Public Draft

BRACKISH WATER DESALINATION FACILITY

Draft Environmental Impact Report
State Clearinghouse No.: 2017082044

Prepared for
City of Antioch

June 2018

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550 Kearny Street
Suite 800
San Francisco, CA 94108
415.896.5900
www.esassoc.com

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LIST OF ACRONYMS

AB	Assembly Bill
ABAG	Association of Bay Area Governments
ACM	Asbestos containing material
ACMMP	ACM Management Plan
ADT	Average daily traffic
AF	Acre feet
AFY	Acre-feet per year
AGR	Agricultural Supply
Air Basin	San Francisco Bay Area Air Basin
APD	Antioch Police Department
ASCE	American Society of Civil Engineers
AWWA	American Water Works Association
BAAQMD	Bay Area Air Quality Management District
BACT	Best Available Control Technology
BARDP	Bay Area Regional Desalination Project
BART	Bay Area Rapid Transit
BiOp	Biological Opinion
BMP	Best management practices
BOD	Biochemical Oxygen Demand
Bureau	HRAUnited State Bureau of Reclamation
C&D	Construction and demolition debris
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
Cal EPA	California Environmental Protection Agency
CALFED	CALFED Bay-Delta Program
CAL FIRE	California Department of Forestry and Fire Protection
CalGreen	California Green Building Standards
Cal OSHA	California Division of Occupational Safety and Health
CalTrans	California Department of Transportation
CAP	Clean Air Plan
CARB	California Air Resources Board
CASQA	California Stormwater Quality Association
CBC	California Building Code
CBPP	Contra Costa Countywide Bicycle and Pedestrian Plan
CCAA	California Clean Air Act
CCR	California Code of Regulations
CCC CDD	Contra Costa County Community Development Department
CCCSD	Central Contra Costa Sanitary District
CCCWP	Contra Costa Clean Water Program
CCTA	Contra Costa Transportation Authority

CCWD	Contra Costa Water District
CDFW	California Department of Fish and Wildlife
CDHS	California Department of Health Services
CDPH	California Department of Public Health
CEC	California Energy Commission
CEDD	California Employment Development Department
CEHC	California Essential Habitat Connectivity
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CGC	California Government Code
CGS	California Geological Survey
CH_4	Methane
CHP	California Highway Patrol
CHRIS	California Historical Resources Information System
CIP	Clean in place (for a membrane system)
City	City of Antioch
CIWR	Center for Integrated Water Research
CJUTCC	California Joint Utility Traffic Control Committee
CMP	Congestion Management Program
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CNRA	California Natural Resources Agency
CO	Carbon monoxide
CO_2	Carbon dioxide
Co_2e	CO_2-equivalent
COA	Coordinated Operations Agreement
COLD	Cold Freshwater Habitat
COMM	Commercial and Sport Fishing
Corps	United States Army Corps of Engineers (or USACE)
CUPA	Certified Unified Program Agency
CVP	Central Valley Project
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
CY	cubic yards
dB	Decibels
dBA	A-weighted decibels
DBPs	Disinfection byproducts
Delta	Sacramento–San Joaquin Delta
DDSD	Delta Diablo Sanitation District
DDT	Dichlorodiphenyltrichloroethane
DEIR	Draft Environmental Impact Report
DNL	Day-night average noise level
DO	Dissolved oxygen
DOF	California Department of Finance
DPM	Diesel particulate matter
DPS	Distinct population segment
DSC	Delta Stewardship Council
DSM2	Delta Simulation Model II

DTSC	California Department of Toxic Substances Control
DWR	Department of Water Resources
EBMUD	East Bay Municipal Utilities District
EC	Electrical conductivity
ECPS	East Canal Pumping Station
EDR	Environmental Data Resources
EFH	Essential Fish Habitat
E/I	Export-to-inflow
EIR	Environmental Impact Report
ENC	Environmental Noise Control
ESA	Environmental Science Associates
ESL	Environmental Screening Level
EST	Estuarine Habitat
ESU	Evolutionarily significant unit
ºF	Degrees Fahrenheit
FAA	Federal Aviation Administration
FE	Federal endangered species
Fed/OSHA	United States Department of Labor Occupational Safety and Health Administration
FEIR	Final Environmental Impact Report
FESA	Federal Endangered Species Act
FEMA	Federal Emergency Management Agency
FGC	Fish and Game Code
FHWA	Federal Highway Administration
FT	Federal threatened species
ft	Feet
FTA	Federal Transit Administration
g	Gravity
GAC	Granular activated carbon
GHG	Greenhouse gases
gpm	Gallons per minute
GWR	Ground Water Recharge
H_2S	Hydrogen sulfide
HAA	Haloacetic acids
HCP	Habitat Conservation Plan
HDPE	High-density polyethylene
HFCs	Hydrofluorocarbons
hp	Horsepower
HMBP	Hazardous Materials Business Plan
HRA	Health risk assessment
Hz	Hertz
IBC	International Building Code
IEP	Interagency Ecological Program
INC	Industrial Noise Control
IND	Industrial Service Supply
IPaC	Information for Planning and Consultation
IPCC	International Panel on Climate Change
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt-hour
lbs/yr	Pounds per year
L_{dn}	Day-night average noise level

LID	Low Impact Development
LOS	Level of Service
LS	Less than Significant
LSA	LSA Associates
LSM	Less than Significant with Mitigation
LUST	Leaking underground storage tank
MAF	Million acre-feet
MBTA	Migratory Bird Treaty Act
MCAP	Municipal Climate Action Plan
MCL	Maximum Concentration Level
MF	Microfiltration
MG	Million gallons
mg/kg	milligrams per kilogram
mg/L	Milligrams per liter
mgd	Million gallons per day
MIGR	Migration of Aquatic Organisms
M_L	Richter magnitude
MMRP	Mitigation Monitoring and Reporting Program
Mph	Miles per hour
MPN/mL	Most probable number per 100 mL
MS4	Municipal separate storm sewer systems
MSPS	Mallard Slough Pumping Plant
MUN	Municipal and Domestic Supply
M_W	Moment Magnitude
MW	Megawatts
MWh	megawatt-hours
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NAV	Navigation
NCCP	Natural Community Conservation Plan
NDOI	Net Delta Outflow Index
NEPA	National Environmental Policy Act
NF	Nanofiltration
NH_3	Ammonia
NHPA	National Historic Preservation Act
NI	No Impact
NMFS	National Marine Fisheries Service
NO	Nitric oxide
NO_2	Nitrogen dioxide
NOAA	National Oceanic and Atmospheric Association
NOC	Notice of Completion
NOI	Notice of Intent
NOP	Notice of Preparation
NO_X	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPMS	National Pipeline Mapping System
NPPA	California Native Plant Protection Act
NRCS	National Resources Conservation Service
NTU	Nephelometric Turbidity Unit
NWIC	Northwest Information Center
NWR	Antioch Dunes National Wildlife Refuge

OEHHA	California Office of Environmental Health Hazards Assessment
OES	Office of Emergency Services
OMR	Old and Middle Rivers
OPR	Office of Planning and Research
OS	Open/Space/Public Use District
OVP	Old Valley Pipeline
PCB	Polychlorinated biphenyl
PD	Planned Development
PFCs	Perfluorocarbons
PFMC	Pacific Fishery Management Council
PGA	Peak ground acceleration
PG&E	Pacific Gas and Electric
PHMSA	Pipeline and Hazardous Materials Safety Administration
$PM_{2.5}$	Particulate matter less than or equal to 2.5 microns in diameter
PM_{10}	Particulate matter less than or equal to 10 microns in diameter
POD	Pelagic Organism Decline
ppm	parts per million
ppt	Parts per thousand
PPV	Peak particle velocity
PRC	Public Resources Code
PRO	Industrial Process Supply
PSD	Prevention of Significant Deterioration
psi	Pounds per square inch
PV	Photovoltaic
PVC	polyvinyl chloride
RARE	Rare, Threatened, or Endangered Species
RCRA	Resource Conservation and Recovery Act
REC-1	Water Contact Recreation
REC-2	Non-Contact Water Recreation
REL	Chronic reference exposure level
RFO	Request for offers
RMP	Regional Monitoring Program
RPA	Reasonable and Prudent Alternatives
RMS	Root mean square
RO	Reverse osmosis
ROG	Reactive organic gases
ROW	Right-of-way
RPA	Reasonable and Prudent Alternatives
RPS	Renewables Portfolio Standard
RRS	Route of Regional Significance
RSL	Regional Screening Level
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act
SB	State Bill
SC	Federal species of concern
SCVWD	Santa Clara Valley Water District
SDC	Seismic design category
SDWA	Safe Drinking Water Act
SE	State endangered species
SFPUC	San Francisco Public Utilities District
SFRWQCB	San Francisco Bay Regional Water Quality Control Board

SHELL	Shellfish Harvesting
SHPO	California State Historic Preservation Office
SIP	State Implementation Plans
SLC	California State Lands Commission
SMP	Soil Management Plan
SO_2	Sulfur dioxide
SPWN	Spawning, Reproduction, and/or Early Development
SR	State Road
SSC	State species of special concern
ST	State threatened species
STLCs	Soluble Threshold Limit Concentrations
SU	Significant and Unavoidable
SWP	State Water Project
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	California State Water Resources Control Board
TAC	Toxic air contaminant
TAOC	Tidewater Associated Oil Company
TC	Threshold concentration
TCDD	Tetrachlorodibenzodioxin
TCLP	Toxic Characteristic Leaching Procedure
TDS	Total dissolved solids
THM	Trihalomethanes
TOAC	Tidewater Associated Oil Company
TOC	Total Organic Carbons
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
TTLCs	Total Threshold Limit Concentrations
UBC	Uniform Building Code
UCMP	University of California Museum of Paleontology
UF	Ultrafiltration
$\mu g/m^3$	Micrograms per cubic meter
USACE	United States Army Corps of Engineers (or Corps)
USBR	United States Bureau of Reclamation
µS/cm	micro-Siemens per centimeter
USDOT	U.S. Department of Transportation
USEIA	United States Energy Information Administration
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
USPS	United States Postal Service
UV	Ultraviolet light
UWMP	Urban Water Management Plan
VOC	Volatile Organic Compounds
VMT	Vehicle miles traveled
WARM	Warm Freshwater Habitat
WCPS	West Canal Pumping Station
WDR	Waste Discharge Requirements
WF	Urban Waterfront District
WGCEP	Working Group on California Earthquake Probabilities
WHO	World Health Organization
WILD	Wildlife Habitat

WQCP	Water Quality Control Plan
WRCC	Western Regional Climate Center
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant
ZEV	Zero-emission vehicle
ZID	Zone of initial dilution

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EXECUTIVE SUMMARY

ES.1 Introduction

As provided by Section 15123 of the California Environmental Quality Act (CEQA) Guidelines (CEQA *Guidelines*), this Executive Summary provides a brief summary of the proposed Antioch Brackish Water Desalination Project and its consequences. This chapter is intended to summarize in a stand-alone section the proposed project described in Chapter 2 (Project Description), the impacts and mitigation measures discussed in Chapter 3 (Environmental Setting, Impacts, and Mitigation Measures), and the alternatives analysis presented in Chapter 5 (Alternatives to the Proposed Project).

This Environmental Impact Report (Draft EIR) has been prepared to evaluate the anticipated environmental effects of the project in conformance with the provisions of CEQA and the CEQA *Guidelines*. The lead agency, the City of Antioch (City), is the public agency that has the principal responsibility for approving and implementing the project.

The purpose of this Environmental Impact Report (EIR) is to provide adequate information for the public, stakeholders (including responsible, trustee, and regulating agencies), and the City to evaluate the potential environmental impacts of the project.

ES.2 Project Overview

The City proposes to construct, operate, and maintain the Antioch Brackish Water Desalination Project (proposed project). The City proposes to replace the existing San Joaquin River intake pump station, construct a desalination facility with associated equipment and appurtenances; and construction of pipelines for the conveyance of source water and brine concentrate. The desalination plant would have the capacity to produce up to 6 million gallons per day (mgd) of desalinated product water to offset use of purchased water.

The project facilities would be located in the cities of Antioch and Pittsburg, California. The proposed desalination facility would be located within the fenceline of the City of Antioch Water Treatment Plant (WTP) at 401 Putnam Street, and the pipeline routes would generally follow road rights-of-way. The river intake pump station is located at the City marina near McElheny Road and Fulton Shipyard Road. The project setting is predominantly developed and urban, characterized by mostly residential, commercial, and industrial development. The proposed project facilities would be built over approximately 14 months. A detailed description of the proposed project is provided in Chapter 2, *Project Description*.

ES.3 Project Objectives

The main objectives of the project are to:

- Improve water supply reliability and water quality for customers.
- Develop a reliable, and drought-resistant water source to reduce dependency on purchased water supplies by maximizing the use of the City's pre-1914 water rights.
- Maximize the use of existing infrastructure to maintain economic feasibility.
- Provide cost effective operational flexibility to allow the City to respond to changes in source water quality, emergencies, changes in climate and Delta conditions.
- Preserve the value of the City's pre-1914 water rights.

ES.4 Project Components

The project consists of the following components:

- New intake pump station and fish screen to replace existing river intake facilities
- New raw water pipeline connection to the City's existing raw water pipeline to allow water to be conveyed directly from the River to the WTP
- A desalination plant with a finished water capacity of 6 mgd and related facilities, including reverse osmosis (RO); post-treatment systems; chemical feed and storage facilities; brine conveyance facilities; and other associated non-process facilities. The existing WTP (Plant A) would provide pre-treatment of the raw water prior to RO treatment
- Brine disposal pipeline and connection to Delta Diablo's Wastewater Treatment Plant (WWTP) outfall

ES.5 Alternatives to the Proposed Project

Chapter 5, *Alternatives to the Proposed Project*, analyzes a range of reasonable alternatives to the proposed project, including the No Project Alternative, Alternative A: Intake Pump Station Siting Option 1, and Alternative B: Reduced Footprint Alternative.

The analysis of the alternatives is summarized and compared in Chapter 5, which provides a summary of impact levels within all environmental topic areas. Overall, the analysis shows that Alternative A would reduce the severity of some impacts but increase the severity of other impacts. Alternative B would reduce many of the project's significant impacts, but it would not meet all of the objectives of the proposed project. The No Project Alternative would eliminate all impacts compared to the proposed project, but would also not have the ability to meet the objectives of the proposed project.

Based on the evaluation described in Chapter 5, Alternative B would be the environmentally superior alternative to the proposed project because it would have less severe environmental impacts while not increasing the severity of any impacts. However, Alternative B does not meet all of the basic objectives of the project.

ES.6 Comments on the Notice of Preparation

In accordance with Section 15082 of the CEQA *Guidelines*, the City, as lead agency, prepared a Notice of Preparation (NOP) for this EIR. On August 15, 2017, the City sent a Notice of Preparation (NOP) to the State Clearinghouse [SCH No. 2017082044], County Clerk, responsible and trustee government agencies, organizations, and individuals potentially interested in the project. The NOP requested that agencies with regulatory authority over any aspect of the project describe that authority and identify relevant environmental issues that should be addressed in the EIR. Interested members of the public were also invited to comment. A scoping meeting was held on September 5, 2017. The 30-day scoping period for the project remained open through September 14, 2017.

The City received 11 comment letters from local and state agencies during the comment period, as well as questions and comments from attendees during the public scoping meeting on September 5, 2017. The NOP, comment letters, and transcript from the public meeting are included in **Appendix A** of this EIR. As discussed in the NOP and per the provisions of CEQA, the City did not prepare a CEQA Initial Study prior to preparation of the EIR, because the City determined that it was clear at the time of the issuance of the NOP that an EIR was required (CEQA *Guidelines* Section 15060[d]).

ES.7 Areas of Controversy and Issues to be Resolved

Based on the City's review of available information and comments received from the general public and other public agencies in response to the NOP and at the public scoping meeting, the following issues may be either controversial or require further resolution:

- Brine discharge impacts, including impacts to the aquatic and terrestrial environment.
- Direct, indirect, and cumulative effects of the project on the ecosystem related to the additional withdrawals of water from the system.
- Potential impingement and entrainment of aquatic organisms related to intake and discharge processes.
- Effects to the ecosystem and regional water supply reliability due to potential reductions in water purchased from the Contra Costa Water District due to the project.
- Potential impacts on the Delta Diablo District's National Pollutant Discharge Elimination System (NPDES) permit related to brine discharge volumes and total dissolved solids (TDS) concentration.
- Potential project construction impacts to cultural resources and tribal cultural resources.

- Potential project construction impacts to existing infrastructure, including stormwater collection and transportation infrastructure in the cities of Antioch and Pittsburg.
- Potential project construction impacts to former Old Valley Pipeline (OVP) and Tidewater Associated Oil Company (TAOC) pipelines in the project area.
- Potential noise and odor impacts.

These issues have been considered in this EIR, where applicable.

ES.8 Mitigation Monitoring and Reporting

CEQA requires public agencies to adopt monitoring and reporting programs to ensure compliance with mitigation measures adopted or made conditions of project approval in order to mitigate or avoid the significant environmental effects identified in environmental impact reports. A Mitigation Monitoring and Reporting Program (MMRP) incorporating the mitigation measures set forth in this EIR will be prepared and approved by the City concurrently with adoption of the findings of this EIR and prior to approval of the proposed project.

ES.9 Summary of Environmental Impacts and Mitigation Measures

Table ES-1 summarizes the impacts, mitigation measures, and unavoidable significant impacts identified and analyzed for the proposed project. Refer to the appropriate EIR section for detailed information.

TABLE ES-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
Aesthetics		
Impact 3.1-1: The proposed project would not have a substantial adverse effect on a scenic vista or scenic resource.	None required	Less than Significant
Impact 3.1-2: The proposed project would change the existing visual character of the river intake pump station site and WTP, but would not substantially degrade the existing visual character or quality of the site and its surroundings.	**Improvement Measure 3.1-2:** Maintain Clean and Orderly Construction Sites. Contractor specifications shall include a requirement that the construction contractor(s) keep staging and construction areas as clean and inconspicuous as practicable by storing construction materials and equipment at the proposed construction staging areas or in areas that are generally away from public view when not in use, and by removing construction debris promptly at regular intervals. If necessary, additional appropriate screening (e.g., temporary opaque fencing) shall be used at construction sites to buffer views of construction equipment and material, where the use of such screening materials would not further degrade the visual character or further obstruct views of scenic resources or vistas in the area. Screening is not required for pipeline construction areas.	Less than Significant
Impact 3.1-3: The proposed project would not create a new source of substantial light or glare that would adversely affect day or nighttime views in the area, or which would substantially impact other people or properties.	None required	Less than Significant
Impact 3.1-C-1: Implementation of the proposed project, in combination with other cumulative development, would not have a substantial adverse effect on a scenic vista or scenic resource.	None required	Less than Significant
Impact 3.1-C-2: Implementation of the proposed project, in combination with other cumulative development, would not substantially degrade the existing visual character or quality of the site and its surroundings.	None required	Less than Significant
Impact 3.1-C-3: Implementation of the proposed project, in combination with other cumulative development, would not create a new source of substantial light or glare that would adversely affect day or nighttime views in the area, or which would substantially impact other people or properties.	None required	Less than Significant
Air Quality		
Impact 3.2-1: Construction of the project would result in criteria pollutant emissions that could exceed air quality standards or contribute substantially to an existing or projected air quality violation.	**Mitigation Measure 3.2-1: BAAQMD Basic Construction Measures.** To limit air pollutant emissions associated with construction, the City of Antioch and/or its construction contractor(s) shall implement and include in all contract specifications for the project the following BAAQMD-recommended Basic Construction Measures:	Less than Significant

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
	• All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day. • All haul trucks transporting soil, sand, or other loose material off-site shall be covered. • 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. • All vehicle speeds on unpaved roads shall be limited to 15 miles per hour (mph). • 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. • Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points. • All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation. • Post a publicly visible sign with the telephone number and persons to contact at the City of Antioch regarding dust complaints. These persons shall respond and take corrective action within 48 hours. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.	
Impact 3.2-2: Operations of the project would not result in criteria pollutant emissions that could contribute to an existing or projected air quality violation.	None required	Less than Significant
Impact 3.2-3: Construction of the project would result in emissions that could conflict with the 2017 Clean Air Plan.	**Mitigation Measure 3.2-1: BAAQMD Basic Construction Measures.**	Less than Significant
Impact 3.2-4: Construction of the project could expose sensitive receptors to toxic air contaminants, including diesel particulate matter emissions.	**Mitigation Measure 3.2-4: Construction Emissions Minimization.** The City of Antioch (and/or its construction contractor(s)) shall ensure that all diesel-powered equipment to be operated during construction activities at the river pump station and desalination facility sites meet USEPA-certified Tier 4 standards, the highest USEPA-certified tiered emission standards. An Exhaust Emissions Equipment inventory shall be prepared prior to the commencement of construction and maintained throughout construction that identifies each off-road unit's certified tier specification status to be operated at the river pump station and desalination facility sites.	Less than Significant
Impact 3.2-5: Operation of the project would not expose sensitive receptors to toxic air contaminants, including diesel particulate matter emissions.	None required	Less than Significant
Impact 3.2-6: Construction of the project would not create odors.	None required	Less than Significant

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
Impact 3.2-C-1: Construction of the proposed project, in combination with other cumulative development, could result in criteria pollutant emissions that would exceed air quality standards or contribute substantially to an existing or projected air quality violation.	**Mitigation Measure 3.2-1: BAAQMD Basic Construction Measures.**	Less than Significant
Impact 3.2-C-2: Operation of the proposed project, in combination with other cumulative development, would not result in criteria pollutant emissions that would exceed air quality standards or contribute substantially to an existing or projected air quality violation.	None required	Less than Significant
Impact 3.2-C-3: Construction of the proposed project, in combination with other cumulative development, could expose sensitive receptors to toxic air contaminants, including diesel particulate matter emissions.	**Mitigation Measure 3.2-4: Construction Emissions Minimization**	Less than Significant
Impact 3.2-C-4: Operation of the proposed project, in combination with other cumulative development, would not expose sensitive receptors to toxic air contaminants, including diesel particulate matter emissions.	None required	Less than Significant
Impact 3.2-C-5: Construction of the proposed project, in combination with other cumulative development, would not expose people to odors.	None required	Less than Significant
Aquatic Biology		
Impact 3.3-1: Construction of the proposed intake facility could result in short-term degradation of aquatic habitat from accidental spills or seepage of hazardous materials during construction.	None required	Less than Significant
Impact 3.3-2: Construction of the proposed project has the potential to result in a loss or degradation of aquatic habitat in the Delta from increased sedimentation and turbidity.	None required	Less than Significant
Impact 3.3-3: Construction of the proposed intake facility could result in direct disturbance and mortality of fish from installation of cofferdams and dewatering.	**Mitigation Measure 3.3-3a: Conduct Worker Awareness Training.** A worker awareness training program shall be conducted for construction crews before the start of construction activities. The program shall include a brief overview of sensitive fisheries and aquatic	Less than Significant

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
	resources (including riparian habitats) on the project site, measures to minimize impacts on those resources, and conditions of relevant regulatory permits. **Mitigation Measure 3.3-3b: Implement In-water Work Windows.** Any in-water construction activities (e.g., construction of the sheetpile cofferdam) shall be conducted during months when special-status fish species/sensitive life stages are least likely to be present or less susceptible to disturbance (e.g., August 1 to October 31; anadromous salmonids and smelts). If any in-water work is to be conducted, a qualified biologist or resource specialist shall be present during such work to monitor construction activities and ensure compliance with terms and conditions of permits issued by regulatory agencies (see Mitigation Measure 3.3-3d below). **Mitigation Measure 3.3-3c: Develop and Implement Fish Rescue Plan.** To reduce the potential for fish stranding or minimize the potential for harm during cofferdam dewatering activities, the City or its contractor shall develop and implement a fish rescue plan. Prior to the closure of the cofferdam in the Delta, seining by a qualified fisheries biologist shall be conducted within the cofferdam using a small-mesh seine to direct and move fish out of the cofferdam area. Upon completion of seining, the entrance to the cofferdam shall be blocked with a net to prevent fish from entering the cofferdam isolation area before the cofferdam is completed. Once the cofferdam is completed and the area within the cofferdam is closed and isolated, additional seining shall be conducted within the cofferdam to remove any remaining fish, if present. Once all noticeable fish have been removed from the isolated area, portable pumps with intakes equipped with 1.75 mm mesh screen shall be used to dewater to a depth of 1.5-2 feet. A qualified biologist shall implement further fish rescue operations using electrofishing and dip nets. All fish that are captured shall be placed in clean 5-gallon buckets and/or coolers filled with Delta water, transported downstream of the construction area, and released back into suitable habitat in the Delta with minimal handling. After all fish have been removed using multiple seine passes, electrofishing, and dip nets (as necessary), portable pumps with screens (see above) shall be used for final dewatering. NMFS, USFWS, and CDFW shall be notified at least 48 hours prior to the fish rescue. **Mitigation Measure 3.3-3d: Consult with Resources Agencies and Implement Additional Measures.** The City shall also consult with NMFS, USFWS, and CDFW (as part of obtaining permit approvals (e.g., FESA Section 7, CESA [Fish and Game Code Sections 2080.1, 2081]) to determine necessary impact minimization actions, which may include surveying the intake site to determine fish presence prior to installation. The City shall implement any additional measures developed through the FESA Section 7 and Fish and Game Code Sections 2080.1, 2081 permit processes, to ensure that impacts are avoided and/or minimized.	
Impact 3.3-4: Construction of the proposed intake facility could result in a short-term degradation of aquatic habitat caused by an increase in hydrostatic pressure, underwater noise, and vibrations.	**Mitigation Measure 3.3-4: Underwater Sound Levels.** The City shall implement the following measures to avoid and minimize potential adverse effects that could otherwise result from in-water pile-driving activities: • The City shall develop a plan for pile-driving activities to minimize impacts on fish and will allow sufficient time in the schedule for coordination with regulatory agencies. Measures will be implemented	Less than Significant

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
	to minimize underwater sound pressure to levels below thresholds for peak pressure and accumulated sound exposure levels. Threshold levels established by NMFS are: ◦ peak pressure = 206 dB_{peak} ◦ accumulated sound exposure levels= 183 dB_{SEL} • Underwater sound monitoring shall be performed during pile-driving activities. A qualified acoustician, biologist, and/or natural resource specialist shall be present during such work to monitor construction activities and compliance with terms and conditions of permits. • Pile driving shall occur during the established/approved work window (August 1 through October 31, or other as approved by NMFS, USFWS, and CDFW). • Sheet piling shall be driven by vibratory or nonimpact methods (i.e., hydraulic) that result in sound pressures below threshold levels to the extent feasible. • Pile driving activities may occur during periods of reduced currents as needed to meet the threshold limits. Pile-driving activities shall be monitored and if any stranding, injury, or mortality to fish is observed, CDFW, NMFS, and/or USFWS shall be immediately notified and in-water pile driving shall cease. • Pile driving shall be conducted only during daylight hours and initially will be used at low energy levels and reduced impact frequency. Applied energy and frequency shall be gradually increased until the force and frequency necessary to advance the pile is achieved. • If it is determined that impact hammers are required and/or underwater sound monitoring demonstrates that thresholds are being exceeded, the contractor shall implement sound dampening or attenuation devices to reduce levels to the extent feasible; these may include the following: ◦ water bladder cofferdam; ◦ confined or unconfined air bubble curtain.	
Impact 3.3-5: Construction of the proposed intake facility would result in a loss of shallow water habitat.	**Mitigation Measure 3.3-5: Purchase Mitigation Credits.** The City shall purchase mitigation credits from a public or private mitigation bank approved by USFWS, NMFS, and/or CDFW. The final number of credits to be purchased shall be determined in consultation with USFWS, NMFS, and CDFW. Mitigation credit purchase shall be conducted either before or as soon as possible after construction of the intake commences.	Less than Significant
Impact 3.3-6: Operation of the proposed intake facility could result in increased predation of fish.	None required	Less than Significant
Impact 3.3-7: Operation of the proposed intake facility could impinge and/or entrain fish, including fish eggs and larvae.	None required	Less than Significant
Impact 3.3-8: Operation of the proposed project, including discharge of brine waste, could result in direct mortality of fish species or degradation and/or loss of aquatic habitat.	None required	Less than Significant

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
Impact 3.3-C-1 through C-4: Construction of the proposed intake facility in combination with other cumulative projects, could result in short-term degradation of aquatic habitat from (C-1) accidental spills or seepage of hazardous materials, (C-2) increased sedimentation and turbidity, (C-3) direct disturbance and mortality of fish from installation of cofferdams and dewatering, and (C-4) short-term degradation of aquatic habitat caused by an increase in hydrostatic pressure, underwater noise, and vibrations.	None required	Less than Significant
Impact 3.3-C-5: Construction of the proposed intake facility in combination with other cumulative projects would result in a loss of shallow water habitat.	None required	Less than Significant
Impact 3.3-C-6: Operation of the proposed intake facility in combination with other cumulative projects could result in increased predation of fish.	None required	Less than Significant
Impact 3.3-C-7: Operation of the proposed intake facility in combination with other cumulative projects could impinge and/or entrain fish, including fish eggs and larvae.	None required	Less than Significant
Impact 3.3-C-8: Operation of the proposed project facility in combination with other cumulative projects, including discharge of brine waste, could result in direct mortality of fish species or degradation and/or loss of aquatic habitat.	None required	Less than Significant
Terrestrial Biological Resources		
Impact 3.4-1: The proposed project could result in significant impacts, either directly or through habitat modifications, on species identified as sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service.	**Mitigation Measure 3.4-1a: Pre-construction Nesting Bird Surveys** The general raptor and passerine bird nesting period cited by CDFW is often cautiously interpreted as the period between February 1 and August 31. Breeding birds are protected under Section 3503 of the California Fish and Game Code (Code), and raptors are protected under Section 3503.5. In addition, both Section 3513 of the Code and the Federal Migratory Bird Treaty Act (16 USC, Sec. 703 Supp. I, 1989) prohibit the killing, possession, or trading of migratory birds. Finally, Section 3800 of the Code prohibits the taking of non-game birds, which are defined as birds occurring naturally in California that are neither game birds nor fully protected species. In general, CDFW recommends a 250-foot construction exclusion zone around the nests of active passerine songbirds during the breeding season, and a 500-foot buffer for nesting raptors. These buffer distances are considered initial starting distances once a nest has been identified, and are sometimes revised downward to 100 feet and 250 feet, respectively, based on site conditions and the nature of the work being performed. These buffer distances may also be modified if obstacles such as buildings or trees obscure the construction area from active bird nests, or existing disturbances create an ambient background disturbance similar to the proposed disturbance.	Less than significant

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
	a) Avian surveys shall be performed during breeding bird season (February 1 to August 31) no more than 14 days prior to ground disturbing or in-water construction activities in order to locate any active passerine nests within 250 feet of the project footprint and any active raptor nests within 500 feet of the project footprint. Building demolition, trenching, pipeline installation, and new construction activities performed between September 1 and January 31 avoid the general nesting period for birds and therefore would not require pre-construction surveys. b) If active nests are found on either the proposed construction site, no-work buffer zones shall be established around the nests (100 to 150 feet for passerine birds and 150 to 250 feet for raptors, depending upon species sensitivity to disturbance) in coordination with CDFW. No staging, ground-disturbing, or construction activities shall occur within a buffer zone until young have fledged or the nest is otherwise abandoned as determined by the qualified biologist. If work during the nesting season stops for 14 days or more and then resumes, then nesting bird surveys shall be repeated, to ensure that no new birds have begun nesting in the area. **Mitigation Measure 3.4-1b: Pre-construction Bat Survey** To minimize impacts on special-status bats, a preconstruction survey shall be performed from accessible lands, and no-disturbance buffers shall be created around active bat roosting sites, if found. Prior to ground disturbing construction activities (i.e., ground clearing, trenching, and grading) within 200 feet of trees that could support special-status bats, a qualified bat biologist shall survey for special-status bats. If no evidence of bats (i.e., direct observation, guano, staining, or strong odors) is observed, no further mitigation shall be required. If evidence of bats is observed, the following measures shall be implemented to avoid potential impacts on breeding populations: a) A no-disturbance buffer of 200-feet shall be created around active bat roosts during the breeding season (April 15 through August 15). Bat roosts initiated during construction are presumed to be unaffected by the indirect effects of noise and construction disturbances. However, the direct take of individuals will be prohibited. b) In the case that removal of trees showing evidence of bat activity is needed, tree removal shall occur during the period least likely to affect bats, as determined by a qualified bat biologist (generally between February 15 and October 15 for winter hibernacula, and between August 15 and April 15 for maternity roosts). Bat exclusion activities (e.g., installation of netting to block roost entrances) shall also be conducted during these periods. The qualified biologist shall be present during any tree trimming and disturbance, if trees containing or suspected of containing bat roosts are present. Trees with roosts shall be disturbed only when no rain is occurring or is forecast to occur for 3 days and when daytime temperatures are at least 50 degrees Fahrenheit (°F). Branches and limbs not containing cavities or fissures in which bats could roost shall be cut only using chainsaws. Branches or limbs containing roost sites shall be trimmed the following day, under the supervision of the qualified biologist, also using chainsaws.	

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
Impact 3.4-2: Development facilitated by the proposed project would not have a substantial adverse effect on riparian habitat or other sensitive natural communities identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.	None required	No impact
Impact 3.4-3: The proposed project could have a substantial adverse effect on state or federally-protected wetlands, 'other waters', and navigable waters through direct removal, filling, hydrological interruption, or other means. (Less than Significant with Mitigation)	**Mitigation Measure 3.4-3: Recontour Aquatic Habitat and Remove Debris Following In-Water Construction** To mitigate impacts on waters of the U.S. in the San Joaquin River, it is estimated that the City will remove debris (e.g., concrete, the existing pipeline, and piers) and structures from the work area in an amount that is equal to or greater than the area of new facilities that will be introduced into the water. Because no wetlands (i.e., vegetated aquatic habitat) is present in the project footprint, the City need only restore the bottom contours of the San Joaquin River bed to emulate existing aquatic conditions at the site and no further shoreline restoration is needed. Specific water quality requirements during construction are identified in Section 3.10, *Local Hydrology and Water Quality*.	Less than significant
Impact 3.4-4: Development facilitated by the proposed project would not interfere with the movement of 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.	None required	No impact
Impact 3.4-5: Development facilitated by the proposed project would not conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	**Mitigation Measure 3.4-1(a) and 3.4-1(b): Pre-construction Surveys**	Less than significant
Impact 3.4-6: Development facilitated by the proposed project would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.	None required	No impact
Impact 3.4-C-1: Implementation of the proposed project, in combination with past, present, and reasonably foreseeable future development could result in a cumulatively significant impact related to terrestrial biological resources.	**Mitigation Measure 3.4-1(a) and 3.4-1(b): Pre-construction Surveys**	Less than significant

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
Cultural Resources		
Impact 3.5-1: The proposed project would not cause a substantial adverse change in the significance of a historical resource or a landmark of local cultural or historical importance.	None required	No impact
Impact 3.5-2: The project could cause a substantial adverse change in the significance of an archaeological resource.	**Mitigation Measure 3.5-2: Inadvertent Discovery of Archaeological Resources.** If prehistoric or historic-era archaeological resources are encountered by construction personnel during project implementation, all construction activities within 100 feet shall halt until a qualified archaeologist, defined as one meeting the Secretary of the Interior's Professional Qualification Standards for archaeology, can assess the significance of the find. Prehistoric archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil (midden) containing heat-affected rocks, artifacts, or shellfish remains; stone milling equipment (e.g., mortars, pestles, hand stones, or milling slabs); and battered stone tools, such as hammer stones and pitted stones. Historic-era materials might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and/or ceramic refuse. If a find is evaluated and determined to be significant, a mitigation plan shall be developed that recommends preservation in place as a preference or, if preservation in place is not feasible, data recovery through excavation. The mitigation plan will be developed in consultation with the affiliated Native American tribe(s), as appropriate. If preservation in place is feasible, this may be accomplished through one of the following means: (1) modifying the construction plan to avoid the resource; (2) incorporating the resource within open space; (3) capping and covering the resource before building appropriate facilities on the resource site; or (4) deeding the resource site into a permanent conservation easement. If preservation in place is not feasible, a qualified archaeologist shall prepare and implement a detailed treatment plan to recover scientifically consequential information from the resource prior to any excavation at the site. Treatment for most resources would consist of (but would not necessarily be limited to) sample excavation, artifact collection, site documentation, and historical research, with the aim to target the recovery of important scientific data contained in the portion(s) of the significant resource to be impacted by the project. The treatment plan shall include provisions for analysis of data in a regional context; reporting of results within a timely manner; curation of artifacts and data at an approved facility; and dissemination of reports to local and state repositories, libraries, and interested professionals. Should the project include federal funding or oversight or otherwise qualify as a federal undertaking, the archaeological study shall be prepared in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended.	Less than significant
Impact 3.5-3: The proposed project could disturb human remains, including those interred outside of dedicated cemeteries.	**Mitigation Measure 3.5-3: Inadvertent Discovery of Human Remains.** In the event human remains are uncovered during construction activities for the project, the City shall immediately halt work, contact the Contra Costa County Coroner to evaluate the remains, and follow the procedures and protocols pursuant to Section 15064.5(e)(1) of the CEQA Guidelines. State Health and Safety Code Section 7050.5 requires that no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to PRC Section 5097.98. If the remains are determined to be of Native American descent, the coroner has 48 hours to notify the Native American Heritage Commission (NAHC). The NAHC will then identify the person thought to be the Most Likely	Less than significant

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
	Descendent of the deceased Native American. The Most Likely Descendent will make recommendations for means of treating, with appropriate dignity, the human remains and any associated grave goods as provided in PRC Section 5097.98.	
Impact 3.5-C-1: Implementation of the proposed project, in combination with other cumulative development, could contribute to cumulative impacts to archaeological resources.	**Mitigation Measure 3.5-2: Inadvertent Discovery of Archaeological Resources.**	Less than significant
Impact 3.5-C-2: Implementation of the proposed project, in combination with other cumulative development, could contribute to cumulative impacts to human remains.	**Mitigation Measure 3.5-3: Inadvertent Discovery of Human Remains.**	Less than significant
Geology, Soils, and Paleontological Resources		
Impact 3.6-1: The proposed project would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury or death involving strong ground shaking or seismically induced ground failure, including liquefaction and lateral spreading.	None required	Less than significant
Impact 3.6-2: The proposed project would not result in substantial soil erosion.	None required	Less than significant
Impact 3.6-3: The proposed project would not create direct or indirect substantial risks to life or property due to expansive or corrosive soils.	None required	Less than significant
Impact 3.6-C-1: Implementation of the proposed project, in combination with past, present, and reasonably foreseeable future development would not result in a cumulatively significant impact related to geology and soils.	None required	Less than significant
Energy		
Impact 3.7-1: The project would not use large amounts of fuel or energy in an unnecessary, wasteful, or inefficient manner.	**Mitigation Measure 3.7-1: Construction Equipment Efficiency.** The City shall retain a qualified professional (i.e., construction planner/energy efficiency expert) to identify the specific measures that the City (and its construction contractors) will implement as part of project construction and decommissioning to increase the efficient use of construction equipment to the maximum extent feasible. Such measures shall include, but not necessarily be limited to: procedures to ensure that all construction equipment is properly tuned and maintained at all times; a commitment to utilize existing electricity sources where feasible rather than portable diesel-powered generators; and identification of procedures (including the routing of haul trips) that will be followed to ensure that all materials and debris hauling is conducted in a fuel-efficient manner. The measures shall be incorporated into construction specifications and implemented throughout the construction and decommissioning periods.	Less than significant

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
	Mitigation Measure 3.2-1: BAAQMD Basic Construction Measures.	
Impact 3.7-2: project would not constrain local or regional energy supplies, require additional capacity, affect peak and base periods of electrical demand, or otherwise require or result in the construction of new electrical generation and/or transmission facilities, or expansion of existing facilities, the construction of which could cause significant environmental effects.	None required	Less than significant
Impact 3.7-C-1: Implementation of the project, in combination with past, present, and reasonably foreseeable future development, would not use large amounts of fuel or energy in an unnecessary, wasteful, or inefficient manner.	**Mitigation Measure 3.7-1: Construction Equipment Efficiency.** **Mitigation Measure 3.2-1: BAAQMD Basic Construction Measures.**	Less than significant
Impact 3.7-C-2: Implementation of the project, in combination with past, present, and reasonably foreseeable future development, would not constrain local or regional energy supplies, require additional capacity, affect peak and base periods of electrical demand, or otherwise require or result in the construction of new electrical generation and/or transmission facilities, or expansion of existing facilities, the construction of which could cause significant environmental effects.	None required	Less than significant
Greenhouse Gases		
Impact 3.8-1: The project would not generate an amount of GHG emissions that would contribute substantially to climate change.	None required	Less than significant
Impact 3.8-2: The project would not conflict with the Executive Order B-30-15 Emissions Reduction Goal.	None required	Less than significant
Impact 3.8-C-1: Implementation of the project, in combination with past, present, and reasonably foreseeable future development, would not result in a cumulatively significant impact related to generating GHG emissions that would contribute substantially to climate change.	None required	Less than significant
Impact 3.8-C-2: The project, in combination with other cumulative development, would not conflict with the Executive Order B-30-15 Emissions Reduction Goal.	None required	Less than significant

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
Hazards and Hazardous Materials		
Impact 3.9-1: The proposed project would not create a significant hazard to the public or the environment through the routine transport, use, disposal, or accidental release of hazardous materials.	None required	Less than significant
Impact 3.9-2: The proposed project could emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.	**Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan**	Less than significant
Impact 3.9-3: The proposed project would be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, could create a significant hazard to the public or the environment.	**Mitigation Measure 3.9-3a: Health and Safety Plan** The construction contractor(s) shall prepare and implement site-specific Health and Safety Plans (HASP) in accordance with 29 CFR 1910.120 to protect construction workers and the public during all excavation and grading activities. This HASP shall be submitted to the City of Antioch for review prior to commencement of demolition and construction activities and as a condition of the grading, construction, and/or demolition permit(s). The HASP shall include, but is not limited to, the following elements: • Designation of a trained, experienced site safety and health supervisor who has the responsibility and authority to develop and implement the site HASP; • A summary of all potential risks to demolition and construction workers and maximum exposure limits for all known and reasonably foreseeable site chemicals; • Specified personal protective equipment and decontamination procedures, if needed; • Emergency procedures, including route to the nearest hospital; and Procedures to be followed in the event that evidence of potential soil or groundwater contamination (such as soil staining, noxious odors, debris or buried storage containers) is encountered. These procedures shall be in accordance with hazardous waste operations regulations and specifically include, but are not limited to, the following: immediately stopping work in the vicinity of the unknown hazardous materials release, notifying Contra Costa Health Services - Hazardous Materials Programs, and retaining a qualified environmental firm to perform sampling and remediation. **Mitigation Measure 3.9-3b: Soil Management Plan** In support of the HASP described above in Mitigation Measure HAZ-1, the contractor shall develop and implement a Soil Management Plan (SMP) that includes a materials disposal plan specifying how the construction contractor(s) will remove, handle, transport, and dispose of all excavated materials in a safe, appropriate, and lawful manner. This SMP shall be submitted to the City of Antioch for review prior to commencement of demolition and construction activities and as a condition of the grading, construction, and/or demolition permit(s). The SMP must identify protocols for soil testing and disposal, identify the approved disposal site, and include written documentation that the disposal site can accept the waste. Contract specifications shall mandate full compliance with all applicable local, state, and federal regulations related to the identification, transportation, and disposal of hazardous materials, including those encountered in excavated soil. In addition, the City or its contractor shall contact the Fulton Shipyards to acquire the most current information regarding chemicals in sediments around the proposed intake pump	Less than significant

Table ES-1 (continued)
Summary of Impacts and Mitigation Measures

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
	station. The contact is Deltech, LLC, c/o Mr. Shannon Creson, 2200 Wymore Way, Antioch, California 94509, shannon@drilltechdrilling.com. **Mitigation Measure 3.9-3c: ACM Management Plan** Prior to commencement of demolition and construction activities and as a condition of the grading, construction, and/or demolition permit(s), the contractor that would be excavating at the location of the oil pipes that may be covered with ACM shall conduct a survey to determine if the oil pipes are present and if they are coated with ACM. In the event that the abandoned petroleum pipelines are coated with ACM and in support of the HASP described above in Mitigation Measure HAZ-1, the contractor shall develop and implement an ACM Management Plan (ACMMP) that includes a materials disposal plan specifying how the construction contractor will remove, handle, transport, and dispose of all ACM-insulated pipe materials in a safe, appropriate, and lawful manner. The ACMMP must identify protocols for worker protection, ACM testing and disposal, identification of the approved disposal site, and include written documentation that the disposal site can accept the waste. The ACMMP shall be submitted to the BAAQMD for their review and approval. Contract specifications shall mandate full compliance with all applicable local, state, and federal regulations related to the identification, transportation, and disposal of ACM.	
Impact 3.9-4: The proposed project could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	Implement **Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan** (see Transportation and Circulation).	Less than significant
Impact 3.9-C-1: The proposed project, in combination with other cumulative development, would not result in a cumulatively significant impact related to hazards and hazardous materials.	None required	Less than significant
Local Hydrology and Water Quality		
Impact 3.10-1: The proposed project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality.	None required	Less than significant
Impact 3.10-2: The proposed project would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would: result in substantial erosion or siltation onsite or offsite; substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite; 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; impede or redirect flood flows.	None required	Less than significant

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
Impact 3.10-3: The proposed project would not risk release of pollutants due to project inundation from being located in flood hazard zones.	None required	Less than significant
Impact 3.10-C-1: Implementation of the proposed project, in combination with past, present, and reasonably foreseeable future development would not result in a cumulatively significant impact related to hydrology and water quality.	None required	Less than significant
Delta Hydrology and Water Quality		
Impact 3.11-1: Changes in the location and timing of water diversion from the Delta, when combined with proposed discharges, could alter threshold concentrations established by the Regional Water Quality Control Board, or otherwise violate waste discharge or water quality standards.	None required	Less than significant
Impact 3.11-2: The proposed project could exceed applicable NPDES permit discharge standards.	None required	Less than significant
Impact 3.11-C-1: Implementation of the proposed project, in combination with other cumulative development, could contribute to cumulative degradation of water quality in the Delta.	None required	Less than significant
Impact 3.11-C-2: Implementation of the proposed project, in combination with other cumulative development, could potentially affect the timing of outfall capacity limitations associated with development identified under the Delta Diablo Master Plan.	None required	Less than significant
Land Use and Planning		
Impact 3.12-1: The proposed project would not conflict with an applicable land use policy included in a general plan or zoning ordinance adopted for the purpose of avoiding or mitigating an environmental effect.	None required	Less than significant
Impact 3.12-C-1: Implementation of the proposed project, in combination with past, present, and reasonably foreseeable future development would not result in a cumulatively significant impact related to land use.	None required	Less than significant

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
Noise and Vibration		
Impact 3.13-1: Construction of facilities under the proposed project could generate noise levels that exceed the applicable county or city noise standards or result in a substantial temporary increase in ambient noise levels at nearby sensitive receptors.	**Mitigation Measure 3.13-1: General Noise Controls for Construction Equipment and Activities** a) The construction contractor(s) shall assure that construction equipment with internal combustion engines have sound control devices at least as effective as those provided by the original equipment manufacturer. No equipment shall be permitted to have an unmuffled exhaust. b) To reduce potential daytime construction noise impacts to residential uses immediately south of the desalination facility contractors shall employ temporary noise curtains or barriers along the southern and western property boundary of the WTP to shield daytime construction noise impacts to residential uses to the south and west. To reduce potential daytime construction noise impacts to residential uses immediately east of the proposed new pump station, contractors shall employ temporary noise curtains or barriers along the eastern property boundary of the pump station worksite to shield daytime construction noise impacts to residential uses to the east Implementation of this measure will ensure that daytime construction activities do not exceed noise criteria for daytime construction at residential uses (70 dBA Leq). These barriers shall be installed prior to the start of construction. c) Impact tools (i.e., jack hammers, pavement breakers, and rock drills) used for project construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler shall be placed on the compressed air exhaust to lower noise levels by up to approximately 10 dBA. External jackets shall be used on impact tools, where feasible, in order to achieve a further reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever feasible.	Less than significant
Impact 3.13-2: Construction of facilities under the proposed project would not expose persons to or generate excessive ground borne vibration or ground-borne noise levels.	None required	Less than significant
Impact 3.13.3: Operation of the project would generate traffic, stationary source, and area source noise similar to existing noise levels and would not exceed City noise requirements.	**Mitigation Measure 3.13-3: Stationary-Source Noise Controls** The City shall retain an acoustical professional to design stationary-source noise controls and ensure the applicable noise standards are met. At a minimum, all stationary noise sources (e.g., RO pumps) shall be located within enclosed structures and with adequate noise screening, as needed, to maintain noise levels to no greater than 5 dBA above the existing monitored ambient values and 60 CNEL, at the property lines of nearby residences. Once the stationary noise sources have been installed, the contractor(s) shall monitor noise levels to ensure compliance with local noise standards.	Less than significant
Impact 3.13-C-1: Implementation of the proposed project, in combination with other cumulative development could result in a significant noise impact for which the proposed project would make a considerable contribution.	**Mitigation Measure 3.13-1: General Noise Controls for Construction Equipment and Activities**	Less than significant

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
Population and Housing		
Impact 3.14-1: The proposed project would not directly or indirectly induce substantial population growth in the area or create demand for additional housing.	None required	Less than significant
Impact 3.14-C-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects in the vicinity, would not contribute to a cumulative impact on population and housing.	None required	Less than significant
Public Services and Utilities		
Impact 3.15-1: The proposed project could disrupt operations or require relocation of regional or local utilities.	**Mitigation Measure 3.15-1a: Locate and Confirm Utility Lines** Before excavation begins, the City of Antioch or its contractor(s) shall locate all overhead and underground utility lines (such as natural gas, electricity, sewage, telephone, fuel, and water lines) that are reasonably expected to be encountered during excavation. When a project excavation is within the approximate location of a subsurface utility, the City of Antioch or its contractor shall determine the exact location of the underground utility by safe and acceptable means, including the use of hand tools and modern techniques. Information regarding the size, color, and location of existing utilities shall be confirmed before construction activities begin. These utilities shall be highlighted on all construction drawings. **Mitigation Measure 3.15-1b: Coordinate Final Construction Plans with Affected Utilities** The City of Antioch or its contractor(s) shall coordinate final construction plans, schedule, and specifications with affected utilities with utility providers and affected jurisdictions (e.g., the City of Pittsburg). Arrangements shall be made with these entities regarding the appropriate protection, relocation, or temporary disconnection of services. If any interruption of service is required, the City of Antioch or its contractor(s) shall notify residents and businesses in the project corridor of any planned utility service disruption at least 2 working days and up to 14 calendar days in advance. **Mitigation Measure 3.15-1c: Safeguard Employees from Potential Accidents Related to Underground Utilities** When any excavation is open, the construction contractor(s) shall protect, support, or remove underground utilities as necessary to safeguard employees. The contractor(s) shall be required to provide weekly updates to the City of Antioch and construction workers regarding the planned excavations for the upcoming week, and to specify when construction will occur near a high-priority utility (i.e., pipelines carrying petroleum products, oxygen, chlorine, or toxic or flammable gases; natural gas pipelines greater than 6 inches in diameter or with normal operating pressures greater than 60 pounds per square inch gauge; and underground electric supply lines, conductors, or cables that have a potential to ground more than 300 volts that do not have effectively grounded sheaths). Construction managers shall hold regular tailgate meetings with construction staff on days when work near high-priority utilities will occur to review all safety measures regarding such excavations, including measures identified in the Mitigation Monitoring and Reporting Program and in construction specifications. The contractor shall designate a qualified Health and Safety Officer who shall specify a safe distance to work near high-priority utilities. Excavation near such utility lines shall not be	Less than significant

