g., Burrowing Owl or other nesting passerines) to excessive noise. Implementation of Mitigation Measure NOI-1 (Comply with Local Noise Regulations during Construction and Provide Advance Notification to Nearby Residences) and Mitigation Measures BIO-3 (Avoid or Minimize Impacts on Burrowing Owls), BIO-4a (Avoid Impacts on Nesting Birds), BIO-4b (Implement Preconstruction Surveys and Minimization Measures for Special-status Passerine Species), and BIO-4c (Implement Preconstruction Surveys for Birds Protected under the MBTA) would reduce temporary noise effects on humans and sensitive species.

Activities that would be conducted as part of the geotechnical and groundwater studies would require the use of vehicles and heavy equipment. For example, the geotechnical investigation would involve excavation of test pits and drilling/sampling for soil bores, which would require the use of vehicles and heavy equipment (e.g., drilling rigs). Similar equipment would also be used for the groundwater study. The use and/or on-site maintenance of this equipment could result in accidental spills or leaks of hazardous chemicals, such as diesel, gas, engine oil, solvents, or lubricants, which could pose a hazard to workers or the general public; however, because minimal amounts of such chemicals would be used, any inadvertent releases would be localized. Implementation of a SWPPP would also minimize the potential for accidental releases of hazardous materials.

The installation of groundwater monitoring wells could result in effects on groundwater quality in areas where the wells are placed. In general, installation of groundwater monitoring wells involves placement of a well casing (steel or plastic pipe) in the borehole to prevent collapse. Typically, the space between the casing and the sides of the hole serves as an area for surface water and contaminants to reach the groundwater but this space is normally filled with grout to prevent this contamination. In the event that the well casing is not properly installed or is damaged, there is potential for groundwater quality effects. Standard BMPs would be implemented before and during well installation to ensure that the casings are installed properly.

In summary, activities implemented as part of the geotechnical and groundwater studies would have the potential to result in significant environmental impacts from noise, ground disturbance, accidental release of hazardous materials, and impacts on groundwater quality. These impacts would be minimized and reduced to a less-than-significant level with implementation of BMPs, a SWPPP, and Mitigation Measures NOI-1, BIO-1a through BIO-1d, BIO-3, BIO-4a, BIO-4b, and BIO-4c.

Note that several other mitigation measures could lead to actions that would have potential environmental impacts, such as payment of fees for wastewater and upgrades to transportation infrastructure; however, because it is unknown whether such upgrades would occur and their exact nature, this Draft EIR/EIS does not speculate regarding their environmental impacts.

21.8 Mitigation Measures that Require Payment of Fees

Although not required by CEQA, this section provides a list of mitigation measures that require the payment of fees. The State CEQA Guidelines acknowledge the use of fee payment as mitigation for a project's otherwise "considerable" incremental contribution to significant cumulative impacts. When an agency has an existing program by which mitigation measures can be funded on a fair-share basis through the collection of fees, an EIR's discussion of mitigation (e.g., traffic improvements) is sufficient if it explains how the fee program would address the impact (Save Our Peninsula Committee, 87 Cal.App.4th). As such, the impacts of proposed improvements identified in the mitigation measures that require payment of fees do not require analysis. The mitigation measures that require the payment of fees are as follows:

- Mitigation Measure TRA-3: Pay Fair Share toward Regional Roadway Network Improvements (Alternative 4).

- Mitigation Measure TRA-8b: Pay Fair Share to the City of Rio Vista toward the Construction of a Traffic Signal at the SR 12/North Front/River Road Intersection (Alternatives 2 and 3).
- Mitigation Measure TRA-12a: Pay Fair Share to the City of Rio Vista toward the Construction of a Northbound Left-turn Lane at the SR 12/Main Street Intersection (Alternatives 2 and 3).

Mitigation Measure UTIL-4: Coordinate with City of Rio Vista Regarding Existing Wastewater Treatment Capacity and Contribution of Fair-Share Funding toward Any Necessary System Improvements (Alternatives 2 and 3).

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Chapter 22
Consultation and Coordination

22.1 Compliance with Agency Consultation Requirements

The following sections describe relevant federal and state consultation requirements and the consultation that has either already been or will be completed for the lead agencies to be in compliance with applicable laws and regulations. **Table 22-1** summarizes the regulatory permits, approvals, and consultations that apply to the DRS alternatives.

22.1.1 Federal Requirements

Clean Water Act

CWA is the primary federal legislation for the protection of surface water. As described in Chapter 12, *Hydrology and Water Quality*, and Chapter 7, *Biological Resources – Terrestrial*, the Proposed Project must comply with CWA Sections 401 and 404. USEPA has delegated the authority to implement and oversee most of the programs authorized or adopted for CWA compliance to USACE or RWQCB. USACE, through its regulatory program, administers and enforces CWA Section 404. Under Section 404, a permit is required for the discharge of dredged and fill materials into water of the U.S., including wetlands.

CWA Section 401 requires that an applicant applying for a federal permit to conduct an activity that might result in a discharge of a pollutant to a water of the state obtain a Water Quality Certification (or waiver) verifying that the discharge would not violate State water quality standards. Water Quality Certifications are issued by RWQCBs in California. The Proposed Project would be located within the jurisdiction of the Central Valley RWQCB.

DWR and USFWS participated in a pre-application meeting with USACE and Central Valley RWQCB in January 2015 and may participate in additional pre-application meetings with these agencies. DWR and USFWS will prepare applications for permits under CWA Section 404 and Water Quality Certifications under CWA Section 401 from Central Valley RWQCB. A wetland delineation report was prepared and submitted to facilitate the USACE permitting process. At the January 2015 meeting, DWR and USFWS provided a brief presentation of the Proposed Project. USACE indicated that an individual permit would be needed if the Proposed Project would result in impacts on waters of the U.S., including wetlands, that are greater than 0.5 acre, which requires a CWA Section 404(b)(1) alternatives analysis.

Federal Endangered Species Act

ESA provides a program for the conservation of threatened and endangered plants and animals and the habitat in which they live. Pursuant to ESA, USFWS and NMFS have authority over projects that might result in the "take" of a species listed as threatened or endangered. Refer to Chapter 7, *Biological Resources – Terrestrial*, for a detailed definition of take. If a project is likely to result in the take of a federally listed species, either an incidental take permit under ESA Section 10(a) or a federal interagency consultation under ESA Section 7 is required.

A list of threatened and endangered species known to occur in the vicinity of the RVARC site and Ryde Avenue site in Stockton are presented in Chapter 7 and Chapter 8, *Biological Resources – Aquatic*. USFWS will initiate consultation (either formal or informal) with the appropriate departments within USFWS and NMFS by submitting one or more biological assessments (BAs). A copy of this Draft EIR/EIS will also be sent to both agencies for their review and determination of concurrence with each BA's findings.

For FTC operations, a recovery and interstate commerce permit may be required pursuant to ESA Section 10(a)(1)(A). Because fish broodstock would be collected for use at FTC, this permit may be necessary for scientific research on any special-status fish species, such as Delta Smelt.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (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, NMFS, and the state wildlife resources agency before the waters of any stream or other waterbody are impounded, diverted, deepened, or otherwise controlled or modified. FWCA requires that the views of USFWS and the state agency be considered when evaluating the impacts and determining mitigation needs. NEPA regulations further require that an EIS meet the consultation requirements of FWCA (40 CFR 1502.25[a]).

For DRS, compliance with FWCA requires that USFWS coordinate with NMFS, CDFW, and SWRCB. FWCA consultation requirements are being satisfied through the EIR/EIS process.

Table 22-1. Regulatory Permits, Approvals, and Consultations Relevant to the Proposed Project

Regulatory Agency	Law/Regulation	Purpose	Relevant Activities	Permit/Authorization Type
Federal				
USACE–Sacramento District	CWA Section 404/RHA Section 10	Regulates placement of dredge and fill materials into waters of the U.S., including wetlands	Construction and operation of marina, boat ramp, and outfall Other aspects of DRS construction and on-site operation (as it relates to ESA compliance)	Individual or Nationwide Permits
U.S. Coast Guard	33 CFR, Part 66 and Part 67	Regulates the installation of private navigable aids to navigation	Construction and operation of marina and outfall	Aids to navigation permit
USEPA	CWA Section 309	Requires EPA to review and publicly comment on the environmental impacts of major federal actions	DRS construction and operation	No permit/authorization issued (only public comments)
State				
Central Valley Regional Water Quality Control Board	CWA Section 401	Water quality certification for placement of dredge and fill materials into waters of the U.S., including wetlands	Construction and operation of marina, boat ramp, and outfall Other aspects of DRS construction and on-site operation (as it relates to ESA compliance)	401 Water Quality Certification is required for federal permits, such as CWA Section 404 Permits
	CWA Section 402	NPDES program, which regulates discharges of pollutants	DRS construction	NPDES General Construction Permit
			FTC process-water discharges	NPDES General Permit for Aquaculture Facilities, if required