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
	authorized until the designated Health and Safety Officer confirms and documents in the construction records that: (1) the line was appropriately located in the field by the utility owner using as-built drawings and a pipeline-locating device; and (2) the location was verified by hand by the construction contractor. **Mitigation Measure 3.15-1d: Emergency Response Plan** Before commencement of construction, the City of Antioch or its contractor(s) shall develop an emergency response plan that outlines procedures to follow in the event of a leak or explosion. The emergency response plan shall identify the names and phone numbers of staff at the potentially affected utilities that would be available 24 hours per day in the event that construction activities cause damage to or rupture of a high-risk utility. The plan shall also detail emergency response protocols, including notification, inspection, and evacuation procedures; any equipment and vendors necessary to respond to an emergency (such as an alarm system); and routine inspection guidelines. **Mitigation Measure 3.15-1e: Notify Local Fire Departments** The City of Antioch or its contractor(s) shall notify local fire departments in advance of any time work that is to be performed in close proximity to a gas utility line, or any time damage to a gas utility line results in a leak or suspected leak, or whenever damage to any utility results in a threat to public safety. **Mitigation Measure 3.15-1f: Ensure Prompt Reconnection of Utilities** The City of Antioch or its contractor(s) shall promptly contact utility providers to reconnect any disconnected utility lines as soon as it is safe to do so.	
Impact 3.15-2: The proposed project would not exceed the wastewater treatment requirements of the applicable Regional Water Quality Control Board or result in a determination by the wastewater treatment provider that it has inadequate capacity, including treatment and/or outfall capacity, to accommodate the project's projected demand.	None required	Less than significant
Impact 3.15-3: The proposed project would not be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs.	None required	Less than significant
Impact 3.15-C-1: The proposed project, in combination with other cumulative development, could disrupt operations or require relocation of regional or local utilities.	**Mitigation Measure 3.15-1a: Locate and Confirm Utility Lines** **Mitigation Measure 3.15-1b: Coordinate Final Construction Plans with Affected Utilities** **Mitigation Measure 3.15-1c: Safeguard Employees from Potential Accidents Related to Underground Utilities** **Mitigation Measure 3.15-1d: Emergency Response Plan** **Mitigation Measure 3.15-1e: Notify Local Fire Departments** **Mitigation Measure 3.15-1f: Ensure Prompt Reconnection of Utilities**	Less than significant

Table ES-1 (continued)
Summary of Impacts and Mitigation Measures

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
Impact 3.15-C-2: The proposed project, in combination with other cumulative development, would not exceed the wastewater treatment requirements of the applicable Regional Water Quality Control Board or result in a determination by the wastewater treatment provider that it has inadequate capacity, including treatment and/or outfall capacity, to accommodate the project's projected demand.	None required	Less than significant
Recreation		
Impact 3.16-1: Project construction activities could temporarily disrupt access to recreational resources in the vicinity of the project components.	**Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan**	Less than significant
Impact 3.16-C-1: Implementation of the proposed project, in combination with other cumulative development would not result in a cumulatively significant impact related to recreational facilities.	None required	Less than significant
Traffic and Transportation		
Impact 3.17-1: Construction of the proposed project would have temporary and intermittent effects on traffic and transportation conditions in the project area.	**Mitigation Measure 3.17-1a: Encroachment Permits** The construction contractor shall obtain any necessary road encroachment permits prior to constructing each project component and shall comply with the conditions of approval attached to all project permits and approval. In addition, the Construction Traffic Control/Traffic Management Plan (subject to local jurisdiction review and approval) required by Mitigation Measure 3.17-1b, would include safety measures for traffic flow and circulation during project construction. **Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan** The construction contractor shall prepare a Construction Traffic Control/Traffic Management Plan and submit it to the appropriate local jurisdiction prior to construction (i.e., City of Antioch, City of Pittsburg) for review and approval prior to construction. The plan shall include the following components: • Identify hours of construction (between 8:00 AM and 5:00 PM; no construction shall be permitted between 10:00 PM and 7:00 AM); • Schedule truck trips outside of peak morning and evening commute hours to minimize adverse impacts on traffic flow (i.e., if agencies with jurisdiction over the affected roads identify highly congested roadway segments during their review of the encroachment permit applications). Haul routes that minimize truck traffic on local roadways and residential streets shall be used. • Develop circulation and detour plans to minimize impact to local street circulation. This may include the use of signing and flagging to guide vehicles, bicyclists, and pedestrians through and/or around the construction zone. • Control and monitor construction vehicle movements by enforcing standard construction specifications through periodic onsite inspections;	Less than significant

TABLE ES-1 (CONTINUED)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
	• Install traffic control devices where traffic conditions warrant, as specified in the applicable jurisdiction's standards (e.g., the California Manual of Uniform Traffic Controls for Construction and Maintenance Work Zones); • Perform construction that crosses on-street and off-street bikeways, sidewalks, and other walkways in a manner that allows for safe access for bicyclists and pedestrians. Alternatively, provide safe detours to reroute affected bicycle/pedestrian traffic. • Consult with the Tri Delta Transit at least one month prior to construction to coordinate bus stop relocations (as necessary) and to reduce potential interruption of transit service; • Comply with roadside safety protocols to reduce the risk of accidents. Provide "Road Work Ahead" warning signs and speed control (including signs informing drivers of state-legislated double fines for speed infractions in a construction zone) to achieve required speed reductions for safe traffic flow through the work zone. • Identify all access and parking restrictions, pavement markings and signage requirements (e.g., speed limit, temporary loading zones); • Store all equipment and materials in designated contractor staging areas; • Encourage construction crews to park at staging areas to limit lane closures in the public ROW; • Include a plan and implementation process for notifications and a process for communication with affected residents, businesses, and recreational users (public boat launch ramp and Contra Costa County Fairground) prior to the start of construction. Advance public notification shall include posting of notices and appropriate signage of construction activities at least one week in advance. The written notification shall include the construction schedule, the exact location and duration of activities within each street (i.e., which lanes and access point/driveways would be blocked on which days and for how long), and a toll-free telephone number for receiving questions or complaints; • Include a plan and implementation process to coordinate all construction activities with emergency service providers in the area at least one month in advance. Emergency service providers shall be notified of the timing, location, and duration of construction activities. All roads shall remain passable to emergency service vehicles at all times; • Include a plan and implementation process to coordinate all construction activities with the Antioch Unified School District at least two months in advance. The School District shall be notified of the timing, location, and duration of construction activities. The City shall coordinate with the School District to identify peak circulation periods at schools along the alignment(s) (i.e., the arrival and departure of students), and require their contractor to avoid construction and lane closures during those periods. The construction contractor for each project component shall be required to maintain vehicle, bicycle, pedestrian, and school bus service during construction through inclusion of such provisions in the construction contract. The assignment of temporary crossing guards at designated intersections may be needed to enhance pedestrian safety during project construction; • Identify all roadway locations where special construction techniques (e.g., trenchless pipeline installation or night construction) will be used to minimize impacts to traffic flow. Include the requirement that all open trenches be covered with metal plates at the end of each workday to accommodate traffic and access; and	

Table ES-1 (continued)
Summary of Impacts and Mitigation Measures

Environmental Impact	Mitigation Measures	Level of Significance after Mitigation
	• Specify the street restoration requirements pursuant to agreements with the local jurisdictions (i.e., City of Antioch, City of Pittsburg).	
Impact 3.17-2: Construction of the proposed project would temporarily disrupt circulation patterns near sensitive land uses (schools, hospitals, fire stations, police stations, and other emergency providers).	**Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan**	Less than significant
Impact 3.17-3: Construction of the proposed project would have temporary effects on alternative transportation or alternative transportation facilities in the project area.	**Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan**	Less than significant
Impact 3.17-4: Construction of the proposed project would temporarily increase the potential for accidents on project area roadways.	**Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan**	Less than significant
Impact 3.17-5: Construction of the proposed project would increase wear-and-tear on the designated haul routes used by construction vehicles to access the project area work sites.	**Mitigation Measure 3.17-5: Roadway Repairs** The City shall repair any roads damaged by project construction to a structural condition equal to that which existed prior to construction activity. Prior to project construction, City of Antioch Public Works Department shall document road conditions for all routes that would be used by project-related vehicles. The City shall also document road conditions after project construction is completed. Roads damaged by project construction shall be repaired to a structural condition equal to that which existed prior to construction activity.	Less than significant
Impact 3.17-C-1: Construction of the proposed project, in combination with other cumulative development, could result in cumulative effects relating to transportation and circulation conditions in the project study area.	**Mitigation Measure 3.17-1a: Encroachment Permits** **Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan** **Mitigation Measure 3.17-5: Roadway Repairs**	Less than significant
Tribal Cultural Resources		
Impact 3.18-1: The project could cause a substantial adverse change in the significance of a tribal cultural resource.	**Mitigation Measure 3.5-2: Inadvertent Discovery of Archaeological Resources** **Mitigation Measure 3.5-3: Inadvertent Discovery of Human Remains**	Less than significant
Impact 3.18-C-1: Implementation of the proposed project, in combination with other cumulative development, could contribute to cumulative impacts to tribal cultural resources.	**Mitigation Measure 3.5-2: Inadvertent Discovery of Archaeological Resources** **Mitigation Measure 3.5-3: Inadvertent Discovery of Human Remains**	Less than significant

CHAPTER 1
Introduction

1.1 Purpose of the Environmental Impact Report

The proposed Brackish Water Desalination Project approvals constitute a "project" as defined by, and subject to the requirements of, the California Environmental Quality Act (CEQA) (Public Resources Code, Section 21000 et seq.) and the "CEQA *Guidelines*" (California Code of Regulations, Title 14, Section 15000 et seq.). For purposes of CEQA, the term "project" refers to the whole of an action which has the potential for resulting in a direct physical change or a reasonably foreseeable indirect physical change in the environment (CEQA *Guidelines* Section 15378). As the principal public agency responsible for approving the project, the City of Antioch (City) is the "lead agency" overseeing and administering the CEQA environmental review process.

As set forth in the provisions of CEQA *Guidelines* Section 15126.4, before deciding whether to approve a project, public agencies must consider the significant environmental impacts of the project and must identify feasible measures to minimize those impacts. Pursuant to CEQA *Guidelines* Section 15064, if any aspect of the proposed project, either individually or cumulatively, may cause a significant effect on the environment, regardless of whether the overall effect of the project is adverse or beneficial, an EIR must be prepared. The City has determined that the potential impacts resulting from the proposed project require the preparation of an environmental impact report (EIR).

This EIR is a factual informational document, prepared in conformance with CEQA, and written for the purpose of making the public and decision-makers aware of the environmental consequences of the proposed project. For any consequence, or project impact, that is considered "significant," the EIR identifies mitigation measures, where feasible, to reduce or avoid the significant impact. The EIR also considers the objectives of the project and identifies whether there might be alternative ways of accomplishing those objectives while avoiding or substantially reducing the project's impacts.

Before any action may be taken to approve the project, the City must certify that it has reviewed and considered the information in the EIR and that the EIR has been completed in conformity with the requirements of CEQA. Certification of the EIR does not approve or deny the proposed project.

1.2 EIR Process

1.2.1 Notice of Preparation

In accordance with Section 15082 of the CEQA *Guidelines*, the City, as lead agency, prepared a Notice of Preparation (NOP) for this EIR. On August 15, 2017, the City sent a Notice of Preparation (NOP) to the State Clearinghouse [SCH No. 2017082044], County Clerk, responsible and trustee government agencies, organizations, and individuals potentially interested in the project. The NOP requested that agencies with regulatory authority over any aspect of the project describe that authority and identify relevant environmental issues that should be addressed in the EIR. Interested members of the public were also invited to comment. A scoping meeting was held on September 5, 2017. The 30-day scoping period for the project remained open through September 14, 2017.

The City received 11 comment letters from local and state agencies during the comment period, as well as questions and comments from attendees during the public scoping meeting on September 5, 2017. The NOP, comment letters, and transcript from the public meeting are included in **Appendix A** of this EIR. As discussed in the NOP and per the provisions of CEQA, the City did not prepare a CEQA Initial Study prior to preparation of the EIR, because the City determined that it was clear at the time of the issuance of the NOP that an EIR was required (CEQA *Guidelines* Section 15060[d]).

Project Modifications Since Publication of the NOP

Since publication of the NOP and public scoping period, the proposed project components have been refined by the City as follows:

- Addition of an optional brine disposal pipeline alignment extending west on West Tregallas Road and crossing Highway 4 at L Street.
- Addition of an optional brine disposal pipeline extending from the WTP to Lone Tree Way, west along Putnam Street, and north on D Street.
- Addition of an optional raw water connection pipelines connecting to the WTP from Lone Tree Way, west along Putnam Street, and south on D Street.
- Increase in square footage of the desalination facility footprint from 9,600 square feet to 10,700 square feet.

The proposed project and components, as revised, are described further in Chapter 2, *Project Description.*

1.2.2 Draft EIR

This document and all attachments hereto constitute the Draft EIR. The Draft EIR contains a description of the project, including the project objectives, description of the environmental setting, identification of project impacts, identification of recommended mitigation measures to avoid or reduce impacts found to be potentially significant, identification of impacts after the implementation of recommended mitigation measures, identification of alternative ways of accomplishing the project's objectives while avoiding or reducing the project's impacts, and a comparative analysis of those alternatives (see Section 1.3, below). The City has filed a Notice of Completion (NOC) for the Draft EIR with the Governor's Office of Planning and Research to begin the public review period (Public Resources Code, Section 21161).

Public Notice and Public Review

This Draft EIR is available to local, state, and federal agencies, and to interested organizations and individuals, who may want to review and comment on the analysis provided, for a 45-day period identified on the notice that is inside the front cover of the document. Notice of this Draft EIR has also been sent directly to every agency, person, or organization that commented on the NOP. During the public comment period, written comments regarding the Draft EIR may be submitted to:

Scott Buenting
Project Manager
City of Antioch
PO BOX 5007
Antioch, CA 94531-5007
SBuenting@ci.antioch.ca.us

During this 45-day review period, copies of the Draft EIR will be available for public review at the following locations:

City of Antioch City Hall
Community Development Department
3rd and H Street, Second Floor
Antioch, CA 94509

Antioch Library
501 W 18th Street
Antioch, CA 94509

An electronic copy of the Draft EIR can also be downloaded at http://www.ci.antioch.ca.us. The Planning Commission is scheduled to receive public comments on the Draft EIR on **July 18, 2018**, at 6:30 p.m. in the City Hall Council Chambers.

Responses to all comments received on environmental issues regarding the Draft EIR and submitted within the specified review period will be prepared and included in the Final EIR.

1.2.3 Final EIR and Certification

Following the public review period, a Final EIR will be prepared. All substantive written comments received on the adequacy of this Draft EIR during the public review period will be addressed in a “response-to-comments” document which, together with this Draft EIR, will constitute the Final EIR. The response-to-comments document will also present any changes to the Draft EIR resulting from public and agency input and City staff initiated changes.

Certification of the EIR and Project Consideration

Prior to any decision to approve, revise, or reject the project, the Antioch City Council will review the Final EIR. If the City finds that the Final EIR is adequate and complete, the City will certify the Final EIR. Upon review and consideration of the Final EIR, the Antioch City Council may take action to approve, conditionally approve, revise, or reject the proposed project. A decision to approve the project would be accompanied by written findings in accordance with CEQA *Guidelines* Section 15091, and Section 15093, as applicable. A Mitigation Monitoring and Reporting Program, as described below, would also be adopted for project design features and mitigation measures that have been incorporated into the proposed project or adopted as conditions of approval to reduce or avoid significant effects on the environment.

Mitigation Monitoring and Reporting Program

Throughout the EIR, mitigation measures have been clearly identified and presented in language that will facilitate establishment of a mitigation monitoring and reporting program (MMRP). CEQA *Guidelines* Section 21081.6(a) requires lead agencies to adopt an MMRP to describe measures that have been adopted or made a condition of project approval in order to mitigate or avoid significant effects on the environment. The MMRP will be presented to the City Council for adoption at the time of project approval. This MMRP will be designed to ensure that these measures are carried out during project implementation.

1.3 Range of Alternatives

CEQA requires that an EIR discuss a range of reasonable alternatives to the proposed project (see Chapter 5). This EIR describes and analyzes a range of reasonable alternatives, including a “No Project” alternative as required under CEQA (CEQA *Guidelines* Section 15126.6[e]); compares the environmental effects of each alternative with the effects of the proposed project; and addresses the relationship of each alternative to the project objectives. The determinations of the Lead Agency concerning the feasibility, acceptance, or rejection of each and all alternatives considered in this EIR will be addressed and resolved in the findings, when the City of Antioch considers approval of the project, as required by CEQA.

1.4 Organization of the Draft EIR

Prior to this chapter, this Draft EIR contains a summary section which provides a concise overview of the document. The ***Executive Summary*** chapter includes a brief project description and an overview table of the environmental impacts identified by this EIR. The summary table lists the environmental impacts, proposed mitigation measures (including standard conditions), and the level of significance after mitigation. Detailed analysis of these impacts and mitigations is provided in Chapter 3, *Environmental Setting, Impacts and Mitigation Measures*.

Following this chapter, this Draft EIR has been organized as follows:

- **Chapter 2, Project Description.** This chapter describes the project, including project objectives, a summary of project components, and information about project construction and proposed operations. The chapter also lists required permits and approvals.
- **Chapter 3, Environmental Setting, Impacts and Mitigation Measures.** A separate section for each environmental topic is discussed within this chapter. Each section contains a description of the environmental setting (existing physical environmental conditions), the regulatory framework, and the environmental impacts (including cumulative impacts) that could result from the proposed project. It includes the thresholds of significance used to determine the significance of adverse environmental effects. The chapter also identifies the mitigation measures that would reduce or eliminate the adverse impacts that have been determined to be significant. The impact discussions disclose the significance of the impact both with and without implementation of mitigation measures and/or standard conditions.
- **Chapter 4, Other CEQA Requirements.** This chapter presents growth-inducing effects, significant irreversible changes, a summary of cumulative impacts, significant and unavoidable environmental impacts, and the significant and irreversible environmental changes of the project.
- **Chapter 5, Alternatives.** This chapter describes the alternatives to the project and compares their impacts to those of the project. This chapter also summarizes the alternatives that were considered but rejected from further analysis.
- **Chapter 6, Report Preparers.** This chapter identifies the persons, and affiliations of those persons who prepared this EIR.
- **Appendices.** The NOP, comment letters received on the NOP, and comments from the scoping hearing, as well as supporting documents and technical information for the impact analyses are presented in **Appendices A** through **D**.

1.5 Intended Uses of the EIR

This EIR provides the CEQA compliance documentation upon which the City of Antioch's consideration of, and action on, all applicable permits and other approvals (collectively, "approvals") for the proposed project or an alternate may be based. These include all approvals listed in this EIR, as well as any additional approvals that may be necessary to implement the proposed project or alternative, including activities such as planning, construction, operation and maintenance (e.g., use permits, grading permits, and building permits).

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CHAPTER 2

Background and Project Description

2.1 Introduction

The City of Antioch (City) proposes to construct, operate, and maintain the Antioch Brackish Water Desalination Project (proposed project). The City proposes to replace the existing San Joaquin River intake pump station, construct a desalination facility with associated equipment and appurtenances; and construct pipelines for the conveyance of source water and brine concentrate. The desalination plant would have the capacity to produce up to 6 million gallons per day (mgd) of desalinated water.

This chapter provides background information on the City's existing water supply system, current water supply limitations, need for the project, and project description.

The proposed Project is being evaluated in accordance with the California Environmental Quality Act (CEQA) to identify the physical environmental impacts of the Project. The City is the CEQA Lead Agency.

2.2 Background

2.2.1 Existing Raw Water Conveyance System and Treated Water Distribution

The proposed project would enable the City to use its pre-1914 water rights year-round to provide a reliable water supply and flexibility in operations for the City. The water service area covers approximately 29 square miles and includes the area within City limits and some adjacent land to the northeast and west (City of Antioch, 2016). The City's treated water system serves 31,798 customers (connections) including residential, commercial, and irrigation customers.

The City's existing water system includes the following components, which are described in further detail under subsequent subheadings:

- River intake and pump station
- Raw water pipelines
- Antioch Municipal Reservoir
- Canal Pumping Stations
- Water treatment plant
- Treated water distribution system

2.2.1.1 River Intake Pump Station

The City has diverted water from the San Joaquin River (river) since the 1870s and as such has pre-1914 water rights. The river pump station is constructed on a pier that extends north over the San Joaquin River at the terminus of Fulton Shipyard Road near McElheny Road. The intake pipeline extends approximately 200 feet in the San Joaquin River, terminating at the pump station structure. The existing river intake pump station and mechanical and electrical equipment is housed in a wooden-piles supported 15-foot-tall metal frame building constructed above the River.

The City rebuilt the pump station in the early 1990s and upgraded the pump to a 1,250-horsepower (hp) vertical turbine pump in 1997. The pump operates at a constant speed and the bowls of the pump sit in a stainless-steel wedge-wire screen that prevents the entrainment of fish, fish larvae and debris. The capacity of the pump station is 16 mgd. The City operates the river pump station as long as river water quality meets potable water supply requirements for distribution to the public primarily with regards to salinity (as expressed by chloride concentration).[1]

2.2.1.2 River Intake Pump Station to Municipal Reservoir Raw Water Pipeline

The City uses several pipeline segments to convey river water from the river intake pump station to the Municipal Reservoir (see **Figure 2-1**). A pipeline from the river intake pump station connects to a 30-inch diameter pipeline that follows City streets to the intersection of Lone Tree Way and Worrell Road. From this intersection, the pipeline runs south in Lone Tree Way to the south side of the Contra Costa Canal, where it connects to another pipeline that conveys water further south to the eastern side of the Municipal Reservoir.

2.2.1.3 Antioch Municipal Reservoir

The 240 million gallon (MG) (735 acre-foot) Antioch Municipal Reservoir provides supply reliability and equalization storage for water pumped from the Contra Costa Canal and the San Joaquin River. The reservoir also serves the secondary purposes of flood control and impoundment of local runoff. Use of equalizing volume, for example, permits purchase of raw water from CCWD at a constant rate for periods of a month or more, depending on the season of the year. Raw water is delivered at a constant rate to the reservoir and the WTP and is withdrawn from the reservoir at varying rates to meet fluctuating demand conditions. The reservoir can also provide some blending of river water and CCWD water, however, it is not specifically designed and operated for that purpose.

2.2.1.4 Canal Pumping Stations and Raw Water Transfer Pipelines

The City has two raw water pumping stations to transfer water from the Contra Costa Canal to the Municipal Reservoir and the WTP (see **Figure 2-1**). Historically these pump stations have transferred up to about 27.2 mgd (about 19,000 gpm). The West Canal Pumping Station (WCPS) is approximately 1,000 feet north of James Donlon Boulevard. The WCPS is equipped with a manually cleaned bar screen (1.0-inch bar spacing) at the canal turnout, a flow meter, a 36-inch diameter intake pipeline, and three vertical pumps that vary in motor size and capacity (125 to 300 hp and 7,000 to 12,000 gpm). Two of the three pumps can be operated in parallel. The City cannot operate all three pumps in parallel due to hydraulic limitations caused by discharge piping connections. The East Canal Pumping Station (ECPS) is south of the Contra Costa Canal, just

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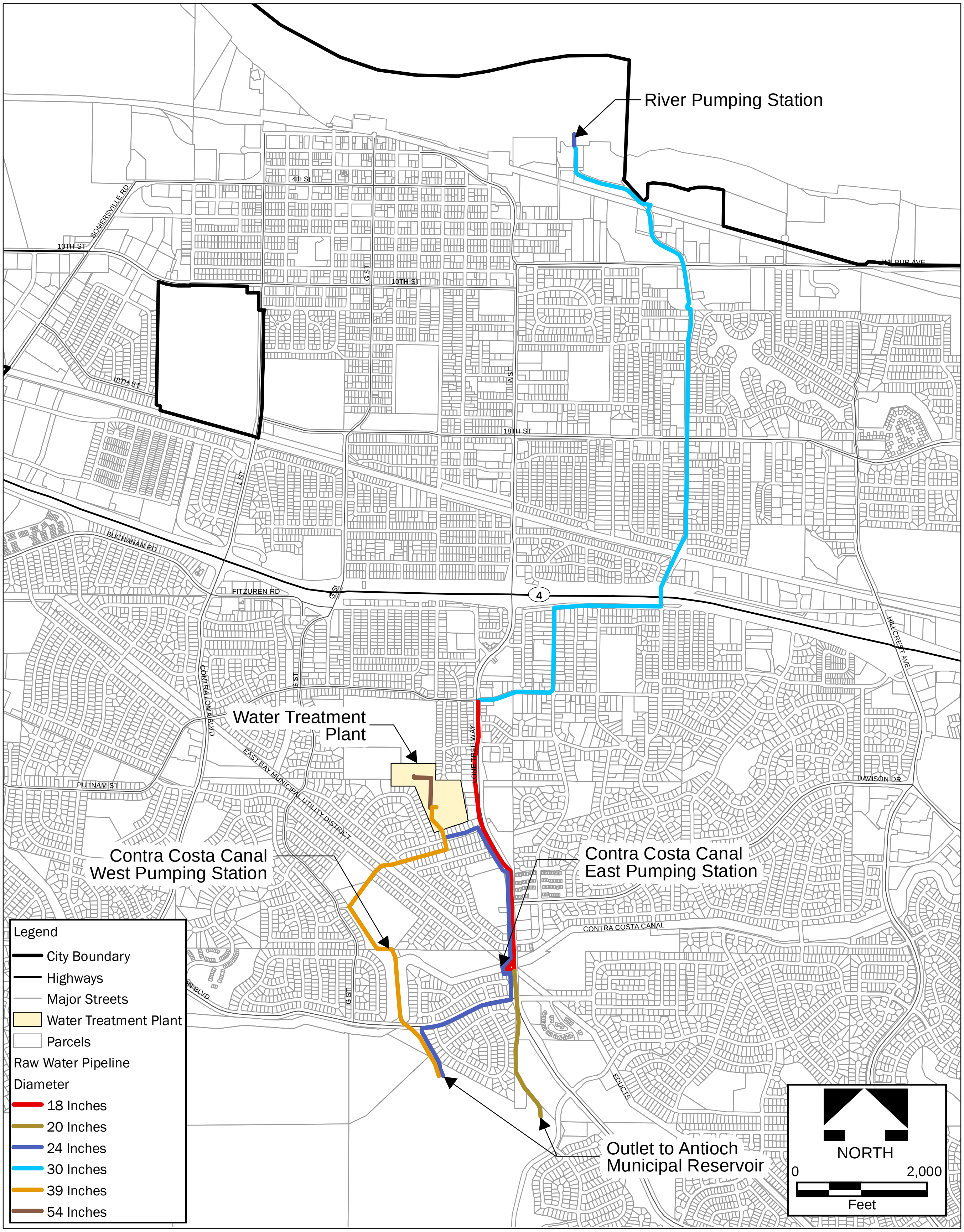
1 Salinity is a measure of the amount of salts contained in water, including chloride and bromide, as well as many others. Chloride anion concentration and electrical conductivity (EC) are commonly used measurements of salinity. Like salinity, total dissolved solids (TDS) also describes the amount of salts in water. TDS also includes small amounts of other constituents, mainly organic carbon; however, the amount of organic carbon in Delta samples near the project is usually miniscule in comparison to the amount of salt in samples. Therefore, salinity, chloride anion concentration, EC, and TDS are all different ways of describing the amount of salts contained in a water sample. As much as possible, data are presented in this document in the form in which they were originally collected or modeled, to minimize the introduction of inaccuracies. As such, TDS and EC data are presented throughout the document, and EC and TDS are frequently used as indicators of salinity or chloride concentrations.



SOURCE: Brown and Caldwell, 2014

Brackish Water Desalination Facility

Figure 2-1
Existing Raw Water System

west of Lone Tree Way. The ECPS is equipped with a two-speed 150-hp pump with a capacity of 2,500 to 5,000 gpm. (City of Antioch, 2014)

2.2.1.5 Municipal Reservoir to WTP Raw Water Transfer Pipelines

Two raw water pipelines connect the Municipal Reservoir with the WTP as depicted in **Figure 2-1**. One pipeline runs from the reservoir to an undercrossing of the Contra Costa Canal about 2,000 feet west of Lone Tree Way, parallel to the Canal to the WCPS, and then to the WTP. The second pipeline runs north from the base of the dam, parallel to the first pipeline to James Donlon Boulevard, east along James Donlon Boulevard to Lone Tree Way, north along Lone Tree Way by the ECPS, across the Canal to Terranova, and along Terranova to connect back to the first pipeline about 400 feet south of the south end of the Plant A sedimentation basins.

2.2.1.6 Water Treatment Plant

The City's WTP is comprised of two plants: Plant A and Plant B. Plant A can treat up to 17 mgd and Plant B can treat up to 20 mgd of water for a maximum production capacity of 37 mgd (City of Antioch, 2014). Both plants are conventional water treatment facilities and their treatment processes include flash mixing, flocculation, sedimentation, and dual media filtration (sand and granular activated carbon).

2.2.1.7 Treated Water Distribution System

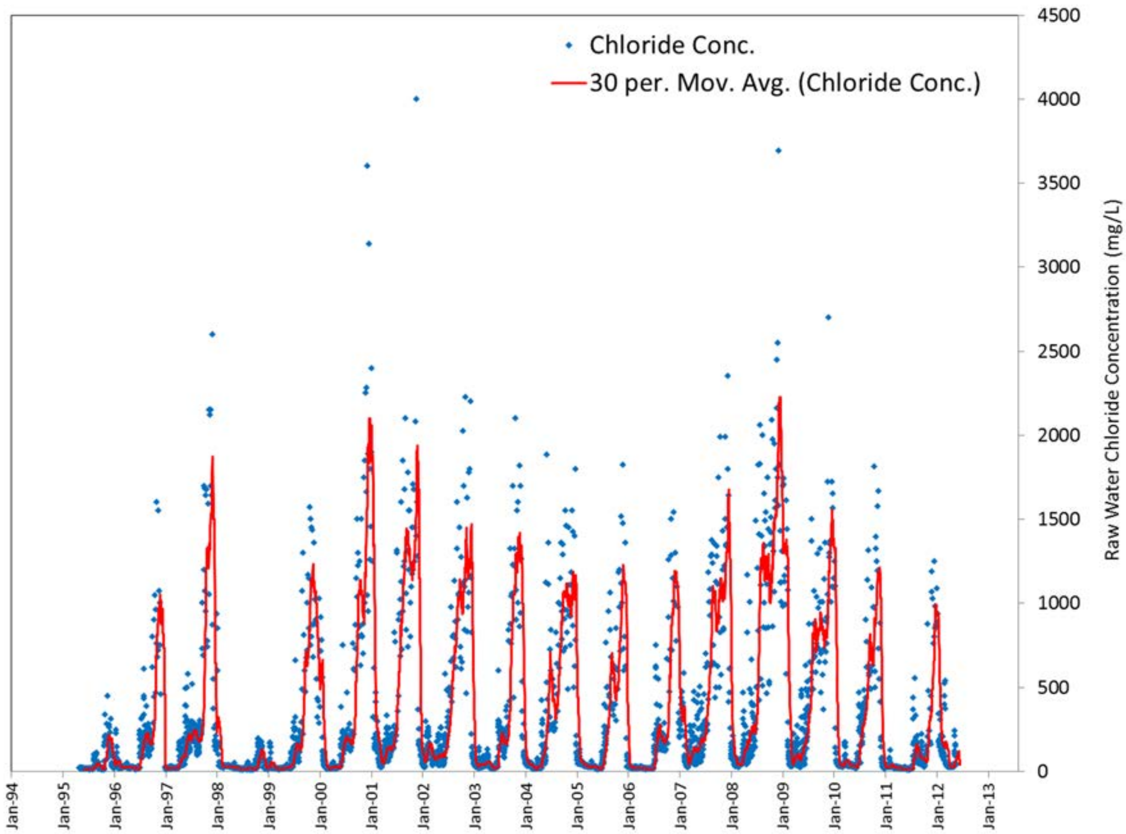
Treated water from Plant A and B flow into two 1.0-MG clearwells (Clearwells A and B) before entering the distribution system. The treated water distribution system consists of approximately 320 miles of pipelines and water mains, and booster pumping stations with six major and two smaller pressure zones.

2.2.2 Sources of Water Supply

The City treats and distributes surface water obtained from two sources; the San Joaquin River and the Contra Costa Canal (Canal), each of which is described below.

2.2.2.1 San Joaquin River

The City's existing intake is in the western Sacramento-San Joaquin River Delta. Water quality in the western Delta varies widely and is influenced by precipitation, regional water management activities, tides, river outflows, agricultural drainage, and drought conditions. Generally, the City's intake experiences fresher conditions in winter and early spring, and salinity increases in the late spring through the fall as conditions become drier and Delta operations change. This seasonal pattern can vary substantially depending on hydrology. The intake location is also tidally influenced, and salinity varies throughout the day. **Figure 2-2** shows historical chloride concentrations in the San Joaquin River at the City's intake on a daily and 30-day moving average basis.



Source: City of Antioch

Figure 2-2
Historical Daily Chloride Concentration of San Joaquin River Water at City of Antioch Intake

2.2.2.2 Contra Costa Water District/Contra Costa Canal

The City is one of 12 cities in Contra Costa County that are contract customers to CCWD for the wholesale purchase of water and is also a member of the CCWD Alliance. CCWD obtains its water supply exclusively from the Sacramento-San Joaquin Delta and provides raw and treated water to approximately 500,000 people in central and eastern Contra Costa County. The CCWD canal system and intake at Rock Slough are owned by the United States Bureau of Reclamation (Bureau) and are operated by CCWD. CCWD owns and operates its own intakes at Victoria Canal and Old River in the Sacramento/San Joaquin Rivers Delta. Water withdrawn at these intakes can be diverted to CCWD's Los Vaqueros Reservoir, or directly to the canal system through a series of pipelines. According to CCWD’s 2015 Urban Water Management Plan (UWMP), the long-term Central Valley Project (CVP) contract between CCWD and Bureau was renewed in May 2005 for a term of 40 years. The contract allows CCWD a maximum annual allotment of 63,500 MG (195,000 AF) from the CVP. Reductions in this allotment are dependent on water shortages, including droughts and regulatory restrictions. (CCWD, 2016)

The City's current agreement with CCWD is for a peak demand of 25,000 gallons per minute (gpm) (36.0 mgd). Between 2005 and 2010, the City purchased an average of approximately 4,000 MG per year (12,325 AFY) from CCWD (City of Antioch, 2016).

2.2.3 Existing Water Operations

The City has pre-1914 appropriative water rights to divert water from the San Joaquin River along with the tributary flow from the Sacramento River. The City has a delivered water quality goal of 75 milligrams per liter (mg/l) chlorides. The City's existing intake has a capacity of 16 mgd. The ability to utilize river water to meet the City's present and future water supply needs, however, is limited by the river's water quality and the inability of the existing WTP to remove salinity and other water quality constituents. Compounding this limitation is the City's constant-speed pump operation. The pump withdraws its full 16 mgd capacity when in operation rather than allowing lower (variable) flow rates which could be managed and blended with water purchased from CCWD to meet the City's delivered water quality goals.

Generally, the City's operational strategy is to utilize river water as much as possible and purchase water from CCWD to supplement its river water supply. Annual water operations can vary significantly depending on hydrology. **Figure 2-3** shows the sources of Antioch's annual water supply from 1998 to 2017 and the corresponding water year type.

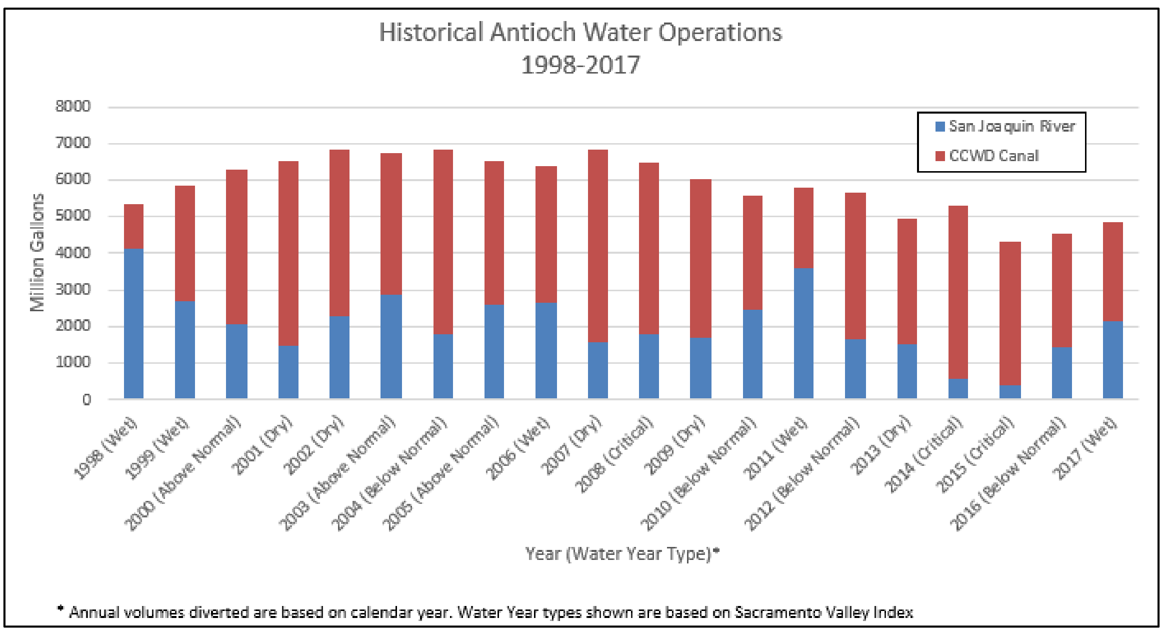


Figure 2-3
Historical Antioch Water Operations

In some years, Antioch is able to divert water from the river from January through October. In drier years, the City may only be able to divert river water until the early Spring. To illustrate this, **Table 2-1 and Figure 2-3a** show the City's monthly water diversions from the San Joaquin River and Contra Costa Canal in the years 2011 (wet) and 2013 (dry).

As shown in **Table 2-1** and **Figure 2-3b**, in the 2011 (wet year), 40 percent of the City's potable water supply was from the San Joaquin River. This percentage decreased to 25 percent in 2013 due to high chloride levels in the river, requiring the City to rely more heavily on CCWD water.

2.3 Need for the Project

The need for the proposed project is based on several conditions:

- Water quality at the City's western Delta intake currently limits the City's ability to fully utilize its pre-1914 water rights
- In the future, water quality in the western Delta may further decline due to changes in Delta management activities, the cumulative impacts of other projects and development in the San Joaquin Valley, and climate change increasing the frequency and duration of droughts.
- Future, more stringent Federal and State drinking water standards could be increasingly difficult to meet.

The City's current water supply operations are limited by water quality in the San Joaquin River. In recent years, the City has needed to rely more on CCWD water to meet its water demands due to San Joaquin River water quality. During drought years, river diversions are extremely limited due to poor water quality caused by saline bay waters moving further upstream into the Delta.

Water supply operations during the most recent drought illustrate this (see **Figure 2-4**). The annual amount of water the City was able to divert from the River declined in each year from 2011 (wet year) to 2015 (critically dry year). This erodes the value of the City's water rights, reduces the reliability of the City's water supply, and increases the City's water supply costs.

Climate change is anticipated to increase the frequency and duration of droughts in California. This could impact the quality and reliability of both River and CCWD water.

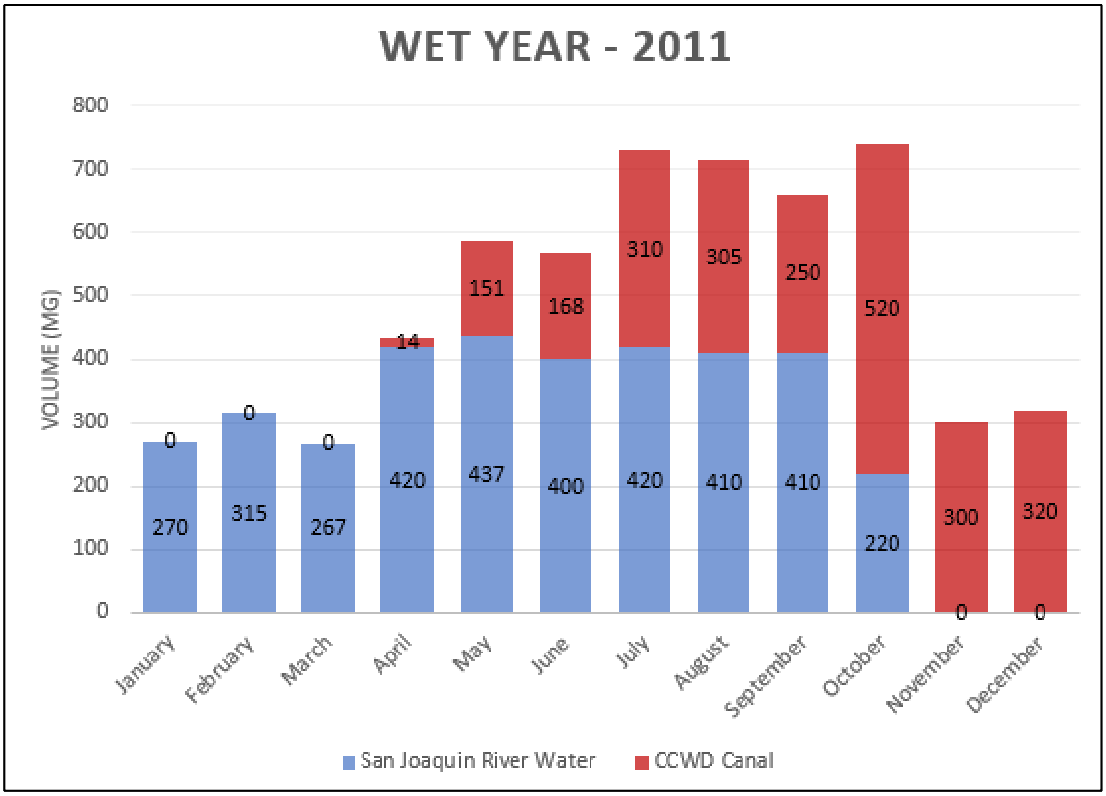
Changes in Delta management are uncertain and may contribute to a decline in water quality in the western Delta. The proposed WaterFix project has the potential to significantly increase the salinity at Antioch's intake in almost all months and year types based on analyses conducted by the City. This could result in increases in both chloride and bromide concentrations at Antioch's intake. Increases in salinity and other water quality constituents of concern could make drinking water quality standards more difficult to meet without more advanced treatment options.

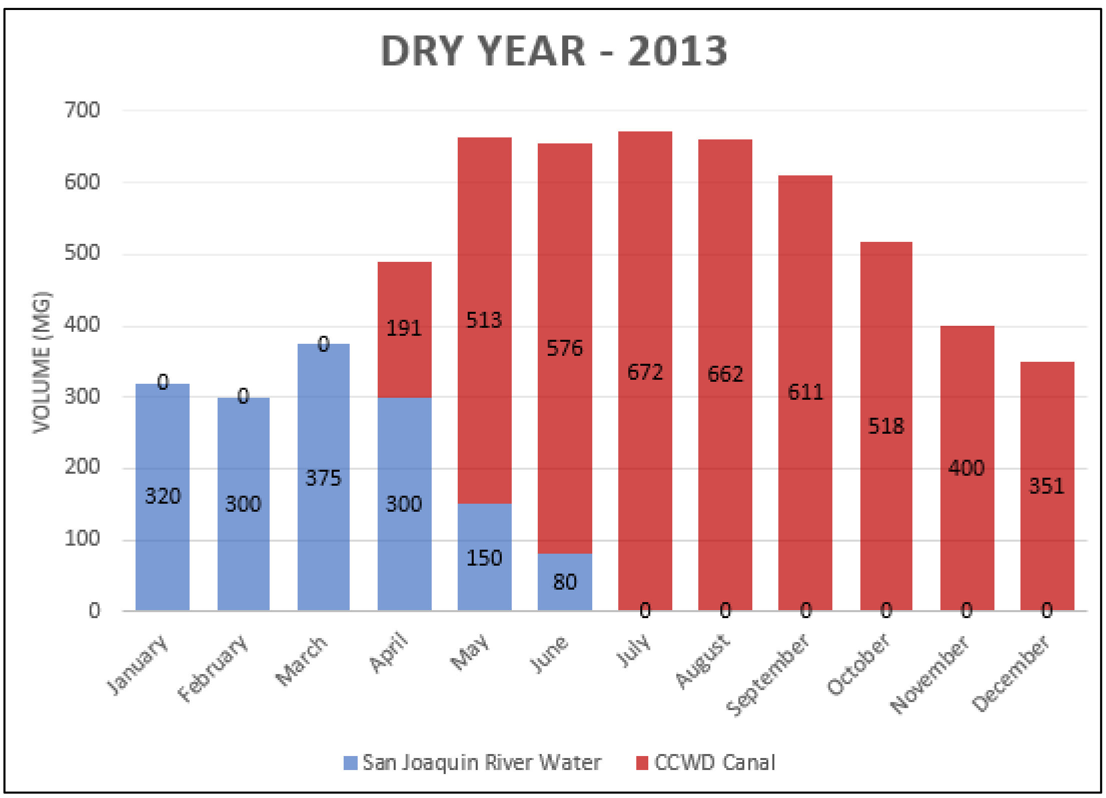
TABLE 2-1
EXAMPLES OF ANTIOCH MONTHLY WATER OPERATIONS IN WET AND DRY YEARS

Month	Wet Year[a, c]					Dry Year[b, c]				
	Water Pumped from Antioch's Intake on the San Joaquin River	Conventionally[d] Treated Water			Total Potable Water Produced (MG)	Water Pumped from Antioch's Intake on the San Joaquin River	Conventionally[d] Treated Water			Total Potable Water Produced (MG)
		Total Water Treated Conventionally[d] (MG)	River Water Treated Conventionally[d] for Potable Use (MG)	CCWD Water Purchased and Treated Conventionally[d] for Potable Use (MG)			Total Water Treated Conventionally[d] (MG)	River Water Treated Conventionally[d] for Potable Use (MG)	CCWD Water Purchased and Treated Conventionally[d] for Potable Use (MG)	
January	270	270	270	0	270	320	320	320	0	320
February	315	315	315	0	315	300	300	300	0	300
March	267	267	267	0	267	375	375	375	0	375
April	420	434	420	14	434	300	491	300	191	491
May	437	588	437	151	588	150	663	150	513	663
June	400	568	400	168	568	80	656	80	576	656
July	420	730	420	310	730	0	672	0	672	672
August	410	715	410	305	715	0	662	0	662	662
September	410	660	410	250	660	0	611	0	611	611
October	220	740	220	520	740	0	518	0	518	518
November	0	300	0	300	300	0	400	0	400	400
December	0	320	0	320	320	0	351	0	351	351
Annual Total (MG)	**3,569**	**5,907**	**3,569**	**2,338**	**5,907**	**1,525**	**6,019**	**1,525**	**4,494**	**6,019**
Annual Percentage of City's Water Supply			**60%**	**40%**	**100%**			**25%**	**75%**	**100%**

NOTES:
a Based on calendar year 2011 monthly raw water use data from the City of Antioch. Water Year 2011 (October 2010-September 2011) is characterizes as a wet year based on the Sacramento Valley Index.
b Based on calendar year 2013 monthly raw water use data from the City of Antioch. Water Year 2013 (October 2012 – September 2013) is characterized as a dry year based on the Sacramento Valley Index.
c These values do not include recycled water use or water system losses.
d Conventionally treated water means water treated at the City's WTP (Plants A and B) using conventional treatment consisting of coagulation, flocculation, sedimentation, filtration, and disinfection.

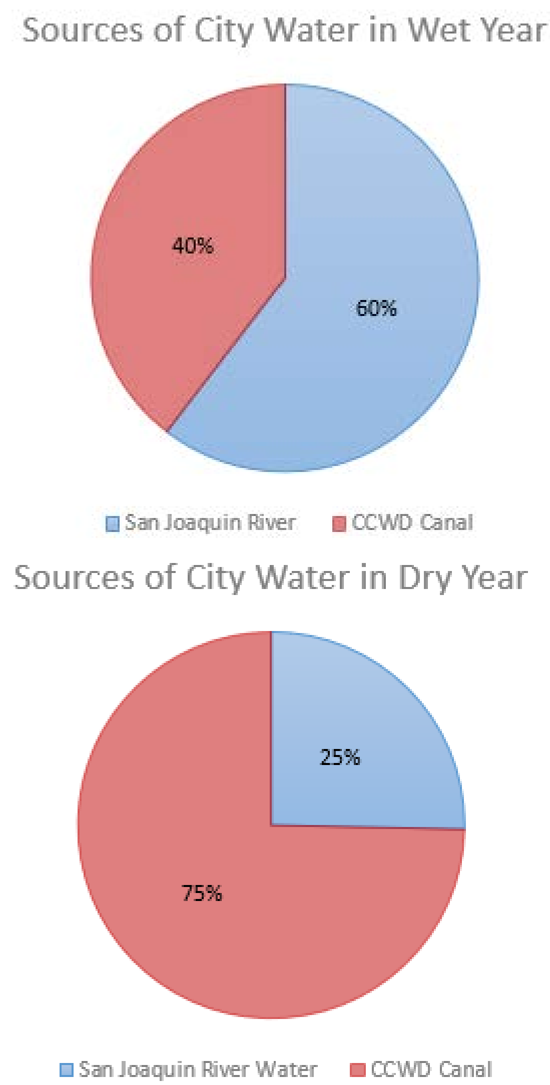
SOURCES: Carollo Engineers 2017 and 2018, RMC Water and Environment 2015





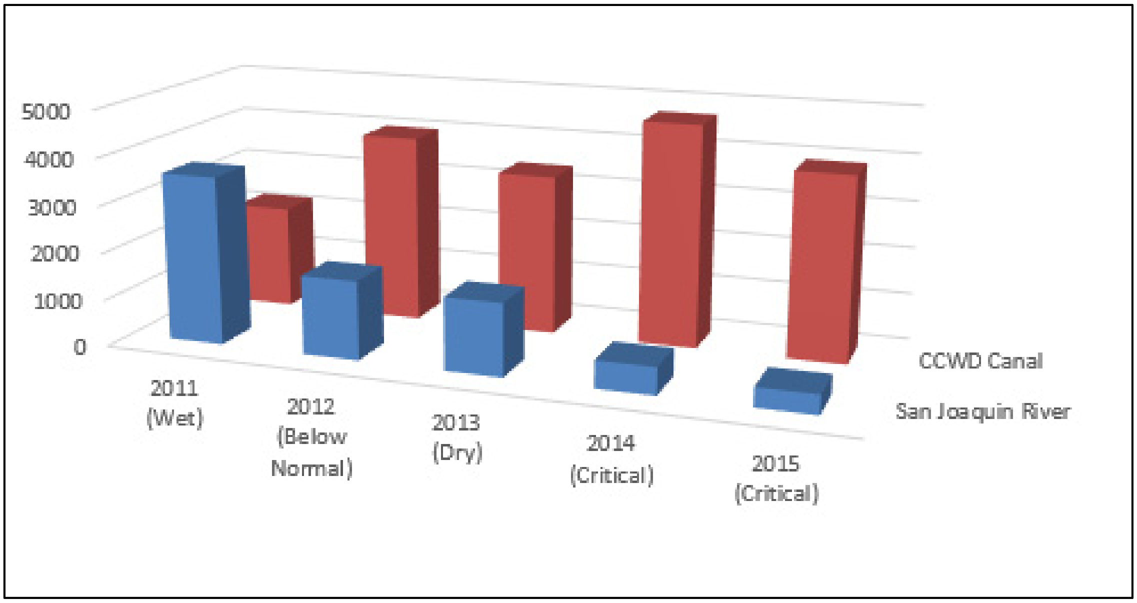
Source: Carollo Engineers, 2018

Figure 2-3a
Examples of Antioch Monthly Water Operations in Wet and Dry Years



Source: Carollo Engineers, 2018

Figure 2-3b
Annual Percentage of Potable Water Produced
in Wet (2011) and Dry (2013) Years



Source: City of Antioch

Figure 2-4
Sources of City's Water 2011-2015

2.4 Project Component Selection and Considerations

Brackish water desalination as a component of the City's water supply portfolio has been evaluated in State-approved water planning documents including the City's 2015 Urban Water Management Plan and East Contra Costa County Integrated Regional Water Management Plan 2015 Update.

Developing the desalination project required an understanding of the brackish water treatment processes, the source water quality (San Joaquin River), and the finished desalinated water quality goals. The project components as proposed were defined through the preparation of several technical memoranda spanning topics from desalination facility siting considerations, intake pump station siting and intake technology, pipeline alignments, and alternative brine disposal processes. The technical memoranda evaluated alternatives for the potential components and feasibility based on available technical and scientific information. Information from these studies informed the basis of design, operating concepts, estimated capital, operations and maintenance, and life cycle costs.

2.4.1 Mallard Slough Pilot Plant Study

From 2007-2010, as a part of the Bay Area Regional Desalination Project (BARDP), CCWD, EBMUD, SFPUC, and SCVWD conducted pilot testing of desalination technologies and prepared a Pilot Plant Study (BARDP, 2010). The purpose of the pilot project was to evaluate the technical feasibility of operating a full-scale desalination plant located in an estuarine environment at CCWD's Mallard Slough Pumping Plant (MSPS) site near Pittsburg, California. The Mallard

Slough site is adjacent to the Estuary at Suisun Bay and offers an existing surface water intake of 40 mgd capacity which is owned and operated by CCWD. Water in Suisun Bay is a blend of fresh water from the Sacramento and San Joaquin Rivers and naturally occurring San Francisco Bay water. The goals of the pilot test were to collect data on technical feasibility (pretreatment options, membrane performance, design parameters) and to assess the potential environmental impacts (brine disposal, marine life) of a desalination facility in east Contra Costa County.

The pilot test started in October 2008 and continued through April 2009. Approximately 50 gpm was drawn from CCWD's Mallard Slough intake. Performance data were collected for treatment by two types of ultra-filtration pre-treatment membranes, two types of Reverse Osmosis (RO) membranes, and one Nanofiltration (NF) membrane. The findings of the pilot study led to a greater understanding of water quality and treatment issues for the water in the Suisun Bay, and confirmed that water sourced from the Suisun Bay is subject to significant tidal influence, resulting in wide variations of total dissolved solids (TDS) observed on a daily, monthly, and seasonal basis. Piloting demonstrated that both pressurized and submerged ultrafiltration (UF) membrane pre-treatment systems could produce a suitable filtrate quality.

A two-stage desalination process, consisting of brackish RO membranes in the first stage and seawater RO membranes in the second stage, was demonstrated in the pilot study to meet treated water quality goals with high recovery throughout the wide range of salinity variation expected. Single stage seawater membranes were found to provide acceptable operation in high salinity conditions and brackish water RO membranes provided acceptable operation during low salinity conditions. Based upon the evaluation, the pilot study concluded that design of a full-scale facility should be based on a two-stage system with brackish water RO membranes in the first stage and seawater RO membranes in the second stage.

Finished water (desalinated water) studies were conducted to verify the compatibility of the desalinated water with the EBMUD Mokelumne Aqueduct and the CCWD sources. Desalinated water requires post-treatment to ensure that water quality stability and corrosivity are acceptable before it is blended with water in the transmission systems. Two methods for post-treatment stabilization were evaluated at the bench-scale using pilot plant permeate: liquid lime with carbon dioxide, and continuous flow through calcite bed filters. Both methods required sodium hydroxide to reach a suitable pH for the transmission systems. The study concluded that both methods produced a stable product water which could be blended with the transmission system.

The study concluded that several opportunities for managing desalination concentrate would be available in the east Contra Costa region. Mixing the concentrate with wastewater effluent produced by Delta Diablo and/or the Central Contra Costa Sanitary District (CCCSD) were identified as opportunities for further consideration. Comingling with spent cooling water from the Mirant power plant, which is located east of the Mallard Slough Pump Station, or discharges into the power plant's intake itself, were also identified as potentially acceptable low cost options.

The study concluded that the piloting at Mallard Slough provided data to suggest that a full-scale facility is viable in this location. In addition, the study noted that data collected during the pilot study may be transferrable to other potential locations for full-scale applications within the East Contra Costa Site (identified as the region from Mallard Slough to Antioch), taking site-specific conditions into consideration. The study recommended that site selection for a full-scale facility needs to consider potential feedwater quality impacts, project economics, solids disposal, and availability of source water intake. The City subsequently evaluated RO system design and brine disposal alternatives for their site-specific application using information from the study.

2.5 Project Objectives and Location

2.5.1 Project Objectives

The main objectives of the project are to:

- Improve water supply reliability and water quality for customers.
- Develop a reliable, and drought-resistant water source to reduce dependency on purchased water supplies by maximizing the use of the City’s pre-1914 water rights.
- Maximize the use of existing infrastructure to maintain economic feasibility.
- Provide cost effective operational flexibility to allow the City to respond to changes in source water quality, emergencies, changes in climate and Delta conditions.
- Preserve the value of the City's pre-1914 water rights.

2.5.2 Project Location

The project facilities would be located in the cities of Antioch and Pittsburg, California (**Figure 2-5**). The proposed desalination facility would be located within the fenceline of the City’s existing WTP at 401 Putnam Street, and the pipeline routes would generally follow road rights-of-way. The river intake pump station is located at the City marina near McElheny Road and Fulton Shipyard Road. The project setting is predominantly developed and urban, characterized by mostly residential, commercial, and industrial development.

SOURCE: Contra Costa County 2014; ESA 2018; Carollo 2017; NAIP 2016

Brackish Water Desalination Facility

Figure 2-5

Project Vicinity

ESA

2.6 Project Components

The project consists of the following components:

- New intake pump station and fish screen to replace existing river intake facilities
- New raw water pipeline connection to the City's existing raw water pipeline to allow water to be conveyed directly from the river to the WTP
- A desalination plant with a finished water capacity of 6 mgd and related facilities, including reverse osmosis (RO); post-treatment systems; chemical feed and storage facilities; brine conveyance facilities; and other associated non-process facilities. The existing WTP (Plant A) would provide pre-treatment of the raw water prior to RO treatment
- Brine disposal pipeline and connection to Delta Diablo's Wastewater Treatment Plant (WWTP) outfall

Table 2-2 summarizes the proposed project components; for detailed descriptions of the facilities contained in **Table 2-2**, see Sections 2.6.1 through 2.6.3. **Figures 2-5a through 2-5f** depict project facilities and pipeline alignments at a larger scale.

2.6.1 Intake Pump Station Replacement and Raw Water Pipeline Connection

The existing pump station and intake pipeline would be demolished and replaced under the proposed project. The intake capacity of the new intake pump station for river water would remain at a firm capacity of 16 mgd. Conceptual design of the new intake pipeline system would include three 36-inch diameter submerged pipelines extending approximately 150 feet into the river. Each of the pipelines would be equipped with a fish screen that meets the protective criteria of the California Department of Fish and Wildlife (CDFW) and National Marine Fisheries Service (NMFS). Other intake screen alternatives are also being evaluated to meet protection criteria.

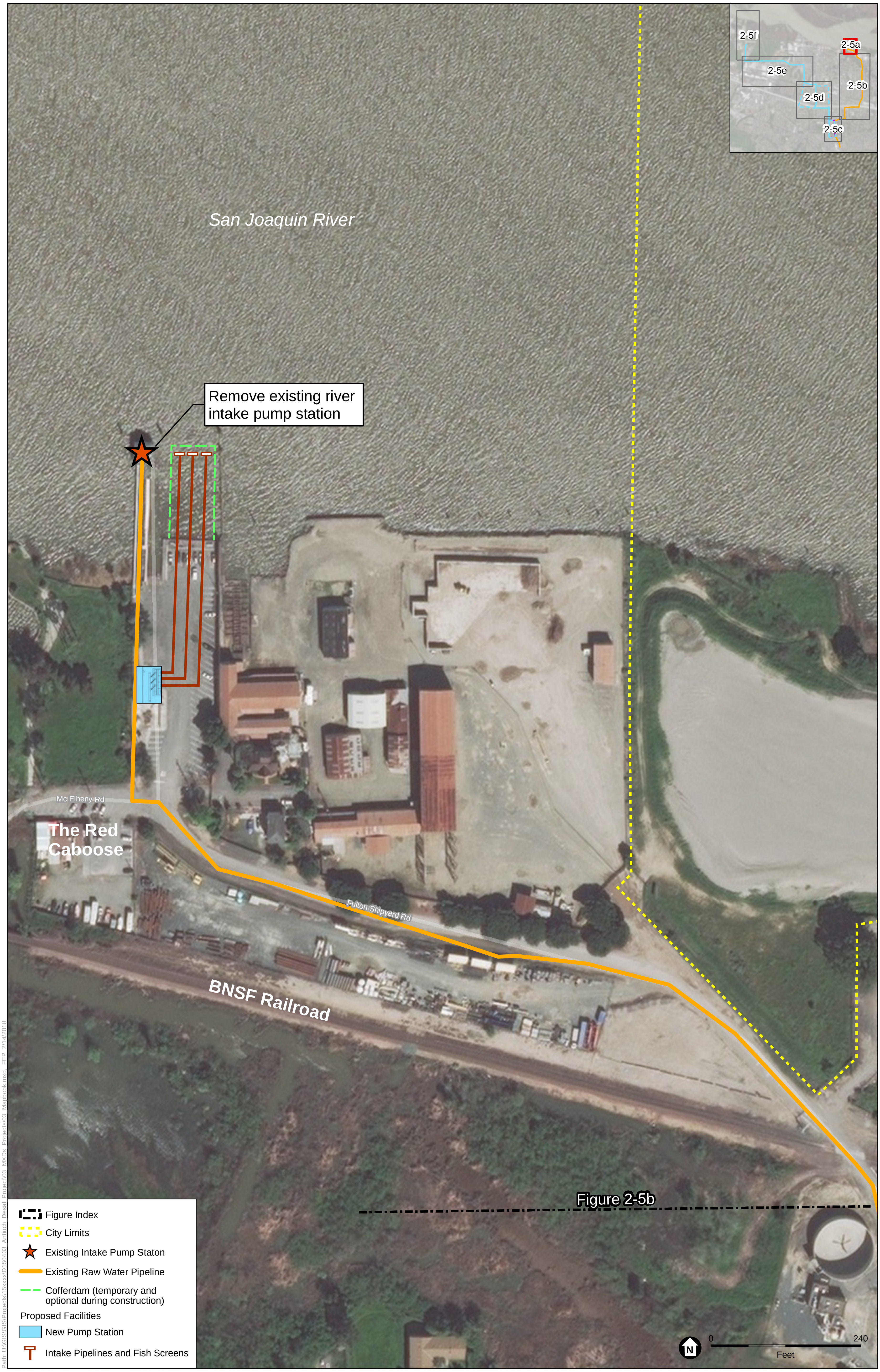
The new pump station would be located approximately 200 feet inland from shore within the existing parking lot with an approximate area of 2,400 square feet. The pump station would house three 8 mgd pumps (two active and one standby) which would allow the pump station to continue operating at 16 mgd if one of the pumps are out of service for maintenance. The variable speed pumps would allow operations at a lower speed if needed, providing flexibility in operations. The pump station building would be designed to allow for sea level rise by the year 2100 without mechanical or electrical room flooding during high river flow coincident with the highest estimated tide. **Figures 2-6 and 2-7** depict the elevation and plan view of the new pump station.

TABLE 2-2
FACILITIES SUMMARY OF THE PROPOSED PROJECT

Facility	Description	Purpose
Intake Pump Station Replacement and Raw Water Pipeline Connection		
Intake Pump Station	***Existing Intake Pump Station*** • Demolition of existing intake pump station (approximately 30 feet x 30 feet) housed at the end of an existing wooden pile supported pier extending approximately 200 feet from shore over the San Joaquin River. The new pump station would be constructed within the existing parking lot, approximately 200 feet inland from the shore. ***New Intake Pump Station*** • Built on concrete foundation footings approximately 2,400 square feet in area. The pump station will be equipped with three 8 mgd vertical turbine pumps, each 600 hp (two active and one standby) for a total intake firm capacity of 16 mgd. • Three new 36-inch-diameter offshore intake pipelines to replace the existing pipeline with fish screens meeting CDFW/NOAA requirements • Electrical and instrumentation equipment	The existing pier leading up to the pump station would remain in place. The existing pump station would be demolished and piles under the pump station would be removed. The intake pump station would draw river water for use as source water for the proposed desalination plant. The fish screens would protect sensitive aquatic species in the Delta
Raw Water Pipeline Connection	• 3,000-foot-long, 30-inch-diameter pipeline	This pipeline would convey the raw source water from the existing pipeline in Lone Tree Way directly to the WTP for treatment.
Desalination Facilities		
Pretreatment	• Existing conventional treatment processes at Plant A will be used for pre-treatment. Miscellaneous repairs including new coatings will be made to existing facilities to improve reliability. • Two pipelines approximately 600 feet each for the filtered water and RO permeate, and associated valves • Three (3) 100-hp pumps at 4 mgd each for pumping filtered water to RO pumps. Two would be on duty, one for standby	This pipeline and pumps would convey the pretreated source water (RO feed water) to the RO system.
Reverse Osmosis (RO) System	• Four (4) RO trains consisting of: o Four (4) RO feed pumps 2 mgd and 250-hp each (one for each RO train) o Four (4) RO booster pumps, 1 mgd and 100-hp each (one for each RO train) o Clean-in-place recirculation pump (1,000 gpm, 25-hp) • The RO units and cleaning systems would be housed within a 10,700-square-foot membrane process building	The RO system would remove salts and other minerals from the pretreated source water

TABLE 2-2 (CONTINUED)
FACILITIES SUMMARY OF THE PROPOSED PROJECT

Facility	Description	Purpose
Chemical Storage	• The following treatment chemicals would be housed in a 2,600-square-foot chemical storage building o Scale inhibitor – three 300-gallon storage tanks o Sulfuric acid – one 6,500-gallon storage tank o Calcium chloride – two 7,750-gallon storage tanks • Sodium hydroxide (caustic soda) – existing Antioch WTP storage would be used.	The scale inhibitor is used in the treatment process to reduce fouling and protect the RO membranes. Sulfuric acid is used to adjust the pH of the water entering the RO system and is also used to clean the RO membranes. Calcium chloride is used for hardness adjustment and corrosion control. Sodium hydroxide would adjust the pH and alkalinity of the desalinated product water. Desalinated water would be disinfected using existing sodium hypochlorite facilities in accordance with drinking water requirements.
Brine Disposal		
Brine Disposal Pipeline and Connection to Delta Diablo WWTP	• 4,3-mile-long, 12-inch-diameter brine discharge pipeline • The pipeline connection to the WWTP would be on Delta Diablo property downstream of wastewater facilities.	Brine (i.e. concentrate) produced during the RO process would be conveyed to the Delta Diablo WWTP to be blended with their treated wastewater effluent prior to discharge through the outfall.



SOURCE: City of Antioch 2017; Carollo Engineers 2017; NAIP 2016, ESA 2018; OSM 2016

Brackish Water Desalination Facility

Figure 2-5a

River Intake Pump Station

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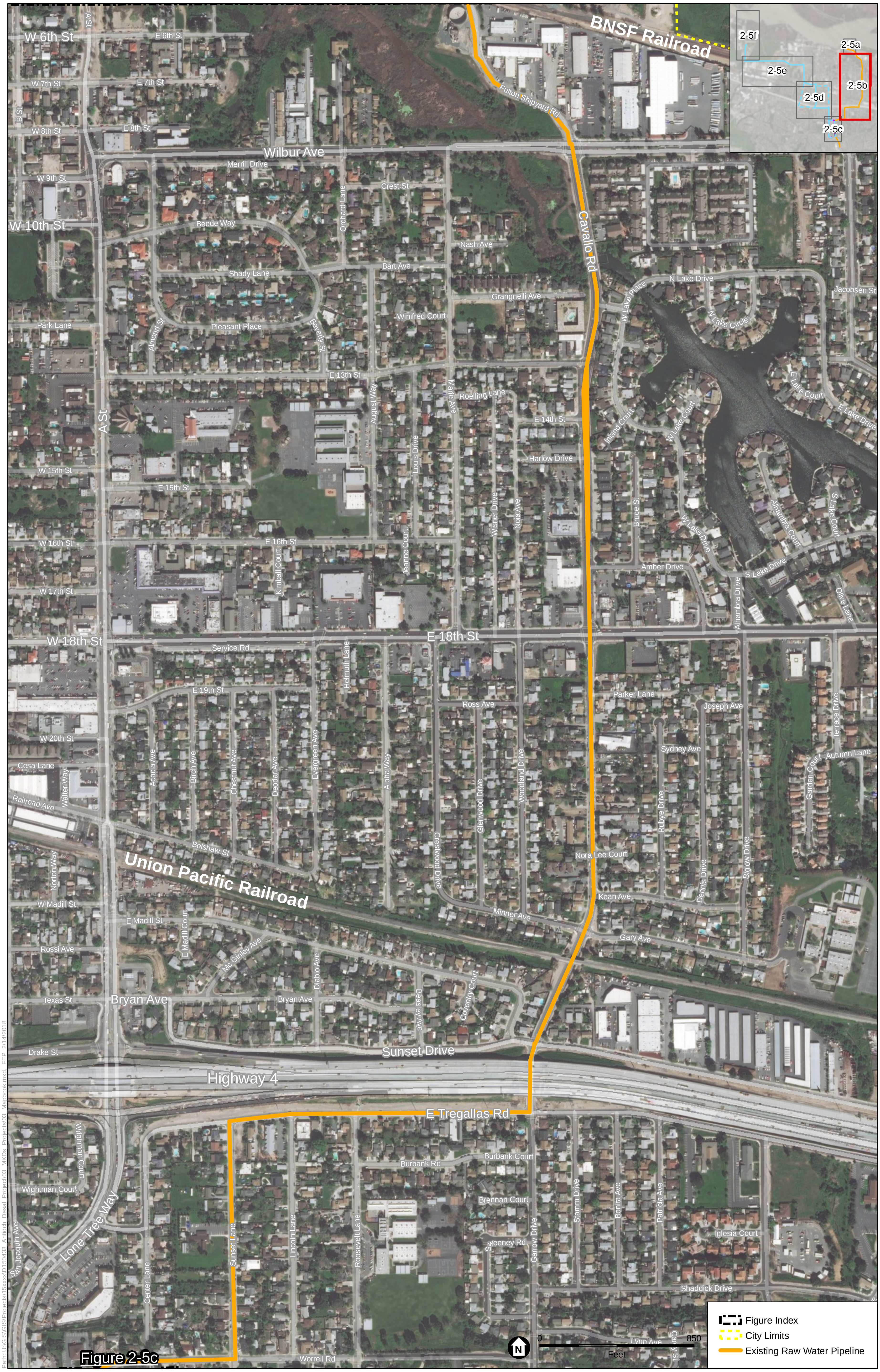

SOURCE: City of Antioch 2017; Carollo Engineers 2017; NAIP 2016, ESA 2018; OSM 2016

Brackish Water Desalination Facility

Figure 2-5b

Existing Raw Water Pipeline

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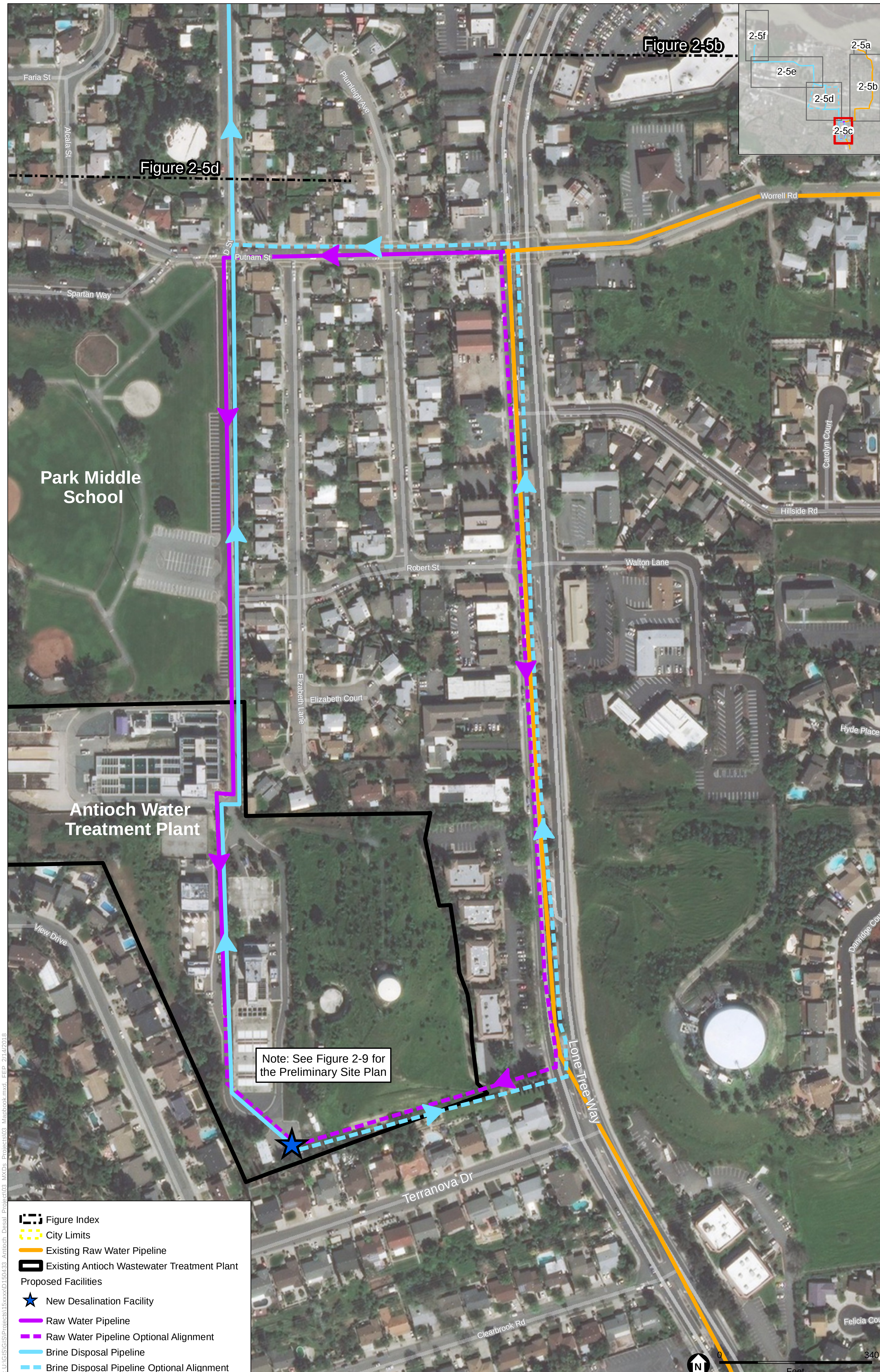

SOURCE: City of Antioch 2017; Carollo Engineers 2017; NAIP 2016, ESA 2018; OSM 2016

Brackish Water Desalination Facility

Figure 2-5c

Proposed Desalination Facility and Pipelines

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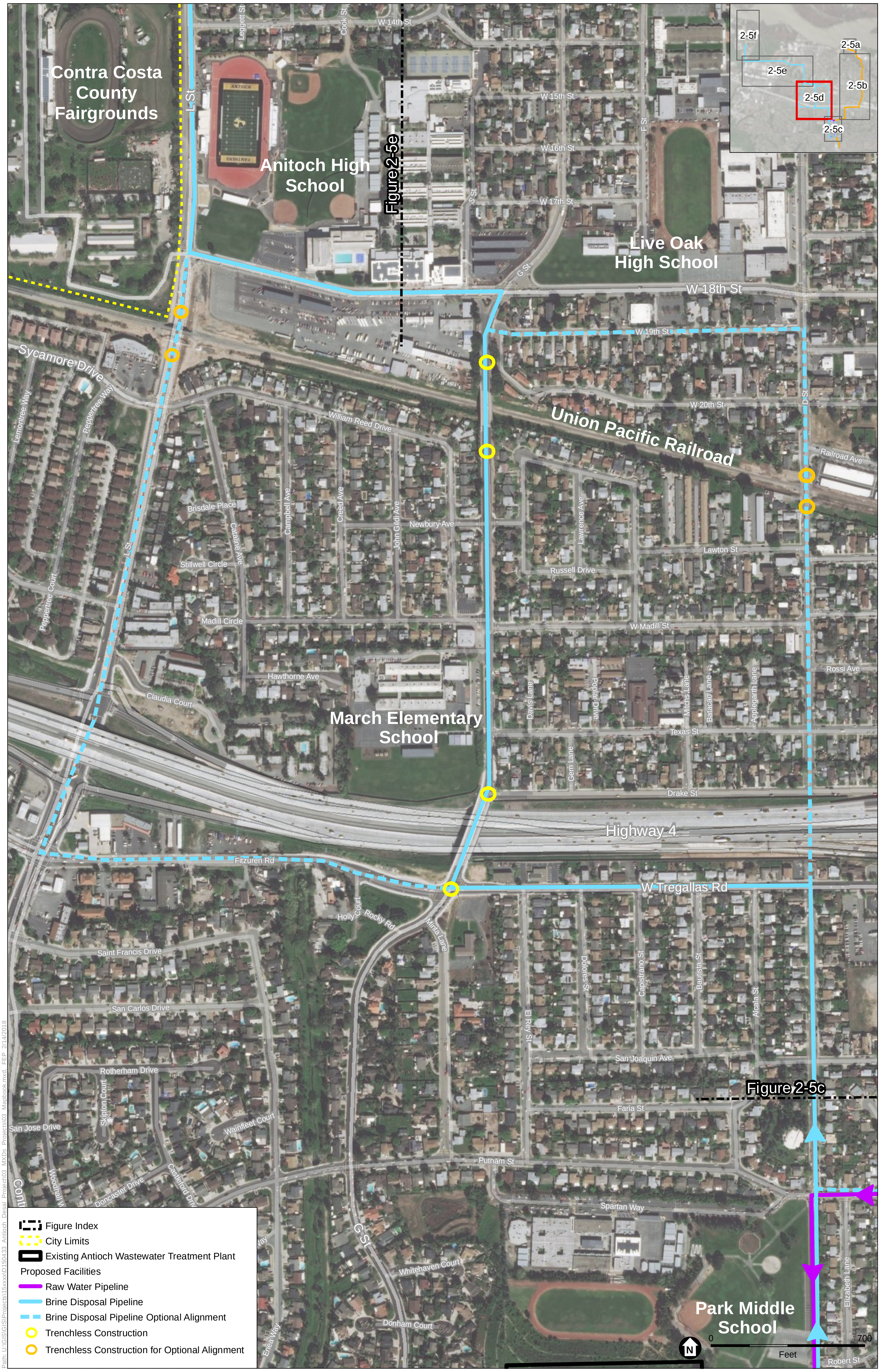

SOURCE: City of Antioch 2017; Carollo Engineers 2017; NAIP 2016, ESA 2018; OSM 2016

Brackish Water Desalination Facility

Figure 2-5d

Brine Disposal Pipeline

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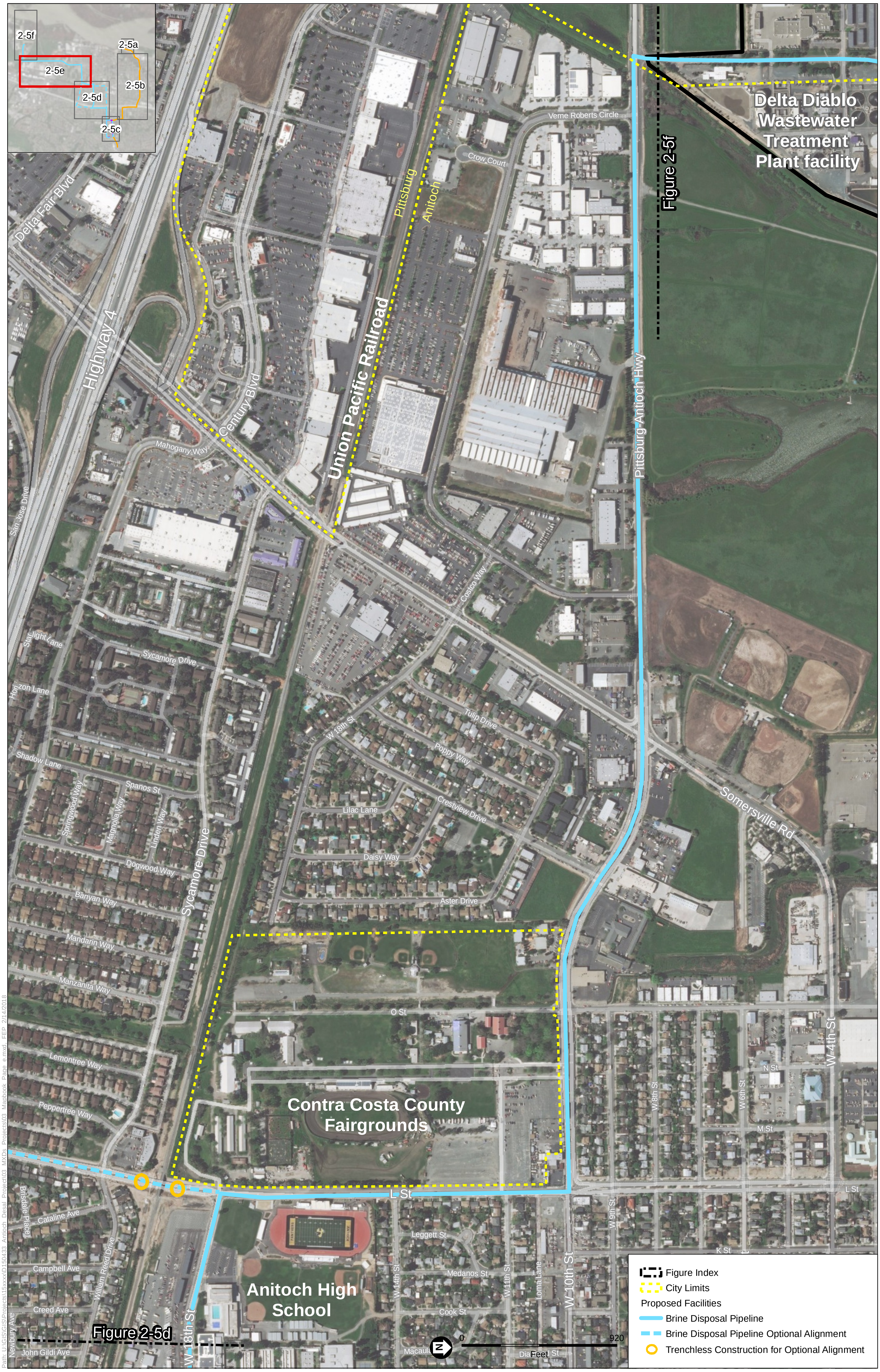

SOURCE: City of Antioch 2017; Carollo Engineers 2017; NAIP 2016, ESA 2018; OSM 2016

Brackish Water Desalination Facility

Figure 2-5e

Brine Disposal Pipeline

ESA

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SOURCE: City of Antioch 2017; Carollo Engineers 2017; NAIP 2016, ESA 2018; OSM 2016

Brackish Water Desalination Facility

Figure 2-5f

Brine Disposal Pipeline and Potential Connection Location

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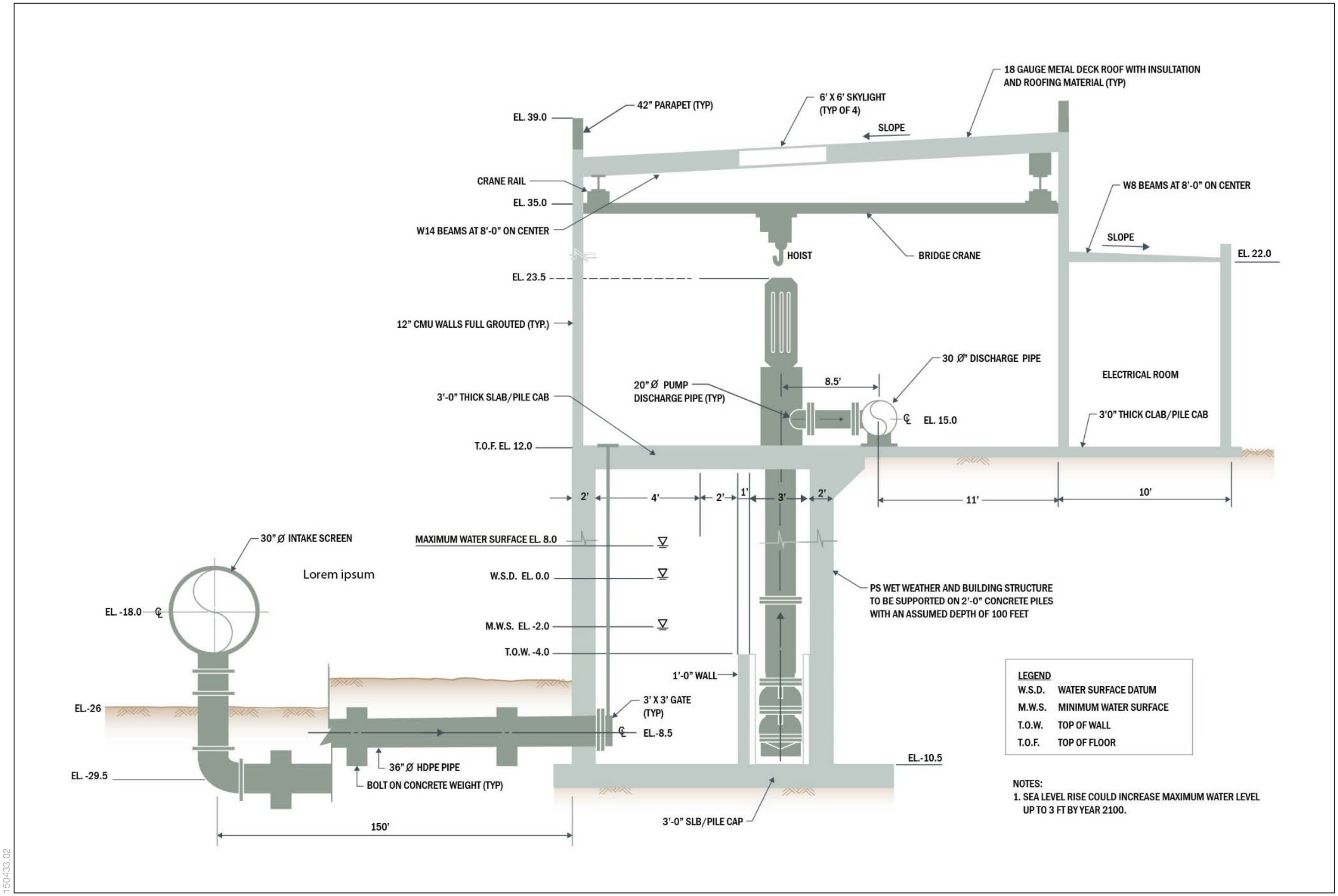


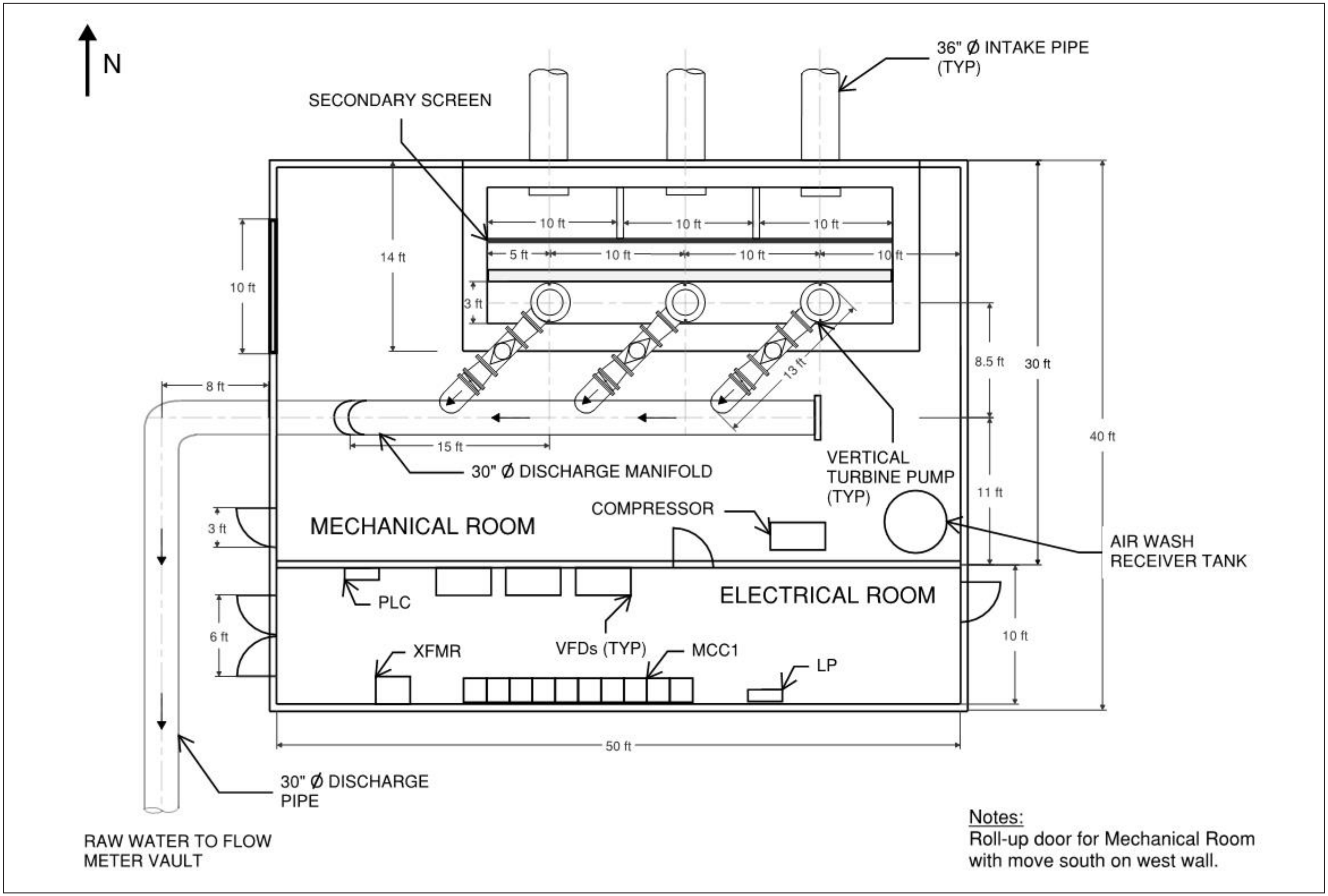
SOURCE: Brown and Caldwell

Brackish Water Desalination Facility

Figure 2-6

Intake Pump Station Elevation

ESA



SOURCE: Brown and Caldwell

Brackish Water Desalination Facility

Figure 2-7
Intake Pump Station Plan View

ESA

The new pump station would connect to and convey river water through the City's existing 30-inch-diameter raw water pipeline for the majority of the distance between the pump station and the WTP. The existing raw water conveyance pipeline is located within road rights-of-way and connects the intake pump station to the Antioch Municipal Reservoir via Fulton Shipyard Road, Cavallo Road, East Tregallas Road, Sunset Lane, Worrell Road, and Lone Tree Way. A new 30-inch-diameter pipeline up to 3,000-feet-long would tee off of the existing pipeline on Lone Tree Way and provide a direct connection between the river's pump station and the WTP through one of two alignments: west along Putnam Street and south along D Street before entering the WTP site, or south along Lone Tree Way and west across easement to the southeast WTP property line (see **Figure 2-5c**). The pipeline would be constructed of ductile iron. Valves would be installed at the tee to allow flow to be directed to either the Reservoir or the WTP.

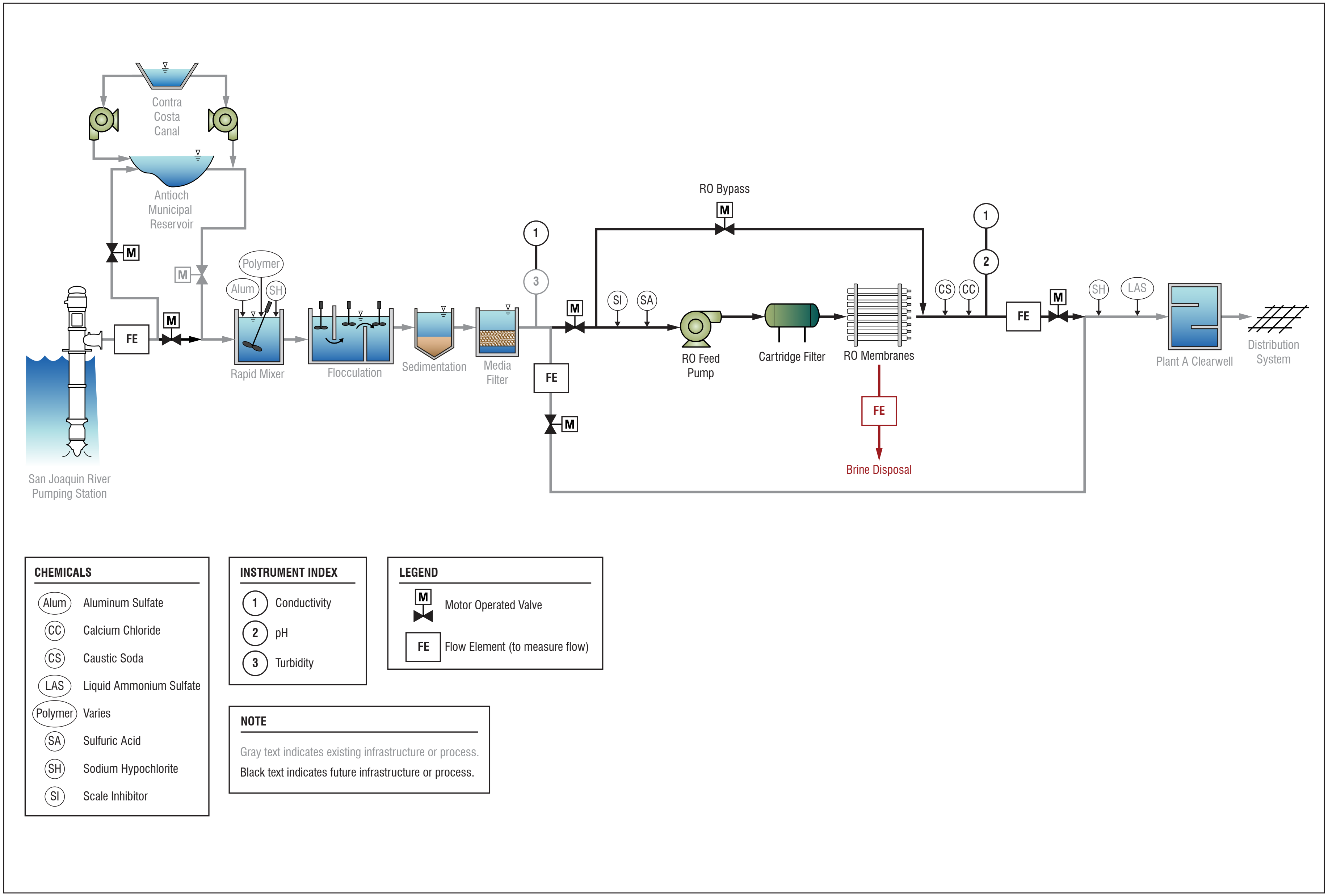
2.6.2 Brackish Water Desalination Plant

The City would construct the desalination plant and related facilities within the fenceline of the existing WTP at 401 Putnam Street. The existing WTP site is approximately 25 acres, and the desalination plant would be located on approximately 10,700 square feet to the south and east of existing Plant A. The facilities to be built at the desalination plant include piping and valves to connect Plant A to the raw water pipeline, a new pipeline and on-site pumps to allow pretreated water from Plant A to flow to the desalination facility, an RO system, a post-treatment system, desalinated water pipeline connection to the existing plant clearwell, and a pipeline from the desalination plant that connects to a dedicated brine disposal pipeline. Existing roads would provide access to the site. The proposed project would create approximately 0.3-acre of impervious surfaces associated with the desalination facilities, buildings, driveways, parking, and maintenance areas. The subsections that follow describe these facilities. **Figure 2-8 and 2-9** present the desalination process flow and preliminary site plan, respectively.

2.6.2.1 Pretreatment System

Locating the desalination facility at the WTP would allow the use of existing infrastructure as part of the overall treatment process including use of Plant A's conventional treatment for removal of solids prior to RO treatment. The purpose of the pretreatment system would be to improve the quality of source water being treated by the RO system by filtering particulates, microorganisms, and organics (e.g., sand, silt, clay) out of the source water. Piping and valves would be installed to connect Plant A to the raw water pipeline. A new pipeline would be constructed to allow the pretreated water from Plant A to flow to the new desalination facility.

Plant A can reliably treat up to 17 mgd and its conventional treatment processes include flash mixing, coagulation and flocculation, solids contact sedimentation, and dual media filtration (sand and granulated activated carbon). Coagulation and flocculation serve as mechanisms for conditioning particles in the water to bind directly to filter media, and to build particles large enough to be removed by the filter media. Flash mixing is used to quickly disperse the coagulant



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SOURCE: Carollo Engineers, 2017

Brackish Water Desalination Facility

Figure 2-8

Desalination Process Flow

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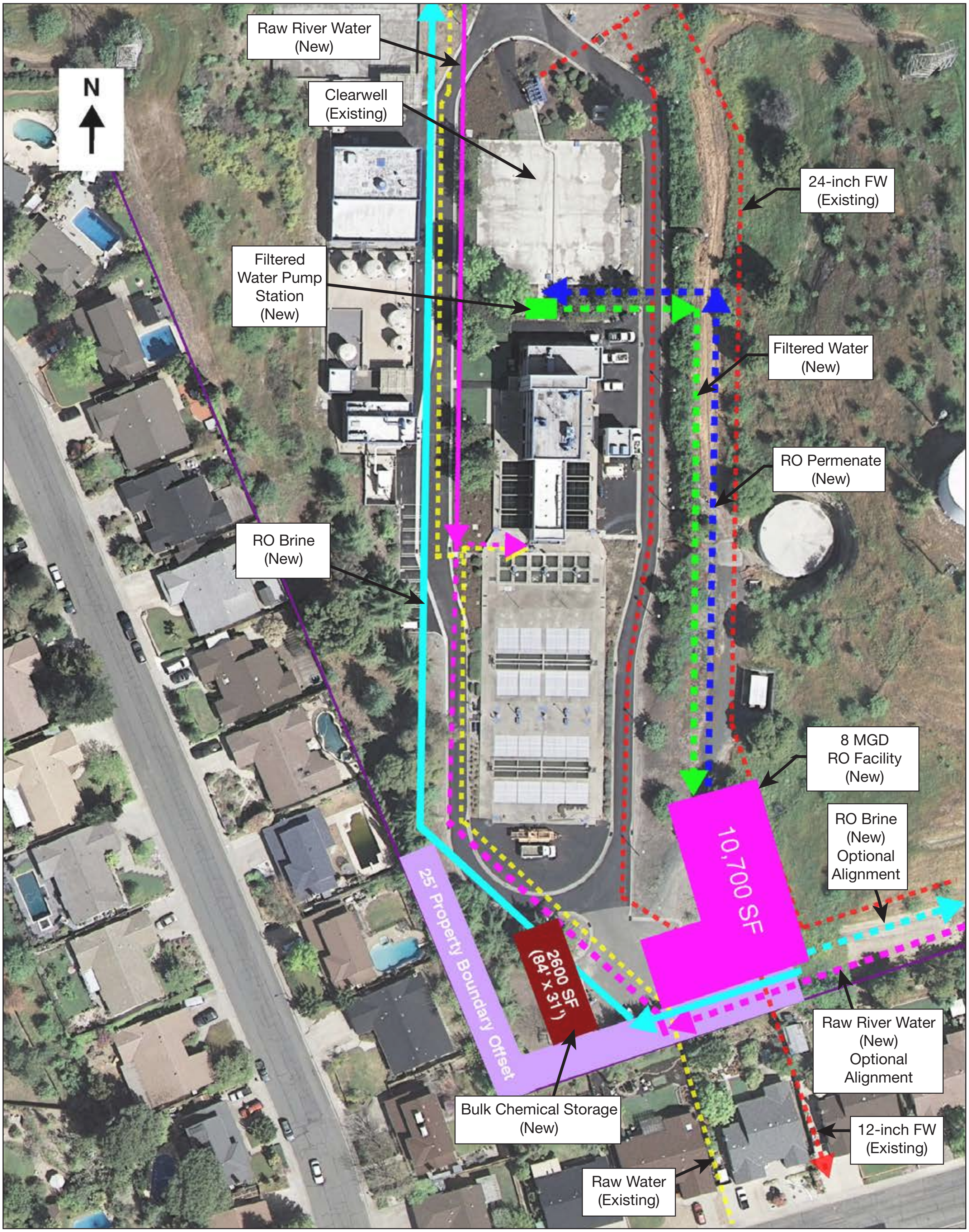


SOURCE: Carollo Engineers, 2017

Brackish Water Desalination Facility

Figure 2-9
Preliminary Site Plan

ESA

chemicals and create a uniform concentration throughout the water undergoing treatment. Flocculation induces contact between particles through the controlled addition of mixing energy. Introducing controlled levels of turbulence allows the particles to group together and progressively grow into larger and larger flocs. The amount of energy input during flocculation is controlled to facilitate the growth of the flocs, and to limit the shearing apart of flocs that have reached a size that allows them to be removed by sedimentation and filtration. Flocculation basins are designed to provide the mixing and retention time desired to optimize the formation of floc particles.

Sedimentation, following coagulation and flocculation, is used to reduce the particle concentration delivered to granular media filters. The sedimentation basins allow and facilitate settling of particles. The accumulated particles on the bottom of the basins are commonly referred to as sludge and are mechanically removed. The main particle removal mechanism in a granular media filter bed is depth filtration, a process where particles are transported to, and attach themselves onto, the surface of the media or previously deposited particles. Chemical coagulants are used to enhance the ability of particles to attach to the media and to themselves.

In addition to particle removal, granular bed filters also perform other water treatment functions. The use of granular activated carbon (GAC) as a support layer in granular media filtration can play a dual role since it also commonly hosts a biofilm that is useful for removing taste- and odor-causing compounds.

This treatment process would continue to be used at the WTP and would provide pretreatment for the RO system as part of the proposed Project. No changes to Plant A's capacity would occur. However, treating the high-TDS water directly from the River may require changes to the coagulant type and/or dosing, increasing the frequency of media filter backwashing, increasing the media filter loading rate, and incorporating corrosion protection upgrades for higher TDS water. Existing concrete and metallic surfaces of Plant A that will be in contact with brackish water will be coated to provide additional corrosion protection.

The pretreatment process for the proposed project at Plant A would produce approximately 8 mgd of pretreated, filtered source water. The pretreated source water (aka RO feed water) would then be pumped directly to the RO system using three new pumps (two active and one standby, 4 mgd and 100 hp each) installed near the inlet to the existing Plant A clearwell.