Regulatory Agency	Law/Regulation	Purpose	Relevant Activities	Permit/Authorization Type
	Porter–Cologne Water Quality Control Act	Regulates discharges of materials to land and protection of beneficial uses of waters of the state	Construction of marina, boat ramp, and outfall	Waste Discharge Requirements (WDRs)
CDFW–Central Region	F&G Code Section 1602	Applies to activities that will substantially modify a river, steam, or lake; includes reasonable conditions necessary to protect those resources	Construction and operation of marina, boat ramp, and outfall	Streambed Alteration Agreement, if required
	CESA (F&G Code Sections 2080.3, 2080.4, and 2081)	Applies to activities that could result in take of a state-listed threatened or endangered species	Project activities with potential for take of listed species	Incidental Take Permit, if needed
	F&G Code Sections 3503, 3513, 3800, and other sections and subsections	Protection of birds	Project activities with potential for effects on birds	Reflected in other permits (e.g., Streambed Alteration Agreement)
USFWS/NMFS	ESA/Magnuson–Stevens Fishery Conservation and Management Act	Consultation with USFWS and NMFS if threatened or endangered species might be affected by the project	DRS construction	ESA Section 7 Consultation
			Collection of broodstock for use at FTC	ESA Section 10(a)(1)(A) Permit, if required
State Historic Preservation Officer	NHPA Section 106	Consultation with State Historic Preservation Officer if historic properties or prehistoric archaeological sites might be affected by the project	DRS construction	Consultation has been conducted by USFWS and has been concluded

Regulatory Agency	Law/Regulation	Purpose	Relevant Activities	Permit/Authorization Type
California State Lands Commission	Public Trust Easement	Review of projects that encroach on the Public Trust Easement.	Marina, boat ramp, and outfall construction and operation	Lease of State Lands, if required
Central Valley Flood Protection Board (CVFPB)	CCR Title 23	Activities that would affect levees or the floodway within/between levees, or the designated floodway if no levees are present, within the Sacramento and San Joaquin Rivers and their tributaries	Marina construction and operation	Encroachment Permit
Delta Stewardship Council	2009 Delta Reform Act	Requires State or local public agencies proposing to undertake a proposed action within the boundaries of the Delta to obtain a written certification of consistency with the Delta Plan.	DRS construction and operation	Certification of consistency
Regional				
SJVAPCD	SJVAPCD Rule 9510	Review of project emissions that might affect regional air quality	All project activities	Indirect Source Review
Delta Protection Commission	1992 Delta Protection Act	Review projects planned to occur within the Delta's Primary Zone boundary to ensure consistency with the Land Use and Resource Management Plan	Marina and outfall construction and operation in Rio Vista	Consistency review

Regulatory Agency	Law/Regulation	Purpose	Relevant Activities	Permit/Authorization Type
Local				
Solano County Department of Environmental Management, Environmental Health Division	Solano County Municipal Code, Chapter 13.10 (Well Standards)	County issues well permits for construction, repair, or destruction of water, monitoring, or cathodic protection well or soil borings	Process-water supply for FTC at RVARC site	Well Drilling Permit
Stockton Municipal Code	Stockton Municipal Code Section 8.88.50	City of Stockton requires that applicants apply for a permit for any activity involving digging, drilling, boring, repair, destruction, or construction of any well	Process-water supply for FTC at the Ryde Avenue site in Stockton	Well Drilling Permit
City of Rio Vista	Rio Vista Municipal Code Section 13.30.015 (Grading Approval Required)	Required for all grading projects of 50 CY and depth of cuts/fill greater than 2.0 feet.	DRS construction at RVARCsite in Stockton	Grading Permit
City of Rio Vista	Rio Vista Municipal Code Section 17.27.030	Required for development planned within the RVARC site	DRS construction at RVARC site	Conditional Use Permit
City of Stockton	Stockton Municipal Code Section 15.48.070	Applies to construction projects that result in soil disturbance greater of 50 CY or greater	DRS construction at Ryde Avenue site In Stockton	Grading and Erosion Control Permit