2.6.2.2 Reverse Osmosis System

RO is a pressure-driven separation process that uses semi-permeable membranes to separate water from dissolved salts. Pretreated source water is forced at very high pressures through RO membranes. Water molecules, which are smaller than salt and many other impurities, are able to pass through the membranes. A portion of the source water passes through the RO membranes to produce "permeate," or desalinated water; the source water that does not pass through the membranes increases in salt concentration and is discharged as brine, as described in more detail below.

The RO system would consist of four RO trains housed in an approximately 18-foot-tall, 10,700 square-foot membrane process building located south and east of Plant A. **Figures 2-10 and 2-11** depict the elevation and plan view of the RO facility building. This building would also house the cartridge filters, four RO feed pumps (2 mgd and 250 hp each), four RO booster pumps (1 mgd and 100 hp each), chemical dosing pumps, clean-in-place (CIP) recirculation pump (1,000 gpm and 25 hp), and electrical room for the RO membranes. Once the water from Plant A reaches the RO facility, it would undergo additional pretreatment to minimize RO membrane fouling and consist of chemical addition by the chemical dosing pumps. A low dose of scale inhibitor (approximately 4 mg/L) is needed to mitigate the impact of highly concentrated salts on the feed side of the RO membranes to prevent scaling. The water would then go through cartridge filters which provide additional protection for the RO membrane elements to capture any final particles of suspended solids that may enter the feed stream. RO feed pumps would supply the pressure needed to force the water through the RO membranes removing the dissolved salts from the RO feed water.

The RO feed water would then go through a two-stage, single pass RO process. In a single-stage system, one stream enters the membrane element and two streams exit. The entering stream is the RO feed water with a high TDS concentration, and the two streams exiting the membrane are permeate and brine. In the two-stage system, the brine from the first phase becomes the feed water for the second stage. Permeate from the second stage combines with permeate from the first stage and, since all of the permeate only pass through a membrane once, it is considered a one-pass system.

The brine produced by RO systems is saturated with dissolved salts, which can result in the accumulation of salts or mineral scaling on the RO membranes, which can cause fouling and reduces the membrane performance. One commonly practiced technique to minimize the opportunity for scale to form on membranes is flushing the membranes with feed water or permeate prior to shutting down an RO train. Flushing the trains displaces the highly concentrated brine away from the membranes, decreasing the opportunity for clusters of atoms to form small seed crystals that can grow and eventually cover the membranes in scale. An RO flushing system consists of additional valves and piping as required to supply the RO train with permeate or low pressure feed water. The pretreatment system described above would reduce fouling of the RO membranes, increasing the efficiency of the RO system and extending the useful life of the RO membranes. However, the RO system would still require cleaning up to two times per year. The RO CIP system would be housed in the same building as the RO system and would include cleaning solution tank with heater, pump, cartridge filter, and associated valves and pipes. Citric acid and sodium hydroxide (approximately 1,200 gallons per month) are used in the CIP system to clean the RO membranes.

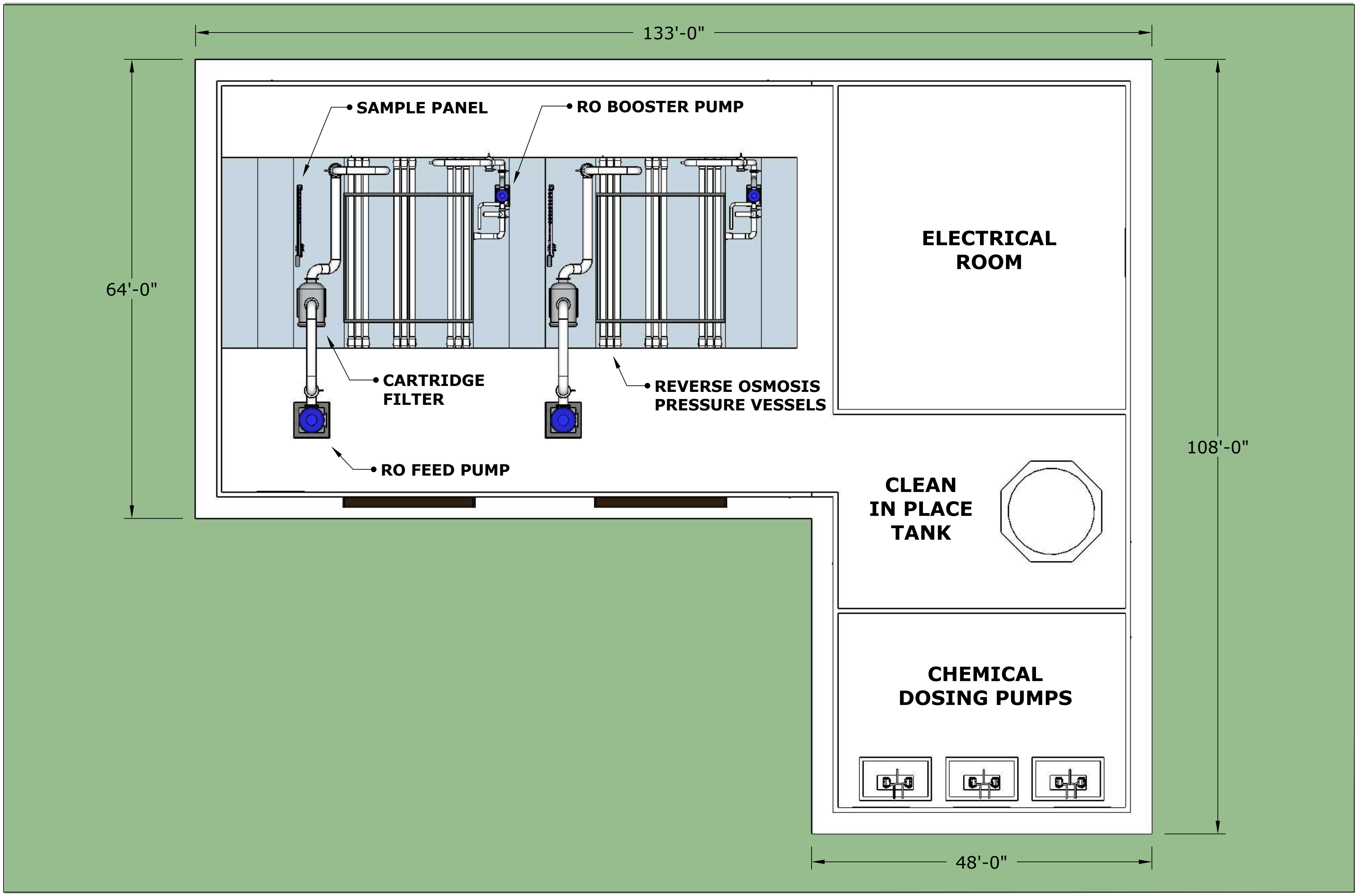
150433.02

SOURCE: Carollo Engineers, 2017

Brackish Water Desalination Facility

Figure 2-10
RO Facility Elevation

ESA



SOURCE: Carollo Engineers, 2017

Brackish Water Desalination Facility

Figure 2-11

RO Facility Plan View

ESA

2.6.2.3 Post-treatment System

After leaving the RO system, the desalinated water would undergo post-treatment to make the water compatible with the City's other water supply sources and provide disinfection prior to distribution to customers. Facility operators would use metering pumps and chemical feedlines to dose the post-treatment chemicals (sodium hydroxide and calcium chloride) into the RO permeate. Caustic soda would be added to adjust pH; calcium chloride would be added for hardness adjustment and corrosion control; and liquid ammonium sulfate and sodium hypochlorite would be added for disinfection. Liquid ammonium sulfate, sodium hydroxide, and sodium hypochlorite are already in use at the WTP and would not represent new chemical storage at the site. All treatment chemicals would be transported, stored and used in accordance with regulatory requirements.

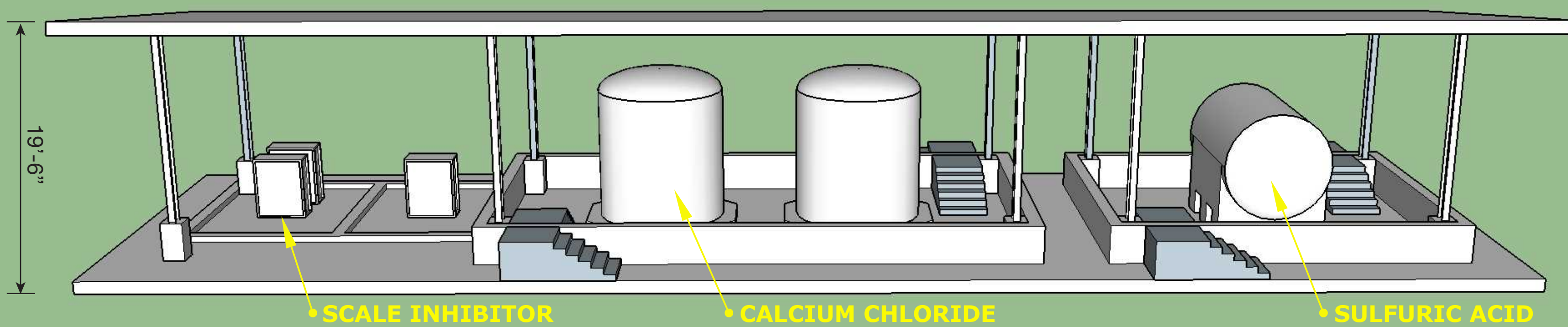
2.6.2.4 Desalinated Water Conveyance

Following the post-treatment system, the desalinated product water would flow by gravity into Plant A's existing 1.0 MG clearwell for distribution. No changes to the existing Plant A clearwell would be required with the exception of the installation of up to 1,200 feet of piping within the WTP site to connect the inlet to the clearwell to the RO facility. The piping would be constructed of cement mortar lined steel. Existing pumps at the WTP would convey water to the distribution system.

2.6.2.5 Chemical Use and Storage

As noted in previous sections, facility operators would use various chemicals to treat the water as it passes through the pretreatment, RO system, and post-treatment processes to ensure the water meets drinking water quality requirements and is compatible with the City's other water supply sources. The chemicals used during the desalination process would be stored onsite in accordance with applicable regulatory requirements. The pre-treatment and post-treatment chemicals would be pumped through feedlines from 270-gallon to 6,000-gallon bulk storage tanks located in an approximately 20-foot-tall, 2,600 square-foot structure located near the membrane process building (see **Figures 2-9 and 2-12**).

As described previously, the RO system would be housed in an approximately 18-foot-tall, 10,700-square-foot membrane process building located south and east of Plant A. RO cleaning chemicals would be stored in smaller containers in the membrane process building. **Table 2-3** summarizes the chemicals that would be used during the desalination process and the projected annual usage amounts.



CHEMICAL	TANK VOLUME (GAL)	TOTAL VOLUME (GAL)	STORAGE CAPACITY (DAYS)
SCALE INHIBITOR	3 X 270	810	37
CALCIUM CHLORIDE	2 X 6000	12,000	32
SULFURIC ACID	1 X 5000	5000	31

150433.02

SOURCE: Carollo Engineers, 2017

Brackish Water Desalination Facility

Figure 2-12
Chemical Storage Area

ESA

TABLE 2-3
DESALINATION CHEMICALS AND ANNUAL USAGE

Chemical	Application	Approximate Annual Usage (gallons)
Scale Inhibitor	Pre-treatment	8,428
Sulfuric Acid	Pre-treatment	62,846
Sodium Hydroxide (Caustic Soda)	Post-treatment	166,084
Calcium Chloride	Post-treatment	147,491
RO Cleaning Chemicals (Citric Acid and sodium hydroxide)	RO membrane cleaning	14,200

SOURCE: Carollo Engineers 2017

2.6.3 Brine Disposal

Delta Diablo provides wastewater resource recovery services for the Cities of Antioch and Pittsburg, and the unincorporated community of Bay Point, serving a population of approximately 208,000. The City of Antioch’s sanitary sewer system includes approximately 292 miles of gravity sewer mains that conveys wastewater to Delta Diablo’s Wastewater Treatment Plant (WWTP). The RO process would generate approximately 2 mgd of brine. Brine from the RO system would be conveyed through an approximately 4.3-mile long, 12-inch-diameter dedicated pipeline from the desalination facility to the existing Delta Diablo WWTP. The brine disposal pipeline would be constructed of high-density polyethylene (HDPE) or polyvinyl chloride (PVC) and would connect to the WWTP effluent channel at the north end of the plant. The brine would be mixed with treated wastewater from the WWTP prior to discharge through the existing WWTP outfall.

The majority of the brine disposal pipeline would be constructed within roadway rights-of way in the cities of Antioch and Pittsburg along Elizabeth Court/D Street, Tregallas Road, Fitzuren Road, Contra Loma Boulevard/L Street, West 10th Street/Pittsburg Antioch Highway, and Arcy Lane (see **Figures 2-5c through 2-5f**). As alternative alignments for crossing the highway/railroad and entering the WTP, G Street, East 18th Street, Putnam Street, Lone Tree Way, and private easement may be used.

The existing Delta Diablo WWTP outfall pipeline ends approximately 500 feet offshore. The outfall is at an elevation depth of 26 feet. The diffuser port diameter is approximately 42 inches, with 50 3-inch diameter ports spaced 8 feet apart in alternating directions. No construction or modifications to the Delta Diablo WWTP outfall would be required.

2.7 Project Construction

An overview of the anticipated construction process is provided below. Included in this discussion are descriptions of site preparation and staging, construction approach and methodology, and schedule. Construction of the various project components could proceed in parallel; that is, the Project implementation would not occur in phases.

2.7.1 Construction Schedule

The proposed project facilities would be built over approximately 14 months. Approximate duration of construction activities would vary by proposed project component as follows: River Intake Pump Station – 12 months; desalination facility – 14 months; pipelines – over the course of 10 months. Construction work would typically occur during normal working hours; weekdays between the hours of 8 a.m. and 5 p.m.

2.7.2 Site Preparation and Construction Staging

2.7.2.1 Site Clearing and Preparation

Construction workers would clear and prepare the construction work areas in stages as construction progresses. Before construction starts, the contractor would clear and grade portions of the Antioch WTP and River intake pump station sites, removing vegetation and debris as necessary, to provide a relatively level surface for equipment access, materials staging, and construction activities. The majority of project components would be located within developed areas. Some trees may be removed for construction of the raw water connection and brine disposal pipeline alternative alignment from Lone Tree Way into the WTP. Limited landscaping and shrubs may be removed. The removed trees would be replaced consistent with the City's tree removal policy.

Upon completion of construction, the remaining undeveloped portions of these sites disturbed during construction would be returned to their approximate pre-construction condition, including topography and vegetation. All waste would be hauled off approximately 10 miles from the project construction areas to Keller Canyon landfill located just outside of Pittsburg.

2.7.2.2 Staging and Laydown Areas

Construction equipment and materials would be stored within the construction work areas to the extent feasible. Construction staging for the River intake pump station would require approximately 3,000 square feet within existing developed or disturbed areas of the pump station property. For the construction of the desalination facility at the Antioch WTP, staging and laydown areas would require approximately ¼ acre within the fenceline and in the southern portion of the site. Staging and laydown for pipeline construction would occur primarily on paved areas near the pipeline route. The designated staging areas are primarily paved or gravel located in highly disturbed areas.

Table 2-4 summarizes the staging area locations and current site conditions.

TABLE 2-4
CONSTRUCTION STAGING AREAS

Project Components	Location	Site Description
Intake Pump Station Replacement		
New Intake Pump Station	At the existing River intake pump station site parking lot near McElheny Road and Fulton Shipyard Road	Already developed or disturbed.
Desalination Facility		
Pretreatment pipeline, RO system, post-treatment system, chemical storage	Antioch WTP	Already developed or disturbed.
Pipelines		
Raw water connection pipeline	Paved areas adjacent to the trench; 10-12 feet wide for entire pipeline alignment length (3,000 feet)	Already developed or disturbed.
Brine Disposal Pipeline	Assumed to be the same as the Raw Water Pipeline staging areas (see above).	Already developed or disturbed.
Connection to Delta Diablo WWTP		
Brine pipeline connection to existing Delta Diablo WWTP outfall on WWTP property	Delta Diablo WWTP	Already developed or disturbed

Because all of the staging areas are developed or disturbed, the City's contractors would not need to remove trees or vegetation to use the sites for staging. Except for heavy machinery that is operated solely to move lighter-duty machinery in and out of the staging area, and for the use of a front-loaded backhoe to load and unload material onto transportation vehicles for delivery to the construction sites, heavy machinery would not be operated at the staging areas.

2.7.3 River Intake Pump Station

Construction activities for the new intake pump station would involve excavation, pouring concrete footing for foundations; assembling and installing piping, pumps, and electrical equipment; building concrete enclosures and roofs; and performing finish work such as paving, and fencing the perimeter of the pump station site on City property. Additionally, a cofferdam may be temporarily installed in the river by the construction contractor to facilitate installation of the intake pipelines and fish screens and minimize turbulence and sediment disturbance during construction. The cofferdam would consist of interlocking sheet piles forming a watertight corridor approximately 50 feet wide that would extend into the river approximately 200 feet from the shore (see **Figure 2-5a**). Installation of the cofferdam is expected to take approximately 2 weeks. Pipelines and fish screens would be installed within the watertight corridor. The cofferdam would be removed following construction. In-river pipelines and fish screens could be installed using underwater construction techniques as an alternative option to using a cofferdam.

The existing pump station would remain in operation while the new pump station is constructed. Once the new pump station is operational, the existing pump station would be demolished after the new pump station is complete. Only minor clearing or grubbing is expected for the new river intake pump station as it would be constructed on pre-developed areas. Construction access would be provided via existing access roads and roadways. Construction of the new river pump station would result in approximately 3,000 square feet of temporary disturbance and 2,600 square feet of permanent disturbance in the existing parking lot of the City's marina. Construction durations and assumptions are shown in **Table 2-5**.

2.7.4 Pipeline Installation

A total of approximately 4.8 miles of pipelines would be installed for the raw water pipeline connection to the WTP, the new filtered water and RO permeate pipelines at the WTP site, and the brine disposal pipeline. The raw water pipeline connection would be up to 3,000-feet-long and would tee off of the existing pipeline in Lone Tree Way and provide a direct connection between the river's pump station and the WTP through one of two alignments: west along Putnam Street and south along D Street before entering the WTP site, or south along Lone Tree Way and west across an easement to the southeast side of the WTP property.

The pipelines within the WTP would be approximately 1,200 feet in total length for the filtered water and RO permeate (600 feet each) and would run between the existing WTP and the proposed desalination plant. The brine disposal pipeline would be approximately 4.3 miles long. It would be constructed within roadway right-of-ways in the cities of Antioch and Pittsburg along Elizabeth Court/D Street, Tregallas Road, Fitzuren Road, Contra Loma Boulevard/L Street, West 10th Street/Pittsburg-Antioch Highway, and Arcy Lane and would connect to the Delta Diablo WWTP. Alternative alignments for crossing the highway/railroad and entering the WTP, G Street, East 18th Street, Putnam Street, Lone Tree Way, and private easement may be used. The

TABLE 2-5
CONSTRUCTION ASSUMPTIONS FOR THE PROPOSED PROJECT

Project Component	Total Excess Spoils and Construction Debris and Imported Fill (CY)	Estimated Construction Equipment		Number of Workers per day	Construction Durations and Work Hours
River Intake Pump Station					
Pump Station Demolition and New Construction	• Excess spoils: 11,000 • Imported fill: 7,200	• Excavator • Backhoe • Air compressor • Boom truck or small crane • Generator	• Concrete pump truck • Paving equipment • Flatbed truck • Pavers and rollers • Welding equipment • Baker tank	6 (average)	The river intake pump station would be built over a 12-month period. Construction at this site would occur during the day.
Desalination Facility					
Desalination Plant and Appurtenant Facilities	• Excess spoils: 1,780	• Excavators • Backhoes • Air compressors • Loaders • Boom trucks • Cranes • Pavers and rollers • Bulldozers	• Concrete transport trucks • Concrete pump trucks • Flatbed trucks • Generators • Pickup trucks • Trucks for materials delivery	8 (average)	The desalination plant and appurtenances would be built over a 14-month period. Construction at this site would occur during the day.
Pipelines					
a) Raw Water Pipeline Connection b) WTP Pipelines c) Brine Disposal Conveyance Pipeline	a) Excess spoils: 4,335 Imported fill: 3,700 b) Excess spoils: 1,470 Imported fill: 1,215 c) Excess spoils: 18,080 Imported fill: 13,550	• Flatbed trucks • Backhoes • Excavators • Pipe cutting and welding equipment • Haul trucks for spoils transport • Trucks for materials delivery • Compaction equipment	• Drill/bore rig • Baker tank(s) • Pickup trucks • Arc welding machine • Generators • Air compressors • Crane • Skip loader • Pavers and rollers	a) 8 (average) b) Included in desalination facility construction c) 7 (average)	a) The Raw Water Pipeline would be built over approximately 15 days. Construction would occur during the day. b) The WTP pipelines would be built over approximately 10 days during the day. c) The Brine Disposal Pipeline would be built within a 10-month period. Construction would occur during the day.
Total Excess Spoils and Construction Debris =	**Approximately 36,665 cy spoils 25,665 cy fill**				**Overall Construction Schedule = February 2019 through March 2020 (14 months)**

SOURCE: Carollo Engineers, 2018

majority of the pipelines would be installed in existing roadways using conventional cut and cover construction techniques and installing the pipe in open trenches as described below. Trenchless construction methods would be used to cross the highway and railroad.

The raw water pipeline connection and brine disposal pipeline construction may be completed simultaneously with other project components. Although construction of these pipelines would occur over a 10-month period, installation could occur at any time throughout the entire 14-month project construction period. The WTP pipelines would be installed during the desalination facility construction period, as described below. Raw water and brine disposal pipeline installation would be sequenced to minimize land use disturbance and traffic disruption to the extent possible.

2.7.4.1 Open-Trench Construction

For pipeline segments to be installed using open-trench methods, the construction sequence would typically include:

- clearing and grading the ground surface along the pipeline alignments;
- excavating the trench;
- preparing and installing pipeline sections;
- installing vaults, manhole risers, manifolds, and other pipeline components;
- backfilling the trench with non-expansive fills;
- restoring preconstruction contours; and
- revegetating or paving the pipeline alignments, as appropriate.

Typical construction equipment for pipeline installation would include flatbed trucks, backhoes, excavators, pipe cutting and welding equipment, haul trucks for spoils transport, trucks for materials delivery, compaction equipment, Baker tanks, pickup trucks, arch welding machines, generators, air compressors, cranes, drill rigs, and skip loaders.

A conventional backhoe, excavator, or other mechanized equipment would be used to excavate trenches. It is anticipated that the typical trench width would be approximately 3 to 5 feet depending on pipe diameter and on average 7-feet deep; however, vaults, manhole risers, and other pipeline components could require wider excavations and existing utility crossings would require deeper excavations. Work crews would install trench boxes or shoring or would lay back and bench the slopes to stabilize the pipeline trenches and prevent the walls from collapsing during construction. After excavating the trenches, the contractor would line the trench with pipe bedding; that is, sand or other appropriate material shaped to support the pipeline. Construction workers would then place pipe sections (and pipeline components, where applicable) into the trench, weld the sections together as trenching proceeded, and then backfill the trench. Most pipeline segments would have approximately 4 feet of cover. Open-trench construction would generally proceed at a rate of about 200 feet per day. Steel plates would be placed over trenches to maintain access to private driveways. Some pipeline installation would require construction in existing roadways and could result in temporary lane closures or detours.

2.7.4.2 Trenchless Construction

Where it is not feasible or desirable to perform open-cut trenching, workers would use trenchless methods such as jack-and-bore. Trenchless methods of pipeline installation would be required at three identified locations (additional locations may be identified during final pipeline design):

1. Installation of the brine disposal pipeline beneath Highway 4 at G Street
2. Installation of the brine disposal pipeline beneath the railroad crossing at G Street or at L Street

Jack-and-Bore and Microtunneling Methods

The jack-and-bore and microtunneling methods entail excavating an entry pit and an egress pit at either end of the pipe segment. A horizontal auger is used to drill a hole, and a hydraulic jack is used to push a steel casing through the hole to the egress pit. Once the casing is in place, the pipe is installed in the casing.

Horizontal Directional Drilling

Horizontal directional drilling requires the excavation of a pit on either end of the pipe alignment. A surface-launched drilling rig is used to drill a small horizontal boring at the desired depth between the two pits. The boring is filled with drilling fluid and enlarged by a back reamer or hole opener to the required diameter. The pipeline is then pulled into position through the boring.

2.7.5 Desalination Plant Construction

Construction workers would access the proposed desalination plant site via WTP site entrance at D Street and existing internal access roads. Construction activities would include excavation, grading, pouring concrete footings for foundations, tanks, and other support equipment; building walls and roofs; assembling and installing major desalination process components; installing piping, pumps, storage tanks, and electrical equipment; testing and commissioning facilities; and finish work such as paving and landscaping of the site. Construction equipment would include excavators, backhoes, graders, pavers, rollers, bulldozers, concrete trucks, flatbed trucks, boom trucks, cranes, forklifts, welding equipment, dump trucks, air compressors, and generators. Desalination membranes, supports, pumps, and chemical metering equipment would be fabricated and delivered to the site. A total of approximately 1/4 acre of the roughly 25 acre WTP site would be disturbed during construction. Construction activities at the desalination plant site are expected to occur over 14 months. Refer to Sections 2.7.3 and 2.7.4 above, for a description of construction activities associated with the river intake pump station and pipeline installation.

2.7.6 Excavation, Stockpiling of Soils, and Spoils Disposal

Excavation and construction activities would generate excess soil, rock, and construction material and debris. Although suitable topsoil and subsoils excavated during construction would be used to backfill excavations and restore work areas, project construction is projected to generate approximately 36,665 cubic yards of excess material requiring offsite disposal at the Keller

Canyon Landfill. Construction of the proposed project components at the River Intake Pump Station and desalination plant facility would require excavation and grading.

If any soil contaminated with hazardous materials were encountered, it would be characterized, transported and disposed of at an appropriate landfill in compliance with applicable federal, state, and local regulations. The average capacity of haul trucks is assumed to be 10 cubic yards. Spoils hauling and placement would occur throughout the 14-month construction schedule.

2.7.7 Dewatering

If water were to accumulate in an open construction trench as a result of groundwater seepage or precipitation, dewatering of the construction work area would be required. Dewatering typically involves pumping water out of the trench/pit and, following appropriate onsite treatment, discharging the water over land or into a nearby sewer and not into any creeks, drainages, or waterways. Discharge to the sanitary sewer system would require a permit and prior approval from the Central Valley Regional Water Quality Control Board, and most of the proposed project sites would be subject to these requirements. Discharge over land must be performed in accordance with municipal stormwater permits and the requirements of the Statewide General Construction Permit for Stormwater Discharges Associated with Construction Activity issued by the State Water Resources Control Board. No discharges will be made into creeks, drainages, or waterways. Permit requirements and mandatory best management practices are further discussed in Section 3.10, *Local Hydrology and Water Quality*.

2.7.8 Site Access

Existing public roadways roads would provide the access routes to the WTP, river intake pump station, pipeline construction areas, and staging areas. Major throughways for site access would include Highway 4. Major arterials would include Lone Tree Way and West 10th Street.

2.8 Operations and Maintenance

2.8.1 Operations

The City's current water supply operations cease river diversions when salinity at the intake becomes too high. The timing of this varies by water year type. With the proposed project, the City would continue to divert water from the river for conventional treatment until salinity increases and then it would begin using the brackish desalination facility. This would enable the new intake pump station to potentially operate year round.

As described in Section 2.6.1, the new 16 mgd pump station equipment would include three vertical variable speed turbine pumps (8 mgd and 600 hp each). Two of the pumps would be active and one on standby, allowing the pump station to continue operating if one of the pumps are out of service for maintenance. The variable speed pumps would allow variable diversion rates, providing the City flexibility in operations. The extended river intake pump station operational period would improve the City's ability to use its existing water right. When the desalination facility is operating, 8 MGD would be diverted to the desalination facility and the City would have the ability to divert up to an additional 8 MGD to the conventional WTP or municipal reservoir to be used for blending depending on demands and water quality.

The desalination plant's operation schedule would vary each year depending on when chloride concentrations increase at the City's river intake. In general, the plant would be operated seasonally, turning on when river salinity increases and operating at full capacity until salinity at the City's intake returns to a suitable level for conventional treatment.

The facility would operate at an overall recovery rate of approximately 75 percent. Approximately 8 mgd of river water would be needed to produce 6 mgd of desalinated product water. When operated, the desalination facility would operate at its full capacity. Intermittent or partial operation of desalination facilities is typically not practiced. Steady flow velocity through the membranes at its rated capacity prevents the buildup of precipitates on the membranes which can reduce treatment efficiency and capacity of the system. The RO process would generate up to 2 mgd of brine. The RO brine TDS is expected to range between 400 mg/L and 30,000 mg/L (Carollo, Exponent, 2018) and will vary with the source water quality.

Project operations were simulated using a spreadsheet model and source water quality conditions for the years 2011 and 2013 to provide an illustration of how the facility could operate in wet and dry years.

Tables 2-6 and 2-7 compare monthly raw water use and potable water produced with and without the project during wet and dry years, respectively. Without project values are based on actual historical operations. With project values are a combination of actual historical operations and simulated desalination operations using a spreadsheet model. Graphical depictions of the raw water use and potable water produced are shown in **Figures 2-13 and 2-14**, respectively**.** While deliveries and demands are the same in both examples, note that the total volume of river water treated is greater under the "with project" conditions in **Figures 2-13a** and **2-14a**¸ because it accounts for the additional river water required to produce desalinated water and returned to the river as brine.

The desalination plant would be used to produce between roughly 2600 AFY – 5,500 AFY (800 – 1800 MG) depending on year type. The plant would operate seasonally for a longer period of time during drier years than in wetter years. In all year types, implementation of the project would allow the City to pump water from the river year-round and reduce the use of CCWD water by varying degrees depending on the month.

TABLE 2-6
MONTHLY ANTIOCH WET YEAR RAW WATER USE AND POTABLE WATER PRODUCED WITH AND WITHOUT PROJECT

Month	Wet Year Without Project					Wet Year With Project								
	Water Pumped from Antioch's Intake on the San Joaquin River	Conventionally Treated Water			Total Potable Water Produced (MG)	Water Pumped from Antioch's Intake on the San Joaquin River[a]	Conventionally Treated Water				RO Permeate (MG)[b]	RO Brine (MG)[c]	Net River Water Used (MG)[d]	Total Potable Water Produced (MG)
		Total Water Treated Conventionally (MG)	River Water Treated Conventionally for Potable Use (MG)	CCWD Water Purchased and Treated Conventionally for Potable Use (MG)			Total Water Treated Conventionally (MG)	River Water Treated Conventionally for Potable Use (MG)	River Water Treated Conventionally for RO Pretreatment (MG)	CCWD Water Purchased and Treated Conventionally for Potable Use (MG)				
January	270	270	270	0	270	270	270	270	0	0	0	0	270	270
February	315	315	315	0	315	315	315	315	0	0	0	0	315	315
March	267	267	267	0	267	267	267	267	0	0	0	0	267	267
April	420	434	420	14	434	420	434	420	0	14	0	0	420	434
May	437	588	437	151	588	437	588	437	0	151	0	0	437	588
June	400	568	400	168	568	400	568	400	0	168	0	0	400	568
July	420	730	420	310	730	420	730	420	0	310	0	0	420	730
August	410	715	410	305	715	429	777	181	248	348	186	62	367	715
September	410	660	410	250	660	424	720	185	240	296	180	60	364	660
October	220	740	220	520	740	417	774	281	136	357	102	34	383	740
November	0	300	0	300	300	281	360	41	240	79	180	60	221	300
December	0	320	0	320	320	270	382	22	248	112	186	62	208	320
Annual Total (MG)	**3,569**	**5,907**	**3,569**	**2,338**	**5,907**	**4,580**	**6,185**	**3,469**	**1,111**	**1,604**	**834**	**278**	**4,303**	**5,907**
Annual Total (AF)	**10,953**	**18,128**	**10,953**	**7,175**	**18,128**	**14,057**	**18,981**	**10,646**	**3,411**	**4,924**	**2,558**	**853**	**13,204**	**18,128**
Percentage of City's Water Supply			**60%**	**40%**	**100%**			**59%**		**27%**	**14%**			**100%**

NOTES:

a The volume of water pumped from the River with the project includes River water to be treated conventionally for potable use and River water for RO pretreatment (desalination).
b Permeate is the purified water produced through the RO membranes and becomes part of the potable water supply.
c The source water that does not pass through the RO membranes increases in salt concentration and is discharged as brine. The RO brine volume represents water that would be mixed with treated wastewater from the WWTP prior to discharge through the outfall into the San Joaquin River.
d The net river water used accounts for the total volume of water pumped from the river intake pump station minus RO Brine volume.
e The With Project simulation shows water being purchased from CCWD in some months in which no river water is being diverted to RO treatment. This is due to City demand exceeding capacity limitations of the River pump station, not river water quality. The pump station has a capacity of 16 mgd. When daily-average required volume of water is greater than 16 mgd, for the purposes of this simulation, it was assumed that demand was met by purchase of additional water from CCWD. In real time operations, the City could also utilize water from its municipal reservoir which has a capacity of 240-MG (735-acre feet).

SOURCE: Carollo Engineers 2017, 2018

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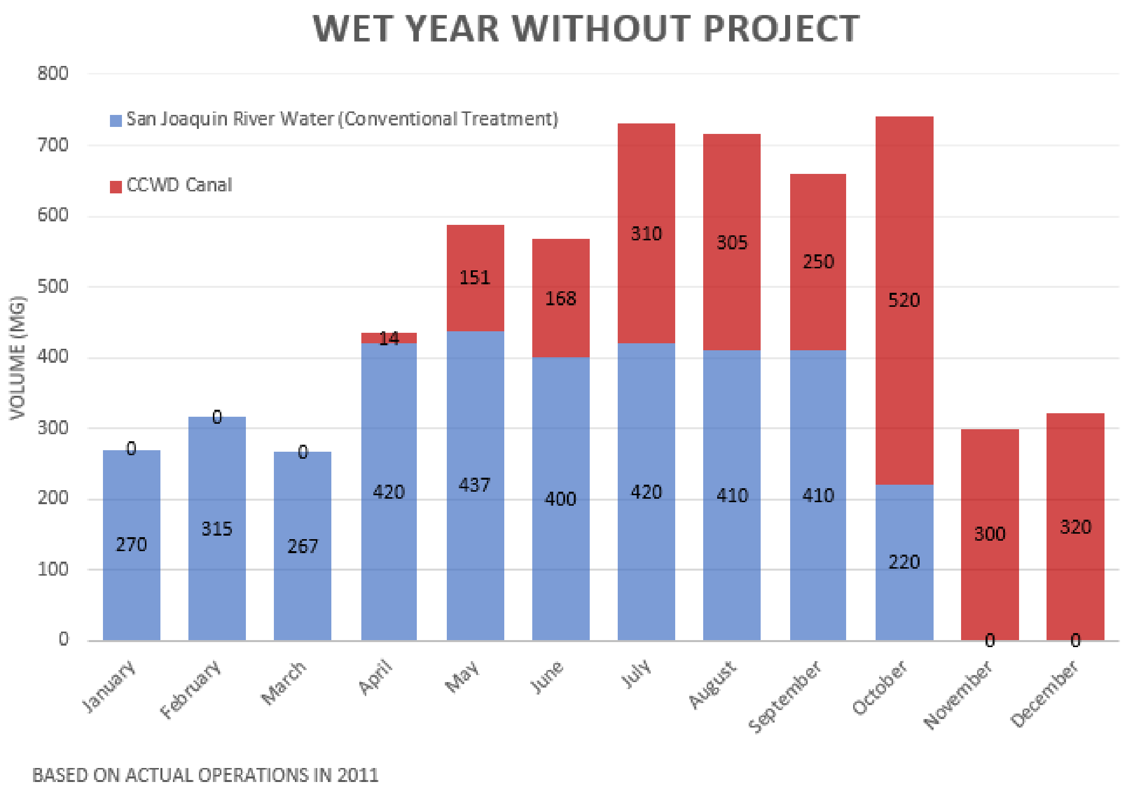
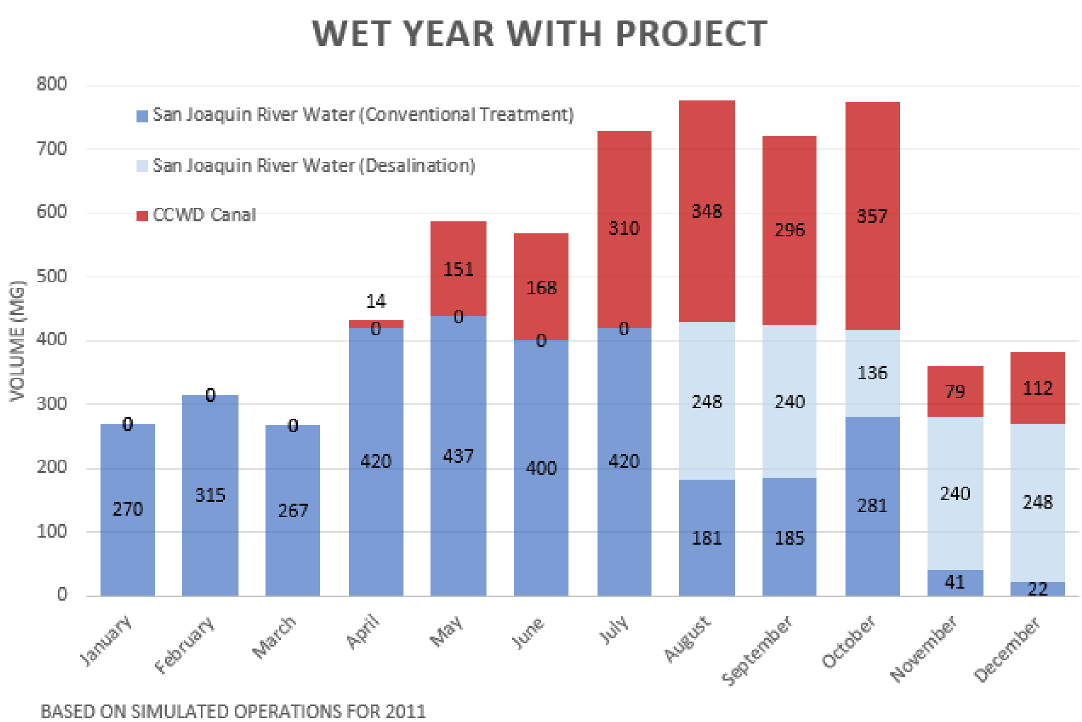
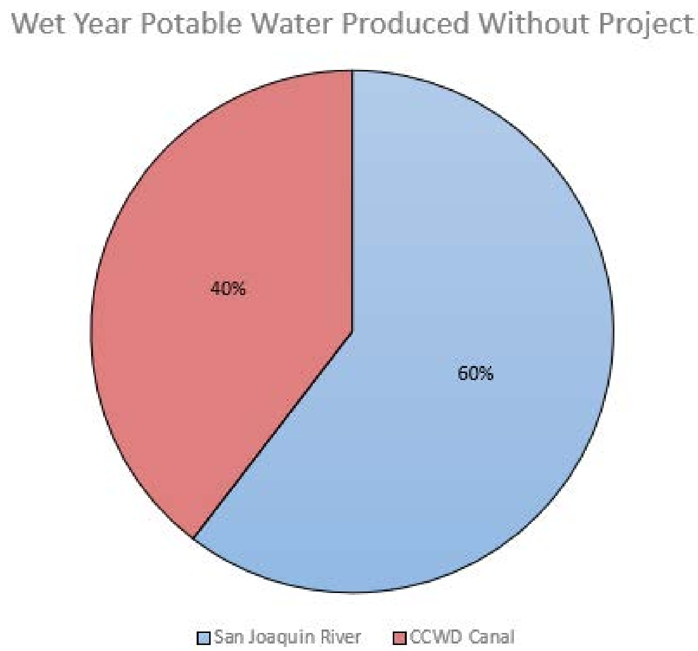
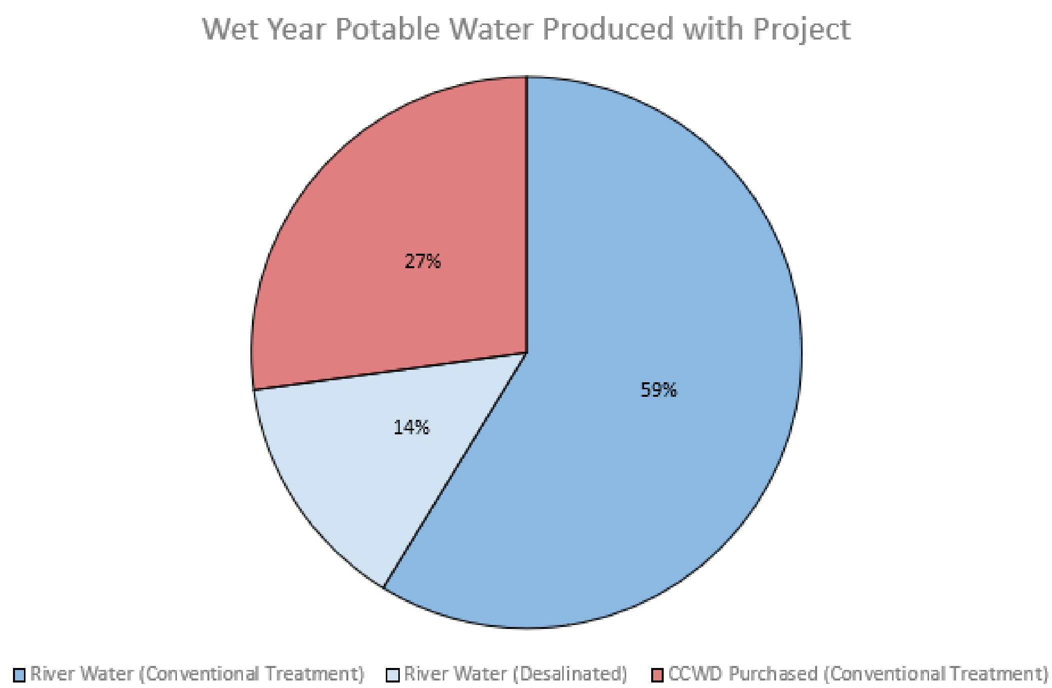




SOURCE: Carollo Engineers 2017, 2018

Figure 2-13a
Monthly Wet Year Raw Water Use With and Without Project





SOURCE: Carollo Engineers 2017, 2018

Figure 2-13b
Annual Percentage of Potable Water Produced With and Without Project (Wet Year)

TABLE 2-7
MONTHLY ANTIOCH DRY YEAR RAW WATER USE AND POTABLE WATER PRODUCED WITH AND WITHOUT PROJECT

	Dry Year Without Project					Dry Year With Project								
		Conventionally Treated Water					Conventionally Treated Water							
Month	Water Pumped from Antioch's Intake on the San Joaquin River	Total Water Treated Conventionally (MG)	River Water Treated Conventionally for Potable Use (MG)	CCWD Water Purchased and Treated Conventionally for Potable Use (MG)	Total Potable Water Produced (MG)	Water Pumped from Antioch's Intake on the San Joaquin River (MG)[a]	Total Water Treated Conventionally (MG)	River Water Treated Conventionally for Potable Use (MG)	River Water Treated Conventionally for RO Pretreatment (MG)	CCWD Water Purchased and Treated Conventionally for Potable Use (MG)	RO Permeate (MG)[b]	RO Brine (MG)[c]	Net River Water Used (MG)[d]	Total Potable Water Produced (MG)
January	320	320	320	0	320	320	320	320	0	0	0	0	320	320
February	300	300	300	0	300	300	300	300	0	0	0	0	300	300
March	375	375	375	0	375	378	431	154	224	53	168	56	322	375
April	300	491	300	191	491	333	537	150	184	204	138	46	287	491
May	150	663	150	513	663	302	725	54	248	423	186	62	240	663
June	80	656	80	576	656	278	716	38	240	438	180	60	218	656
July	0	672	0	672	672	263	734	15	248	471	186	62	201	672
August	0	662	0	662	662	260	724	12	248	464	186	62	198	662
September	0	611	0	611	611	252	671	12	240	419	180	60	192	611
October	0	518	0	518	518	254	580	6	248	326	186	62	192	518
November	0	400	0	400	400	242	460	2	240	218	180	60	182	400
December	0	351	0	351	351	250	413	2	248	163	186	62	188	351
Annual Total (MG)	**1,525**	**6,019**	**1,525**	**4,494**	**6,019**	**3,433**	**6,611**	**1,065**	**2,368**	**3,178**	**1,776**	**592**	**2,841**	**6,019**
Annual Total (AF)	**4,680**	**18,472**	**4,680**	**13,792**	**18,472**	**10,535**	**20,288**	**3,269**	**7,266**	**9,753**	**5,450**	**1,817**	**8,719**	**18,472**
Percentage of City's Water Supply			**25%**	**75%**	**100%**			**18%**		**53%**	**30%**			**100%**

NOTES:

a The volume of water pumped from the River with the project includes River water to be treated conventionally for potable use and River water for RO pretreatment.
b Permeate is the purified water produced through the RO membranes and becomes part of the potable water supply.
c The source water that does not pass through the RO membranes increases in salt concentration and is discharged as brine. The RO brine volume represents water that would be mixed with treated wastewater from the WWTP prior to discharge through the outfall into the San Joaquin River.
d The net river water used accounts for the total volume of water pumped from the river intake pump station minus RO Brine volume.

SOURCE: Carollo Engineers 2017, 2018

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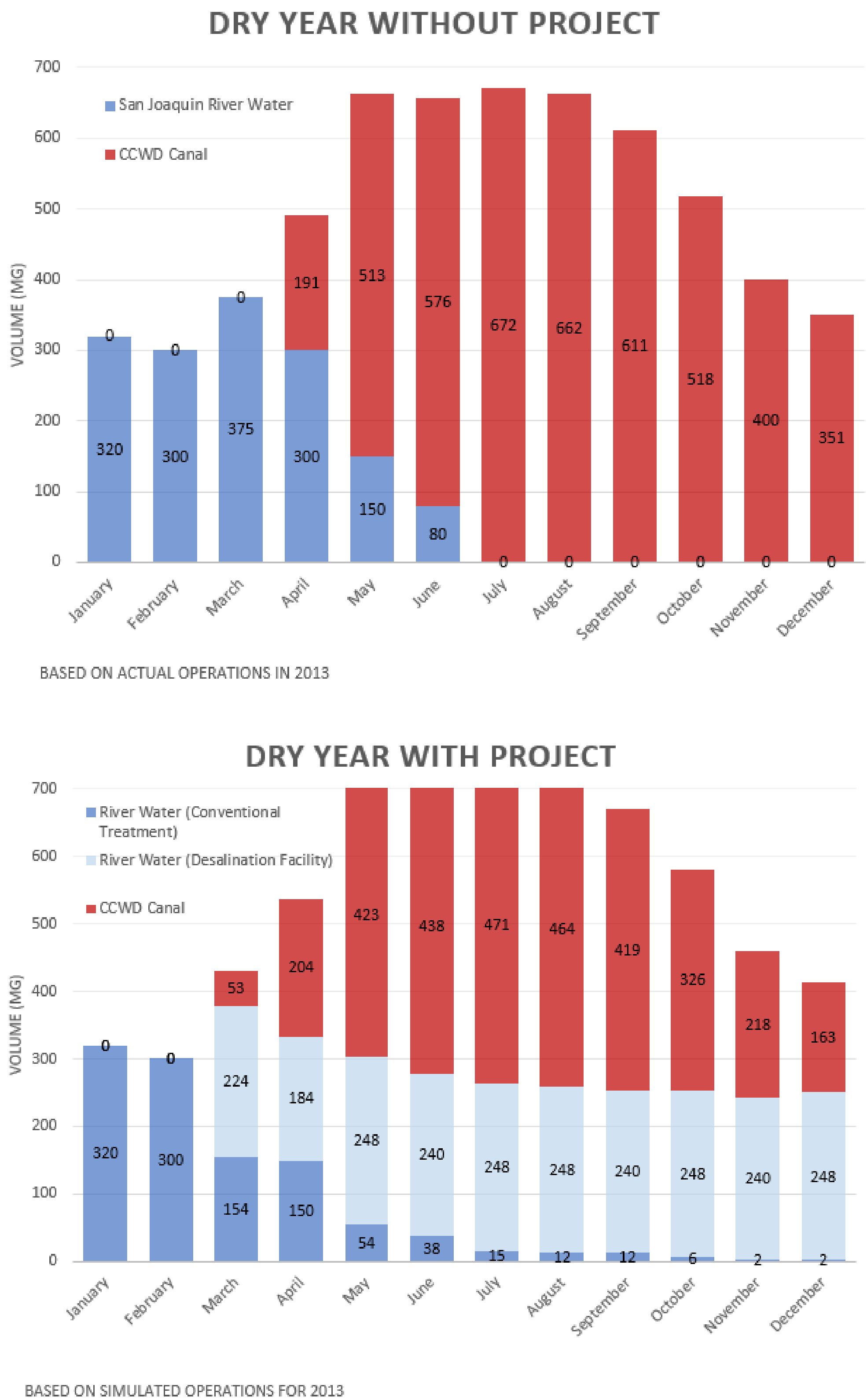
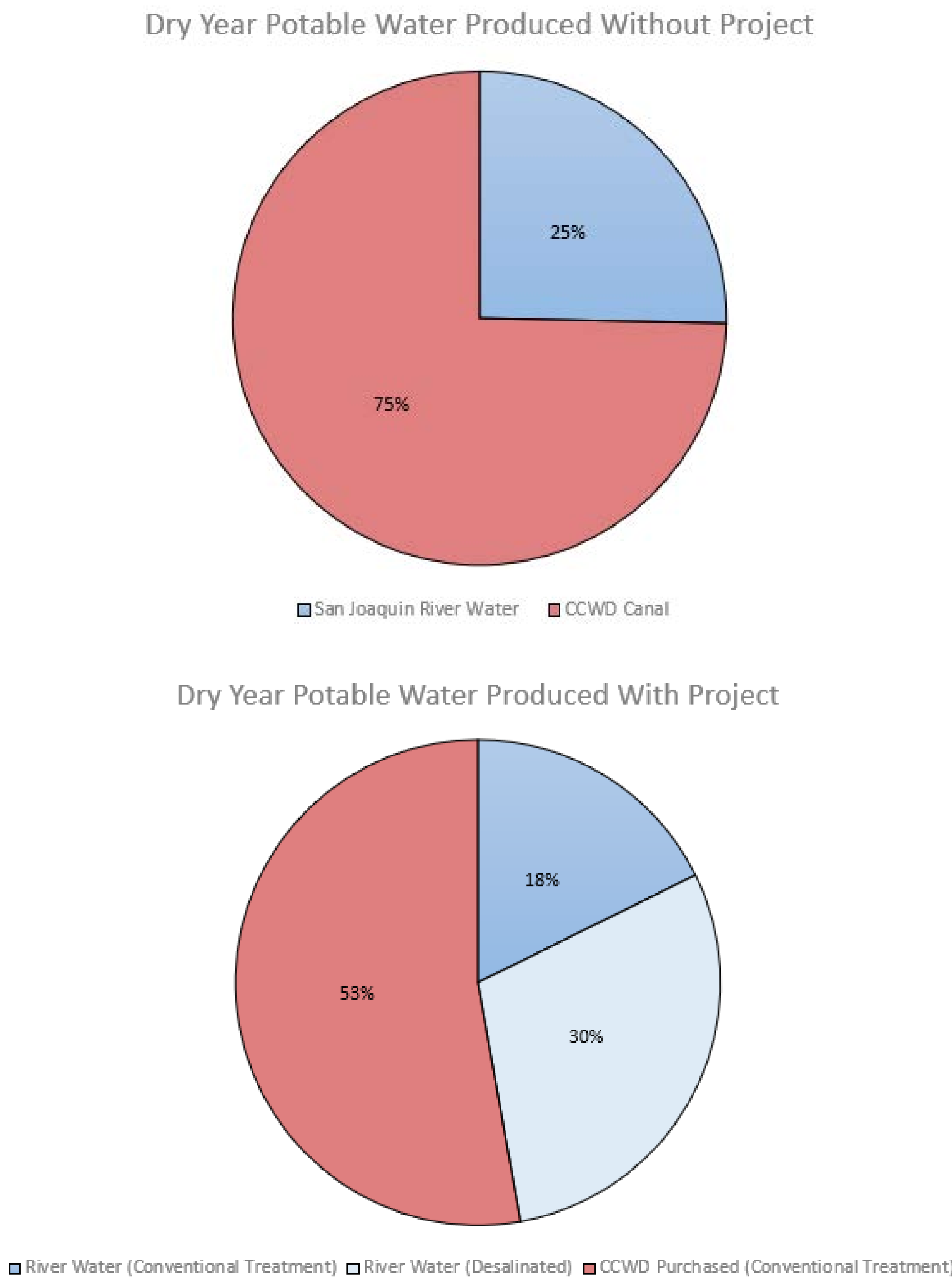


SOURCE: Carollo Engineers 2017, 2018

Figure 2-14a
Monthly Drought Year Raw Water Use With and Without Project (Dry Year)



SOURCE: Carollo Engineers 2017, 2018

Figure 2-14b
Annual Percentage of Potable Water Produced With and Without Project (Dry Year)

2.8.2 Brine Discharge

Brine will be generated and conveyed to the Delta Diablo outfall at a consistent rate of 2 mgd when the desalination facility is operating. The salinity of the brine will vary with the river's water quality at the intake pump station. The RO process concentrates the salinity in the brine at a ratio of approximately four times the sources water quality. Modeling analyses indicate the salinity of the brine stream will range from 400 mg/L and 30,000 mg/L TDS.

The brine disposal pipeline would connect to the WWTP downstream of the wastewater treatment facilities. The 2 mgd of brine would be mixed with treated wastewater from the WWTP prior to discharge through the existing WWTP outfall. The WWTP's outfall diffuser would disperse the combined WWTP effluent and RO brine stream. Sections 3.11, *Water Quality*, and 3.3, *Aquatic Biological Resources*, describe the modeling and analysis performed for brine discharge under the proposed project.

As shown in **Tables 2-6 and 2-7**, the brine volume would vary, ranging from approximately 0 MG to 62 MG depending on how much the plant was operated in the month.

Table 2-8 shows estimates of the average monthly wastewater effluent flows from the WWTP during wet and dry year conditions. Graphical depictions of these scenarios for brine disposal are shown in **Figure 2-15**. Wastewater flows for Delta Diablo are based on actual monthly average flows. Brine flows are based on simulations of desalination plant operations.

2.8.3 Maintenance and Personnel

The new intake pump station could operate continuously for up to 24 hours a day. Although pump station would typically be operated remotely via SCADA, facility operators would conduct routine visits to the pump station sites to monitor operations, conduct general maintenance activities, and service the pumps. No new operators or support personnel would be required for the intake pump station.

General operations and maintenance activities associated with pipelines would include annual inspections, testing and servicing of valves, and repairs of minor leaks in buried pipeline joints or segments. Operation of the desalination facility at the WTP could potentially require up to 7 new employees. This assumed number of new employees would consist of 5 operators (2 operators for each of the two day shifts, and 1 operator for the night shift), 1 instrument technician, and 1 mechanic/maintenance technician.

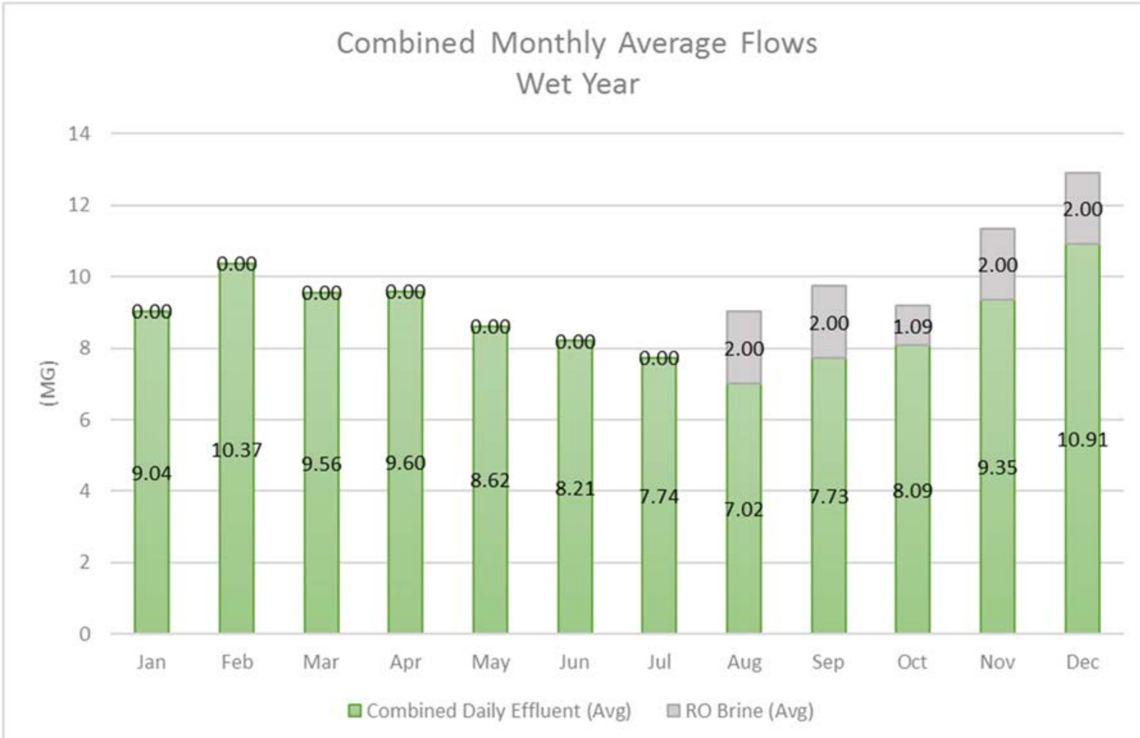
Trucks would deliver scale inhibitor, sulfuric acid, sodium hydroxide, calcium chloride, and RO cleaning chemicals to the WTP facility every 5 days to once a month, depending on the chemical to replenish the chemical storage supply for the desalination system.

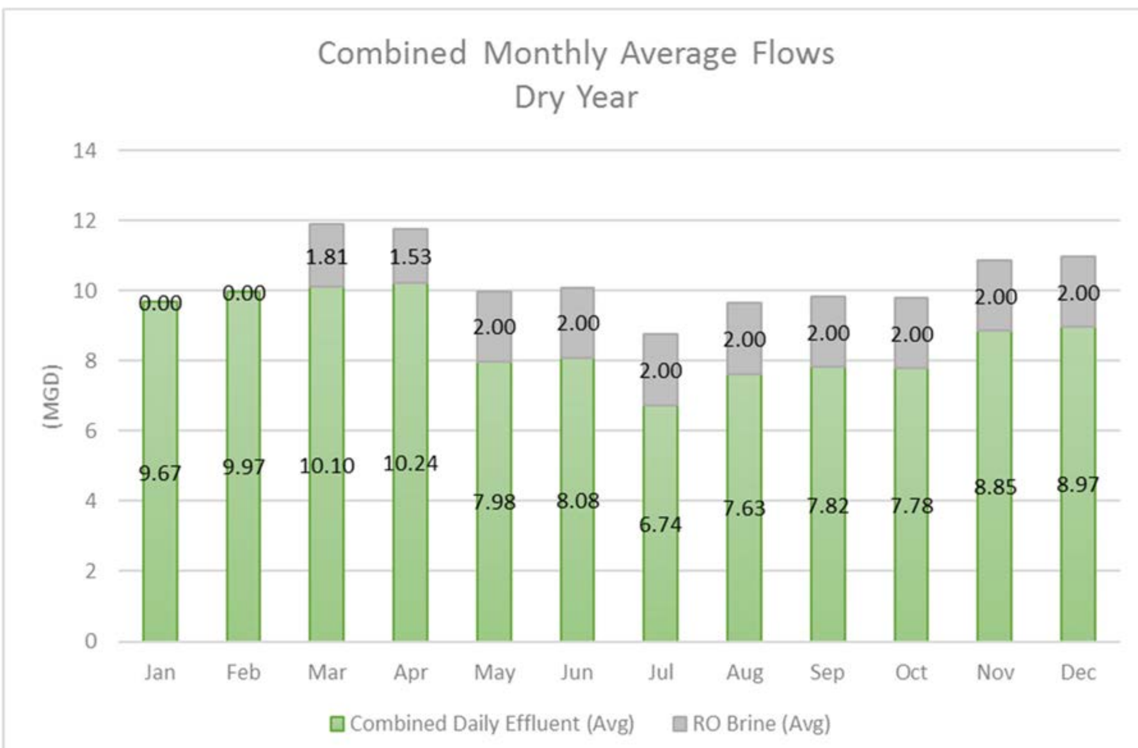
TABLE 2-8
BRINE STREAM AND DELTA DIABLO WASTEWATER EFFLUENT FLOWS THROUGH THE OUTFALL AND DIFFUSER

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Monthly Average Flows (mgd) for Wet Year												
Brine Stream from Desalination Plant[1]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00	1.09	2.00	2.00
Treated Wastewater Effluent from Delta Diablo WWTP[2]	9.04	10.37	9.56	9.60	8.62	8.21	7.74	7.02	7.73	8.09	9.35	10.91
Combined Discharge	9.04	10.37	9.56	9.60	8.62	8.21	7.74	9.02	9.73	9.18	11.35	12.91
Monthly Average Flows (mgd) for Dry Year[3]												
Brine Stream from Desalination Plant[3]	0.00	0.00	1.81	1.53	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Treated Wastewater Effluent from Delta Diablo WWTP[1]	9.67	9.97	10.10	10.24	7.98	8.08	6.74	7.63	7.82	7.78	8.85	8.97
Combined Discharge	9.67	9.97	11.91	11.77	9.98	10.08	8.74	9.63	9.82	9.78	10.85	10.97

NOTES:
1. Wet Year brine stream flows are based on simulated desalination plant operations for 2011
2. Monthly average flows for Delta Diablo are based on actual flows in 2012.
3. Dry Year flows are based on simulated brine flows and actual Delta Diablo WWTP flows for 2013.

SOURCES: Delta Diablo, 2017; Carollo Engineers, 2018





Source: Carollo Engineers 2018, Delta Diablo 2017

Figure 2-15
Combined Brine Stream and Delta Diablo
Wastewater Effluent Flows through the Outfall and Diffuser

2.9 Regulatory Requirements, Permits, and Approvals

This is a project-specific EIR, intended to provide review under CEQA for the proposed project. In addition to describing the proposed project and required approvals, this EIR analyzes potential environmental impacts of the proposed project, and identifies mitigation measures where those impacts are significant, addresses cumulative adverse impacts to which the proposed project could make a substantial contribution, and evaluates alternatives to the project that could avoid or reduce significant impacts while still meeting most of the project's objectives.

The anticipated permits and approvals required for the proposed project are described below:

2.9.1 Federal

- U.S. Army Corps of Engineers – Clean Water Act Section 404/ Rivers and Harbor Act Section 10 Dredge and Fill Permit
- U.S. Fish and Wildlife Service – Endangered Species Act Section 7 Consultation
- National Marine Fisheries Service – Endangered Species Act Section 7 Consultation
- California Office of Historic Preservation – National Historic Preservation Act Section 106 Compliance
- U.S. Coast Guard – Private Aids to Navigation Permit for pump station intake

2.9.2 State

- State Water Resources Control Board (SWRCB) – Stormwater General Construction Permit and Stormwater Pollution Prevention Plan, if more than 1 acre of land is disturbed
- State Historic Preservation Officer – National Historic Preservation Act Section 106 compliance
- California Natural Resources Agency Central Valley Flood Protection Board – Section 6 Board Permit
- Regional Water Quality Control Board (RWQCB) – Section 401 Water Quality Certification
- California Department of Public Health – Domestic Water Supply Permit Amendment for change in the water system
- California Department of Fish and Wildlife –California Endangered Species Act compliance, Section 1602 Streambed Alteration Agreement
- California Department of Transportation – Encroachment Permit for constructing pipeline within any state rights-of-way
- Delta Stewardship Council – Certification of Consistency with the Delta Plan
- State Lands Commission – General Permit

2.9.3 Regional and Local

- City of Antioch – certification of the Final EIR, Project approval, encroachment and excavation permit, tree removal
- City of Pittsburg – Encroachment Permit
- Bay Area Rapid Transit (BART) – Construction permit
- Delta Diablo Sanitation District – Brine disposal coverage in scheduled NPDES renewal, Encroachment Permit
- Union Pacific Railroad – Encroachment Agreement and Right of Entry for Survey

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References – Background and Project Description

Bay Area Regional Desalination Project, 2010. *Pilot Testing at Mallard Slough Pilot Plant Engineering Report.* June 2010. Prepared by MWH.

Carollo Engineers, 2016a. *Technical Memorandum No. 1 Water Quality Basis of Design,* August 2016.

Carollo Engineers, 2016b. *Technical Memorandum No. 2 Brine Management Alternative Analysis,* October 2016.

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City of Antioch, 2014. *Water System Master Plan Update*, August 2014. Prepared by Brown and Caldwell.

City of Antioch, 2016. *City of Antioch 2015 Urban Water Management Plan,* May 2016. Prepared by West Yost Associates.

Contra Costa Water District, 2016. *2015 Urban Water Management Plan for the Contra Costa Water District,* June 2016.

RMC Water and Environment, 2015. *City of Antioch Brackish Water Desalination Evaluation Technical Memorandum, Prepared for the City of Antioch*, February 2015.

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CHAPTER 3
Environmental Setting, Impacts, and Mitigation Measures

Sections	Figures	Tables

3.0 Introduction to the Environmental Analysis

3.0.1 Scope of the EIR

This chapter presents the environmental setting and regulatory framework, impacts, and mitigation measures for the technical issue areas applicable to the project. The environmental analysis provided is organized according to environmental topic as follows:

3.1 Aesthetics
3.2 Air Quality
3.3 Aquatic Biological Resources
3.4 Terrestrial Biological Resources
3.5 Cultural Resources
3.6 Geology, Soils, and Seismicity
3.7 Greenhouse Gas Emissions
3.8 Energy
3.9 Hazards and Hazardous Materials
3.10 Hydrology and Water Quality
3.11 Delta Hydrology and Water Quality
3.12 Land Use and Planning
3.13 Noise and Vibration
3.14 Population and Housing
3.15 Public Services and Utilities
3.16 Recreation
3.17 Transportation and Circulation
3.18 Tribal Cultural Resources
3.19 Environmental Topics Not Subjected to Detailed Analysis (Agricultural and Mineral Resources)

3.0.2 CEQA Requirements

The California Environmental Quality Act (CEQA) and the CEQA *Guidelines* require that the environmental analysis for an Environmental Impact Report (EIR) must evaluate impacts associated with a project and identify mitigation measures for any potentially significant impacts. The CEQA *Guidelines* state:

- An EIR shall identify and focus on the significant environmental effects of the project. In assessing the impact of a project on the environment, the lead agency should normally limit its examination to changes in the existing physical conditions in the affected area as they exist at the time the Notice of Preparation (NOP) is published, or where no NOP is published, at the time environmental analysis is commenced. Direct and indirect significant effects of the project on the environment shall be clearly identified and described, giving due consideration to both the short-term and long-term effects. The discussion should include relevant specifics of the area, the resources involved, physical changes, alterations to ecological systems, and changes induced in population distribution, population concentration, the human use of the land (including commercial and residential development), health and safety problems caused by the physical changes, and other aspects of the resource base such as water, historical resources, scenic quality, and public services. (CEQA *Guidelines* Section 15126.2[a]).

- An EIR must discuss any inconsistencies between the project and applicable general plans and regional plans, including, without limitation, the applicable air quality attainment or maintenance plan or State Implementation Plan, area-wide waste treatment and water quality control plans, regional transportation plans, regional housing allocation plans, habitat conservation plans, natural community conservation plans and regional land use plans (CEQA *Guidelines* Section 15125[d]).

- An EIR must describe feasible measures that could minimize significant adverse impacts; such measures must be fully enforceable through permit conditions, agreements, or other legally-binding instruments. Mitigation measures are not required for effects that are found to be less than significant (CEQA *Guidelines* Section 15126.4[a]).

3.0.3 Project Baseline

The environmental baseline identifies the existing physical conditions on, around, and affecting the project site. The baseline is established to provide a point of comparison between pre-project conditions (the baseline) and post-project conditions to determine whether the change to the existing environment caused by the project is significant under CEQA. While stable regarding its point in time, the baseline condition is tailored to each environmental topic area and is established by the significance criteria (discussed below). For most topics or resource areas (such as hazards and hazardous materials; utilities and service systems; noise environment; and other aspects of the physical environment), the baseline is the same as the "environmental setting," *i.e.*, the physical environmental conditions in the vicinity of the project as they existed in the summer of 2017[1] when the City published the NOP for the project (CEQA *Guidelines* Sections 15125(a), 15126.2(a)).

3.0.4 Section Contents and Impact Terminology

Each section contains, as relevant: (1) identification of the technical issue areas being evaluated in the section; (2) environmental setting and regulatory framework; (3) standards of significance;

1 The City issued an NOP for the project on August 15, 2017.

(4) method of analysis; (5) assessment of project impacts; and (6) recommended mitigation measures that reduce or avoid significant impacts, as applicable.

The environmental and regulatory framework discussion presented in each of the resource area sections summarizes the conditions that exist prior to implementation of the project, and provides a point of reference (or baseline) for assessing the environmental impacts of the proposed project. Each impact and mitigation measure discussion includes an impact statement (in bold text), an explanation of the impact (as it relates to the project), an analysis of the significance of the impact, identification of relevant mitigation measures if applicable, and an evaluation of whether the identified mitigation measures would reduce the magnitude of identified impacts.

Sections 3.1 through 3.18 contain the following elements:

- **Environmental Setting:** This subsection presents a description of the existing physical environmental conditions in the vicinity of the project with respect to each resource topic at an appropriate level of detail to allow the reader to understand the impact analysis.

- **Regulatory Framework:** Identifies the laws, regulations, ordinances, plans, and policies that are relevant to each resource area.

- **Significance Criteria:** Provides the criteria used in this document to define the level at which an impact would be considered significant in accordance with CEQA. Significance criteria are based on CEQA *Guidelines* Section 15064.5, Appendix F, and the checklist presented in Appendix G; factual or scientific information and data; and regulatory standards of the City of Antioch and federal, State, and local agencies. This section also discusses, where applicable, the *Methodology and Analysis,* and, where applicable, a summary of *Issues Not Discussed in Impacts*.

- **Analysis, Impacts, and Mitigation:** Each section lists impacts numerically and sequentially. An impact statement (always in bold text) precedes the discussion of each impact analysis and summarizes the potential for the project to have an impact. Impact statements use a numeric designation that corresponds to the environmental topic (e.g., "3.1-1" for aesthetic impacts). A number follows the numeric designation to indicate the order in which that impact is identified within that particular analysis. For example, "Impact 3.1-3" is the third aesthetics impact identified in the aesthetic resources analysis. The impact statement culminates with the level of impact that exists prior to the consideration of mitigation measures, if any are required. The impact determination after the incorporation of mitigation measures is stated at the close of the impact analysis discussion.

  The categories used to designate impact significance are:

  – ***No Impact (NI)*****:** A project is considered to have no impact if there is no potential for impacts, or if the environmental resource does not exist within the project area or the area of potential effect.

  – ***Less than Significant (LS)*****:** This determination applies if there is a potential for some limited impact, but not a substantial adverse effect that qualifies under the significance criteria as a significant impact. The impact would not cause a substantial adverse change in the environment as measured by the applicable significance criterion and threshold; therefore, no mitigation would be required.

- ***Less than Significant with Mitigation (LSM)*:** This determination applies to impacts that either could be or are significant and likely to occur, but for which feasible mitigation is available to reduce the impacts to a less-than-significant level.

- ***Significant and Unavoidable (SU)*:** This determination applies to impacts that either could be or are significant but for which no feasible mitigation has been identified reduce the impacts to a less-than-significant level. There might be some mitigation available to lessen the impact, but the residual effect remains significant and therefore the impact is considered unavoidable.

Within each resource area section in this chapter, there is a table at the beginning of the impact discussion that summarizes the potential impacts and indicates the level of impact significance.

Project-specific mitigation measures are identified throughout this EIR where feasible and necessary to avoid, minimize, rectify, reduce, or compensate for potential significant, adverse impacts of the project in accordance with CEQA *Guidelines* Section 15126.4. Mitigation measures are numbered to correspond with the impact numbers; for example, Mitigation Measure 3.3-1 addresses Impact 3.3-1. In some cases, mitigation measures are used again to address sequentially later impacts. When this occurs, the measures are not renumbered or repeated in full; rather, the reader is directed to review the mitigation measure where it is first introduced. All mitigation measures will be 1) included as part of the design, construction, and operation of the proposed project; 2) adopted as conditions of approval for the proposed project; and 3) subject to monitoring and reporting requirements of CEQA and the terms of the discretionary approvals for the project.

3.0.5 Cumulative Analysis

As defined in Section 15355 of the CEQA *Guidelines*, cumulative impacts are defined as “two or more individual effects which, when considered together, are considerable, or which can compound or increase other environmental impact.” Section 15130 of the CEQA *Guidelines* requires that an EIR evaluate potential environmental impacts when the project’s incremental effect is cumulatively considerable. “Cumulatively considerable” means that the incremental effects of an individual project are significant when viewed in connection with the effects of past, present, existing, approved, pending and reasonably foreseeable future projects. These impacts can result from a combination of a proposed project together with other projects causing related impacts.

Cumulative Context

CEQA *Guidelines* Section 15130(b)(1) discusses two approaches to a cumulative effects analysis. First, the analysis can be based on a list of past, present, and probable future projects producing related or cumulative impacts. Second, a summary of projections contained in a general plan or related planning document or in an adopted or certified environmental document that described or evaluated regional or area-wide conditions contributing to the cumulative impact can be used to determine cumulative impacts. This EIR employs the list-based approach, except where specifically discussed in individual resource sections in Chapter 3, where a summary of projections approach is more appropriate. To determine an appropriate list of projects for the cumulative analyses, the City considered three factors: similar environmental impacts, geographic scope and location, and timing and duration of implementation. The effects of relevant projects (e.g., short-term construction or demolition, or long-term operations) could happen at the same time as the proposed project's effects.

The projects that could contribute to cumulative impacts are listed in **Table 3-1**. This list was compiled from several sources and only those projects that might contribute to cumulative impacts are listed. These projects are similar in scope to the proposed project, have similar types of impacts within the study area, affect similar resources, or are large enough to have far-reaching effects on a resource. This approach includes both projects for which detailed descriptions and expected impacts are known, as well as projects that have less defined impacts but may contribute to the regional impacts. The City has considered the effects of these projects along with the proposed project's impacts to determine the overall cumulative impact on the resources in the study area. The numbering of projects in **Table 3-1** provides a key to the locations of the cumulative projects shown in **Figure 3-1**.

Table 3-1
Cumulative Projects

Project No. on Map	Project Name	Project Description	Construction Dates
City of Antioch			
1	Almond Knolls	Construction of 58 apartments/condominiums on 2.9 acres on Worrell Road, just east of Lone Tree Way. Project was approved on 7/25/17. Project would remove 40 trees. (City of Antioch, 2017a)	Construction anticipated to begin in May 2018 and completed in 1.5 years
2	Water Treatment Plant Disinfection Improvements Project	Modification of existing facilities at the Antioch Water Treatment Plant (WTP) to replace existing chemical storage and feed system with the use of less hazardous chemicals. Project components would include new chemical storage tanks, piping, containment areas, metering pumps, a pump room, and water softening systems. The softening system would generate small amounts of backwash water and brine that would be discharged to the sanitary sewer, trucked offsite for disposal, or blended and recycled with used washwater or plant effluent and retreated at the WTP. Existing chemical storage and equipment would be decommissioned. City of Antioch, 2017c)	Construction anticipated to be complete in 2018.
3	The Ranch Project	Construction of multiple single-family residential neighborhoods, various public facilities and amenities, and circulation and access improvements on 551.5 acres of primarily undeveloped land designated for Golf Course Community, Senior Housing, and Open Space in the City of Antioch General Plan. The proposed project site is located within the Sand Creek Focus Area, and would include a General Plan Amendment to change land use designations of the site to Low Density Residential, Medium Low Density Residential, Mixed Use, Public/Quasi Public, and Open Space. The proposed site is currently zoned S, and would require a zoning amendment to change the zoning designation of the project site from S to Planned Development (PD). (City of Antioch, 2017e)	Construction schedule is unknown at this time.
4	The Big Break Solar Project	Construction of a 2-megawatt solar photovoltaic (PV) power generation development located on an approximately 16-acre site on the north side of Wilbur Avenue in the City of Antioch, California. The site is located on a portion of an approximately 86-acre parcel within the retired Contra Costa Generating Station's property and was formerly host to three aboveground oil storage tanks for the now-retired power plant units. Once constructed, the facility would passively generate electric output from the sun during daylight hours. Project output would be delivered to an existing PG&E 21 kilovolt (kV) distribution line located on the north side of Wilbur Avenue through a generation tie line that would be constructed by PG&E. (City of Antioch, 2017b)	Construction anticipated to begin in April 2017, and completed in 6 months.
5	Heidorn Village Subdivision	Proposal to subdivide 20.3 acres into 117 single-family residential lots, park and open spaces areas, and internal access roads. The project location is in the southeastern portion of the City of Antioch, along the western side of Heidorn Ranch Road, about 0.4 miles south of Lone Tree Way. Construction would occur in three phases. (City of Antioch, 2015)	Construction anticipated to be completed in 12 to 18 months.
		Various housing developments in the City of Antioch are currently approved and under construction or approved and awaiting construction.	
6	Rocketship Elementary School	The Rocketship Elementary School, at 1700 Cavallo Road, would include the demolition of the existing, vacant office building to construct a new 30,367 square foot elementary school on 1.7 acres. (City of Antioch, 2017d)	Plans under review. Construction schedule unknown.
7	Walmart Expansion	Physical expansion of the existing 141,498 square-foot Walmart store by 33,575 square feet, increasing the total floor area to 175,073 square feet. The proposed project is located at 4897 Lone Tree Way. (City of Antioch, 2009)	Unknown

TABLE 3-1 (CONTINUED)
CUMULATIVE PROJECTS

Project No. on Map	Project Name	Project Description	Construction Dates
City of Antioch (cont.)			
8	West Antioch Creek Channel Improvement Project	The project would reduce flood risk in the project area by increasing capacity of the West Antioch Creek channel between West Tenth Street and West Eighth Street and re-establish the 25-year flood protection capacity of the channel downstream of West Eight Street to the Burlington Northern Santa Fe railroad trestle.	Construction would occur between March 15 and October 15.
9	East Contra Costa BART Extension (EBart)	Construction of a new rail passenger service comprising approximately 10 miles of new track between the existing Pittsburg/Bay Point Station and the City of Antioch. Stations for the new service will be located in the cities of Pittsburg and Antioch. (BART, 2017)	Construction anticipated to be completed in 2018.
City of Pittsburg			
10	Mt. Diablo Resource Recovery Park Service	Operational expansion of the existing Mt. Diablo Recycling Facility and the Recycling Center and Transfer Station on a 36-acre site at 1300 Loveridge Road. Construction of a new 18,000 square foot building and site improvements for an onsite truck maintenance facility. (City of Pittsburg, 2015)	Construction is anticipated to completed in 1 year, and could begin in mid-2018.
11	Americana Park Bypass Channel	The proposed project would divert Americana Park detention basin overflows into a proposed bypass channel, conveying storm flows eastward across a PG&E utility corridor, emptying into the tributary to Willow Creek The length of the proposed earthen channel would be approximately 780 feet from the edge of the detention basin located in the northeast parcel of the Americana subdivision. The project site consists of a utility corridor owned and operated by PG&E and is located between North Parkside Drive on the north and Power Avenue on the south, to the north of State Route 4. (City of Pittsburg, 2017c)	Construction anticipated to be completed from June 2018 to November 2018.
12	James Donlon Boulevard Extension	Construction of a 1.71-mile extension of James Donlon Boulevard from the western edge of the approved Sky Ranch II Subdivision to Kirker Pass Road, and the improvements to Kirker Pass Road from Nortonville Road north to the City limit line, within unincorporated Contra Costa County. From Sky Ranch II, the proposed roadway would merge from a four-lane road to a two-lane road and would meet City and California Department of Transportation (Caltrans) standards and regulations for highway design for vehicles traveling up to 55 miles per hour (mph). (City of Pittsburg, 2014)	Construction anticipated to begin in 2022 and completed by end of 2023.
13	BART Multimodal Transfer Facility	Construction of a passenger transfer facility and short term parking lot for BART patrons along the east side of Railroad Avenue between California Avenue and Center Drive. (City of Pittsburg, 2017a)	Construction anticipated to begin April 2017 and end April 2018
14	Dow Modernization Project	The proposed Dow Modernization Project consists of the construction of a new production plant on Block 760, a six-acre portion of the 248-acre Dow Chemical Company property in Pittsburg; modernization to improve operational efficiency, consisting of the installation of new equipment and upgrading of existing equipment within the existing 660, 540, and 640 Blocks of the Dow Chemical Company property to increase production capacity at the 540 and 640 Blocks, allow production of new formulations at the 540 and 660 Blocks, and connect the existing 660 Block to the new 760 Block; and construction of three new railcar parking tracks, each ranging from 700 to 1,000 feet in length. Phase I components would include the 540 block; Phase II would include the 640, 660, and 760 blocks and railcar parking. (City of Antioch, 2017b)	Phase I components anticipated to begin construction in 2019 and completed within approximately 4 years. Phase II components would be constructed over 4 years, but there is no projected start date.

TABLE 3-1 (CONTINUED)
CUMULATIVE PROJECTS

Project No. on Map	Project Name	Project Description	Construction Dates
Delta Diablo Sanitation District			
15	East County Bioenergy Project	Construction of a new bio-refinery, co-located with Delta Diablo water resource recovery facilities in Antioch. The Project would convert food waste and wastewater sludge via an anaerobic digestion process into a range of bio-products, and biogas which can be used to generate energy to provide renewable energy. (Delta Diablo Sanitation District, 2017)	Construction would occur between January 2019 and December 2020.
Other			
16	WaterFix, California Department of Water Resources & U.S. Bureau of Reclamation	The preferred alternative and proposed project, Alternative 4A, would construct two tunnels 150 feet below ground surface, three new intakes with 3,000 cfs capacity and an annual yield of 4.9 million acre feet. The North Delta diversion capacity would be 9,000 cfs. Construction and operation would include 2,300 acres of habitat restoration and 13,300 acres of habitat protection (DWR & USBR, 2016; CNRA, 2017). A reduced alternative is currently under review by DWR. However, Alternative 4A represents the worst case scenario relative to Delta operations.	Unknown
17	Los Vaqueros Reservoir Expansion Project, Contra Costa Water District & U.S. Bureau of Reclamation	Expansion of the Los Vaqueros Reservoir from 160 TAF to 275 TAF storage capacity. Construction of new pipelines, interties, and pump stations would increase pumping capacity to the reservoir, local agency partners, and wildlife refuges. (CCWD & USBR, 2017)	Construction is expected to take 6 years, beginning in 2021.

SOURCES:

Bay Area Rapid Transit (BART), 2017. East Contra Costa BART Extension (eBART). Available at https://www.bart.gov/about/projects/ecc. Accessed on January 8, 2018.
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City of Antioch, 2015. Mitigated Negative Declaration. Heidorn Village Subdivision. August 2015.
City of Antioch, 2017a. Annotated Agenda, City of Antioch Planning Commission, Wednesday, June 7, 2017.
City of Antioch, 2017b. Draft California Environmental Quality Act Initial Study, Big Break Solar Project. March 2017. Prepared by TRC.
City of Antioch, 2017c. Final Initial Study/Mitigated Negative Declaration. City of Antioch Water Treatment Plant Disinfection Improvements Project. Prepared by CDM Smith, January 27, 2017.
City of Antioch, 2017d. Rocketship Elementary School. Initial Study/Mitigated Negative Declaration. Prepared by Raney Planning and Management, Inc. September 2017.
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City of Pittsburg, 2017b. Dow Modernization. Available at http://www.ci.pittsburg.ca.us/index.aspx?page=842. Accessed on November 27, 2017.
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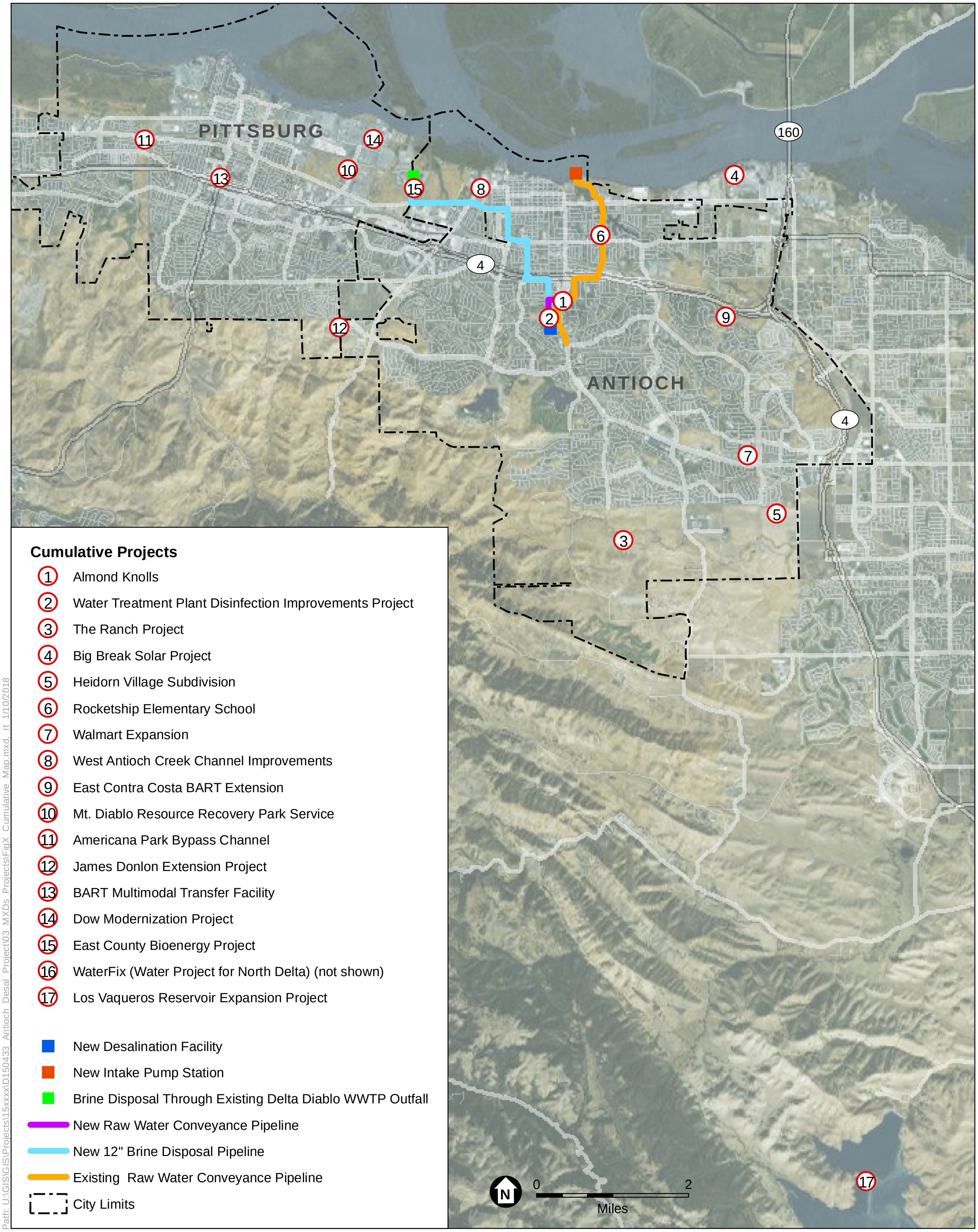
Delta Diablo Sanitation District, 2017. Delta Diablo East County Bioenergy Project Organics Codigestion, Initial Study/Mitigated Negative Declaration. Prepared by ESA. October 2017.
Pollot, Kristen. 2017. Personal communication between Kristen Pollot and Hilary Finck. November 29, 2017.



SOURCE: Contra Costa County 2014; ESA 2017; Carollo 2017; NAIP 2016

Brackish Water Desalination Facility

Figure 3-1

Cumulative Projects

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3.1 Aesthetic Resources

Sections	Figures	Tables
3.1.1 Environmental Setting 3.1.2 Regulatory Framework 3.1.3 Analysis, Impacts, and Mitigation	3.1-1 Viewpoint Location Map 3.1-2 Project Area Views 3.1-3 Project Area Views 3.1-4 Project Area Views	3.1-1 Summary of Impacts - Aesthetics

This section describes the existing visual character of the project area, including the proposed pipeline routes, and evaluates the potential for the proposed project to result in significant adverse impacts to aesthetic resources. The evaluation considers existing visual conditions and assesses the effects of the project on scenic vistas and scenic resources, visual quality and visual character, and its potential to have adverse light and glare effects.

Public comments received during the scoping period that relate to aesthetic resources concerned the visibility of project elements (e.g., storage tanks, pipelines) from residential properties and public viewpoints. This issue is discussed below in Impact 3.1.2.

3.1.1 Environmental Setting

This subsection describes the existing visual character in which the proposed project components would be constructed. Photographs from public vantage points portray the visual character of these locations.

Regional and Citywide

The City of Antioch occupies approximately 31.2 square miles of land approximately 40 miles northeast of the City of Oakland. The city extends in a roughly square pattern, from Pittsburg on the west to the Antioch Bridge on the east, and from the foothills of Mount Diablo on the south to the San Joaquin River on the north. The city is bisected by Highway 4, an east-west-oriented four-lane freeway. The Southern Pacific Railroad line runs east-west just north of Highway 4; the Burlington Northern Santa Fe Railroad line runs east-west along the San Joaquin River waterfront.

The city is relatively flat and low-lying north of Highway 4. The elevation gradually slopes upward south of the City of Antioch Water Treatment Plant (WTP) toward the Contra Loma Regional Park, approximately 1-mile south of the project site boundary. The elevation continues to increase to the foothills of Mount Diablo. The City has a largely built-out environment, with the exception of the San Joaquin River shoreline in park or open space uses.

Scenic Vistas, Scenic Resources, and Public View Corridors

The City of Antioch General Plan identifies views, view corridors, and landmarks that are considered important scenic vistas and resources. Views of Mount Diablo, the ridgelines and hills south of Highway 4, and the San Joaquin River are considered scenic vistas. Lone Tree Way and Highway 4 are important view corridors to the hills or the San Joaquin River. Lone Tree Way is also designated as a scenic arterial roadway and gateway to the city. In terms of scenic resources, Mount Diablo and the San Joaquin River are identified as natural visual landmarks in the city.

The primary scenic vistas are views from public streets looking south towards Mount Diablo and to the north towards San Joaquin River. The WTP and existing river intake pump station are located in lower-elevation areas, with the city's topography increasing in elevation to the south. Due to the elevation increases, intervening structure, landscaping, and trees, scenic views of the hills of Contra Loma Regional Park and Mount Diablo are largely obstructed from surrounding streets.

The primary scenic vista and scenic resource in the vicinity of the intake pump station site looking north is the expansive view of the San Joaquin River. The terminus of Fulton Shipyard Road, a publicly accessible area, provides scenic views of the San Joaquin River. A portion of the view looking west is obstructed by the existing intake pump station structure which extends approximately 200 feet into the river and the adjacent property's fence looking east.

Project Site

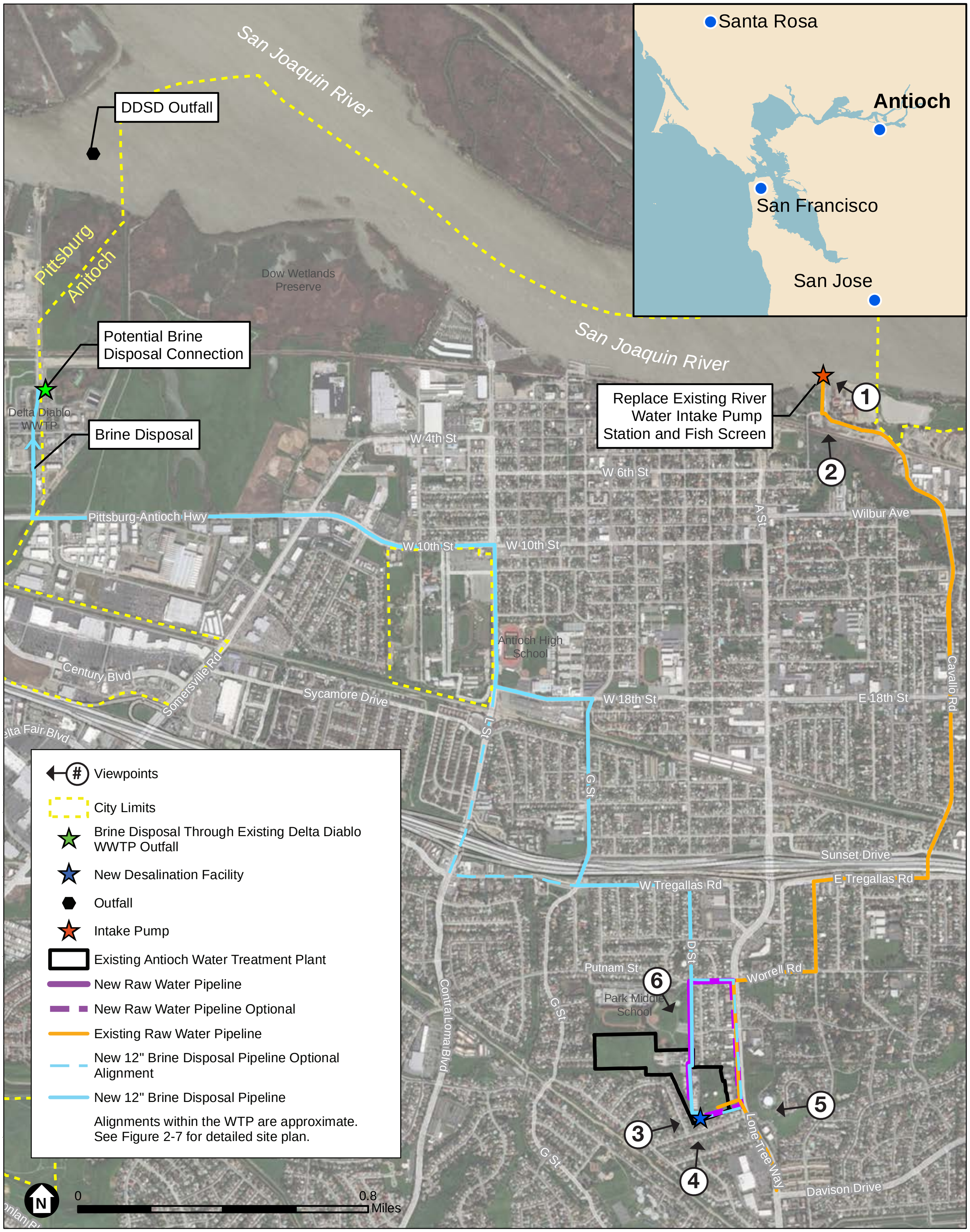
The project site includes the location of the proposed river intake pump station at the end of Fulton Shipyard Road, the location of the proposed desalination facility within the fenceline of the existing WTP at 401 Putnam Street, and the alignments of the proposed raw water pipeline and brine disposal pipeline. **Figure 3.1-1** provides a map showing the location and direction of photograph viewpoints presented in this section. **Figures 3.1-2 and 3.1-4** show views of the existing pump station site and the WTP site, where new aboveground structures would be constructed.

River Intake Pump Station

The proposed river intake pump station would be located in an area defined by a combination of natural and industrial features. The intake pump station site is developed, containing an asphalt parking lot, and located along the south shoreline of the San Joaquin River. A small boat ramp is at the north end of the site and east of the existing pier. The existing river intake pump station's light gray/white concrete pipeline and wood pier are linear features along the northwestern end of the project site. The wood pier and pipeline extend approximately 200 feet from shore into the San Joaquin River where the existing pump station is housed in a white, gabled-roof structure.

Antioch Water Treatment Plant

The visual character in the vicinity of the project site at the existing WTP reflects a mix of industrial, commercial, public, and residential land uses. The area immediately surrounding the WTP site is developed and includes one- to two-story single-family residential uses to the south, southwest, and northeast. The area to the northwest is occupied by a public school and school grounds, and the area to the east is commercial. The WTP property is surrounded by fencing, with mature trees obscuring some views onto adjacent parcels.



SOURCE: ESA, 2018

Brackish Water Desalination Facility

Figure 3.1-1
Viewpoint Location Map

ESA

View 1: Existing river intake pump station. View facing north.

View 2: View toward existing river intake pump station from Fulton Shipyard Road. View facing north.

150433.02

SOURCE: ESA, 2018

Figure 3.1-2
Project Area Views

ESA

View 3: View toward Antioch Water Treatment Plant (WTP) from View Drive. View facing northeast.

View 4: View toward WTP from Terranova Drive. View facing north.

150433.02

SOURCE: ESA, 2018

Brackish Water Desalination Facility

Figure 3.1-3
Project Area Views

ESA

View 3: View toward Antioch Water Treatment Plant (WTP) from View Drive. View facing northeast.


View 4: View toward WTP from Terranova Drive. View facing north.

150433.02

SOURCE: ESA, 2018

Brackish Water Desalination Facility

Figure 3.1-4
Project Area Views

ESA

Plant A is located in the southern portion of the 25-acre WTP site. This three-story building is an industrial building in midcentury modern style, with a flat roof, horizontal bands of concrete, and metal elements. The building has a roughly L-shaped footprint with single story east/west leg on the north end of the building measuring 55 by 20 feet. The main north/south portion of Plant A extends 55 feet by 30 feet. The underground filtered water reservoir on the north end of the site measures approximately 100 by 100 feet, and is capped with concrete.

Within the site, the water treatment facilities are located on flat land, while the adjacent undeveloped open space land directly to the east of Plant A slopes up approximately 85 feet from the facilities. This open space area blocks the view of the WTP from Lone Tree Way. To the west of Plant A, the topography slopes up toward the residences along View Drive, which are situated approximately 35 feet above the plant facilities. These residences have a view of the project site. However, trees located in the undeveloped area between the residences and Plant A may block some or all of the view of Plant A and the construction area.

The south and southeast portion of the site, where the proposed desalination facility and chemical storage facilities would be located, consists mostly of undeveloped land. The land in this area directly south of the WTP facilities is paved and includes a single-story corrugated-metal building. The land in this area that is southeast of the WTP facilities includes a portion of the aforementioned unpaved land that slopes upward and includes several ornamental trees. This area, where the proposed desalination facility and chemical storage facilities would be located, is flanked on the west by one- to two-story single-family homes on View Drive and on the south by one-story single-family homes on Terranova Drive. Views of this portion of the project site from public viewpoints are largely obscured by mature trees and wood fencing.

Pipelines

Pipeline alignments are proposed between Lone Tree Way and the WTP and between the WTP and Delta Diablo WWTP (refer to **Figures 2-3a –2-3f** in Chapter 2, *Project Description*). The proposed pipelines would be constructed within existing public streets and within the Antioch WTP and Delta Diablo WWTP properties. The visual character of the alignment areas along existing streets is mainly urbanized, surrounded by commercial, residential, and industrial development, with man-made features and streetscapes and very little open space. Landscaping is typically ornamental, including street trees.

Lighting

Existing nighttime lighting at the intake pump station and WTP consists of security and internal circulation lighting.

3.1.2 Regulatory Framework

Federal

There are no applicable federal regulations related to aesthetics.

State

Scenic Highway Program

In 1963, the 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. The State Highway System includes highways that either are eligible for designation as Scenic Highways or have been designated as such. A portion of Highway 4 east of Highway 160 and outside of the project area is an eligible, but not officially designated Scenic Highway. Highway 4 in the vicinity of the project area is not designated as a Scenic Highway.

Title 24 Energy Efficiency Standards

The State of California regulates energy consumption under Title 24 of the California Code of Regulations (CCR). The Title 24 Building Energy Efficiency Standards were developed by the California Energy Commission (CEC) and apply to energy consumed for lighting (as well as heating, cooling, ventilation, and water heating) in new residential and non-residential buildings. The CEC updates these standards periodically, with the most recent update enacted in the year 2016.

The 2016 Building Energy Efficiency Standards focus on several key areas to improve the energy efficiency of newly constructed buildings and additions and alterations to existing buildings, and include requirements that will enable both demand reductions during critical peak periods and future solar electric and thermal system installations. The 2016 standards also include updates to the energy efficiency divisions of the California Green Building Standards (CalGreen) Code (Title 24, Part 11).

California Green Building Code

On January 12, 2010, the State Building Standards Commission unanimously adopted updates to CalGreen Code, which went into effect on January 1, 2011. The CalGreen Code includes mandatory requirements for exterior light sources to reduce the amount of light and glare that extends beyond a property. Non-residential mandatory measures contained in Section 5.106.8, Light Pollution Reduction, require that exterior lights be shielded or meet "cutoff" lighting standards and meet specified backlight, uplight, and glare ratings designed to limit the amount of light that escapes beyond a site's boundary.

Local

City of Antioch General Plan

The following policies of the Antioch General Plan are relevant to aesthetic resources (City of Antioch, 2003).

> ***Policy 5.4.2.c:*** Maintain view corridors from public spaces to natural ridgelines and landmarks, such as Mount Diablo and distant hills, local ridgelines, the San Joaquin River, and other water bodies.

- Important view corridors to be protected include Somersville Road, Lone Tree Way, Hillcrest Avenue, SR 4, SR 160, James Donlon Boulevard, Deer Valley Road, and Empire Mine Road.

Policy 5.4.2.j: Within multi-family, commercial, office and business parks, and industrial developments, screen enclosures, loading areas, mechanical equipment, and outdoor storage areas of industrial areas from view from public streets, and as appropriate, from other public views.

Policy 5.4.2.o: Design onsite lighting to improve the visual identification of adjacent structures.

- Within commercial and industrial development, provide design features such as screened walls, landscaping, setbacks, and lighting restrictions between the boundaries of adjacent residential land use designations to reduce the impacts of light and glare.

- In all projects, lighting fixtures should be attractively designed and of low profile to complement the overall design theme of the project within which they are located.

- On-site lighting shall create a safe environment, adhering to established crime prevention standards, but shall not result in nuisance levels of light or glare on adjacent properties. Limit sources of lighting to the minimum required to ensure safe circulation and visibility.

Policy 5.4.10.a: The primary design objective for the industrial development is the arrangement of structures and functions in an efficient manner. Within the constraints of utility and economic feasibility, manufacturing and industrial buildings shall display architectural statements that are aesthetically pleasing, and shall be designed in accordance with the following design guidelines:

- Architectural design and details are generally to be oriented toward public views with utilitarian work, maintenance, and storage areas screened from public view.

- Architectural design and details should be used to break up the box-like appearance of the tilt-up construction typically used for industrial buildings.

Policy 10.3.2b: Implement the design standards of the Community Image and Design Element so as to maintain views of the San Joaquin River, Mount Diablo and its foothills, Black Diamond Mines Regional Preserve and other scenic features, and protect the natural character of Antioch’s hillside areas as set forth in the Community Image and Design Element.

City of Pittsburg General Plan

The following policy from the City of Pittsburg General Plan Urban Design element may be relevant to the proposed project (City of Pittsburg, 2001).