Regulatory Agency	Law/Regulation	Purpose	Relevant Activities	Permit/Authorization Type
City of Stockton	Stockton Municipal Code Section 16.92.050	Applies to new building construction and site development	DRS construction at Ryde Avenue site in Stockton	Building Permit

Notes: CCR = California Code of Regulations, CDFW = California Department of Fish and Wildlife, CESA = California Endangered Species Act, CVFPB = Central Valley Flood Protection Board, Central Valley RWQCB = Central Valley Regional Water Quality Control Board, CWA = Clean Water Act, DRS = Delta Research Station, F&G Code = Fish and Game Code, NHPA = National Historic Preservation Act, NMFS = National Marine Fisheries Service, NPDES = National Pollutant Discharge Elimination System, RVARC = Rio Vista Army Reserve Center, SJVAPCD = San Joaquin Valley Air Pollution Control District, USACE = U.S. Army Corps of Engineers, USESA = Endangered Species Act, USFWS = U.S. Fish and Wildlife Service, WDR = Wastewater Discharge Requirement

Magnuson–Stevens Fishery Conservation and Management Act

The Magnuson–Stevens Fishery Conservation and Management Act establishes a management system for national marine and estuarine fishery resources. Section 305(b)(2) of the 1996 Magnuson-Stevens Fishery Conservation and Management Act reauthorization includes a provision for federal agencies to consult with NMFS about impacts on EFH, which applies to commercial fisheries. EFH includes specifically identified waters and substrate necessary for fish spawning, breeding, feeding, or growing to maturity.

This Draft EIR/EIS includes an assessment of the DRS's effects on EFH in Chapter 8, *Biological Resources – Aquatic*. USFWS cannot issue a ROD for this Draft EIR/EIS until NMFS issues a statement of concurrence with the findings of that assessment.

Rivers and Harbors Act

The Rivers and Harbors Act of 1899 addresses projects and activities in navigable waters and harbor and river improvements. Section 10 disallows the unauthorized obstruction or alteration of any navigable water in the U.S. This section provides that the construction of any structure in or over any navigable water of the U.S., or the accomplishment of any other work affecting the course, location, condition, or physical capacity of such water, is unlawful unless the work has been authorized by the Chief of Engineers and the Secretary of the Army.

For this project, USFWS and DWR are coordinating with USACE under both Rivers and Harbors Act Section 10 and CWA Section 404.

National Historic Preservation Act

Title 54 U.S.C Section 306108, commonly known as Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended in 1992) requires federal agencies to evaluate the effects of federal undertakings on historic properties (i.e., cultural resources[1] that are listed on or eligible for listing on the National Register of Historic Places). Before federal funds can be approved for a particular project and the issuance of any license, any of these effects would be evaluated.

USFWS served as the lead agency for compliance with the NHPA for the Proposed Project. To comply with NHPA, USFWS must "take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register." To that end, USFWS and its partners has complied with the NHPA by preparing an archaeological inventory report and an inventory/evaluation report for the buildings associated with the Rio Vista Army Reserve Center.. In addition, the NOP and, subsequently, a copy of the Draft EIR/EIS for DRS was sent to the State Historic Preservation Officer (SHPO). The USFWS initiated consultation under Section 106 with the SHPO in August 2015, in which they, requested their concurrence with a finding of No

[1] Cultural resources include archaeological sites, buildings and structures, landscapes, districts and places important to the continuation of a culture.

Adverse Effect to Historic Properties with respect to construction and operation of Alternative 2. In a letter dated September 2015, the SHPO requested additional information and the USFWS's Regional Historic Preservation Officer met with the SHPO's staff in April 2016. The USFWS submitted the additional information requested by the SHPO in August 2016. On November 7, 2016, the SHPO issued a letter concurring with the USFWS's finding of No Adverse Effect to Historic Properties and acknowledged that with the exception of the pier S-104, construction and operation of the Proposed Project would have no direct or indirect effects on historic properties within the area of potential effects. The letter acknowledges that the pier will be photographed and documentation and interpretive signage will be installed.