Policy 4-P-3: As part of the development review process, limit building heights and massing where views of the hills from adjacent properties and public spaces could be preserved.

> Limiting the height and massing of new structures to retain views of ridgelines over the tops of rooflines will ensure that the City's hillside identity is preserved. These building standards should then be used to ensure views before development approval.

3.1.3 Analysis, Impacts, and Mitigation

Significance Criteria

Based on Appendix G of the CEQA *Guidelines,* the project would have a significant impact on aesthetics 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 other features of the built environment or natural environment which contribute to a scenic public setting;
- 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, or which would substantially impact other people or properties.

Methodology and Assumptions

The visual quality impact analysis is based on field observations conducted by ESA in January 2018; review of project maps and drawings; aerial and ground-level photographs; and review of a variety of data in the record, including local planning documents. The methodology of the aesthetics analysis presented below considers several factors that affect the proposed project's physical appearance compared to existing visual conditions as observed from public locations. For this analysis, the proposed project component sites and representative portions of the proposed pipeline alignments were photographed and observed from public vantage points (see **Figures 3.1-1 through 3.1-4**). These observation points are representative examples of publicly accessible viewpoints from which the proposed project components would normally be seen, either temporarily (during construction) or permanently (aboveground structures).

Approach to Determining Impacts to Scenic Vistas and Scenic Resources

"Scenic vistas" (also referred to as *viewsheds*) are view corridors that capture the total field of vision from a specific viewpoint. View corridors are areas in which views are available from publicly accessible places such as city streets, parks, and other public spaces. Scenic vistas generally encompass a large geographic area for which the field of view can be quite wide and extend into the distance. Scenic vistas are formed by built and natural physical elements that guide lines of sight and control view directions available to pedestrians and motorists. The expanse of a scenic vista or viewshed can be limited by the framing of a photograph or illustration. As discussed in Section 3.1.1, *Environmental Setting*, views of Mount Diablo, the ridgelines and hills south of Highway 4, and the San Joaquin River are considered scenic vistas. Lone Tree Way is also designated as a scenic arterial roadway and gateway to the city.

"Scenic resources" (also referred to as *features*) are elements of high scenic value or visual prominence that appear within a scenic vista or scenic corridor. This analysis does not limit the definition of "scenic resources" to those located within a state scenic highway. As discussed in Section 3.1.1, *Environmental Setting,* Mount Diablo and the San Joaquin River are considered scenic resources.

Generally, while a project's interference with scenic views from public vantage points would be considered an adverse aesthetic effect on the environment, the obstruction of individual landowners' views from private property is not considered a significant environmental impact under CEQA. The purpose of CEQA is to evaluate the impacts of a project on the environment in general, not the impacts of a project on particular individuals. As a result, this EIR does not consider or evaluate the project's impact on views from private residences or other private vantage points.

A project is considered to have a significant impact to scenic vistas and scenic resources if it would prominently obstruct, or block the majority of the expanse, of a scenic vista or scenic resource, as seen by most viewers from public locations, taking into account the view as a whole. Damage to a scenic resource is substantial when it is reasonably perceptible to affected viewers and when it appreciably degrades one or more of the aesthetic qualities that contributes to a scenic setting.

Approach to Determining Impacts to Visual Character and Visual Quality

A project is considered to "substantially degrade" the visual character or quality of a site if it would have a strongly negative influence on the public's experience and appreciation of the visual environment. As such, visual changes are considered in the context of the site and locale's visual sensitivity. Visual sensitivity is the overall measure of a site's susceptibility to adverse visual changes based on the combined factors of visual quality, viewer types and volumes, and viewer exposure to the project. The analysis considers whether the extent of change in the appearance of the project components (i.e., desalination facility and new river intake pump station) would be substantially adverse, damaging, or degrading when compared to existing conditions.

Visual changes caused by the project are evaluated in terms of their visual contrast with the area's predominant landscape elements and features, their dominance in views relative to other existing features, and the degree to which they could block or obscure views of aesthetically pleasing landscape elements. Visual changes are also evaluated in terms of potential damage to or removal of features of the natural or built environment that contribute visual appeal to a public setting. The magnitude of visual change that would result in a significant impact (i.e., substantial degradation) is influenced by its degree of permanence, and is inversely related to the visual sensitivity of a site (that is, more visual change could occur at a site with low visual sensitivity without resulting in a significant impact, compared to a site with greater visual sensitivity, which could be substantially degraded by a smaller degree of visual change).

Impacts and Mitigation Measures

Table 3.1-1 summarizes the proposed project's impacts and significance determinations related to aesthetic resources.

TABLE 3.1-1
SUMMARY OF IMPACTS – AESTHETICS

Impacts	Significance Determinations
Impact 3.1-1: The proposed project would not have a substantial adverse effect on a scenic vista or scenic resource.	LS
Impact 3.1-2: The proposed project would change the existing visual character of the river intake pump station site and WTP, but would not substantially degrade the existing visual character or quality of the site and its surroundings.	LS
Impact 3.1-3: The proposed project would not create a new source of substantial light or glare that would adversely affect day or nighttime views in the area, or which would substantially impact other people or properties.	LS
Impact 3.1-C-1: Cumulative impacts related to scenic vistas or scenic resources.	LS
Impact 3.1-C-2: Cumulative impacts related to visual character or quality of the site.	LS
Impact 3.6-C-1: Cumulative impacts related to light and glare.	LS

NOTES:
LS = Less than Significant

Impact 3.1-1: The proposed project would not have a substantial adverse effect on a scenic vista or scenic resource. *(Less than Significant)*

There are no designated State Scenic Highways in the vicinity of the project components, therefore the proposed project would not damage scenic resources within a state scenic highway.

Construction

Project construction activities could result in temporary impacts on scenic resources. Construction sites, vehicles, equipment and materials, stockpiles, and exposed soils would be temporarily visible from multiple public vantage points. Staging areas would include vehicle and equipment storage, generally within existing paved areas, and would not involve ground disturbance, vegetation removal, or other types of activities that would substantially impact scenic resources or the visual character of the area.

Demolition of the existing river intake pump station and construction of the new intake pump station would take place along the south side of the San Joaquin River. The intake pump station site is in a highly disturbed industrial area. Construction at the intake pump station site would take approximately 14 months. Given the industrial nature of the site and area, the construction activities would not contrast with the site's existing setting. Construction of the intake pump station would not have a substantial adverse effect on a scenic vista or scenic resources and the impact would be **less than significant**.

The desalination plant would be constructed within the existing WTP property. Project construction would not impair public views of Mount Diablo to the south. There are no designated scenic roadways or scenic viewpoints from which the desalination plant construction activities would be visible, as the topography and intervening development would screen construction activities. Construction of the desalination plant would not have a substantial adverse effect on a scenic vista or scenic resource, and the impact would be **less than significant**.

As noted above, Lone Tree Way is designated as a scenic arterial road and gateway to the city. A small portion of the proposed raw water pipeline would be located within this roadway in order to tee off the existing raw water pipeline. The new pipeline would tee off of the existing pipeline in Lone Tree Way and provide a direct connection between the River's pump station and the WTP through one of two alignments: west along Putnam Street and south along D Street before entering the WTP site, or south along Lone Tree Way and west across easement to the southeast WTP property line.

Pipeline construction would involve the use of heavy equipment, trenching, and other earthwork that would be visible from public viewing areas. The raw water pipeline installation would result in short-term construction impacts in the vicinity of a locally designated scenic roadway. However, the duration of construction would be brief, as pipeline installation would progress at a rate of approximately 200 feet per day. Thus, construction in the vicinity of Lone Tree Way would be for a duration of a few days. Upon completion of construction, the roadway would be repaved and returned to its approximate pre-construction condition. Therefore, impacts to Lone Tree Way would be temporary and **less than significant**.

Construction of the brine disposal pipeline would have short-term construction impacts and would not be located in the vicinity of a scenic highway or scenic resource. Although construction activities would be visible from public viewing areas, the duration of construction for the brine disposal pipeline would progress at a rate of approximately 200 feet per day, for a total of 10 months. The pipelines would be placed below grade along existing roadways once complete and would have **no impact** to scenic resources.

Operation

As described above, views of Mount Diablo and the ridgelines and hills and San Joaquin River are considered scenic vistas and scenic resources. Permanent new aboveground facilities, if visible from public viewpoints and if it would prominently obstruct or block the majority of scenic views, would be considered a significant impact.

The proposed project would develop the south end of the existing WTP site. The desalination facility and chemical storage structures would be approximately 18 feet and 20 feet high, respectively. Views to the southern portion of the project site are obstructed by residences and trees along the south and west sides, and hillside on the east side. Views looking south toward the project site are obstructed by trees and the existing WTP building. As described previously, scenic views of Mount Diablo looking south from public streets are largely obstructed by intervening development and trees. Lone Tree Way is the nearest scenic arterial road. However, views of Mount Diablo looking southwest are completely obstructed by the hillside on the east side of the WTP property. The WTP site is also located in a different direction away from the north-south primary view corridor of Lone Tree Way. Given that the proposed desalination facility would not exceed the height of the existing WTP building and limited visual accessibility to the site, operation of the desalination facility would not block of impair views of Mount Diablo.

The proposed intake pump station would be a permanent aboveground structure. It would occupy an area of approximately 40 by 60 feet, and the structure would be approximately 23 feet high. This project component has the potential to affect views of San Joaquin River, as the San Joaquin River is visible from the terminus of Fulton Shipyard Road looking north. The proposed project would demolish and remove the existing river intake pump station, which partially obstructs views of the San Joaquin River. Consequently, removal of the existing structure could be a beneficial effect. The new pump station would be located within the existing parking lot.

The new pump station would not block or impair views looking north to the San Joaquin River from Fulton Shipyard Road (see **Figure 3.1-2**, View 2).

The raw water connection and brine disposal pipelines would be installed below ground and therefore would have no impact on scenic views or scenic resources.

Once operational, the proposed project would have a **less than significant** impact on scenic vistas and scenic resources.

<u>Mitigation Measure:</u>

None required.

Impact 3.1-2: The proposed project would change the existing visual character of the river intake pump station site and WTP, but would not substantially degrade the existing visual character or quality of the site and its surroundings. *(Less than Significant)*

Construction

As described in Impact 3.1-1, construction sites, staging areas, vehicles, equipment and materials, stockpiles, and exposed soils would be temporarily visible during project construction, which would last for approximately 14 months. Demolition of the existing river intake pump station and construction of the new intake pump station would take place along the south side of the San Joaquin River in a highly disturbed and developed industrial area. The desalination plant would be constructed within the existing WTP property. Construction of the raw water and brine disposal pipelines would involve the use of heavy equipment, trenching, and other earthwork along public roadways that would be temporarily visible from public viewing areas. Upon completion of construction, the roadways would be repaved and returned to their approximate pre-construction condition. Because project construction would be temporary, it would not be anticipated to substantially degrade the existing visual character or quality of the site and its surroundings, and impacts would be **less than significant**. Implementation of **Improvement Measure 3.1-2 (Maintain Clean and Orderly Construction Sites)**, which includes measures to ensure that construction and staging areas are kept as clean and inconspicuous as practicable, would further reduce the less than significant impact associated with construction.

Operation

The proposed new pump station would be located approximately 200 feet inland from shore within the existing parking lot with an approximate area of 2,400 square feet. The pump station building would be approximately 23-feet-tall (see **Figures 2-3, 2-4**, and **2-5** in Chapter 2, *Project Description).*

The desalination facility would be within the fenceline of the existing WTP to the south and east of the existing Plant A. The new facility would include piping and valves to connect Plant A to the raw water pipeline, a Reverse Osmosis (RO) system, a post-treatment system, desalinated water pipeline connection to the existing plant clearwell, and a pipeline from the desalination plant that connects to a dedicated brine disposal pipeline. The new facility would include approximately 0.3-acre of impervious surfaces associated with the desalination facilities, buildings, driveways, parking, and maintenance areas.

The RO system would consist of four RO trains and housed in an approximately 18-foot-tall, 10,700 square-foot membrane process building located south and east of Plant A (see **Figures 2-8 and 2-9** in Chapter 2, *Project Description*).

Chemicals used during the desalination process would be stored onsite in 270 to 6,000-gallon bulk storage tanks located in an approximately 20-foot-tall, 2,600 square-foot structure located near the membrane process building. (see **Figures 2-7 and 2-10** in Chapter 2, *Project Description*).

The raw water connection and brine disposal pipelines would be installed below ground and would not be visible from public view points.

As noted above, a project is considered to "substantially degrade" the visual character or quality of a site if it would have a strongly negative influence on the public's experience and appreciation of the visual environment. As such, visual changes are considered in the context of the site and locale's visual sensitivity. Visual sensitivity is the overall measure of a site's susceptibility to adverse visual changes based on the combined factors of visual quality, viewer types and volumes, and viewer exposure to the project.

The proposed pump station would be located in a developed industrial location, and the proposed desalination facility would be within the fenceline of the existing WTP. Due to the location and nature of each location, public views of both facilities would be limited, and neither facility would be of a function or design that would be out of character with its surrounding environment.

In the case of the proposed pump station, in accordance with the design standards of the General Plan Community Image and Design Element (see Section 3.1.2, *Regulatory Framework* above), the new facility would, be sited and designed to maintain views of the San Joaquin River, Mount Diablo and its foothills. In addition, in accordance with applicable policies of the Antioch General Plan that address industrial development, the proposed pump station and desalination facility would be designed in a manner that is compatible with surrounding uses.

Because the proposed project facilities would be visually compatible with their surrounding environment and would be sited and designed in accordance with applicable City design standards for industrial development, impacts related to degradation of visual character or quality would be **less than significant**.

Improvement Measure:

> **Improvement Measure 3.1-2: Maintain Clean and Orderly Construction Sites.** Contractor specifications shall include a requirement that the construction contractor(s) keep staging and construction areas as clean and inconspicuous as practicable by storing construction materials and equipment at the proposed construction staging areas or in areas that are generally away from public view when not in use, and by removing construction debris promptly at regular intervals. If necessary, additional appropriate screening (e.g., temporary opaque fencing) shall be used at construction sites to buffer views of construction equipment and material, where the use of such screening materials would not further degrade the visual character or further obstruct views of scenic resources or vistas in the area. Screening is not required for pipeline construction areas.

Impact 3.1-3: The proposed project would not create a new source of substantial light or glare that would adversely affect day or nighttime views in the area, or which would substantially impact other people or properties. *(Less than Significant)*

Construction

As described in Chapter 2, *Project Description,* construction would occur during daytime hours. Therefore, no light impact related to nighttime construction would occur. Construction of the project would not require the use of reflective materials that would result in substantial adverse effects related to glare. Therefore, the proposed project would have no construction impact related to glare.

Operation

The proposed project components are located in areas of existing residential and non-residential developments that already generate light. The desalination facility and river intake pump station would require the installation of permanent outdoor lighting for safety and security purposes. These lights would be similar to existing light sources in the vicinity and would not be out of character with adjacent light sources. In accordance with City design standards and the California Green Building Code, the lights would be directed downward and oriented so that lights would not be directly visible from neighboring residences, or located on the sides of the buildings away from neighboring residents, to minimize light and glare effects.

The proposed raw water connection and brine disposal pipelines would be installed below ground. These components do not require lighting and would not result in impacts with respect to introducing new sources of light or glare.

Consequently, impacts related to production of substantial light or glare that would adversely affect day or nighttime views in the area would be **less than significant**.

Mitigation Measure:

None required.

Cumulative Impacts

The geographic context for the analysis of cumulative aesthetic and visual resources impacts varies by threshold. The cumulative context for each threshold is presented in the impact discussions below.

Impact 3.1-C-1: Implementation of the proposed project, in combination with other cumulative development, would not have a substantial adverse effect on a scenic vista or scenic resource. *(Less than Significant)*

The geographic context for the analysis of cumulative scenic resource impacts is cumulative development in the city of Antioch and the city of Pittsburg (**Figure 3-1**). Both cities include areas where new development could result in impacts to views of Mount Diablo and the ridgelines and hills and San Joaquin River, which are considered scenic vistas and scenic resources. If the new development is not designed to be compatible with and sensitive to scenic resources and sensitive public views, adverse effects to scenic resources could occur. Because there is a potential for future cumulative development in the city of Antioch and the city of Pittsburg to affect sensitive public views and scenic resources, this cumulative impact is considered potentially significant.

As discussed above in Impact 3.1-1, neither construction nor operation of the proposed project would result in impacts to scenic vistas or resources. The proposed project would demolish and remove the existing river intake pump station, which partially obstructs views of the San Joaquin River, and the new pump station would not block or impair views looking north to the San Joaquin River. The proposed desalination facility would not exceed the height of the existing WTP and would not block of impair views of Mount Diablo or other scenic resources. The raw water connection and brine disposal pipelines would be installed below ground and therefore would have no impact on scenic views or scenic resources. Consequently, the contribution of the proposed project to the cumulative impact would be less than considerable, and this impact would be **less than significant**.

Impact 3.1-C-2: Implementation of the proposed project, in combination with other cumulative development, would not substantially degrade the existing visual character or quality of the site and its surroundings. ***(Less than Significant)***

The geographic context for cumulative impacts associated with the degradation of visual quality includes cumulative development in the city of Antioch. If new development within the city is lacking in visual quality and is not designed to be compatible with the surrounding environment adverse effects related to visual character could occur. However, as noted above in Impact 3.1-2, the proposed pump station and desalination facility would be designed in a manner that is aesthetically pleasing and compatible with surrounding uses in accordance with Antioch General Plan policies that address industrial development. In addition, the City of Antioch Design Review process encourages and promotes the highest quality of design and site planning within the city. New buildings, exterior changes to existing buildings, or the installation of permanent signage requires design review approval. The Citywide Design Guidelines supplement the City's Zoning Code and seek to enhance the design of streetscapes and commercial and residential projects. The provisions of the Design Guidelines are applicable to any new buildings, additions, exterior alterations, landscaping, and any modification to an approved landscaping plan or parking lot design. Because new development in the City of Antioch would be subject to policies and design standards that require that the new development is aesthetically pleasing and compatible with surrounding uses, the cumulative impact is considered **less than significant**.

Impact 3.1-C-3: Implementation of the proposed project, in combination with other cumulative development, would not create a new source of substantial light or glare that would adversely affect day or nighttime views in the area, or which would substantially impact other people or properties. ***(Less than Significant)***

Ambient Light

The geographic context for the analysis of cumulative ambient light impacts is cumulative development in the city of Antioch and the city of Pittsburg. Both cities include vacant or underutilized lands where new development could increase the ambient nighttime lighting levels in these areas that could negatively affect nighttime views of the sky. However, because both cities are subject to substantial amounts of existing nighttime ambient light, the increase in such light that would be attributable to new development would not significantly affect nighttime views of the sky. Therefore, cumulative impacts associated with ambient nighttime lighting would be considered **less than significant**.

Spillover Light

The cumulative context for spillover light would be development adjacent to the intake pump station site and the WTP property that could be subject to spillover light effects from new development. However, as noted above, new development in the city is subject to the City design review process and the California Green Building Code, which address excessive or spillover light, ensuring that cumulative spillover light impacts would be **less than significant**.

Glare

The cumulative context for glare effects is the areas surrounding the intake pump station site and the WTP property affected by glare produced from new development. As previously discussed, new development in the city is subject to the city design review process, which reviews projects for compatibility with surrounding uses, ensuring that glare would be minimized and that cumulative spillover glare impacts would be **less than significant**.

References – Aesthetic Resources

City of Antioch, 2003. *City of Antioch General Plan*, updated November 24, 2003.

City of Pittsburg, 2001. *General Plan Pittsburg 2020: A Vision for the 21st Century*, adopted November 16, 2001.

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3.2 Air Quality

Sections	Tables

This section evaluates the potential impacts on regional and local air quality that would result from construction and operation of the proposed project. The background for air pollutants is described in Section 3.2.1, *Background*, the environmental setting with respect to climate and topography, existing air quality, and sensitive receptors is described in Section 3.2.2, *Environmental Setting*, and the regulatory framework that governs air pollutants of concern [including criteria pollutants and toxic air contaminant (TAC) emissions and related considerations] are discussed in Section 3.2.3, *Regulatory Setting*. Section 3.2.4, *Analysis, Impacts, and Mitigation*, defines significance criteria used for the impact assessment, analyzes the potential impacts of the proposed project, including cumulative effects.

With the exception of one comment that was received at the scoping meeting held for the project that noted a concern relative to odors, there were no comments received during the scoping period for this EIR regarding air quality. For discussion related to odors that would be associated with the proposed project, refer to Section 3.2.4.

The analysis included in this section was developed based on project-specific construction and operational features of the proposed project provided by the City of Antioch, using methods and guidance developed by the Bay Area Air Quality Management District (BAAQMD) and the California Office of Environmental Health Hazards Assessment (OEHHA).

3.2.1 Background

Criteria Air Pollutants

The U.S. Environmental Protection Agency (USEPA) has identified criteria air pollutants and has set National Ambient Air Quality Standards (NAAQS) for widespread pollutants from numerous and diverse sources that are a threat to public health and welfare. The USEPA has set NAAQS for seven principal pollutants, which are called "criteria" pollutants:

- Carbon monoxide (CO);
- Lead;

- Nitrogen dioxide (NO_2);
- Ozone;
- Particulate matter less than or equal to 10 microns in diameter (PM_{10});
- Particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$); and
- Sulfur dioxide (SO_2).

The State of California has established California Ambient Air Quality Standards (CAAQS) for these criteria pollutants, as well as ambient air quality standards for sulfates, hydrogen sulfide (H_2S), and vinyl chloride. NAAQS and CAAQS are summarized in **Table 3.2-2**. Below are descriptions of criteria pollutants that are a concern in the project area.

Ozone

Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and that can cause substantial damage to vegetation and other materials. Ozone is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving volatile organic compounds (VOC) and nitrogen oxides (NO_x). VOC and NO_x are known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately 3 hours.

Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of VOC and NO_x under the influence of wind and sunlight. Ozone concentrations tend to be higher in the late spring, summer, and fall, when conditions, such as long sunny days and regional subsidence inversions, are conducive to the formation and accumulation of secondary photochemical compounds.

Nitrogen Dioxide

Nitrogen dioxide (NO_2) is an air quality pollutant of concern because it acts as a respiratory irritant. NO_2 is a major component of the group of gaseous nitrogen compounds commonly referred to as oxides of nitrogen (NO_x). A precursor to ozone formation, NO_x is produced by fuel combustion in motor vehicles, industrial stationary sources (such as industrial activities), ships, aircraft, and rail transit. Typically, NO_x emitted from fuel combustion is in the form of nitric oxide (NO) and NO_2. NO is often converted to NO_2 when it reacts with ozone or undergoes photochemical reactions in the atmosphere.

Carbon Monoxide

Carbon monoxide (CO) is a non-reactive pollutant that is a product of incomplete combustion and is mostly associated with motor vehicle traffic. High CO concentrations develop primarily during winter when periods of light winds combine with the formation of ground level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures. When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease, or anemia.

Particulate Matter

Particulate matter less than 10 microns in diameter (PM_{10}) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) represent fractions of particulate matter that can be inhaled into air passages and the lungs and can cause adverse health effects. Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, fuel combustion, and atmospheric photochemical reactions. Some sources of particulate matter, such as demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. Particulates can damage materials and reduce visibility. Very small particles of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. According to a study by the California Air Resources Board (CARB), the estimated number of annual $PM_{2.5}$-related premature deaths in California is 9,200 (CARB, 2010).

Sulfur Dioxide

Sulfur Dioxide (SO_2) is a colorless acid gas with a pungent odor. It has potential to damage materials and it can have health effects at high concentrations. It is produced by the combustion of sulfur-containing fuels, such as oil, coal and diesel. SO_2 can irritate lung tissue and increase the risk of acute and chronic respiratory disease.

Toxic Air Contaminants

Toxic Air Contaminants (TACs) are airborne substances that are capable of causing short-term (acute) and/or long-term (chronic or carcinogenic, i.e., cancer-causing) adverse human health effects (i.e., injury or illness). TACs include both organic and inorganic chemical substances. They may be emitted from a variety of common sources including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations. The current California list of TACs includes nearly 200 compounds, including Diesel Particulate Matter (DPM) emissions from diesel-fueled engines (CARB, 2011).

3.2.2 Environmental Setting

The primary factors that determine air quality are the locations of air pollutant sources and the amounts of pollutants emitted. Other important factors are meteorological and topographical conditions. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants.

Climate and Topography

The project would be located in the cities of Antioch and Pittsburg in eastern Contra Costa County and is within the boundaries of the San Francisco Bay Area Air Basin (Air Basin), which encompasses the nine-county regions including all of Alameda, Contra Costa, Santa Clara, San Francisco, San Mateo, Marin and Napa counties, and the southern portions of Solano and Sonoma counties. The climate in the Air Basin is dominated by the strength and location of a semi-permanent, subtropical high-pressure cell. During the summer, the Pacific high pressure cell is centered over the northeastern Pacific Ocean resulting in stable meteorological conditions and a steady northwesterly wind flow. Upwelling of cold ocean water from below to the surface because of the northwesterly flow produces a band of cold water off the California coast. The cool and moisture-laden air approaching the coast from the Pacific Ocean is further cooled by the presence of the cold water band resulting in condensation and the presence of fog and stratus clouds along the Northern California coast. In the winter, the Pacific high-pressure cell weakens and shifts southward resulting in wind flow offshore, the absence of upwelling, and the occurrence of storms. Weak inversions coupled with moderate winds result in low air pollution potential (BAAQMD, 2017a).

Within the Air Basin, 11 subregions have been defined based on their unique climatology and topography. The project area is within the Carquinez Strait subregion. The Carquinez Strait subregion extends from Rodeo in the southwest and Vallejo in the northwest to Fairfield on the northeast and Brentwood on the southeast (BAAQMD, 2017a). It is the only sea-level gap between the Bay and the Central Valley. The subregion includes the lowlands bordering the strait to the north and south, and includes the area adjoining Suisun Bay and the western part of the Sacramento-San Joaquin Delta as far east as Bethel Island.

Prevailing winds in the Carquinez Strait are from the west. During the summer and fall months, high pressure offshore coupled with low pressure in the Central Valley causes marine air to flow eastward through the Carquinez Strait. The wind is strongest in the afternoon. Afternoon wind speeds of 15 to 20 mile per hour (mph) are common throughout the strait region. Annual average wind speeds east of Martinez are 9 to 10 mph. Sometimes atmospheric conditions cause air to flow from the east. East winds usually contain more pollutants than the cleaner marine air from the west. In the summer and fall months, this can cause elevated pollutant levels to move into the central Air Basin through the strait. These high pressure periods are usually accompanied by low wind speeds, shallow mixing depths, higher temperatures, and little or no rainfall (BAAQMD, 2017a). The project area typically has average maximum and minimum winter (i.e., January) temperatures of 54 degrees Fahrenheit (ºF) and 37 ºF, respectively, while average summer (i.e., July) maximum and minimum temperatures are 91 ºF and 58 ºF, respectively. Rainfall averages approximately 13 inches per year in the City of Antioch (WRCC, 2017).

Existing Air Quality

The Bay Area Air Quality Management District (BAAQMD) is the local air district responsible for air quality within the Air Basin. The BAAQMD maintains a regional monitoring network that measures the ambient concentrations of criteria pollutants in the Air Basin. Ambient air quality measurements from air monitoring stations maintained by BAAQMD help to determine the level of air quality in the local area. The closest air quality monitoring station to the proposed project sites is the Bethel Island Road station, approximately 9 miles east-northeast of the City of Antioch WTP. **Table 3.2-1** shows a 5-year (2012 through 2016) summary of ozone, PM_{10}, and NO_2 data monitored at the Bethel Island Road station. The data are compared to the CAAQS and NAAQS. As shown in the table, the State 1-hour ozone standard was exceeded twice during the 5-year study period. The national 8-hour ozone standard was exceeded once to four times per year during the 5-year period. The 24-hour State PM_{10} standard was estimated to be exceeded approximately six times in 2012 and approximately 13 times in 2014, there were no exceedances in 2015 or 2016, and insufficient data during 2013. The annual average State PM_{10} standard was not exceeded during the 2 years with sufficient data (i.e., 2012 and 2014). There were no exceedances of the NO_2 national or State standards during the 5-year study period.

TABLE 3.2-1
AIR QUALITY DATA SUMMARY (2012–2016) FOR THE STUDY AREA

Pollutant	Standard	Monitoring Data by Year				
		2012	2013	2014	2015	2016
Ozone						
Highest 1 Hour Average (ppm)		0.098	0.082	0.092	0.080	0.089
Days over State Standard	0.09	2	0	0	0	0
Highest 8 Hour Average (ppm)		0.087	0.075	0.071	0.072	0.080
Days over National Standard	0.070	4	1	1	1	2
Particulate Matter (PM_{10})						
Highest 24 Hour Average (μg/m^3)		52.3	50.7	61.3	33.0	26.0
Estimated Days over State Standard	50	6.1	*	12.8	0	0
State Annual Average (μg/m^3)	20	14.1	*	16.6	*	*
Nitrogen Dioxide (NO_2)						
Highest 1 Hour Average (ppb)		0.032	0.033	0.034	0.029	0.032
Days over National Standard	0.100	0	0	0	0	0
State Annual Average (ppm)	0.030	0.006	*	0.005	0.005	0.005

NOTES:
ppm = parts per million; μg/m^3 = micrograms per cubic meter; * insufficient data.

SOURCE: CARB, 2017.

Sensitive Receptors

For the purposes of this air quality analysis, sensitive receptors are generally defined as facilities or land uses that include members of the population that are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples include schools, hospitals, and daycare centers. The reasons for greater than average sensitivity include pre-existing health problems, proximity to emissions sources, and/or duration of exposure to air pollutants. Schools, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because children, elderly people, and the infirm are more susceptible to respiratory distress and other air quality-related health problems than the general public. Residential areas are considered sensitive to poor air quality because people usually stay home for extended periods of time, which results in greater exposure to ambient air quality.

The proposed desalination plant would be located at the existing WTP where the rear yards of single-family residential uses on Terranova Drive and View Drive would be separated from the proposed desalination plant and chemical storage areas by a 25-foot setback. The closest sensitive receptor to the proposed river pump station construction area is a residence, approximately 50 feet to the east of the existing parking lot. Sensitive receptors along the proposed brine disposal pipeline route consist of Park Middle School, March Elementary School, Antioch High School, and single-family residences along Elizabeth Lane, D Street, Tregallas Road, G Street, 18th Street, L Street, and 10th Street. Sensitive receptors along the proposed raw water pipeline route consist of Park Middle School and single-family residences along Elizabeth Lane and Putnam Street.

3.2.3 Regulatory Framework

Air quality within the Air Basin is addressed through the efforts of various federal, State, and local government agencies. These agencies work jointly, as well as individually, to improve air quality through legislation, regulations, planning, policy-making, education, and a variety of programs. The air pollutants of concern and agencies primarily responsible for improving the air quality within the Air Basin and the pertinent regulations are discussed below.

Criteria Air Pollutants

Regulation of air pollution is achieved through both CAAQS and NAAQS as well as emission limits for individual sources of air pollutants. As required by the federal Clean Air Act (CAA), the USEPA has identified criteria pollutants and has established NAAQS to protect public health and welfare. NAAQS have been established for ozone, CO, NO_2, Sulfur dioxide (SO_2), PM_{10}, $PM_{2.5}$, and lead. These pollutants are called "criteria" air pollutants because standards have been established for each of them to meet specific public health and welfare criteria.

To protect human health and the environment, the USEPA has set "primary" and "secondary" maximum ambient thresholds for all six criteria pollutants. Primary thresholds were set to protect human health, particularly sensitive receptors such as children, the elderly, and individuals suffering from chronic lung conditions such as asthma and emphysema. Secondary standards were set to protect the natural environment and prevent further deterioration of animals, crops, vegetation, and buildings.

The NAAQS are defined as the maximum acceptable concentration that may be reached, but not exceeded more than once per year. California has adopted more stringent ambient air quality standards (i.e., CAAQS) for most of the criteria air pollutants. **Table 3.2-2** presents both sets of ambient air quality standards (i.e., national and State) and provides the attainment status for each. California has also established State ambient air quality standards for sulfates, hydrogen sulfide, and vinyl chloride; however, air emissions of these pollutants are not expected under the proposed project or alternatives and are not further discussed in this EIR.

TABLE 3.2-2
AMBIENT AIR QUALITY STANDARDS AND BAY AREA ATTAINMENT STATUS

Pollutant	Averaging Time	State Standard	Attainment Status for California Standard	Federal Primary Standard	Attainment Status for Federal Standard
Ozone	8 Hour	0.070 ppm	Non-Attainment	0.070 ppm	Non-Attainment - Marginal
	1 Hour	0.09 ppm	Non-Attainment	---	---
Carbon Monoxide	8 Hour	9.0 ppm	Attainment	9 ppm	Attainment
	1 Hour	20 ppm	Attainment	35 ppm	Attainment
Nitrogen Dioxide	Annual Average	0.030 ppm	---	0.053 ppm	Attainment
	1 Hour	0.18 ppm	Attainment	0.100 ppm	Unclassified
Sulfur Dioxide	Annual Average	---	---	0.030 ppm	Attainment
	24 Hour	0.04 ppm	Attainment	0.14 ppm	Attainment
	1 Hour	0.25 ppm	Attainment	0.075 ppm	Attainment
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 $\mu g/m^3$	Non-Attainment	---	---
	24 Hour	50 $\mu g/m^3$	Non-Attainment	150 $\mu g/m^3$	Unclassified
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 $\mu g/m^3$	Non-Attainment	12.0 $\mu g/m^3$	Unclassified/ Attainment
	24 Hour	---	---	35 $\mu g/m^3$	Non-Attainment - Moderate
Sulfates	24 Hour	25 $\mu g/m^3$	Attainment	---	---
Lead	Calendar Quarter	---	---	1.5 $\mu g/m^3$	Attainment
	30-Day Average	1.5 $\mu g/m^3$	Attainment	---	---
	3-Month Rolling Average	---	---	0.15 $\mu g/m^3$	Unclassified
Hydrogen Sulfide	1 Hour	0.03 ppm	Unclassified	No Federal Standard	---
Vinyl Chloride	24 Hour	0.010 ppm	No information available	---	---
Visibility Reducing Particles	8 Hour	Extinction of 0.23/km; visibility of 10 miles or more	Unclassified	No Federal Standard	---

NOTES:
ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter.

SOURCE: BAAQMD, 2017b.

The Air Basin is classified as a non-attainment area for the State 1-hour ozone standard as well as the State and federal 8-hour ozone standards. The air basin is also a non-attainment area relative to the State and federal $PM_{2.5}$ annual arithmetic mean and 24-hour standards, respectively, and the State standards for PM_{10}. For all other criteria pollutants, the Air Basin is classified as either unclassified or as attainment with respect to State and federal standards (BAAQMD, 2017b).

Federal

The USEPA is responsible for implementing programs established under the federal CAA, such as establishing and reviewing the NAAQS and judging the adequacy of State Implementation Plans (SIPs), but has delegated the authority to implement many of the federal programs to the states while retaining an oversight role to ensure that the programs continue to be implemented.

State

CARB is responsible for establishing and reviewing the State standards, compiling the California SIP and securing approval of that plan from USEPA, conducting research and planning, and identifying TACs. CARB also regulates mobile sources of emissions in California, such as construction equipment, trucks, and automobiles, and oversees the activities of California's air quality districts, which are organized at the county or regional level. County or regional air quality management districts are primarily responsible for regulating stationary sources at industrial and commercial facilities within their geographic areas and for preparing the air quality plans that are required under the federal CAA and California CAA.

California's Diesel Risk Reduction Plan/Diesel Fuel Regulations

As part of California's Diesel Risk Reduction Plan, CARB has passed numerous regulations to reduce diesel emissions from vehicles and equipment that are already in use. Combining these retrofit regulations with new engine standards for diesel fueled vehicles and equipment, CARB intends to reduce DPM emissions by 85 percent from year 2000 levels by 2020. California Diesel Fuel Regulations (13 California Code of Regulations [CCR] §2281-2285; 17 CCR §93114) provide standards for diesel motor vehicle fuel and non-vehicular diesel fuel.

CARB has also adopted a regulation for in-use off-road diesel vehicles that is designed to reduce emissions from diesel-powered construction and mining vehicles by imposing idling limitations on owners, operators, renters, or lessees of off-road diesel vehicles. The regulation requires an operator of applicable off-road vehicles (self-propelled diesel-fueled vehicles 25 horsepower and up that were not designed to be driven on-road) to limit idling to no more than 5 minutes.

Local

Bay Area Air Quality Management District

The project area is within the jurisdiction of the BAAQMD, which is the local agency delegated responsibility for preparing, adopting, and implementing stationary and area air emission control measures and standards.

BAAQMD Air Quality Plans

The 1977 CAA amendments require regional planning and air pollution control agencies to prepare a regional air quality plan to outline the measures by which both stationary and mobile sources of pollutants can be controlled in order to achieve all standards specified in the CAA. The California CAA also requires development of air quality plans and strategies to meet state air quality standards in areas designated as non-attainment (with the exception of areas designated as non-attainment for the state particulate matter standards). Maintenance plans are required for attainment areas that had previously been designated non-attainment in order to ensure continued attainment of the standards. (As indicated above, air quality plans developed to meet federal requirements are referred to as SIPs.)

For state air quality planning purposes, the Air Basin is classified as a serious non-attainment area for the 1-hour ozone standard. The "serious" classification triggers various plan submittal requirements and transportation performance standards. One such requirement is that the BAAQMD update its Clean Air Plan every 3 years to reflect progress in meeting the air quality standards and to incorporate new information regarding the feasibility of control measures and new emission inventory data. The BAAQMD's record of progress in implementing previous measures must also be reviewed.

The most recently adopted air quality plan to address nonattainment issues for the Air Basin is titled *Spare the Air, Cool the Climate, A Blueprint for Clean Air and Climate Protection in the Bay Area, Final 2017 Clean Air Plan* (2017 Clean Air Plan; BAAQMD, 2017c). The 2017 Clean Air Plan provides a regional strategy to protect public health and protect the climate by continuing progress toward attaining all state and federal air quality standards; eliminating health risk disparities from exposure to air pollution among Bay Area communities; transitioning the region to a post-carbon economy needed to achieve GHG reduction targets for 2030 and 2050; and providing a regional climate protection strategy that will put the Bay Area on a pathway to help achieve those GHG reduction targets. The 2017 Clean Air Plan includes a wide range of 85 control measures designed to decrease emissions of the air pollutants that are most harmful to residents, such as particulate matter, ozone, and TACs; to reduce emissions of methane and other "super-GHGs" that are potent climate pollutants in the near-term; and to decrease emissions of CO by reducing fossil fuel combustion (BAAQMD, 2017c).

City of Antioch General Plan

The following air quality policy from the Antioch General Plan is relevant to the proposed project (City of Antioch, 2003).

> ***Policy 10.6.2a.:*** Require development projects to minimize the generation of particulate emission during construction through implementation of the dust abatement actions outlined in the CEQA Handbook of the Bay Area Air Quality Management District.

City of Pittsburg General Plan

The following air quality policies from the City of Pittsburg General Plan Resource Conservation element may be relevant to the proposed project (City of Pittsburg, 2001).

> ***Policy 9-P-29:*** Cooperate with the Bay Area Air Quality Management District to achieve emissions reductions for ozone and its precursor, PM-10.
>
> ***Policy 9-P-30:*** Cooperate with Bay Area Air Quality Management District to ensure compliance with dust abatement measures during construction.

3.2.4 Analysis, Impacts, and Mitigation

Significance Criteria

Based on Appendix G of the CEQA *Guidelines*, the project would have a significant impact on air quality if it would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under a federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);
- Expose sensitive receptors to substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

Methodology and Assumptions

Criteria Pollutant Emissions

For analyzing short-term construction and long-term operational emissions under CEQA, the BAAQMD has established quantitative significance thresholds of 54 pounds per day for ROG, NO_x, and $PM_{2.5}$, and 82 pounds per day for PM_{10}. For construction emissions, the PM_{10} and $PM_{2.5}$ significance thresholds should be compared to exhaust emissions only. With regard to the assessment of construction-related fugitive dust, the BAAQMD emphasizes implementation of its recommended dust control measures rather than a quantitative comparison of estimated emissions to a significance threshold. The BAAQMD also has established annual significance thresholds of 10 tons per year for ROG, NO_x, and $PM_{2.5}$, and 15 tons per year for PM_{10} exclusively for long-term operational emissions. The Brackish Water Desalination Project would be considered to result in a significant impact on air quality if it would generate pollution emissions in excess of the BAAQMD's daily or annual significance thresholds (BAAQMD, 2017a).

Toxic Air Contaminants

Any project that would have the potential to expose sensitive receptors to substantial levels of TACs that would result in an incremental cancer risk of 10.0 in one million or greater, a hazard index of 1.0 or greater, or an increase in ambient annual average $PM_{2.5}$ concentrations of 0.3 $\mu g/m^3$ or greater would be considered to have a significant impact to sensitive receptors (BAAQMD, 2017a).

Odors

Construction of the project would result in odorous emissions associated with diesel exhaust from onsite construction activities. These short-term impacts are addressed qualitatively. Regarding the potential for long-term odors generated by the project, refer to the *Issues not Discussed in Impacts* discussion below.

Issues not Discussed in Impacts

For odors, BAAQMD recommends that impacts be evaluated if a potential source of objectionable odors is proposed at a location near existing sensitive receptors or if sensitive receptors are proposed to be located near an existing source of objectionable odors. It is recommended that wastewater treatment plants not be sited within 1 mile of sensitive receptors (BAAQMD, 2017a). The project would involve construction at an existing water treatment plant, but would not include any new sources of odors. Therefore, operations of the project would not create objectionable odors that would affect a substantial number of sensitive receptors. There would be **no long-term impact**; therefore, this issue is not discussed further in this document.

Impacts and Mitigation Measures

Table 3.2-3 summarizes the proposed project's impacts and significance determinations related to air quality.

TABLE 3.2-3
SUMMARY OF IMPACTS – AIR QUALITY

Impacts	Significance Determinations
Impact 3.2-1: Construction of the project would result in criteria pollutant emissions that could exceed air quality standards or contribute substantially to an existing or projected air quality violation.	LSM
Impact 3.2-2: Operations of the project would not result in criteria pollutant emissions that could contribute to an existing or projected air quality violation.	LS
Impact 3.2-3: Construction of the project would result in emissions that could conflict with the 2017 Clean Air Plan.	LSM
Impact 3.2-4: Construction of the project could expose sensitive receptors to toxic air contaminants, including diesel particulate matter emissions.	LSM
Impact 3.2-5: Operation of the project would not expose sensitive receptors to toxic air contaminants, including diesel particulate matter emissions	LS
Impact 3.2-6: Construction of the project would not create odors.	LS
Impact 3.2-C-1: Cumulative impacts related to construction criteria pollutant emissions contributing to an existing or projected air quality violation.	LSM
Impact 3.2-C-2: Cumulative impacts related to operational criteria pollutant emissions contributing to an existing or projected air quality violation.	LS

TABLE 3.2-3
SUMMARY OF IMPACTS – AIR QUALITY

Impacts	Significance Determinations
Impact 3.2-C-3: Cumulative construction impacts related to exposing sensitive receptors to toxic air contaminants, including diesel particulate matter emissions.	LSM
Impact 3.2-C-4: Cumulative operation impacts related to exposing sensitive receptors to toxic air contaminants, including diesel particulate matter emissions.	LS
Impact 3.2-C-5: Cumulative impacts related to odors.	LS

NOTES:
LS = Less than Significant
LSM = Less than Significant with Mitigation

Impact 3.2-1: Construction of the project would result in criteria pollutant emissions that could exceed air quality standards or contribute substantially to an existing or projected air quality violation. *(Less than Significant with Mitigation)*

Construction activities that would be associated with the project would involve the use of a variety of off-road diesel-fueled equipment, including cranes, excavators, forklifts, loaders, etc., that would emit exhaust containing air pollutants at the construction sites. In addition, construction trucks and workers' vehicles would generate exhaust emissions offsite, and fugitive dust would be generated by onsite ground disturbing and material handling activities. Construction-related emissions of the proposed project have been estimated for comparison to BAAQMD significance thresholds. The NO_x significance threshold represents emissions of all oxides of nitrogen, including NO_2. Given the low ambient levels of SO_2 and lead in the Air Basin, short-term construction-related SO_2 and lead emissions associated with the project are not expected to result in significant effects and were not calculated.

Exhaust Emission Estimates

Total emissions associated with construction of each of the proposed project components were estimated to determine the total project average daily emissions. The average daily emissions are based on construction of the following components of project:

- Demolition/Construction of River Pump Station;
- Raw Water Pipeline
- Water Treatment Plant (WTP) Pipeline Installation; and
- Desalination Facility Construction.

Emissions for off-road equipment and off-site vehicle trips were estimated using the California Emissions Estimator Model version 2016.3.2 (CalEEMod v2016.3.2), with assumptions for construction equipment inventories, equipment horsepower ratings, average daily use amounts, average daily trips, and construction phasing developed by the City for this EIR analysis.

To compare the estimated proposed project construction emissions to the BAAQMD significance thresholds, the emissions must be exhaust only (i.e., no fugitive dust) and in an average daily pounds format. It is assumed that each piece of equipment associated with construction of the project would operate for 1 to 8 hours per day depending on the type of construction activity as well as the duration of the schedule for the associated project component. Average hours per day for each equipment type were estimated by dividing the total work hours for the equipment types, by the total workdays required to construct the given project component. It is assumed that each project component would result in an average of 12 to 16 one-way worker trips per day, and up to 70 one-way heavy truck trips per day depending on the project component type. Total emissions associated with each of the proposed project components were divided by the total number of construction workdays (estimated to be 280 days) to obtain the average daily emissions. A summary of the estimated average daily construction emissions delineated by proposed project component is presented in **Table 3.2-4**. Refer to **Appendix B** for the calculation sheets and the associated CalEEMod output file that were used to estimate the average daily emissions that would be associated with construction of the proposed project.

TABLE 3.2-4
ESTIMATED DAILY AVERAGE CONSTRUCTION EXHAUST EMISSIONS (POUNDS/DAY)

Project Phase/Emissions Source	ROG	NO_x	CO	PM_{10}	$PM_{2.5}$
Demolition/Construction of River Pump Station					
Off-road Equipment	1.74	17.83	10.46	0.64	0.60
On-road Vehicles	0.04	0.03	0.29	0.00	0.00
Subtotal	1.78	17.86	10.74	0.64	0.60
Raw Water Pipeline					
Off-road Equipment	0.12	1.41	0.76	0.05	0.04
On-road Vehicles	0.01	0.07	0.06	0.00	0.00
Subtotal	0.13	1.48	0.82	0.05	0.05
Desalination Facility Construction					
Off-road Equipment	1.56	15.78	8.72	0.56	0.53
On-road Vehicles	0.06	0.05	0.44	0.00	0.00
Subtotal	1.62	15.83	9.16	0.56	0.53
WTP Pipeline Installation					
Off-road Equipment	0.05	0.56	0.30	0.02	0.02
On-road Vehicles	0.00	0.05	0.03	0.00	0.00
Subtotal	0.05	0.62	0.33	0.02	0.02
Brine Discharge Pipeline					
Off-road Equipment	0.47	4.74	2.60	0.16	0.16
On-road Vehicles	0.03	0.08	0.20	0.00	0.00
Subtotal	0.50	4.83	2.81	0.16	0.16
Grand Total	**4.08**	**40.61**	**23.86**	**1.42**	**1.35**
BAAQMD Significance Thresholds	**54**	**54**	**--**	**82**	**54**
Significant Impact?	**No**	**No**	**No**	**No**	**No**

SOURCE: ESA, 2018. See Appendix B.

As shown in **Table 3.2-4**, average daily construction equipment and vehicle exhaust emissions for all of the proposed project components combined would not exceed any of the BAAQMD significance thresholds. Therefore, construction-related exhaust emissions of criteria pollutants and their precursors would not exceed air quality standards or contribute substantially to an existing or projected air quality violation, and the associated impact would be less than significant.

In addition to exhaust emissions, fugitive dust would also be generated by construction activities associated with trenching, earth disturbance, etc. With regard to fugitive dust emissions, the BAAQMD Guidelines focus on implementation of recommended dust control measures rather than a quantitative comparison of estimated emissions to a significance threshold. For all projects, the BAAQMD recommends the implementation of its *Basic Control Mitigation Measures*. Therefore, implementation of the BAAQMD's Basic Control Measures, which are contained in **Mitigation Measure 3.2-1 (BAAQMD Basic Construction Measures)**, would reduce impacts associated with fugitive dust emissions to a less-than-significant level.

Mitigation Measure:

> **Mitigation Measure 3.2-1: BAAQMD Basic Construction Measures.** To limit air pollutant emissions associated with construction, the City of Antioch and/or its construction contractor(s) shall implement and include in all contract specifications for the project the following BAAQMD-recommended Basic Construction Measures:
>
> - All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
> - All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
> - 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.
> - All vehicle speeds on unpaved roads shall be limited to 15 miles per hour (mph).
> - 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.
> - Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
> - All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

- Post a publicly visible sign with the telephone number and persons to contact at the City of Antioch regarding dust complaints. These persons shall respond and take corrective action within 48 hours. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

Significance after Mitigation: With implementation of **Mitigation Measure 3.2-1**, listed above, this impact would be reduced to a **less-than-significant** level per BAAQMD guidance because the BAAQMD's *Basic Control Measures* would be applied.

Impact 3.2-2: Operations of the project would not result in criteria pollutant emissions that could contribute to an existing or projected air quality violation. *(Less than Significant)*

Routine operation of the proposed project would rely on electrical power supplied from Pacific Gas and Electric Company (PG&E)'s existing regional power grid. It is generally not possible to determine the exact generation source(s) of electricity on the power grid that would supply the proposed project, or whether or not the electricity would even be generated within the Air Basin. Therefore, indirect emissions of criteria pollutants associated with electricity use from the regional power grid are not addressed in this air quality analysis because it would be impractical/impossible to do so with any certainty.

The only operational emission sources that would be associated with the project would be daily vehicle trips by seven employees to/from the desalination plant site, and periodic maintenance and delivery vehicle trips to and from the various project component sites. Estimated maximum annual emissions that would be associated with project-related operational vehicle trips are presented below in **Table 3.2-5**. Refer to **Appendix B** for the CalEEMod output sheets that show the assumptions used to estimate operational emissions that would be associated with the proposed project.

TABLE 3.2-5
MAXIMUM ANNUAL PROJECT OPERATIONAL EMISSION ESTIMATES

Emissions Source	Maximum Annual (tons/year)				
	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Vehicle Trips	0.00	0.02	0.06	0.02	0.00
BAAQMD Significance Thresholds	10	10	---	15	10
Significant Impact?	No	No	No	No	No

SOURCE: ESA, 2018. See Appendix B.

As identified in **Table 3.2-5**, operational emissions that would be associated with the project would not exceed any of the significance thresholds; therefore, operational emissions would not be expected to result in or contribute to an exceedance of an ambient air quality standard and the associated impact would be **less than significant**.

Mitigation Measure:

None required.

Impact 3.2-3: Construction of the project would result in emissions that could conflict with the 2017 Clean Air Plan. (*Less than Significant with Mitigation)*

The Air Basin is currently designated as a nonattainment area for state and federal ozone standards, state particulate matter (both PM_{10} and $PM_{2.5}$) standards, and the federal $PM_{2.5}$ (24-hour) standard. The BAAQMD's 2017 Clean Air Plan – Spare the Air, Cool the Climate (2017 CAP) is the applicable air quality plan that has been prepared to address ozone and particulate matter nonattainment as well and other issues, such as TAC and GHG emissions (BAAQMD, 2017c). The 2017 Clean Air Plan updates the BAAQMD's 2010 Clean Air Plan to comply with State air quality planning requirements.

The BAAQMD CEQA Guidelines recommends that a project's consistency with the current air quality plan should be evaluated using the following three criteria: does the project (in this case, the Brackish Water Desalination Project) support the goals of the air quality plan; does the project include applicable control measures from the air quality plan; and would the project not disrupt or hinder implementation of any control measures from the air quality plan? If it can be concluded with substantial evidence that the answers to the three criteria are in the affirmative, then the BAAQMD considers the project to be consistent with air quality plans prepared for the Air Basin.

The primary goals of the 2017 Clean Air Plan are to attain air quality standards, reduce population exposure, protect public health in the Air Basin, and reduce GHG emissions and protect the climate. The BAAQMD-recommended gauge for determining if a project supports the goals in the current clean air plan is consistency with BAAQMD thresholds of significance. If the project would generate emissions that would not exceed the thresholds of significance, the project would be consistent with the goals of the 2017 CAP. As indicated in the discussion under Impact 3.2-1, the proposed project would not result in pollutant emissions during construction that would exceed the BAAQMD significance thresholds. In addition, implementation of **Mitigation Measure 3.2-1 (BAAQMD Basic Construction Measures)** would ensure that dust-related construction emission impacts would be mitigated to a less-than-significant level. As indicated in the discussion under Impact 3.2-2, the proposed project would result in pollutant emissions during operations that would be less than the BAAQMD significance thresholds. Therefore, the proposed project would be considered to support the primary goals of the 2017 CAP.

The 2017 CAP contains 85 control measures aimed at reducing air pollution in the Air Basin. Projects that incorporate all feasible air quality plan control measures are considered consistent with the 2017 CAP. The 2017 CAP contains two measures specific to water. The measures are referred to as Water Control Measures WR1, *Limit Greenhouse Gases (GHGs) from Publically Owned Treatment Works*, and WR2, *Support Water Conservation*. The intent of these control measures is to reduce criteria pollutants, TACs, and GHGs by encouraging water conservation, limiting GHG emissions from water treatment plants, and promoting the use of biogas recovery systems. The City of Antioch's Municipal Climate Action Plan (MCAP) outlines the policies and measures in energy efficiency and renewable energy, transportation, water, and solid waste management sectors that the City may implement and/or is already implementing to achieve its ultimate target goal of an 80 percent GHG emissions reduction by 2050. Based on a survey and report of the City's water distribution system that made recommendations on pumps that could be upgraded, the MCAP identifies a water and wastewater measure that includes upgrades designed to improve energy efficiency in water treatment and distribution. The proposed upgrades and installation of low maintenance landscaping were estimated to result in a five percent reduction in water and wastewater energy consumption compared emissions generated in 2005, which would equate to an emissions reduction of 165 metric tons CO_2e per year (City of Antioch, 2011).

In September 2016, the City approved its 2010 GHG emissions inventory for 2015. The inventory suggests that the City has reduced its municipal GHG emissions related to water and wastewater operations by approximately 1,385 metric tons per year from 2005 to 2015 (City of Antioch, 2016), which far exceeds the reduction goal of the MCAP water and wastewater measure. Although the proposed project would result in a modest increase in GHG emissions compared to existing conditions (see the Impact 3.8-1 discussion in GHG Emissions Section 3.8.3, *Analysis, Impacts, and Mitigation*), the City's MCAP water and wastewater goals would continue to be met while improving water supply reliability and water quality during droughts and due to future changes in Delta water management. Therefore, no inconsistency with the 2017 CAP has been identified. The proposed project would not hinder implementation of any of the 2017 CAP control measures.

In summary, the proposed project would not be considered to conflict with the 2017 CAP with implementation of mitigation. This impact would be mitigated to a less-than-significant level through implementation of Mitigation Measure 3.2-1.

<u>Mitigation Measure:</u>

Mitigation Measure 3.2-1: BAAQMD Basic Construction Measures
(see Impact 3.2-1)

Significance after Mitigation: Implementation of **Mitigation Measure 3.2-1** would reduce construction-related impacts to a **less-than-significant** level.

Impact 3.2-4: Construction of the project could expose sensitive receptors to toxic air contaminants, including diesel particulate matter emissions. ***(Less than Significant with Mitigation)***

Construction activities associated with the project would result in the short-term generation of DPM emissions from the use of off-road diesel equipment, and from construction material deliveries and debris/spoils removal using on-road heavy-duty trucks. As discussed previously, DPM is a complex mixture of chemicals and particulate matter that has been identified by the State of California as a TAC with potential cancer and chronic non-cancer effects. The dose to which receptors are exposed is the primary factor affecting health risk from TACs. Dose is a function of the concentration of a substance (or substances) in the environment and the duration of exposure to the substance. According to the Office of Environmental Health Hazard Assessment (OEHHA), health risk assessments (HRAs), which determine the lifetime exposure of sensitive receptors to TAC emissions, should be based on a 30-year exposure period when assessing TACs (such as DPM) that have only cancer or chronic non-cancer health effects. However, for short term activities such as construction, such HRAs should be limited to the duration of the emission-producing activities associated with the project, unless the activities occur for less than 6 months. Activities that would last more than 2 months, but less than 6 months, are recommended to be evaluated as if they would last for 6 months. OEHHA does not recommend conducting health risk assessments for projects that would last less than 2 months (OEHHA, 2015).

Construction activities associated with the project components would take place over periods that would range from 2 to 14 months. The BAAQMD has identified a distance of 1,000 feet from the source to the closest sensitive receptor locations within which community health risk thresholds would be applicable to gauge the significance of health risk-related impacts. The BAAQMD and OEHHA consider projects that are estimated to result in a cancer risk of 10 in one million or a chronic or acute hazard index of 1.0 to be a significant health risk, and the BAAQMD has an additional health risk significance threshold of 0.3 μ/m^3 for ambient $PM_{2.5}$ concentration increases (BAAQMD, 2017a). Depending on the distance separating construction activities from the nearest sensitive receptors and the concentration of DPM and $PM_{2.5}$ emissions generated during construction of the project components, health risk impacts on sensitive receptors could be significant.

Construction of the project components would occur in the vicinity (i.e., within 1,000 feet) of sensitive receptors for durations ranging from several days to more than a year. Pipeline construction activities would proceed linearly at rates that would average from 100 to 200 feet per day, which would limit the duration of exposure for any given receptor to less than 2 months. Therefore, applying OEHHA guidance, project pipeline construction activities would not exceed the BAAQMD's TAC significance thresholds (i.e., they would not result in a hazard index greater than 1 for acute or chronic impacts and/or cancer risk greater than 10 incidents per 1,000,000 population) and would result in less-than-significant impacts related to exposure of sensitive receptors to DPM or $PM_{2.5}$. The construction activities within 1,000 feet of sensitive receptors that would pose the highest health risks would be at the proposed desalination facility construction site (located approximately 30 feet to the closest residence) and the river pump station construction site (located approximately 50 feet to the closest residence). A HRA for construction activities at the proposed desalination facility and river pump station construction sites was conducted using OEHHA's dose-response methodology to estimate the numeric health risk impact associated with inhaled TACs. Refer to **Appendix B** for the HRA, which includes a detailed description of the methodology used to evaluate the health risks from on-site construction activities.

As discussed in the Impact 3.2-1 discussion, project construction emissions were estimated using the CalEEMod model (version 2016.3.2). The emissions estimates represent the average daily emissions from each phase that would be expected from construction of the proposed project using average daily heavy-duty construction equipment activity levels. For the river pump station, total onsite DPM and $PM_{2.5}$ emissions are estimated to be 178.4 pounds and 168.4 pounds, respectively. For the desalination facility, total estimated onsite DPM and $PM_{2.5}$ emissions are 155.4 pounds and 147.0, respectively. These emissions were then converted to maximum emissions concentrations, which were used to estimate health risks. Risk characterization combines the maximum annual average ground-level DPM concentration from the exposure assessment and the cancer potency factor and the chronic reference exposure level (REL) to estimate the potential inhalation cancer risk from exposure to project DPM emissions. The lifetime exposure under OEHHA guidelines takes into account early life (infant and children) exposure.

Table 3.2-6 identifies the maximum increase in carcinogenic risk for sensitive receptors in the vicinity of the proposed river pump station and desalination facility construction sites. The calculated cancer risk assumes sensitive receptors (residential uses and school) do not have mechanical filtration and exposure would occur with windows open. For carcinogenic exposures, the maximum cancer risk from DPM emissions to a residential receptor is estimated to be approximately 101.2 per one million for the river pump station and 87.0 per one million for the desalination facility. The maximum annual average $PM_{2.5}$ concentrations at the nearby residential receptors are estimated to be approximately 0.9 μ/m^3 associated with construction of the river pump station and 0.7 μ/m^3 associated with construction of the desalination facility. As shown in **Table 3.2-6**, these estimated risk and concentration levels exceed the significance thresholds, and represent a **significant impact** relative to exposure of sensitive receptors to substantial pollutant concentrations. The health risks to the nearest school receptor and non-cancer health risks to all receptors would not exceed the applicable significance thresholds, and would therefore represent a less-than-significant impact.

TABLE 3.2-6
HEALTH RISK AND $PM_{2.5}$ CONCENTRATIONS FROM PROJECT CONSTRUCTION EMISSIONS

Receptor Type	Maximum Cancer Risk (# in one million)	Maximum Non-Cancer Risk (Chronic Hazard Index)	Maximum Annual Average PM2.5 Concentration (μ/m^3)
River Pump Station			
Residential Receptor	101.2	0.19	0.91
BAAQMD Threshold	10	1	0.3
Exceeds Threshold?	Yes	No	Yes
Desalination Facility			
Residential Receptor	87.0	0.14	0.66
School Receptor	0.8	0.01	0.05
BAAQMD Threshold	10	1	0.3
Exceeds Threshold?			
Residential Receptor	Yes	No	Yes
School Receptor	No	No	No

SOURCE: ESA, 2018. See Appendix B.

However, implementation of **Mitigation Measure 3.2-4 (Construction Emissions Minimization)**, which would require all diesel-powered construction equipment at the river pump station and desalination plant sites to be equipped with engines that meet Tier 4 emissions standards, would decrease the maximum incremental carcinogenic risk in the vicinity of the river pump station and desalination plant sites to 8.7 in one million and 8.0 in one million, respectively. In addition, the $PM_{2.5}$ concentrations in the vicinity of the river pump station and desalination plant sites would be reduced to less than 0.1 μ/m^3. The impact to sensitive receptors in the vicinity of river pump station and desalination plant sites would be mitigated to a less than significant level.

<u>Mitigation Measure:</u>

> **Mitigation Measure 3.2-4: Construction Emissions Minimization.** The City of Antioch (and/or its construction contractor(s)) shall ensure that all diesel-powered equipment to be operated during construction activities at the river pump station and desalination facility sites meet USEPA-certified Tier 4 standards, the highest USEPA-certified tiered emission standards. An Exhaust Emissions Equipment inventory shall be prepared prior to the commencement of construction and maintained throughout construction that identifies each off-road unit's certified tier specification status to be operated at the river pump station and desalination facility sites.
>
> **Significance after Mitigation:** With implementation of **Mitigation Measure 3.2-4**, listed above, impacts related to health risk would be reduced to a **less-than-significant** level.

Impact 3.2-5: Operation of the project would not expose sensitive receptors to toxic air contaminants, including diesel particulate matter emissions. *(Less than Significant)*

The only DPM emissions sources that would be associated with operations of the proposed project would be associated with periodic off-site truck trips to the project facilities. Given the negligible amount of emissions exposure to sensitive receptors in the vicinity of the project facility sites, the increased health risk from long-term DPM emissions would be negligible and this impact would be **less than significant**.

<u>Mitigation Measure:</u>

None required.

Impact 3.2-6: Construction of the project would not create odors. *(Less than Significant)*

Project construction would require the use of diesel-fueled equipment that would result in exhaust emissions that could be perceived as having an objectionable odor. Since the construction activities would be temporary and spatially dispersed, exhaust emission odors would be diluted and would not affect a substantial number of people. Therefore, impacts from odors generated by construction of the project would be **less than significant**.

<u>Mitigation Measure:</u>

None required.

Cumulative Impacts

The geographic context for the analysis of air quality impacts varies by threshold. The cumulative context for each threshold is presented in the impact discussions below.

Impact 3.2-C-1: Construction of the proposed project, in combination with other cumulative development, could result in criteria pollutant emissions that would exceed air quality standards or contribute substantially to an existing or projected air quality violation. ***(Less than Significant with Mitigation)***

In developing thresholds of significance for air pollutants relative to whether emissions could exceed air quality standards or contribute substantially to an existing or projected air quality violation, BAAQMD considered the emission levels at which a project's individual emissions would be cumulatively considerable. Therefore, if a project would result in an increase in ROG, NO_x, PM_{10}, or $PM_{2.5}$ of more than its respective average daily emissions significance thresholds, then it would also contribute considerably to a significant cumulative impact. If a project would not exceed the significance thresholds, its emissions would not be cumulatively considerable. As presented in the Impact 3.2-1 discussion, short-term construction exhaust emissions would not exceed the applicable significance thresholds and implementation of **Mitigation Measure 3.2-1** would ensure that impacts would be reduced to a less-than-significant level. In summary, construction of the project would not be cumulatively considerable and the cumulative impacts would be mitigated to a **less-than-significant** level.

Impact 3.2-C-2: Operation of the proposed project, in combination with other cumulative development, would not result in criteria pollutant emissions that would exceed air quality standards or contribute substantially to an existing or projected air quality violation. ***(Less than Significant)***

As described under Impact 3.2-C-1, if a project would result in an increase in ROG, NO_x, PM_{10}, or $PM_{2.5}$ of more than its respective emissions significance thresholds, then it would also contribute considerably to a significant cumulative impact. If a project would not exceed the significance thresholds, its emissions would not be cumulatively considerable. As shown in **Table 3.2-5**, operational emissions that would be associated with the project would be substantially less than the BAAQMD's significance thresholds and therefore would not be cumulatively considerable relative to the impact of exceeding air quality standards or contributing substantially to an existing or projected air quality violation. The operational cumulative impact would be **less than significant**.

Impact 3.2-C-3: Construction of the proposed project, in combination with other cumulative development, could expose sensitive receptors to toxic air contaminants, including diesel particulate matter emissions. (*Less than Significant with Mitigation*)

The geographic context for the analysis of sensitive receptor exposure to TACs are cumulative projects within 1,000 feet of project components. Cumulative project number 2 (Water Treatment Disinfection Improvements Project) shown in Figure 3-1, would be located within the existing WTP fenceline, less than 1,000 feet from the desalination plant site. As described in **Table 3.2-6**, the maximum cancer risk and $PM_{2.5}$ concentrations to a residential receptor that would be associated with construction of the proposed desalination facility is estimated to be approximately 87.0 per one million and 0.7 μ/m^3, respectively. Although construction of the Disinfection Improvements Project is expected to be completed prior to the construction of the proposed project, its construction emissions and the emissions of the proposed project could result in a **significant cumulative impact**. However, implementation of **Mitigation Measure 3.2-4**, which would require all diesel-powered construction equipment at the proposed desalination facility site to be equipped with engines that meet Tier 4 emissions standards, would reduce the maximum cancer risk and $PM_{2.5}$ concentrations to approximately 8.0 per one million and 0.1 μ/m^3, respectively, and would ensure that the contribution of the desalination plant construction to the cumulative impact would not be cumulatively considerable. Therefore, the cumulative impact would be mitigated to a less-than-significant level.

There are no cumulative projects within 1,000 feet of the proposed river pump station site; therefore, emissions from the cumulative projects would be unlikely to combine with those that would be associated with construction of the proposed river pump station, and the proposed project would not be cumulatively considerable. The cumulative impact would be **less than significant**.

Impact 3.2-C-4: Operation of the proposed project, in combination with other cumulative development, would not expose sensitive receptors to toxic air contaminants, including diesel particulate matter emissions. (*Less than Significant*)

As described in Impact 3.2-C-4, the Water Treatment Disinfection Improvements Project would be located within 1,000 feet of the proposed desalination plant site; however, the only DPM emissions sources that would be associated with operations of the proposed project would be periodic off-site truck trips to the project facilities. Given the negligible amount of emissions exposure to sensitive receptors in the vicinity of the project facility sites, the increased health risk from long-term DPM emissions would not be cumulatively considerable and the cumulative impact would be **less than significant**.

Impact 3.2-C-5: Construction of the proposed project, in combination with other cumulative development, would not expose people to odors. (*Less than Significant*)

The geographic context for the analysis of sensitive receptor exposure to odors are cumulative projects immediately adjacent to proposed project components. Project construction would require the use of diesel-fueled equipment that would result in exhaust emissions that, if combined with odors from other cumulative projects, could be perceived as having an objectionable odor. However, because the construction activities would be temporary and spatially dispersed, exhaust emission odors would be diluted and would not affect a substantial number of people. Therefore, the odor impact of the project would not be cumulatively considerable and impacts would be **less than significant**.

References - Air Quality

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3.3 Aquatic Biological Resources

This section includes a summary description of the conditions of the Delta waterways in the project area that pertain to fish species and their aquatic habitats, and brief summaries of key or important fish species that are known to exist in the Delta for at least a portion of their life cycle and the various factors affecting those fish species. This section also discusses the regulatory setting, including federal, State, and local regulations. Potential impacts resulting from the project are also described and mitigation measures are presented for those impacts that were determined to be potentially significant or significant. The analysis included in this section was developed based on project-specific construction and operational features. Terrestrial biological resources are described and analyzed separately in Section 3.4*, Terrestrial Biological Resources.* Hydrology and water quality are also described and analyzed separately in Section 3.10*, Local Hydrology and Water Quality,* and Section 3.11, *Delta Hydrology and Water Quality.*

Several comments were received in response to the NOP addressing aquatic biological resources. Specifically, these comments requested the EIR address impacts of pumping water out of the Delta and releasing brine waste discharge on aquatic species and their habitat. See **Appendix A** for NOP comment letters.

3.3.1 Environmental Setting

This section briefly describes aquatic habitats and fish use patterns in the Delta adjacent to proposed project. The section also discusses the potential for occurrence of special-status species, with a focus on timing and distribution patterns of the most vulnerable species and/or life stages. The information is based on a review of long-term California Department of Fish and Wildlife (CDFW) fish monitoring data and literature reviews.

Delta Setting

The Delta is a large network of tidally influenced channels located at the confluence of the Sacramento and San Joaquin rivers. The Delta provides shallow open-water and emergent marsh habitat for a variety of resident and migratory fish and macroinvertebrates. The primarily open-water habitat within the Delta is relatively shallow (typically less than 20 feet deep) and has a relatively uniform channel bottom composed of silt, sand, peat, and decomposing organic matter. Tules (*Scirpus* spp.) and other emergent and submerged aquatic vegetation occur both within the open-water areas and along the shoreline margins of sloughs and channels, providing habitat for fish migration, spawning, juvenile rearing, and adult holding and foraging.

The Delta's environmental conditions depend primarily on the physical structure of Delta levees and channels, inflow volume and source, Delta exports and diversions, and tides. The Central Valley Project (CVP) and State Water Project (SWP) affect Delta conditions primarily by controlling upstream storage and diversions, reservoir releases, Delta water conveyance pathways, and Delta exports and diversions. These factors also largely determine Delta outflow and the location of the entrapment zone, an area of high organic carbon that is critically important to numerous fish and invertebrate species and to the overall ecology of the Delta.

In addition to these physical factors, environmental conditions contribute to interactive, cumulative conditions that substantially affect Delta fish populations. Water temperature, predation (primarily by introduced fish species), food production and availability, competition with introduced exotic fish and invertebrate species, reduced habitat complexity, and pollutant concentrations are all important contributors to cumulative conditions.

The Delta serves as a migration corridor for all anadromous fish species in the Central Valley as they return to their natal rivers to spawn, and during juvenile outmigration downstream to the ocean. Adult Chinook Salmon (*Oncorhynchus tshawytscha*) move through the Delta during most months of the year (Moyle 2002). Chinook Salmon and Steelhead (*O. mykiss*) juveniles depend on the Delta as transient rearing habitat while they migrate through the system to the ocean; these juveniles could remain for several months, feeding in marshes, tidal flats, and sloughs. Numerous resident species live in the Delta year-round, such as Delta Smelt (*Hypomesus transpacificus*), Longfin Smelt (*Spirinchus thaleichthys*), Green Sturgeon (*Acipenser medirostris*), Sacramento Splittail (*Pogonichthys macrolepidotus*), and introduced Threadfin Shad (*Dorosoma petenense*) (Moyle 2002).

Levee construction and reclamation of wetland areas within the Delta for agriculture and other purposes has significantly modified much of the Delta, reducing the areal extent of wetlands and increasing the channelization of tributary rivers and Delta islands. Changes in hydrologic conditions resulting from the construction of upstream water storage impoundments and operations for flood control and water supply, in combination with increased levels of water diversions both upstream and within the Delta, contributed to reduced habitat quality and availability for juvenile salmonid and Green Sturgeon rearing within the Delta. In addition, the introduction of a number of nonnative fish (e.g., Striped Bass [*Morone saxatilis*], Largemouth Bass [*Micropterus salmoides*]) has increased predation mortality for juvenile salmon rearing and migrating through the Delta.

Since about 2002, four pelagic (occupying the open water) fish species have been subject to an area of study called Pelagic Organism Decline (POD) (Sommer et al. 2007). The POD refers to the sudden, overlapping declines of pelagic fishes in the Delta that were first recognized in data collected between 2002 and 2004. The species identified in the POD consist of Delta Smelt, Longfin Smelt, Threadfin Shad, and young-of-year Striped Bass. Together, these species account for most of the resident pelagic fish biomass in the tidal water upstream from X2, the position (isohaline) at which 2 parts per thousand (ppt) salinity occurs in the Delta.

The causes of the POD and earlier declines are not fully understood, but studies are under way to evaluate potential causes. Among these potential causes are the stock-recruitment relationship (i.e., previous abundance), a decrease in habitat carrying capacity or production potential, predation and entrainment, and a decline (or changes) in primary productivity (Bennett 2005; Feyrer et al. 2007). In 2011, both Delta Smelt and Longfin Smelt populations increased, with Delta Smelt populations at their highest since 2001 and Longfin Smelt at their highest since 2006. However, these increases are still a fraction of historic abundances, and numbers significantly declined again in 2012, 2013, 2014, 2015, 2016, and 2017 (CDFW 2017 [unpublished data]).

Fish Species in Project Vicinity

The west Delta, in the vicinity of the City's Diversion Intake, provides vital fish spawning, rearing, and/or migratory habitat for a diverse assemblage of native and nonnative species. Key life stages and needs of the species of primary management concern with the greatest potential to be affected by the proposed program are discussed below. These species collectively represent a diversity of life histories and environmental/habitat requirements, and they are among the most sensitive to environmental perturbation; therefore, findings from assessments of these species can be effectively used to make inferences about other fish species in the project area.

Special-Status Fish Species

Special-status fish species are legally protected or are otherwise considered sensitive by federal, state, or local resource conservation agencies and organizations. Special-status fish species addressed in this section include:

- species listed as threatened or endangered under the Federal Endangered Species Act (FESA) or California Endangered Species Act (CESA);
- species identified by U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), or CDFW as species of special concern;
- species fully protected in California under the California Fish and Game Code; and
- species protected under the Magnuson-Stevens Fishery Conservation and Management Act.

Fish species identified for protection under the CESA and/or FESA that are known to occur in the west Delta (vicinity of the proposed project) and may potentially be affected by the construction and operation of the project, include the southern distinct population segment (DPS) of the North American Green Sturgeon, Delta Smelt, Longfin Smelt, Sacramento River Winter-Run Chinook

Salmon evolutionarily significant unit (ESU), Central Valley Spring-Run Chinook Salmon ESU, and Central Valley Steelhead DPS. The USFWS and NMFS have designated all or part of the Delta as critical habitat for Delta Smelt, Central Valley Steelhead, and Sacramento River Winter-Run, Central Valley Spring-Run Chinook Salmon, and Green Sturgeon.

Additionally, the Pacific Fishery Management Council (PFMC) has designated the Delta, San Francisco Bay, and Suisun Bay as Essential Fish Habitat (EFH) to protect and enhance habitat for coastal marine fish and macroinvertebrate species that support commercial fisheries such as Pacific salmon. The amended Magnuson-Stevens Fishery Conservation and Management Act, also known as the Sustainable Fisheries Act (Public Law 104-297), requires that all federal agencies consult with the Secretary of Commerce (through NMFS) on activities or proposed activities authorized, funded, or undertaken by that agency that may adversely affect EFH of commercially managed marine and anadromous fish species.

Three fishery management plans cover species that occur in the project area and designate EFH within the entire Delta estuary:

- Pacific Groundfish Fishery Management Plan: Starry Flounder (*Platichthys stellatus*),
- Coastal Pelagic Fishery Management Plan: Northern Anchovy (*Engraulis mordax*) and Pacific Sardine (*Sardinops sagax caerulea*), and
- Pacific Salmon Fishery Management Plan: Chinook Salmon.

Table 3.3-1 lists the special-status fish species that may potentially be affected by the proposed project.

TABLE 3.3-1
SPECIAL-STATUS SPECIES AND OCCURRENCE IN THE PROJECT AREA

Species	Status	Distribution
Central Valley Fall-/Late Fall-Run Chinook Salmon	SSC, SC, EFH	Sacramento and San Joaquin rivers and their major tributaries, Delta, Suisun Bay; Suisun and Napa marshes, San Francisco Bay, Pacific Ocean
Central Valley Spring-Run Chinook Salmon	ST, FT, EFH	Sacramento and Feather river and their major tributaries; Delta, Suisun Bay; Suisun and Napa marshes, San Francisco Bay, Pacific Ocean
Sacramento River Winter-Run Chinook Salmon	SE, FE, EFH	Sacramento River; Delta, Suisun Bay; Suisun and Napa marshes, San Francisco Bay, Pacific Ocean
Central Valley Steelhead	FT	Sacramento and San Joaquin rivers and their major tributaries, Delta, Suisun Bay; Suisun and Napa marshes, San Francisco Bay, Pacific Ocean
North American Green Sturgeon	FT	Sacramento River and major tributaries; Delta, San Francisco Bay, Pacific Ocean
Delta Smelt	SE, FT	Delta, San Francisco Bay, Pacific Ocean
Longfin Smelt	ST	Delta, Suisun Bay; San Francisco Bay
Northern Anchovy	EFH	Delta, San Francisco Bay, Pacific Ocean
Pacific Sardine	EFH	Delta, San Francisco Bay, Pacific Ocean
Starry Flounder	EFH	Delta, San Francisco Bay, Pacific Ocean

KEY:
SSC = State species of special concern
ST = State threatened species
SE = State endangered species
SC = Federal species of concern
FT = Federal threatened species
FE = Federal endangered species
EFH = Essential Fish Habitat

Fish Species and Life Stages of Primary Management Concern

Evaluating the potential for degradation of aquatic habitat associated with brine waste discharge and/or entrainment of fish species into diversion intakes requires an understanding of fish species' life histories and life stage-specific habitat preferences and vulnerabilities. For example, it is assumed that fish that prefer habitat areas near the location of an intake would have an increased vulnerability to entrainment. Likewise, because the earliest life stages of fish are smaller and have reduced swimming capabilities, they would also have increased vulnerabilities to entrainment if present near the location of an intake. Conversely, adult fish that use habitat areas away from where an intake is located would be considered to have a reduced vulnerability to entrainment. Therefore, this information is provided below for fish species of primary management concern that occur within the west Delta in the vicinity of the project study area. Species of primary management concern include special-status species likely to occur in the potentially affected portions of the Delta (i.e., Chinook Salmon, Steelhead, Green Sturgeon, Delta and Longfin Smelt, Northern Anchovy, Pacific Sardine, and Starry Flounder). Species of primary management concern are discussed below. The seasonal timing of life stages for these species in the study area is presented in **Table 3.3-2** below.

Chinook Salmon

Chinook Salmon are an anadromous species, spawning in freshwater and spending a portion of their life cycle within the Pacific Ocean. The species is divided into the following four runs according to spawning migration timing and reproductive behavioral differences in the Central Valley: winter-run, spring-run, fall-run, and late fall-run. Chinook Salmon generally require cool, clean, and well-oxygenated water in streams and rivers that contain adequately sized spawning gravels, instream cover, and riparian shading. Migration barriers in the form of dams, grade control structures, culverts, or water diversion structures significantly limit Chinook Salmon access to historical habitat throughout their range. Chinook Salmon do not spawn within the Delta. However, this species seasonally uses the Delta during adult upstream migration, smolt emigration, and juvenile rearing (Moyle, 2002). The Delta historically served as an important rearing habitat for juvenile Chinook Salmon. Loss of tidal wetlands in combination with changes in hydrologic conditions resulting from the construction of upstream water storage impoundments and operations for flood control, and increased levels of water diversions both upstream and within the Delta contributed to reduced habitat quality and availability for juvenile salmon rearing within the Delta. In addition, the introduction of a number of nonnative fish (e.g., Striped Bass, Largemouth Bass, etc.) increased predation mortality for juvenile salmon rearing and migrating through the Delta.

Sacramento River Winter-Run Chinook Salmon

Winter-run Chinook Salmon spend one to three years in the ocean before migrating upstream into the Sacramento River to spawn upstream of Red Bluff. Adult winter-run Chinook Salmon migrate upstream through San Francisco Bay, Suisun Bay, and the Delta during winter and early spring, with peak migration occurring during March (Moyle, 2002). Spawning occurs from mid-April through August (Moyle, 2002). Egg incubation continues through the fall. Juvenile winter-run

TABLE 3.3-2
LIFE STAGE TIMING FOR KEY FISH SPECIES IN THE PROJECT AREA

Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fall-Run Chinook Salmon												
Adult migration						■	■	■	■	■	■	■
Emigration	■	■	■	■	■	■						
Late Fall-Run Chinook Salmon												
Adult migration	■	■	■	■						■	■	■
Emigration				■	■	■	■	■	■	■	■	■
Winter-Run Chinook Salmon												
Adult migration	■	■	■	■	■	■						■
Emigration	■	■	■	■	■			■	■	■	■	■
Spring-Run Chinook Salmon												
Adult migration			■	■	■	■	■	■				
Emigration	■	■	■							■	■	■
Steelhead												
Adult migration	■	■	■				■	■	■	■	■	■
Emigration	■	■	■	■	■	■				■	■	■
Green Sturgeon												
Adult migration		■	■	■	■	■	■	■				
Rearing/emigration	■	■	■	■	■	■	■	■	■	■	■	■
Delta Smelt												
Adult migration	■	■	■									■
Spawning	■	■	■	■	■	■	■					
Larvae/juvenile rearing	■	■	■	■	■	■	■					
Estuarine rearing	■	■	■	■	■	■	■	■	■	■	■	■
Longfin Smelt												
Adult migration	■	■	■									■
Spawning	■	■	■	■	■	■	■					
Larvae/juvenile rearing	■	■	■	■	■	■	■					
Estuarine rearing	■	■	■	■	■	■	■	■	■	■	■	■

Key: ■ period of potential occurrence

SOURCES: Vogel and Marine 1991; Moyle 2002; Wang 1986.

Chinook Salmon rear within the Sacramento River throughout the year, and smolts migrate downstream through the lower reaches of the Sacramento River, Delta, Suisun Bay, and San Francisco Bay during winter and early spring (November through May) (USFWS, 2001). The Sacramento River mainstem is the primary upstream and downstream migration corridor for winter-run Chinook Salmon. Winter-run Chinook Salmon are not present in the San Joaquin River drainage.

The migration timing of juvenile winter-run Chinook Salmon varies within and among years in response to a variety of factors, including increases in river flow and turbidity resulting from winter storms.

Central Valley Spring-Run Chinook Salmon

Spring-run salmon migrate upstream in the Sacramento River from March through October. Over the summer months, adults hold in deep cold pools within the rivers and tributaries prior to spawning, which occurs from September to October. Fry emerge from spawning areas during the late fall and winter. A portion of the fry migrate downstream soon after emerging and rear in downstream river channels, and potentially in the Delta estuary, during winter and spring months. The remainder of the fry reside in creeks and upstream tributaries and rear for approximately one year. The juvenile spring-run Chinook Salmon that remain in the creeks migrate downstream as one-year-old smolts, primarily during the late fall, winter, and early spring, with peak migration occurring in November (Hill and Weber, 1999).

The downstream migration of both spring-run Chinook Salmon fry and smolts during the late fall and winter typically coincides with increased flow and water turbidity during winter stormwater runoff. Construction of major dams and reservoirs on the Sacramento and San Joaquin River systems eliminated access to the upper reaches for spawning and juvenile rearing and completely eliminated the spring-run salmon population from the San Joaquin River system; however, spring-run Chinook Salmon are being reintroduced into the San Joaquin River as part of the San Joaquin River Restoration Program.

Juvenile spring-run Chinook Salmon may migrate into the Delta during their downstream migration and also use the Delta as a foraging area and migration pathway during the winter and early spring migration period. The occurrence of juvenile spring-run Chinook Salmon in the Delta would be expected during late fall through early spring, when water temperatures would be suitable for juvenile spring-run Chinook Salmon migration.

Central Valley Fall-Run and Late Fall-Run Chinook Salmon

Adult fall-run Chinook Salmon migrate upstream from July through December and spawn in October and November (Moyle, 2002), with the greatest spawning activity typically occurring in November and early December. The success of fall-run Chinook Salmon spawning is dependent, in part, on seasonal water temperatures. After incubating and hatching, the young salmon emerge from the spawning areas as fry. A portion of the fry population migrates downstream soon after emergence, rearing in the downstream river channels and the Delta estuary during the spring months. The remaining portion of juvenile salmon continues to rear in the upstream systems through the spring months until they have adapted to migration into salt water (smolting), which typically takes place between April and early June. In some streams, a small proportion of the fall-run Chinook Salmon juveniles may rear through the summer and fall months, migrating downstream during the fall, winter, or early spring as one-year-old smolts.

The occurrence of adult fall-run Chinook Salmon within Delta would be limited to the fall period (primarily October through December) of adult upstream migration. Juvenile Chinook Salmon, particularly in the fry stage, may rear within the Delta and Suisun Bay, foraging along channel and shoreline margins and lower velocity backwater habitats. Juvenile fall-run Chinook Salmon would be expected to occur within the Delta during late winter (fry) through early spring (smolts), when water temperatures within the Delta would be suitable for juvenile Chinook Salmon migration.

Late-fall-run Chinook Salmon adults migrate upstream through the Delta from November through May, and spawn from January through April. Juvenile fall-run and late-fall-run Chinook Salmon migrate downstream through the Delta during the late winter and spring migration period.

Factors Affecting Chinook Salmon

The environmental and biological factors that affect the abundance, mortality, and population dynamics of Chinook Salmon within the Bay-Delta and Central Valley include, but are not limited to, the following:

- Loss of access to historical spawning and juvenile rearing habitat within the upper reaches of the Central Valley rivers caused by major dams and reservoirs that act as migration barriers
- River water temperatures that affect incubating eggs, holding adults, and growth and survival of juvenile salmon
- Entrainment of juveniles (i.e., the pulling of fish along with current into water diversion facilities) at a large number of unscreened water diversions along the Sacramento and San Joaquin Rivers and in the Delta
- Salvage mortality (defined as the fraction of fish that do not survive fish salvage) at the SWP and CVP export facilities
- Changes in habitat quality, including availability for spawning and juvenile rearing
- Exposure to contaminants
- Predation by native and non-native fish species and other predators, including marine mammals
- Competition and interactions with hatchery-produced Chinook Salmon and Steelhead
- Recreational and commercial fishing of subadult and adult Chinook Salmon
- Climatic and oceanographic conditions

Regulatory Listing Status

The listing status of Chinook Salmon varies among runs. Winter-run Chinook Salmon are listed as an endangered species under both CESA and FESA; spring-run Chinook Salmon are listed as a threatened species under both CESA and FESA; and fall-run and late-fall-run are not listed, although both fall-run and late-fall-run Chinook Salmon are California species of special concern and federal species of concern. Critical habitat has been designated for winter- and spring-run Chinook Salmon. Fall-run and late-fall-run are included in this environmental analysis because they support important commercial and recreational fisheries and the proposed project would be located within the area of the Delta identified as EFH for Pacific salmon.

Central Valley Steelhead

Steelhead are the anadromous form of rainbow trout (*O. mykiss*): adults spawn in fresh water and the juveniles migrate to the Pacific Ocean, where they reside for several years before returning to the river system. Rainbow trout that spend their entire life in fresh water and do not migrate to the ocean are known as resident rainbow trout.

Adult Steelhead typically migrate through the Delta to upstream spawning areas during the fall and winter months. A portion of the adult Steelhead survive spawning and migrate back downstream to spawn in subsequent years. Steelhead spawn in areas characterized by clean gravels, cold water temperatures, and moderately high water velocities. Spawning typically occurs during the winter and spring (December through April), with the majority of spawning activity occurring between January and March.

Young Steelhead typically rear in fresh water for one to three years before migrating to the ocean. Downstream migration of Steelhead smolts typically occurs during the late winter and early spring (January through May). Although the occurrence of juvenile Steelhead observed in SWP and CVP fish salvage operations may vary in response to changes in export rates, the general seasonal distribution of Steelhead in the fish salvage operations is consistent with observations on the seasonal migration of juvenile Steelhead observed in other fishery monitoring programs conducted within the Delta (e.g., USFWS beach seine surveys, Chipps Island trawling, etc.). The seasonal timing of downstream migration of Steelhead smolts can vary in response to a variety of environmental and physiological factors, including changes in water temperature, stream flow, and increased water turbidity resulting from stormwater runoff.

Steelhead distribution is currently restricted to the mainstem Sacramento River downstream of Keswick Dam, the Feather River downstream of Oroville Dam, the American River downstream of Nimbus Dam, the Mokelumne River downstream of Comanche Dam, and a number of smaller tributaries to the Sacramento River system, the Delta, and San Francisco Bay. Steelhead may also inhabit San Joaquin River tributaries in low abundance. The Central Valley Steelhead population is composed of both naturally spawning Steelhead and Steelhead produced in hatcheries.

Juvenile Steelhead migrate from the upstream spawning and rearing areas through the Delta, Suisun Bay, and San Francisco Bay during the winter and early spring.

Factors Affecting Central Valley Steelhead Populations

Factors affecting Steelhead abundance include, but are not limited to:

- Loss of access to historical spawning and juvenile rearing habitat within the upper reaches of the Central Valley rivers caused by major dams and reservoirs acting as migration barriers
- Water temperatures in rivers and creeks, especially in summer and fall, affecting the growth and survival of juvenile Steelhead
- Juveniles' vulnerability to entrainment at a large number of unscreened water diversions along the Sacramento and San Joaquin Rivers and in the Delta
- Salvage mortality at the SWP and CVP export facilities
- Changes in habitat quality, including availability for spawning and juvenile rearing
- Exposure to contaminants
- Predation by native and non-native fish species and other predators, including marine mammals
- Passage barriers and impediments to migration
- Changes in land-use practices
- Competition and interactions with hatchery-produced Chinook Salmon and Steelhead
- Climatic and oceanographic conditions
- Predation by marine mammals

Unlike Chinook Salmon, Steelhead populations are not vulnerable to recreational and commercial fishing in the ocean, although hatchery-produced Steelhead support a small inland recreational fishery.

Regulatory Listing Status

Central Valley Steelhead are listed as a threatened distinct population segment (DPS) under FESA. Steelhead are not listed for protection under CESA. Critical habitat for Central Valley Steelhead was most recently designated in 2005 and became effective in January 2006. The critical habitat designation for this DPS includes the Delta.

Delta Smelt

Delta Smelt are endemic to the Sacramento–San Joaquin Delta estuary and inhabit the freshwater portions of the Delta, Sacramento and San Joaquin rivers, and the low-salinity portions of Suisun Bay. As described above, the substantial declines in Delta Smelt abundance indices in recent years, as well as declines in other pelagic fish species, have led to widespread concern regarding the pelagic fish community of the Bay-Delta estuary. A number of recent and ongoing analyses have focused on identifying the factors potentially influencing the status and abundance of Delta Smelt and other pelagic fish species within the estuary.

The Interagency Ecological Program (IEP) continues to evaluate the available scientific information regarding the status of Delta Smelt and the performance of various management actions designed to improve protection, reduce mortality, and enhance habitat quality and availability for Delta Smelt within the estuary. Additional measures have been taken since the beginning of 2005 to determine the magnitude of entrainment at the CVP and SWP intakes, and to monitor and provide additional information on Delta Smelt abundance and distribution within the Delta.

Delta Smelt are a relatively small species (2 to 4 inches long) with an annual life cycle, although some individuals may live two years. Adult Delta Smelt migrate upstream into channels and sloughs of the Delta during winter to prepare for spawning. Delta Smelt live their entire life cycle within the Bay-Delta estuary. Juveniles and adults typically inhabit open waters of the Delta.

A portion of adults move from Suisun Bay or river channels in the lower Delta to freshwater upstream to spawn in February to May (Moyle et al. 1992; Moyle 2002; Bennett 2005). Females deposit adhesive eggs on substrates such as gravel and sand. Eggs hatch, releasing planktonic larvae that are passively dispersed downstream by river flow. Larval and juvenile Delta Smelt rear within the estuary for a period of approximately six to nine months before beginning their upstream spawning movement into freshwater areas of the lower Sacramento and San Joaquin Rivers. They also have been known during high flows to move downstream into Napa River or sometimes they do not move at all if the western end of Suisun Bay freshens or they have been known to end up at the north intake of Suisun Marsh, etc. Recent distributional studies indicate that movement patterns of smelt are highly variable, depending on outflow, exports, channel configurations, and other factors (Moyle et al. 2016). An increasingly higher percentage of Smelt caught in various surveys are found in freshwater areas, year around, such as the Sacramento Deepwater Ship Channel and the Toe Drain of the Yolo Bypass (Merz et al. 2011; Sommer et al. 2011; Sommer and Mejia 2013).

Juvenile and adult Delta Smelt are usually most abundant within the central and west Delta during winter, and early summer, as reflected in SWP and CVP fish salvage records. Juvenile and adult Delta Smelt do not typically inhabit portions of the Delta during summer, when water temperatures exceed approximately 77 degrees Fahrenheit and high water clarity tends to keep them out during the fall (Nobriga et al. 2008; Feyrer et al. 2007). Adult Delta Smelt spawn within the Delta during late winter and spring, and larvae occur within the Delta during spring. As a result of their life history and geographic distribution, Delta Smelt may occur seasonally within the vicinity of the proposed project as larvae, juveniles, and adult life stages.

Factors Affecting Delta Smelt Populations

Historically, Delta Smelt was the most abundant pelagic fish species in the San Francisco Estuary (Moyle, 2002), but by the early-1980s, abundance had declined dramatically (Sommer et al. 2007). There is no single cause of the Delta Smelt decline, instead, multiple factors have created habitat that is less able to support smelt in large numbers (Moyle et al. 2016). The ultimate cause of decline in Delta Smelt is competition with people for water and habitat (Moyle et al. 2016). Some of the proximate drivers of decline in Delta Smelt abundance include entrainment, altered hydrology, reduced food availability, predation, contaminants, habitat change, drought, and climate change (Moyle et al. 2016).

The degree to which a single factor is responsible for driving Delta Smelt population responses is uncertain, and it is hypothesized that recent declines are a result of interacting factors that are not fully understood. Baxter et al. (2010) theorized that Delta Smelt abundance in a given generation is a function of top-down effects (i.e., predation and entrainment influencing mortality rate), bottom-up effects (i.e., food quantity and quality influencing growth and survival), and fish abundance in previous generations (i.e., stock-recruitment relationships), with habitat quantity and quality overlapping all other factors. Many recent studies have related the decline in Delta Smelt abundance to various environmental covariates, including: water clarity and salinity (Feyrer et al. 2007), water exports, water temperatures, and zooplankton abundance (MacNally et al. 2010), and water clarity and water exports (Thomson et al. 2010). It has been hypothesized that the decline has been associated with water diversion, levee construction, impoundments, water quality and toxicity issues, non-native species introductions (both competition and predation) and overall habitat degradation (Baxter et al. 2008).

Fall outflow effects on Delta Smelt abundance and habitat quality is an active area of research, and understanding of these effects is expected to improve in the coming years. Under the USFWS (2008) BiOp, it is hypothesized that the fall habitat objective will be achieved by providing fall (i.e., September–November) flows necessary to position X2 in or near Suisun Bay in wet or above-normal years.

Regulatory Listing Status

Delta Smelt is listed as a threatened species under FESA and an endangered species under CESA. In March 2006, a petition seeking to relist Delta Smelt as an (federally) endangered species was submitted to the USFWS. The proposal to elevate the listing status remains under review and USFWS has, as yet, not acted on the petition. Critical habitat for Delta Smelt has been designated by USFWS within the Delta.

North American Green Sturgeon

Green Sturgeon is a large, bottom-dwelling, anadromous fish that is widely distributed along the Pacific coast of North America. North American Green Sturgeon is the most broadly distributed, wide ranging, and marine-oriented species of the Sturgeon family; however, they are not very abundant in comparison to White Sturgeon. San Francisco Bay, San Pablo Bay, Suisun Bay, the Delta and the Sacramento River support the southernmost reproducing population of Green Sturgeon (Moyle, 2002).

North American Green Sturgeon are thought to reach sexual maturity at about 15 years of age or a total length of 150-155 cm for DPS individuals. Southern DPS Green Sturgeon typically spawn every three to four years (range two to six years) and spawning occurs primarily in the Sacramento River (Brown 2007; Poytress et al. 2012). Adult Southern DPS Green Sturgeon enter San Francisco Bay in late winter through early spring and spawn from April through early July, with peaks of activity influenced by factors including water flow and temperature (Heublein et al. 2009; Poytress et al. 2011).

Spawning primarily occurs in cool sections of the upper mainstem Sacramento River in deep pools containing small to medium sized gravel, cobble or boulder substrate (Poytress et al. 2011). Adults may remain in the upper reaches of the rivers during the summer before returning to the ocean in the autumn (Heublein et al. 2009).

Larval Green Sturgeon disperse from nursery habitats quickly, but then slow their emigration (Israel and Klimley 2008), likely remaining in the upper reaches of the Sacramento River in the summer months. In the Sacramento River, larval and juvenile Green Sturgeon are encountered in rotary screw traps at Red Bluff Diversion Dam between early May and mid-August and in rotary screw traps at the Glenn-Colusa Irrigation District pumping plant between early May and October (Adams et al. 2002). Because the reproductive success of age-0 juvenile Green Sturgeon is negatively impacted when exposed to temperatures greater than 20°C (Israel and Klimley 2008), it is unlikely that young juveniles would migrate through the lower Sacramento River in the summer, where temperatures often exceed 20°C. Therefore, the first opportunity that juvenile Green Sturgeon would be expected to reach the lower Sacramento River would likely be during the cooler months in fall and winter. Based on length of juvenile sturgeon captured in the Bay-Delta, Southern DPS Green Sturgeon migrate downstream toward the estuary between 6 months and 2 years of age (Radtke et al. 1966).

Little is known about juvenile Green Sturgeon habitat suitability and diet; however, they have been observed to occupy deep, low-light habitats with some rock structure during their first winter (Kynard et al. 2005). The diet of riverine juvenile Green Sturgeon is unknown, though they are presumed to be generalists and opportunists.

Factors Affecting Green Sturgeon Populations

A variety of environmental and biological factors affect the abundance of Green Sturgeon:

- Spawning habitat made inaccessible or altered by dams
- Destruction of riparian and stream channel habitat used for spawning
- The introduction of invasive benthic organisms that have altered the benthic invertebrate communities
- The introduction of non-native invasive plant species that have altered habitat by raising temperatures, reducing turbidity and dissolved oxygen (DO), and inhibiting access to shallow water habitat
- Reduced rearing habitat due to historical reclamation of wetlands and islands that has degraded the availability of suitable in- and off-channel rearing habitat (Sweeny et al. 2004)
- Dredging
- Increased water temperatures

- Exposure to toxins in the Sacramento and San Joaquin Rivers and Delta
- Poaching (illegal harvest)

Regulatory Listing Status

The southern DPS of North American Green Sturgeon is listed as threatened under FESA and is a California species of special concern. Critical habitat for Green Sturgeon has not been designated.

Longfin Smelt

Longfin Smelt is a small, planktivorous fish species found in several Pacific coast estuaries from San Francisco Bay to Prince William Sound, Alaska. Longfin Smelt can tolerate a broad range of salinity concentrations, ranging from fresh water to seawater. Spawning is believed to occur in the Sacramento and San Joaquin rivers and adjacent sloughs. Spawning may take place as early as November and may extend into June, with the peak spawning period occurring from December to April (Baxter 1999; Moyle 2002). Adult Longfin Smelt are found mainly in Suisun, San Pablo, and San Francisco Bays, although their distribution is shifted upstream into the western Delta in years of low outflow (Baxter 1999; Moyle 2002). While spawning of Longfin Smelt was previously thought to occur solely in areas of low salinity, recent data suggests that Longfin Smelt are hatching and rearing in a much broader region and under higher salinities (~2–12 psu) than previously recognized (Grimaldo et al. 2016). Dispersal of longfin smelt larvae downstream is likely dependent on the level of freshwater flow, with transport likely being reduced in drought years (Grimaldo et al. 2016).

Like Delta Smelt, Longfin Smelt spawn adhesive eggs in river channels of the estuary, and after hatching their larvae are carried downstream (planktonic drift) to nursery areas by freshwater outflow. A measurable portion of the Longfin Smelt population consistently survives into a second year. During the second year of life, the adult Longfin Smelt inhabit San Francisco Bay and occasionally have been found in nearshore ocean surveys (Rosenfield and Baxter, 2007). Therefore, Longfin Smelt are often considered anadromous (SWRCB, 1999).

Longfin Smelt are also more broadly distributed throughout the Delta and are found at higher salinities than Delta Smelt. During non-spawning periods Longfin Smelt are most often concentrated in Suisun, San Pablo, and North San Francisco Bay (Baxter 1999; Moyle 2002). The easternmost catch of Longfin Smelt in the CDFW fall midwater trawl samples has been at Medford Island in the central Delta.

Factors Affecting Longfin Smelt Populations

Similar to Delta Smelt, Longfin Smelt were once one of the most common fish in the Delta. Their abundance has fluctuated widely in the past, but, since 1982, abundance has declined significantly, reaching its lowest levels during drought years. Longfin Smelt abundance indices, although variable, show a general pattern of declining abundance. Longfin Smelt are among the POD species showing a substantial decline in abundance in recent years.

Potential factors affecting Longfin Smelt populations include entrainment losses to water diversions; however, it should be noted that as a result of recent pumping restrictions enforced by the USFWS (2008) and NMFS (2009) BiOps, USFWS no longer considers entrainment of Longfin Smelt at the south Delta export facilities to be a major threat to the population.

Regulatory Listing Status

Longfin Smelt is a federal species of concern and listed as threatened under CESA. In August 2007, USFWS was petitioned to list Longfin Smelt as endangered. On May 6, 2008, USFWS found that the listing may be warranted and initiated a status review to determine if listing this species is in fact warranted. The USFWS (2012) found that the listing of Bay-Delta DPS of Longfin Smelt was warranted, however, listing the Bay-Delta DPS of Longfin Smelt was precluded by higher priority actions to amend the lists of endangered and threatened wildlife and plants.

Northern Anchovy

Northern Anchovy range from Cape San Lucas, Baja California to Queen Charlotte Island, British Columbia. Northern Anchovy are one of the most prolific fish, in terms of numbers and biomass, along the northeastern coastal waters of the Pacific Ocean. There are three subpopulations, with the northern subpopulation that occur only in the estuary. This species can be the most abundant species in San Francisco Bay, constituting 85 percent of all fish. An individual Anchovy can spawn two to three times a year. Post-larvae swim near the surface and are most abundant in San Francisco Bay and San Pablo Bay. As the salt wedge moves upstream within the estuary in the summer, Anchovy larvae can be found in Suisun Bay and the western Delta. The juveniles use inshore bays and estuaries as their nursery ground, while adults are typically found in offshore waters.