Native American Consultation

The regulations for NHPA Section 106 require federal agencies to consult with Native American tribes that attach cultural or religious significance to cultural resources subject to management during the NHPA Section 106 process (36 CFR 800.2). Each federal agency performing an action that constitutes an undertaking as defined in the Section 106 regulations will consult with relevant Native American tribes regarding that undertaking (36 CFR 800.16[y]). As described in Chapter 9, *Cultural Resources*, coordination with Native American tribes regarding important Native American sites within the vicinity of the Proposed Project sites was initiated in December 2014. None of the tribes contacted identified important cultural sites within the Proposed Project area.

U.S. Coast Guard Oversight of Construction in Navigable Waters

The U.S. Coast Guard regulates the installation of private navigable aids to maritime navigation (33 CFR 66). The term "private aids to navigation" includes all marine navigational aids that are operated in navigable waters of the U.S. Applicants seeking to establish and maintain private navigational aids are required to submit an application (CG-2554) to the U.S. Coast Guard District Commander. To determine DRS's need for submittal of an application for private navigational aids, a copy of this Draft EIR/EIS has been provided to the U.S. Coast Guard for review.

Clean Air Act Section 309

Under CAA Section 309, USEPA is required to review and provide comments on the environmental impacts of major federal actions, including those that are described in EISs. In the event that USEPA determines that the action is "environmentally unsatisfactory," CAA Section 309 requires USEPA to refer such matters to CEQ (USEPA 2015).

Consistent with CAA Section 309, the lead agencies have appropriately notified USEPA during the scoping process. The Draft EIR/EIS will also be sent to USEPA for review and public comment.

22.1.2 State Requirements

Below is a summary of state laws requiring agency consultation. Refer to Chapter 12, *Hydrology and Water Quality*, for a discussion on the Porter–Cologne Water Quality Control Act.

California Endangered Species Act

As described in Chapter 7, *Biological Resources – Terrestrial*, CESA (Fish & Game Code Section 2050 et. seq.) prohibits the take of listed and candidate (petitioned to be listed) species. Refer to Chapter 7 for details regarding CESA's definition of "take." For projects that would affect a species that is federally and state listed, compliance with ESA satisfies CESA if CDFW determines that the federal incidental take authorization is consistent with CESA (Fish & Game Code Section 2080.1). For projects that would result in take of a state-listed species, the project proponent must apply for a take permit under Fish and Game Code Section 2081(b).

Consistent with Fish and Game Code Section 2080.1, the lead agencies may request a consistency determination from CDFW after obtaining a federal incidental take statement from USFWS pursuant to the ESA Section 7 consultation process; however, if CDFW determines that the ESA statement/permit is inconsistent with CESA, the lead agencies will apply for a State Incidental Take Permit under Fish and Game Code Section 2081(b). For the Proposed Project, the need for an Incidental Take Permit will be evaluated in coordination with CDFW.

Lake and Streambed Alteration Program

CDFW is responsible for conserving, protecting, and managing California's fish, wildlife, and native plant resources. To meet this responsibility, Fish and Game Code Section 1602 requires lead agencies to notify CDFW of any proposed activities that might substantially modify a river, stream, or lake.

Depending on which alternative is ultimately approved, DWR would modify either the Sacramento River or the San Joaquin River by developing a boat ramp, marina, and outfall, all of which might substantially alter the river. Pursuant to the Lake and Streambed Alteration Program, DWR would notify CDFW about the Proposed Project by preparing a Lake and Streambed Alteration Notification. CDFW would then issue a Streambed Alteration Agreement if it determines that the alteration of the river is substantial.

Title 23, California Code of Regulations

CVFPB's jurisdiction covers tributaries and distributaries of the Sacramento and San Joaquin Rivers. Under CCR Title 23, CVFPB has jurisdiction over activities involving construction, reconstruction, removal or abandonment of any landscaping, fence, fill, embankment, building, structure, encroachment, or other activities that involve cutting into a levee. Title 23 also provides protection for adopted plans pertaining to flood control. Per Title 23, Article 5, CVFPB also has the responsibility of determining allowable uses in the designated floodway. Refer to Chapter 12, *Hydrology and Water Quality*, for additional discussion on this topic.

Because the Sacramento River and the Stockton DWSC are designated floodways, an encroachment permit would need to be obtained before construction of the Proposed Project. CVFPB was notified about the Proposed Project throughout the public scoping process and has been notified about publication of this Draft EIR/EIS.

Indirect Source Review

SJVAPD is responsible for enforcing the Indirect Source Review rule, which went into effect on March 1, 2006, and requires developers of large-scale projects to reduce smog-forming and particulate emissions generated by their projects. Rule 9510 of the Indirect Source Review specifically applies to new development projects that include full buildout of the following: 50 residential units, 2,000 square feet of commercial space, 25,000 square feet of light industrial space, 100,000 square feet of heavy industrial space, 20,000 square feet of medical office space, 39,000 square feet of general office space, 9,000 square feet of educational space, 20,000 square feet of recreational space, or 9,000 square feet of space not previously described. Applicants who are subject to the Indirect Source Review rule are required to submit an Air Impact Assessment application no later than submittal o the application for final discretionary approval with the public agency (i.e., EIR certification and filing of the ROD).

Given that the Proposed Project would create over 9,000 square feet of research, laboratory, and office space, it is subject to the Indirect Source Review. Refer to Chapter 6*, Air Quality and Greenhouse Gas Emissions,* for additional discussion on this topic.

Delta Protection Act

The 1992 Delta Protection Act, which recognizes the international importance of the Delta, mandated the designation of primary and secondary zones within the "legal Delta" as defined in California Water Code Section 12220. As described in Chapter 13, *Land Use and Planning*, the boundaries of the legal Delta and the Primary Zone run along the shore of the Sacramento River adjacent to the RVARC site. The Ryde Avenue site in Stockton (Alternative 4) is within the Secondary Zone. Because all three action alternatives are within the primary and secondary zones, the Proposed Project proponents would need to notify the Delta Protection Commission about the Proposed Project. To comply with the Delta Protection Act, the Delta Protection Commission has been notified about publication of this Draft EIR/EIS and has been asked to provide comments on this document.

Delta Reform Act

The 2009 Delta Reform Act sets forth the State policy of establishing the following coequal goals: (1) providing a more reliable water supply for California; and (2) protecting, restoring, and enhancing the Delta ecosystem. The Legislature added that these two goals must be met in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place. When the Act was passed, the Delta Stewardship Council was established and entrusted with the responsibility of giving practical meaning to these directives. One of the Delta Stewardship Council's first tasks was to develop a legally enforceable, long-term, management plan. In May 2013, the Council adopted the *Delta Plan* which was prepared in consultation with multiple agencies including SWRCB, DWR, CDFW, the Delta Protection Commission, and many other agencies. Additionally, in implementing the *Delta Plan*, the Delta Stewardship Council has other authorities including the role in commenting on any State agency EIR, and requesting reports from State, federal and local agencies. The Council also has the authority to review and make consistency determinations for State and local actions that would have a significant impact on the coequal goals with the Delta Plan (Delta Stewardship Council 2013). Because the Proposed Project would be constructed and operated within the Delta, the Proposed Project proponents would need to notify the Delta Stewardship Commission about the Proposed Project, and DWR would need to submit a certification of consistency that details findings addressing specific requirements contained in Policy G P1 of the *Delta Plan*. To comply with the Delta Reform Act and the *Delta Plan,* the Delta Stewardship Council has been notified about publication of the Draft EIR/EIS. DWR will also submit a certification of consistency describing the Proposed Project's consistency with the Delta Plan.

22.1.3 Local Permits and Approvals

As summarized in Table 22-1, several local permits and approvals must be obtained before construction of the ERS and FTC facilities. These comprise permits for grading, well drilling, conditional use, and building. Depending on which alternative is approved, the DWR and/or USFWS contractor(s) would be responsible for coordinating with the appropriate local agencies to obtain the necessary permits and approvals.

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Chapter 23
Report Preparation

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Chapter 24
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