Regulatory Status

Northern Anchovy could occur in the vicinity of the intake. Northern Anchovy is managed under the Coastal Pelagic Species Fishery Management Plan. EFH for this species has been designated within the project study area.

Pacific Sardine

The Pacific Sardine is a schooling pelagic species distributed from northern Mexico to southeastern Alaska. Each year, beginning in their second summer, sardines migrate northwards early in summer and travel south again in fall. They form large schools (up to 10 million individuals) and are often associated with Anchovy. Main spawning areas are off the coast of Southern California. Similar to Northern Anchovy, there are three stocks, with the northern stock entering the estuary. Pacific Sardine could be found in the vicinity of the project study area.

Regulatory Status

Pacific Sardine is managed under the Coastal Pelagic Species Fishery Management Plan. EFH for this species has been designated within the project study area.

Starry Flounder

Starry Flounder occur on the Pacific coast from Santa Barbara to Alaska. The species is found over sand, mud, and gravel bottoms in coastal ocean waters, bays, sloughs, and occasionally fresh water. Males spawn at the end of their second year and females in their third year. The spawning season extends from November through February, with the greatest activity in September-March

(Moyle 2002). Starry Flounder is one of the most numerous fish in San Francisco Bay, but are relatively uncommon in the Delta. They could occur in the vicinity of the project study area

Regulatory Status
Starry Flounder is managed under the Pacific Groundfish Fishery Management Plan. EFH for this species has been designated within the project study area.

3.3.2 Regulatory Framework

The following text summarizes federal, State, regional, and local laws and regulations pertinent to evaluation of the proposed project's impacts on aquatic biological resources.

Federal

Federal Endangered Species Act

The FESA protects threatened and endangered plants and animals and their critical habitat. FESA is administered by both NMFS and the USFWS. NMFS administers FESA for marine fish and mammals, and anadromous fishes such as Central Valley Steelhead, winter-run and spring-run Chinook Salmon, and Green Sturgeon. USFWS administers FESA resident freshwater fish species such as Delta Smelt, which is listed, and Longfin Smelt, which has been recently proposed for listing. Projects for which a federally listed species is present and likely to be affected by an existing or proposed project must receive authorization from USFWS and/or NMFS.

FESA prohibits the "take" of endangered or threatened fish and wildlife species. The definition of "take" is to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." USFWS and NMFS also interpret the definition of "harm" to include significant habitat modification that could result in the take of a plant or wildlife species.

Pursuant to the requirements of Section 7 of FESA, a federal agency reviewing a proposed project that it may authorize, fund, or carry out must determine whether any federally listed threatened or endangered species, or species proposed for federal listing, may be present in the project area and determine whether implementation of the proposed project is likely to affect the species. In addition, the federal agency is required to determine whether a proposed project is likely to jeopardize the continued existence of a listed species or any species proposed to be listed under the FESA or result in the destruction or adverse modification of critical habitat proposed or designated for such species (16 USC 1536[3], [4]).

If an activity would result in the take of a federally listed species, one of the following is required: an incidental take permit under Section 10(a) of FESA, or an incidental take statement issued pursuant to federal interagency consultation under Section 7 of FESA. Such authorization typically requires various measures to avoid and minimize species take, and to protect the species and avoid jeopardy to the species' continued existence.

FESA requires the federal government to designate critical habitat for any species it lists under the FESA. Critical habitat is defined as: (1) specific areas within the geographic area occupied by the species at the time of listing, if they contain physical or biological features essential to the species conservation, and those features that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by the species if the agency determines that the area itself is essential for conservation.

Sustainable Fisheries Act (Essential Fish Habitat)

In response to growing concern about the status of fisheries in the United States, Congress passed the Sustainable Fisheries Act of 1996 (Public Law 104-297). This law amended the Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265), the primary law governing marine fisheries management in the federal waters of the United States. Under the Sustainable Fisheries Act, consultation is required by NMFS on any activity that might adversely affect EFH. EFH consists of those habitats that fish rely on throughout their life cycles. It encompasses habitats necessary to allow sufficient production of commercially valuable aquatic species to support a long-term sustainable fishery and contribute to a healthy ecosystem.

The Pacific Fishery Management Council (PFMC) has designated the Sacramento and San Joaquin Rivers, Delta, San Francisco Bay, and Suisun Bay as EFH to protect and enhance habitat for anadromous and coastal marine fish and macroinvertebrate species that support commercial fisheries, such as Pacific salmon.

Rivers and Harbor Act and Clean Water Act

The Secretary of the Army (represented by the USACE) has permitting authority over activities affecting waters of the U.S. under Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) and Section 404 of the CWA (33 USC 1344). Waters of the U.S. are defined in Title 33 CFR Part 328.3(a) and include a range of wet environments such as lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds. Section 10 of the Rivers and Harbor Act requires a federal license or permit prior to accomplishing any work in, over, or under navigable[1] waters of the U.S., or which affects the course, location, condition or capacity of such waters. Section 404 of the CWA requires a federal license or permit prior to discharging dredged or fill material into waters of the U.S., unless the activity is exempt (33 CFR 324.4) from Section 404 permit requirements (e.g., certain farming and forestry activities). To obtain a federal license or permit, project proponents must demonstrate that they have attempted to avoid the resource or minimize impacts on the resource; however, if it is not possible to avoid impacts or minimize impacts further, the project proponent is required to mitigate remaining project impacts on all federally-regulated waters of the U.S.

Section 401 of the CWA (33 USC 1341) requires any project proponents for a federal license or permit to conduct any activity including, but not limited to, the creation or operation of facilities, which may result in any discharge into navigable waters of the U.S. to obtain a certification from the state in which the discharge originates or would originate, or, if appropriate, from the

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1 "Navigable waters of the United States" (33 CFR Part 329) are defined as water that have been used in the past, are now used, or are susceptible to use as a means to transport interstate or foreign commerce up to the head of navigation.

interstate water pollution control agency having jurisdiction over the navigable waters at the point where the discharge originates or would originate, that the discharge will comply with the applicable effluent limitations and water quality standards. A certification obtained for the creation of any facility must also pertain to the subsequent operation of the facility. The responsibility for the protection of water quality in California rests with the SWRCB and its nine RWQCBs. See Section 3.10, *Local Hydrology and Water Quality* for a more detailed discussion of the CWA and of the jurisdiction of the SWRCB and RWQCBs.

State

California Endangered Species Act

As part of the CESA and Section 2081 of the California Fish and Game Code, a permit from CDFW is required for projects that could result in the taking of a species that is State-listed as threatened or endangered. Under the CESA, take is defined as an activity that would directly or indirectly kill an individual of a species; however, the CESA definition does not include harm or harass, as the FESA definition does. As a result, the threshold for take is higher under CESA than under FESA.

Section 2080 of the Fish and Game Code prohibits the taking of plants and animals listed under the authority of CESA, except as otherwise permitted under Fish and Game Code Sections 2080.1, 2081, and 2835. Under CESA, the California Fish and Game Commission maintains a list of threatened species and endangered species (Fish and Game Code Section 2070).

CDFW administers CESA for all State-listed fish including Sacramento River winter-run Chinook Salmon, Central Valley spring-run Chinook Salmon, Delta Smelt, and Longfin Smelt. Projects for which a State-listed species is present and likely to be affected by an existing or proposed project must receive authorization from CDFW.

Water Right Decisions

The California Water Code authorizes the SWRCB to allocate surface water rights, and to permit diversion and use of water throughout California. The SWRCB considers effects on fisheries as part of its permitting process. Division 7 of the California Water Code, known as the Porter-Cologne Act, regulates activities that affect water quality (see the separate discussion of the Porter-Cologne Act below). The California water right decision process and the Porter-Cologne Act is described in Section 3.10, *Local Hydrology and Water Quality*.

California Fish and Game Code

The sections of the California Fish and Game Code listed below provide environmental protections and could apply to the proposed project.

Section 1602 – Streambed Alteration. Diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by CDFW. CDFW is also authorized under California Fish and Game Code Sections 1600–1616 to develop mitigation measures and enter into streambed alteration agreements with applicants, whose projects would obstruct the flow or alter the bed, channel, or bank of a river or stream, including intermittent and ephemeral streams, in which a fish or wildlife resource is present.

Sections 3511, 4700, 5050, and 5515 – Fully Protected Species. These statutes prohibit take or possession at any time of fully protected species.

Section 5937. Under most conditions, sufficient volumes of water are required to pass through a fishway at all times. In the absence of a fishway, sufficient water must be allowed to pass over, around, or through a dam to keep in good condition any fish that may be planted or exist below the dam.

State Lands Commission

The State Lands Commission has exclusive jurisdiction over all ungranted tidelands and submerged lands owned by the State, and the beds of all navigable rivers, sloughs, and lakes. A project cannot use these State lands unless a lease is first obtained from the State Lands Commission.

Local

The cities and county that the project footprint falls within contain goals and policies within their general plans that could apply to biological resources and the proposed project. These goals and policies are described in Section 3.4, *Terrestrial Biological Resources*.

3.3.3 Analysis, Impacts and Mitigation

Significance Criteria

An impact on aquatic biological resources is considered significant if implementation of the project would:

- Have a substantial adverse effect, either directly or through habitat modifications, including direct disturbance, removal, filling, hydrological interruption, or discharge, on any species, natural community, or habitat, including candidate, sensitive, or special-status species identified in local or regional plans, policies, regulations or conservation plans (including protected wetlands or waters, critical habitat, essential fish habitat (EFH)); or as identified by the CDFW, USFWS, or NMFS; or
- Threaten to eliminate a marine plant or animal wildlife community or cause a fish or marine wildlife population to drop below self-sustaining levels; or
- Interfere substantially with the movement of any native resident or migratory fish or marine wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native marine wildlife nursery sites.

Methodology and Assumptions

Project-related aquatic resources impacts would fall into two categories: (1) short-term construction-related impacts; and (2) long-term operations-related impacts. Short-term construction activities would be caused by in the temporary loss of fish habitat from increased sedimentation, release and exposure of construction-related contaminants, direct disturbance, underwater noise impacts, or loss of shallow water habitat. Operational impacts would be triggered by potential changes in fish entrainment and/or impingement at the new intake, and/or the loss or degradation of aquatic habitat in the vicinity of the brine waste discharge. Methodologies associated with the evaluation of fish entrainment and impingement and the evaluation of brine waste discharge are discussed in additional detail below.

Evaluation of Fish Entrainment and Impingement

Evaluation of potential fish entrainment and impingement considered the following:

- **Seasonal timing of fish species and life stages in the study area and proposed operations:**
  - Fish screen should be protective of most special-status species and life stages seasonally present in vicinity of the intake; however, Delta and Longfin Smelt eggs and larvae could be present January through June and cannot be protected by the screen design or operational criteria because they are too small and have no (or very limited) swimming capabilities.
- **Review of Delta diversions and fish entrainment and impingement risk studies and monitoring data:**
  - Evaluation of entrainment in a screened and an unscreened diversion in the vicinity of Decker Island, along Horseshoe Bend in July 2000 and July 2001 (Nobriga et al. 2004):
    - Results: screen is protective of Delta Smelt.
  - Bay Area Regional Desalination Project, Entrainment and Source Water Study (Tenera, 2010):
    - Results: experimental entrainment surveys resulted in entrainment of relatively low amounts of special-status species (smelt); Antioch Intake would be smaller and, therefore, entrainment vulnerabilities would be commensurately less.
- **Egg and larvae entrainment risk and vulnerability modeling:**
  - The distribution of early life stages (i.e., eggs, larvae, and juveniles) of many fish species, including Delta and Longfin Smelt, is affected by changes in Delta flow patterns and diversions. Many other factors also affect the distribution of larvae and juveniles in the estuary, including the distribution and timing of spawning, larval growth, and the response of fish to various environmental conditions (e.g., salinity, temperature, and prey distribution). These other factors are less well described and more unpredictable than water movement based on Delta flows and flow splits between channels. Therefore, entrainment analyses often assume that eggs and larvae behave as passive particles and that water movement represents egg and larval movement (e.g., Kimmerer and Nobriga, 2008).

    As a result, spreadsheet model-based particle tracking simulations were conducted to evaluate the potential entrainment of egg or larval Delta Smelt and Longfin Smelt (all other species scoped out above). Simulated project intake operations developed by Carollo Engineers were applied to 16-year Delta Simulation Model II (DSM2; see Section 3.11, *Delta Hydrology and Water Quality* for additional description) hydrologic conditions (net Delta outflow) to estimate the proportion of net Delta outflow diverted by the Antioch intake, with and without the Project, across the 16-year period of record (water years 1976-1991) in DSM2. For each species, one billion eggs/larvae (represented by particles) were assumed to originate in the Delta during certain months of each year (Table 3.3-3). The proportion of total eggs/larvae assigned to each month was based known spawning and egg production distributions documented in literature and other regulatory documents (Moyle

2002; CDFG 2009 [SWP Longfin Smelt ITP]). For each species, the total number of particles (representing eggs or larvae) assumed for the whole year (i.e., one billion) was multiplied by the monthly weights to give the number of particles at the start of each month. The overall effect of the proposed project diversions was characterized in terms of the proportion of particles entrained (calculated for with and without project) and the percentage point difference between with and without project scenarios.

The primary assumptions of the egg and larval entrainment risk and vulnerability simulations are as follows:

- eggs and larvae are evenly distributed throughout the water column;
- entrainment of eggs and larvae into the intake can be estimated using proportional relationships between total flow volume in the channel and total diversion volume;
- The proportion of water diverted was calculated by dividing modeled diversion flows by net Delta outflow as estimated by DSM2 modeling;
- intake screening offers no protection to eggs and larvae; and
- eggs and larvae behave as passive particles and move with water flows.

Because most Delta Smelt and Longfin Smelt spawning (and associated egg and larvae production) is typically centered in the north Delta (Moyle 2002; Bennett 2005; Feyrer et al. 2007; CDFW 2009; Merz et al. 2011 Moyle et al. 2016), it is likely that eggs and larvae are more densely distributed in the Sacramento River (north) side of the west Delta and; therefore, the assumptions that eggs and larvae are evenly distributed throughout the water column is likely a conservative assumption for the Antioch intake, which is located on the south bank of the San Joaquin River (south side of west Delta).

TABLE 3.3-3
MONTHLY WEIGHTS USED IN THE ANALYSIS OF FISH EGG AND LARVAL ENTRAINMENT FOR THE PROJECT

	Monthly weights						
	Dec	Jan	Feb	Mar	Apr	May	Jun
Delta Smelt	0	0	0.1	0.25	0.35	0.25	0.05
Longfin Smelt	0.1	0.25	0.35	0.2	0.1	0	0

SOURCE: Adapted from CDFW 2009

Evaluation of Brine Waste Discharge

Extensive modeling of hydrologic and water quality conditions was performed using mixing and dispersion models to provide a quantitative basis from which to assess potential operational effects of the project alternatives associated with brine waste discharge on fisheries resources and aquatic habitats. Important factors that were examined include:

- Biological considerations:
  - species and life history seasonal presence in the vicinity of the outfall diffuser;
  - species and life stage habitat use tendencies and presences (e.g., demersal [bottom, benthic], pelagic [open water], littoral [shallow, water edge]); and

- species and life stage tolerance to varying levels of waste discharge.

- Waste discharge plume(s) considerations:
  - spatial, temporal, and quality characteristics of plume(s); specific factors for consideration include:
    - localized plume(s) size at each diffuser port and potential joining of localized plumes across the diffuser;
    - quality of the plume(s); and
    - temporal dynamics of the plume(s) across the tide cycle.

Impacts and Mitigation Measures

Table 3.3-4 summarizes the proposed project's impacts and significance determinations related to terrestrial biological resources.

TABLE 3.3-4
SUMMARY OF IMPACTS – AQUATIC BIOLOGICAL RESOURCES

Impacts	Significance Determinations
Impact 3.3-1: Construction of the proposed intake facility could result in short-term degradation of aquatic habitat from accidental spills or seepage of hazardous materials during construction.	LS
Impact 3.3-2: Construction of the proposed project has the potential to result in a loss or degradation of aquatic habitat in the Delta from increased sedimentation and turbidity.	LS
Impact 3.3-3: Construction of the proposed intake facility could result in direct disturbance and mortality of fish from installation of cofferdams and dewatering.	LSM
Impact 3.3-4: Construction of the proposed intake facility could result in a short-term degradation of aquatic habitat caused by an increase in hydrostatic pressure, underwater noise, and vibrations.	LSM
Impact 3.3-5: Construction of the proposed intake facility would result in a loss of shallow water habitat.	LSM
Impact 3.3-6: Operation of the proposed intake facility could result in increased predation of fish.	LS
Impact 3.3-7: Operation of the proposed intake facility could impinge and/or entrain fish, including fish eggs and larvae.	LS
Impact 3.3-8: Operation of the proposed project, including discharge of brine waste, could result in direct mortality of fish species or degradation and/or loss of aquatic habitat.	LS
Impact 3.3-C-1 through **C-4:** Construction of the proposed intake facility in combination with other cumulative projects, could result in short-term degradation of aquatic habitat from (C-1) accidental spills or seepage of hazardous materials, (C-2) increased sedimentation and turbidity, (C-3) direct disturbance and mortality of fish from installation of cofferdams and dewatering, and (C-4) short-term degradation of aquatic habitat caused by an increase in hydrostatic pressure, underwater noise, and vibrations.	LS
Impact 3.3-C-5: Construction of the proposed intake facility in combination with other cumulative projects would result in a loss of shallow water habitat.	LS
Impact 3.3-C-6: Operation of the proposed intake facility in combination with other cumulative projects could result in increased predation of fish.	LS
Impact 3.3-C-7: Operation of the proposed intake facility in combination with other cumulative projects could impinge and/or entrain fish, including fish eggs and larvae.	LS
Impact 3.3-C-8: Operation of the proposed project facility in combination with other cumulative projects, including discharge of brine waste, could result in direct mortality of fish species or degradation and/or loss of aquatic habitat.	LS

NOTES:
LS = Less than Significant
LSM = Less than Significant with Mitigation

Impact 3.3-1: Construction of the proposed intake facility could result in short-term degradation of aquatic habitat from accidental spills or seepage of hazardous materials during construction. ***(Less than Significant)***

Use of heavy equipment and storage of materials is required for the construction of the proposed intake facility. As a result, if not properly contained, contaminants (e.g., fuels, lubricants, hydraulic fluids) could be introduced into the water system, either directly or through surface runoff. Contaminants may be toxic to fish or cause altered oxygen diffusion rates and acute and chronic toxicity to aquatic organisms, thereby reducing growth and survival.

As discussed in Section 3.10, *Local Hydrology and Water Quality* under Impact 3.10-1, potential construction-related effects on surface water quality would be managed by the application for a Notice of Intent (NOI) of coverage under the National Pollution Discharge Elimination System (NPDES) General Construction Permit (see subsection 3.10.2 for a more detailed description of NPDES permit requirements), and adherence to permit conditions. The NPDES General Construction Permit requires implementation of best management practices (BMPs), water quality monitoring and reporting, post construction-period requirements, and other water quality pollutant-reduction techniques to protect degradation of beneficial uses. Adherence to the conditions of the NPDES General Construction Permit, construction windows, and permit requirements would minimize the risk of release of pollutants into receiving waters during construction activities and would minimize potential degradation of aquatic habitat and the associated harm to aquatic species. Furthermore, as described under Impact 3.10.1, all materials stored on site would be done so consistent with regulatory requirements. Therefore, this impact is considered **less than significant**.

<u>Mitigation Measure:</u>

None required.

Impact 3.3-2: Construction of the proposed project has the potential to result in a loss or degradation of aquatic habitat in the Delta from increased sedimentation and turbidity. ***(Less than Significant)***

Construction activities could disturb sediments and soils within and adjacent to waterways. These activities, including construction of the new intake, using staging areas, and placing excavated material, could disturb sediments and soils within and adjacent to waterways. Any construction-related erosion or disturbance of sediments and soils would temporarily increase downstream turbidity and sedimentation throughout the study area if soils were transported in river flows or stormwater runoff.

The abundance, distribution, and survival of fish populations have been linked to levels of turbidity and silt deposition. Prolonged exposure to high levels of suspended sediment would create a loss of visual capability in fish in aquatic habitats within the study area, leading to reduced feeding and growth rates. Such exposure would also result in a thickening of the gills, potentially causing the loss of respiratory function; in clogging and abrasion of gills; and in increased stress levels, which in turn could reduce tolerance to disease and toxicants (Waters, 1995). Turbidity also could result in increased water temperature and decreased dissolved oxygen (DO) levels, especially in low-velocity pools, which can cause stressed respiration.

High levels of suspended sediments could also cause redistribution and movement of fish populations in the upper Sacramento River, and could diminish the character and quality of the physical habitat important to fish survival. Deposited sediments can reduce water depths in stream pools and can contribute to a reduction in carrying capacity for juvenile and adult fish (Waters, 1995). Increased sediment loading downstream from construction areas could degrade food-producing habitat, by interfering with photosynthesis of aquatic flora, and could displace aquatic fauna.

Many fish, including salmonids, are sight feeders and turbid waters reduce the ability of these fish to locate and feed on prey. Some fish, particularly juveniles, could become disoriented and leave the areas where their main food sources are located, ultimately reducing growth rates. However, increased turbidity may also increase survival due to the resulting decrease in predatory efficiency. Also, it is expected that increases in turbidity due to construction activities would only be temporary and while increased turbidity could temporarily disrupt essential fish behaviors such as foraging, turbidity levels are not expected to be high enough or of sufficient duration to cause physiological impairment of fish. In addition, prey of fish populations, such as macroinvertebrates, could be adversely affected by declines in habitat quality (water quality and substrate conditions) caused by temporary increases in turbidity, decreased DO content, and an increased level of pollutants.

Temporary avoidance of adverse habitat conditions by fish is the most common result of increases in turbidity and sedimentation. Fish will not occupy areas unsuitable for survival unless they have no other option. Therefore, increased turbidity attributed to construction activities could temporarily preclude fish from occupying habitat required for specific life stages.

As discussed under Impact 3.3-1, potential construction-related effects on surface water quality would be managed by the application for a NOI of coverage under the NPDES General Construction Permit, and adherence to permit conditions (see also Section 3.10). The NPDES General Construction Permit requires implementation of BMPs, water quality monitoring and reporting, post construction-period requirements, and other water quality pollutant-reduction techniques to protect degradation of beneficial uses. Adherence to the conditions of the NPDES General Construction Permit, construction windows, and permit requirements would minimize the risk of release of increased sediment loading into receiving waters during construction activities and would reduce the risk of adverse effects to fish habitat and fish populations. Water quality and fisheries conservation measures would also be implemented and project activities would be in compliance with all required permit terms and conditions.

With the implementation of BMPs and other permit conditions (see Impact 3.3-3 discussion below), impacts associated with increased sedimentation and turbidity during construction into the river is considered **less than significant**.

Mitigation Measure: None required.

Impact 3.3-3: Construction of the proposed intake facility could result in direct disturbance and mortality of fish from installation of cofferdams and dewatering. ***(Less than Significant with Mitigation)***

The construction of the intake structure, including installation of a sheetpile cofferdam and dewatering at the intake installation site, could result in fish injury, mortality, and/or stranding within the cofferdam if fish are present in the immediate work area during construction activities. A separate analysis of potential degradation of aquatic habitat caused by an increase in hydrostatic pressure, underwater noise, and vibrations associated with cofferdam installation is provided below under Impact 3.3-4.

If fish are present during the installation of the cofferdam, they could be injured by the in-water construction activity itself, and/or become trapped behind the cofferdam. If any fish become trapped behind the cofferdam, they would be subject to water quality degradation (e.g., increased temperatures, decrease dissolved oxygen), become entrained in or impinged on pumps used for dewatering, or become stranded after dewatering is complete. This would be a **potentially significant impact**.

Mitigation Measures:

Mitigation Measure 3.3-3a: Conduct Worker Awareness Training.

A worker awareness training program shall be conducted for construction crews before the start of construction activities at the river intake pump station site. The program shall include a brief overview of sensitive fisheries and aquatic resources (including riparian habitats) on the project site, measures to minimize impacts on those resources, and conditions of relevant regulatory permits.

Mitigation Measure 3.3-3b: Implement In-water Work Windows.

Any in-water construction activities (e.g., construction of the sheetpile cofferdam) shall be conducted during months when special-status fish species/sensitive life stages are least likely to be present or less susceptible to disturbance (e.g., August 1 to October 31; anadromous salmonids and smelts). If any in-water work is to be conducted, a qualified biologist or resource specialist shall be present during such work to monitor construction activities and ensure compliance with terms and conditions of permits issued by regulatory agencies (see Mitigation Measure 3.3-3d below).

Mitigation Measure 3.3-3c: Develop and Implement Fish Rescue Plan.

To reduce the potential for fish stranding or minimize the potential for harm during cofferdam dewatering activities, the City or its contractor shall develop and implement a fish rescue plan. Prior to the closure of the cofferdam in the Delta, seining by a qualified fisheries biologist shall be conducted within the cofferdam using a small-mesh seine to direct and move fish out of the cofferdam area. Upon completion of seining, the entrance to the cofferdam shall be blocked with a net to prevent fish from entering the cofferdam isolation area before the cofferdam is completed. Once the cofferdam is completed and the area within the cofferdam is closed and isolated, additional seining shall be conducted within the cofferdam to remove any remaining fish, if present. Once all noticeable fish have been removed from the isolated area, portable pumps with intakes equipped with 1.75 mm mesh screen shall be used to dewater to a depth of 1.5-2 feet. A qualified biologist shall implement further fish rescue operations using electrofishing and dip nets. All fish that are captured shall be placed in clean 5-gallon buckets and/or coolers filled with Delta water, transported downstream of the construction area, and released back into suitable habitat in the Delta with minimal handling. After all fish have been removed using multiple seine passes, electrofishing, and dip nets (as necessary), portable pumps with screens (see above) shall be used for final dewatering. NMFS, USFWS, and CDFW shall be notified at least 48 hours prior to the fish rescue.

Mitigation Measure 3.3-3d: Consult with Resources Agencies and Implement Additional Measures.

The City shall also consult with NMFS, USFWS, and CDFW (as part of obtaining permit approvals (e.g., FESA Section 7, CESA [Fish and Game Code Sections 2080.1, 2081]) to determine necessary impact minimization actions, which may include surveying the intake site to determine fish presence prior to installation. The City shall implement any additional measures developed through the FESA Section 7 and Fish and Game Code Sections 2080.1, 2081 permit processes, to ensure that impacts are avoided and/or minimized.

Significance After Mitigation: With the implementation of **Mitigation Measure 3.3-3a through 3.3-3d** listed above, this impact would be reduced to a **less-than-significant** level because worker awareness training program would be conducted for construction crews before the start of construction activities, in-water construction would be conducted during periods when special-status fish species are not present or least sensitive, and the City would consult with resource agencies and implement additional measures, where appropriate.

Impact 3.3-4: Construction of the proposed intake facility could result in a short-term degradation of aquatic habitat caused by an increase in hydrostatic pressure, underwater noise, and vibrations. ***(Less than Significant with Mitigation)***

A cofferdam may be temporarily installed in the river by the construction contractor to facilitate installation of the intake pipelines and fish screens and minimize turbulence and sediment disturbance during construction. The cofferdam would consist of interlocking sheet piles forming a watertight corridor approximately 50 feet wide that would extend into the river approximately 200 feet from the shore (see Chapter 2, **Figure 2-3a**). Installation of the cofferdam would take approximately 2 weeks. The pipelines and fish screens would be installed within the watertight work area. The cofferdam would be removed following construction. In-river pipelines and fish screens could be installed using underwater construction techniques as an alternative option to using a cofferdam.

To the greatest extent possible, the proposed cofferdams would be installed using a vibratory pile driver, which generate relatively low underwater noise levels and is not likely to cause physical injury to special-status fish species. However, impact pile driving may be required if hard substrate is encountered, which may generate underwater sound levels that exceed injury and harm thresholds for fish.

If impact pile driving is required, potentially injurious sound levels would be localized, temporary, and intermittent. The in-water work window (see Mitigation Measure 3.3-3b) is established so that potentially injurious activities are likely to occur when most special-status fish species are absent or only present at low densities. However, some special-status fish species potentially could be present during the in-water work window and during pile-driving activities. Thus, impact pile driving potentially could affect the special-status species, including Delta and Longfin Smelt, and migrating adults and rearing juvenile Chinook Salmon, Steelhead, and Sturgeon, as well as other more common fish species that serve as prey for these special-status species.

Hydrostatic pressure waves and vibration generated by pile driving can adversely affect all life stages of fish. Effects on fish from changes in hydrostatic pressure are not related to the distance of the fish from the point of impact, but to the level and duration of the sound exposure (Hastings and Popper 2005). Hydrostatic pressure waves may rupture the swim bladders and other internal organs of all life stages of fish, and could permanently injure their inner ears and lateral line organs (Hastings and Popper 2005). These injuries could reduce the ability of fish (including special-status fish species) to orient in the water column, capture prey, and reduce the ability of fish to avoid predators (California Department of Transportation (Caltrans) 2009).

If there are areas where impact pile driving is required, there could be periods of time when the underwater sound levels exceed injury and harm thresholds established by NMFS. To avoid direct physical injury, impact driving of sheet piles should conducted during periods when special-status species (or their most sensitive life stages) are least likely to be present, and be managed (through operational controls) to be lower than a single-strike sound levels of less than 206 decibels (dB) peak (dB_{peak}) and 183 dB (fish less than 2 grams) and 187 dB (fish greater than or equal to 2 grams) sound exposure level (dB_{SEL}) measured at a distance of 10 meters (Fisheries Hydroacoustic Working Group 2008). (Attenuation is assumed at a rate of 4.5 dB per doubling of distance.)

Because of the timing of in-water construction (August through October), most special-status fish are not present or are present in their least sensitive life stage in the areas affected by elevated sound levels from pile-driving activities. The habitat at the intake sites is of relatively poor condition, with a relatively steep banks armored with riprap, and limited in-water or overwater habitat features typically associated with rearing habitat. As a result, these river reaches are expected to be used primarily as transient, migratory corridors. For most species with migratory life stages that have the potential to be present, only a small portion of the population is expected to be exposed to the increased underwater sound levels because these increases generally would occur outside of peak migration periods.

The upstream adult migration of several special-status fish may coincide with these in-water pile-driving activities, including fall-run, late fall-run, and spring-run Chinook Salmon, and Steelhead. Likewise, late juvenile outmigrating anadromous salmonids and Green Sturgeon juveniles may be present in the August to October in-water work window. Adult and juvenile Chinook Salmon, Steelhead, and Sturgeon may be able to move away from the area affected by the underwater sound. If pile driving occurs, the sound generated at each intake location would be intermittent over a period of 8 hours each day. Effects on special-status fish species are likely to be low to moderate, depending on the duration of exposure and the actual need for impact driving (compared with vibratory driving).

Except for Delta Smelt and Longfin Smelt, no spawning occurs in this area, so no egg or fry life stages of Chinook Salmon or Steelhead would be affected, and no egg or larvae life stages of Sturgeon would be affected. Overall, there could be instances of take and/or disruption of behavior or migration during intake construction, but underwater noise thresholds would be exceeded when the fewest fish and least sensitive life stages area present, therefore the lowest potential for effects, would occur.

Because special-status fish could be in the area affected by underwater sound from impact pile driving, they could experience an adverse effect, such as injury or mortality and therefore, this is considered a **potentially significant impact**.

Mitigation Measure:

Mitigation Measure 3.3-4: Underwater Sound Levels.

The City shall implement the following measures to avoid and minimize potential adverse effects that could otherwise result from in-water pile-driving activities:

- The City shall develop a plan for pile-driving activities to minimize impacts on fish and will allow sufficient time in the schedule for coordination with regulatory agencies. Measures will be implemented to minimize underwater sound pressure to levels below thresholds for peak pressure and accumulated sound exposure levels. Threshold levels established by NMFS are:
  - peak pressure= 206 dB_{peak}
  - accumulated sound exposure levels = 183 dB_{SEL}
- Underwater sound monitoring shall be performed during pile-driving activities. A qualified acoustician, biologist, and/or natural resource specialist shall be present

during such work to monitor construction activities and compliance with terms and conditions of permits.

- Pile driving shall occur during the established/approved work window (August 1 through October 31, or other as approved by NMFS, USFWS, and CDFW).
- Sheet piling shall be driven by vibratory or nonimpact methods (i.e., hydraulic) that result in sound pressures below threshold levels to the extent feasible.
- Pile driving activities may occur during periods of reduced currents as needed to meet the threshold limits. Pile-driving activities shall be monitored and if any stranding, injury, or mortality to fish is observed, CDFW, NMFS, and/or USFWS shall be immediately notified and in-water pile driving shall cease.
- Pile driving shall be conducted only during daylight hours and initially will be used at low energy levels and reduced impact frequency. Applied energy and frequency shall be gradually increased until the force and frequency necessary to advance the pile is achieved.
- If it is determined that impact hammers are required and/or underwater sound monitoring demonstrates that thresholds are being exceeded, the contractor shall implement sound dampening or attenuation devices to reduce levels to the extent feasible; these may include the following:
  - water bladder cofferdam;
  - confined or unconfined air bubble curtain.

Significance After Mitigation: With the implementation of **Mitigation Measure 3.3-4** listed above, this impact would be reduced to a **less-than-significant** level because underwater sound levels would be managed to levels below thresholds for peak pressure and accumulated sound exposure levels through the implementation of operational controls and attenuation devices for construction equipment, as necessary.

Impact 3.3-5: Construction of the proposed intake facility would result in a loss of shallow water habitat. ***(Less than Significant with Mitigation)***

Construction for the intake structure would require the alteration, or loss, of shallow water habitat. The loss of shallow water habitat results in the loss of foraging habitat and potentially refugia for special-status fish from predators and high flows. While the area of loss would be small (approximately 0.04 acre), according to the USFWS and CDFW, any loss of shallow water habitat is considered significant and must be replaced (or compensated for). Therefore, because construction of the intake structure would require removal of shallow water habitat, this is considered a **significant impact**.

<u>Mitigation Measure:</u>

Mitigation Measure 3.3-5: Purchase Mitigation Credits.

The City shall purchase mitigation credits from a public or private mitigation bank approved by USFWS, NMFS, and/or CDFW. The final number of credits to be purchased shall be determined in consultation with USFWS, NMFS, and CDFW. Mitigation credit purchase shall be conducted either before or as soon as possible after construction of the intake commences.

Significance After Mitigation: With the implementation of **Mitigation Measure 3.3-5** listed above, this impact would be reduced to a **less-than-significant** level because the purchase of shallow water habitat mitigation credits would ensure no net loss of shallow water habitat.

Impact 3.3-6: Operation of the proposed intake facility could result in increased predation of fish. ***(Less than Significant)***

Predation is thought to be one of the major factors in fish mortality associated with screened diversions. Increased predation at the proposed intake could occur if conditions were favorable for predators to ambush or otherwise prey upon juvenile fish that may become injured or disoriented as they passed by the intake structure (including supporting infrastructure). Predation near the diversion intake can be minimized by avoiding structural designs that create predator holding areas.

The fish screen and supporting infrastructure would be designed, to the extent feasible, to minimize turbulence and eddying in front, upstream, and downstream from the screen. The proposed intake fish screen structure would be designed to avoid creating areas where predators may congregate or where potential prey would have increased vulnerability to predation. Specifically, the design includes no supporting piles, piers, or other structural features that would create artificial structure. All water conveyance pipelines would be constructed below grade and therefore, they would not be present in the water column.

Because the fish screen would be designed to avoid and/or minimize velocity gradients and in-water structures where predation on juvenile fish may be increased, attraction of predatory fish to the intake screen would be expected to be small to indiscernible relative to surrounding habitat conditions. As a result, the potential for the operation of the new intake to result in increased predation on Chinook Salmon, Steelhead, Delta and Longfin Smelt, and other special-status fish species would be a **less than significant**.

Impact 3.3-7: Operation of the proposed intake facility could impinge and/or entrain fish, including fish eggs and larvae. ***(Less than Significant)***

Impingement and entrainment of fish could occur as a result of operating the proposed intake facility. Impingement is the involuntary contact and entrapment of fish on the screen surface due to approach velocity exceeding swimming capability. Screen entrainment is the movement of fish through, under, or around the fish screen resulting in a loss of fish from the population. Physical injury can lead directly to mortalities. Injuries or disorientation can also increase the susceptibility to predation.

The proposed intake structure is designed to minimize the potential for entrainment and impingement. It would include a fish screen designed to meet or exceed applicable NMFS and CDFW criteria (and USFWS recommended guidelines for tidal waters), which would minimize the potential for fish entrainment and impingement for most species and life stages. Specifically, entrainment or impingement of Chinook Salmon, Steelhead, and Green Sturgeon is unlikely because these species would only be present in the vicinity of the intake as juvenile or adult life stages, which are not vulnerable to entrainment or impingement because fish screen design and operating criteria would be protective. However, the intake would be located in a region of the Delta that is downstream of and within known Delta Smelt and Longfin Smelt spawning habitat (Moyle 2002; Bennet 2005; CDFW 2009). Therefore, it is possible that smelt eggs and larvae could be present in the vicinity of the intake and vulnerable to entrainment risk. Importantly, fish screen design and operation criteria cannot be protective of eggs and larvae because these life stages are extremely small and do not possess swimming capabilities.

Several factors have been identified as being important indicators for evaluating the potential for fish entrainment. These factors include species/life stages that are seasonally present during intake operation, and species/life stages that use habitat near the location of the intake. It is assumed that fish that prefer habitat areas near the location of intakes would have an increased vulnerability to entrainment and/or impingement. Likewise, because the earliest life stages of fish are smaller and have absent (i.e., eggs and larvae) or reduced (i.e., young juveniles) swimming capabilities, they would also have increased vulnerabilities to entrainment if present near the location of intakes. Conversely, adult fish that use habitat areas away from where intakes are located would be considered to have a reduced vulnerability to entrainment.

Seasonal Timing of Fish Species and Life Stages in the Study Area and Proposed Operations

As discussed above, seasonal timing of fish species in the study area tends to be primarily during the fall, winter, and spring months. Adult migrations, which would be less vulnerable to entrainment and impingement, tend to occur earlier in fall and/or winter; post larval and juvenile migrations, which would be expected to be more vulnerable to entrainment, tend to occur in the winter and spring (see **Table 3.3-2**). As discussed in Chapter 2 and above, the timing of intake operations tends to correspond to winter and spring months when water quality is not limiting. The greatest overlap between fish species presence and operations of the intake occurs during this period. During winter and spring, primary fish species that would be anticipated to be present are adult and juvenile Chinook Salmon and Steelhead and all life stages of Delta and Longfin Smelt.

Juvenile and adult Steelhead and Chinook Salmon are relatively large fish that exhibit high swimming capabilities and would not be expected to readily succumb to being entrained (or impinged) into the screened intake. However, larval and post-larval Delta and Longfin Smelt are very small with no to limited swimming capabilities and, as a result, would be vulnerable to entrainment and/or impingement into the screened intake.

Habitat Use by Fish Species and Life Stages Moving through the Study Area

Emigrating salmonids tend to migrate along the river margins in shallow, slower-moving waters rather than in the higher velocity water near the center of the channel (Moyle 2002). Here they use near-shore structure to reduce predation pressures and provide shade and food resources.

In the Hanford reach of the Columbia River Estuary, Dauble et al. (1989) found juvenile fall-run Chinook Salmon residing primarily in areas near shore where current velocities were reduced. When migrating downstream, the juvenile and smolt life stages of anadromous salmonids also are believed to use the upper one-third of the water column and the river margins, with the larger smolts more likely to use the center of the channel (Dauble et al. 1989).

As discussed above, the channel in the study area is largely channelized; has extensive riprap along the banks; is characterized by a lack of near-shore structure, shading, and backwater areas; have relatively swift currents. As such, the channel does not provide the kind of habitat that would encourage salmonid rearing; rather, the channel serves as a migration corridor. Consequently, movement of actively swimming anadromous salmonid emigrants past the study area is believed to occur rather rapidly, with juvenile salmonids rearing in the more complex slough habitats of the Delta prior to ocean entry.

Green Sturgeon would have the potential to use habitats at or near the river bottom in the area where the intake is located. However, there are a number of uncertainties regarding their potential vulnerability to being entrained or impinged in the study area.

As discussed herein and above, fish species such as Chinook Salmon, Steelhead, Delta Smelt, and Longfin Smelt are generally believed to move through the upper half of the water column when migrating, and thus typically do not move along the river bottom in relatively deep channels like the San Joaquin River. Therefore, the vulnerability of these species to entrainment into intakes generally located near the channel bottom would be anticipated to be low, if these species were present during operation of the pump intake.

Review of Delta Diversion Fish Entrainment Studies

Nobriga et al. (2004) evaluated entrainment in a screened and an unscreened diversion in the vicinity of Decker Island, along Horseshoe Bend in July 2000 and July 2001. The screened diversion was designed to exclude Delta Smelt and other fishes longer than 25 mm total length. No Delta Smelt were found in the screened diversion, whereas entrained fish were detected in the unscreened diversion. Specifically, 43 Delta Smelt were entrained during 69 hours of unscreened sampling of 170,839 cubic meters of water. Even greater entrainment of other ecologically similar, open-water species (i.e., Threadfin Shad, Inland Silverside, Striped Bass) was observed. The authors refer to data from the 20-mm Delta Smelt Survey (a mid-channel trawling survey) that suggests Delta Smelt were, in fact, relatively abundant in the vicinity of the experimental diversion. These data, along with their own sampling, led Nobriga et al. (2004) to conclude that

Delta Smelt are distributed farther from shore than the other species. However, the study was limited to the month of July and was therefore related to post-larval Delta Smelt and not earlier larval stages, which display limited motility and potentially greater shallow water affinity. Because spawning and larval development is likely to occur in shallow shoreline locations, entrainment of these life stages by diversions may be more significant. In addition, larval and post-larval individuals, which measure less than 25 mm in total length, would not have been excluded by the screens used for this study.

The screened diversion in the Nobriga et al. (2004) study successfully excluded fish larger than 25 mm in length and reduced entrainment of Threadfin Shad by up to 450 percent compared to the unscreened diversion (**Table 3.3-5**). Although few Delta Smelt were sampled in this study, the results for ecologically similar species suggest that screens may reduce juvenile and adult Delta Smelt entrainment at some diversions.

TABLE 3.3-5
NUMBERS OF DELTA SMELT, STRIPED BASS, THREADFIN SHAD, AND INLAND SILVERSIDE COLLECTED, AND THEIR LENGTH RANGES FROM SCREENED AND UNSCREENED DIVERSION SAMPLES IN HORSESHOE BEND, 12-14 JULY 2000 AND 9-11 JULY 2001

Year	Species	Screened	FL (mm)	Unscreened	FL (mm)
2001	Delta Smelt	0	--	12	19-30
	Striped Bass	2	11-18	300	13-33
	Threadfin Shad	1	19	59	13-59
	Inland Silverside	0	--	0	--
2002	Delta Smelt	0	--	31	16-45
	Striped Bass	3	12-16	115	9-35
	Threadfin Shad	17	10-22	7,824	9-42
	Inland Silverside	0	--	160	15-37

SOURCE: Nobriga et al. 2004

Under separate studies for a pilot desalination plant (Tenera 2010), the potential entrainment effects of a 25 million gallons per day (mgd) BARDP feedwater intake system at a site in east Contra Costa County was evaluated. An existing permitted intake, CCWD's Mallard Slough Pump Station (MSPS), located approximately 6.5 miles west of the proposed project in an unincorporated area near Pittsburg, California, was selected as the location for the pilot desalination plant. MSPS provides raw water to CCWD at a physical capacity of 40 mgd during times when the water quality is acceptable by diverting water from Mallard Slough through state-of-the-art 3/32-inch mesh wedge wire intake screens. The studies were designed to specifically address the following questions (Tenera, 2010):

- What are the species composition and abundance of larval fishes and fish eggs entrained by the BARDP pilot plant?

- What are the local species composition and abundance of entrainable larval fishes and fish eggs in the Mallard Slough source water?
- What are the potential impacts of entrainment losses on larval fish and fish eggs due to operation of a BARDP full-scale feedwater intake system?

The results of the entrainment studies for larval fish and fish eggs show the following (Tenera, 2010):

- Three taxa of larval fishes were collected during entrainment sampling–Prickly Sculpin, Longfin/Delta Smelts, and Bluegill/Redear sunfishes. Prickly Sculpin are an abundant native species and Bluegill and Redear sunfishes are abundant introduced species. As described above, both Longfin Smelt and Delta Smelt are listed species. These species were only collected during the sensitive fish period of January through June.
- No fish eggs were collected in entrainment or source water samples during the entire study.
- The species composition of larval fishes collected during the studies was consistent with published life history information for species found in Suisun Bay, along with documented collections from other studies conducted in Suisun Bay (Moyle 2002; Tenera 2010).
- Experimental entrainment surveys resulted in entrainment of relatively low amounts of special-status species (smelt); Antioch Intake would be smaller and, therefore, entrainment vulnerabilities would be expected to be commensurately less.

Egg and Larvae Entrainment Risk and Vulnerability Modeling:

As described above, for each species (i.e., Longfin and Delta Smelt), the total number of particles (representing eggs or larvae) assumed for the whole year (i.e., one billion) was multiplied by the monthly weights to give the number of particles at the start of each month (see **Table 3.3-3**). The percentage of particles lost was calculated based on the proportion of water diverted (existing conditions and with-project). The overall effect of the proposed project diversions is characterized below in terms of the number of particles entrained (calculated for existing conditions and with-project) and the percentage difference between with- and without-project scenarios. A summary of the input parameter values that were used to inform entrainment vulnerability modeling are provided in **Table 3.3-6**.

It is important to note that the entrainment effect should not be construed as an estimate of the actual level of entrainment that would occur. Simulated monthly conditions, a fixed spawning (and egg and larvae production) distribution, and the assumed transport characteristics of a life stage cannot accurately and fully characterize the complex conditions and variable time periods that affect the entrainment process. Model simulations were run over water years 1976 to 1991.

TABLE 3.3-6
INPUT PARAMETER VALUES FOR ENTRAINMENT VULNERABILITY MODELING SIMULATIONS

Month	Average NDO (MG)	Average Diversion (MG)		Egg/Larvae Presence (No. of Particles)	
		Existing Conditions	With Project	Delta Smelt	Longfin Smelt
Jan	695,022	127	280	0	250,000,000
Feb	948,885	186	285	100,000,000	350,000,000
Mar	1,063,806	237	312	250,000,000	200,000,000
Apr	591,773	351	418	350,000,000	100,000,000
May	414,472	293	399	250,000,000	0
Jun	315,904	172	338	50,000,000	0
Jul	249,664	62	292	0	0
Aug	156,570	31	271	0	0
Sep	197,383	77	273	0	0
Oct	148,874	117	306	0	0
Nov	326,834	78	264	0	0
Dec	536,285	87	279	0	100,000,000

Notes:
General: The model was simulated using monthly data over a 16-year model period of record. The average of those monthly values over the 16-year model period of record is shown in the table.
[1] Net Delta Outflow (NDO) was derived from DSM2 simulations.
[2] Average of simulated monthly Antioch intake operations with and without project over 16-year model period of record.
[3] Number of particles, representing eggs and larvae, inserted by month were consistent for every year in 16-year model period of record.

Results

Monthly mean percentage of net Delta outflow water diverted under the with-project scenario varied between 0.03 and 0.21 percent across the 1976-1991 model period of record. The differences in mean percent diversion between existing conditions and with-project scenarios was less than 0.16 percent across all months, ranging from 0.01 to 0.15 percent higher in the with-project scenario versus the existing conditions scenario.

Of the simulated one billion eggs or larvae produced annually under the 1976–1991 model period of record, the annual mean percentage of loss of Delta Smelt was low, with 0.11% entrained under the with-project scenario across all years. Monthly mean percentage entrainment in particles under the with-project scenario varied between 0.07 and 0.14 percent across all years (**Table 3.3-7**). The differences in mean percentage entrainment between existing conditions and with-project scenarios was less than 0.09% across all months, ranging from 0.03 to 0.09 percent higher in the with-project scenario versus the existing conditions scenario (**Table 3.3-7**).

TABLE 3.3-7
ENTRAINMENT VULNERABILITY MODELING SIMULATION RESULTS FOR DELTA SMELT

	Potential Entrainment (%)						Change from Existing Conditions (%)		
	No Project (Existing Conditions)			With Project					
Month	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Jan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Feb	0.033	0.000	0.128	0.092	0.008	0.205	0.060	0.008	0.077
Mar	0.036	0.000	0.096	0.072	0.006	0.165	0.035	0.006	0.069
Apr	0.087	0.000	0.151	0.118	0.017	0.201	0.032	0.017	0.049
May	0.070	0.000	0.156	0.137	0.030	0.227	0.067	0.030	0.071
Jun	0.049	0.000	0.158	0.135	0.032	0.168	0.086	0.032	0.010
Jul	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aug	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Oct	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dec	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

NOTE: N/A = NOT APPLICABLE (NO DATA).

Of the simulated one billion eggs or larvae produced annually under the 1976–1991 model period of record, the annual mean percentage of loss of Longfin Smelt was low, with 0.10% entrained under the with-project scenario across all years. Monthly mean percentage entrainment in particles under the with-project scenario varied between 0.07 and 0.16 percent across all years (**Table 3.3-8**). The differences in mean percentage entrainment between with project and without project scenarios was less than 0.15 percent across all months, ranging from 0.03 to 0.14 percent higher in the with-project scenario versus the existing conditions scenario (**Table 3.3-8**).

TABLE 3.3-8
ENTRAINMENT VULNERABILITY MODELING SIMULATION RESULTS FOR LONGFIN SMELT

	Potential Entrainment (%)						Change from Existing Conditions (%)		
	No Project (Existing Conditions)			With Project					
Month	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Jan	0.018	0.000	0.076	0.092	0.013	0.194	0.073	0.013	0.118
Feb	0.033	0.000	0.128	0.092	0.008	0.205	0.060	0.008	0.077
Mar	0.036	0.000	0.096	0.072	0.006	0.165	0.035	0.006	0.069
Apr	0.087	0.000	0.151	0.118	0.017	0.201	0.032	0.017	0.049
May	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jun	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jul	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aug	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Oct	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dec	0.015	0.000	0.117	0.158	0.011	0.280	0.143	0.011	0.163

NOTE: N/A = not applicable (no data).

In conclusion, potential entrainment of particles representing Delta Smelt and Longfin Smelt eggs and larvae at the Antioch diversion was modeled to be minimal, with an extremely low risk of significant entrainment mortality. In addition, the new diversion would include fish screen designed to meet or exceed applicable NMFS and CDFW criteria (and USFWS recommended guidelines for tidal waters), which would minimize the potential for fish entrainment and impingement for most species and life stages. As a result, the potential for the operation of the new intake to result in increased mortality of Delta and Longfin Smelt and other listed fish species would be a **less than significant**.

Impact 3.3-8: Operation of the proposed project, including discharge of brine waste, could result in direct mortality of fish species or degradation and/or loss of aquatic habitat. *(Less than Significant)*

The chemical constituents and physical behavior of brine discharge have the potential to pose a threat to aquatic organisms (Cooley et al. 2006). Extensive brine discharge, as it constitutes a hypersaline layer that sinks towards the seabed due to its greater density, has the potential to heavily affect local marine biota (Ahmed and Anwar 2012). Certain habitat types, organisms, and organismal life stages are at greater risk than others. Benthic organisms in the immediate vicinity of the discharge pipe are at the greatest risk from the effects of brine discharge (Cooley et al. 2006). Early life stages of fish species such as the egg and larval stages, are particularly vulnerable due to their limited or total lack of mobility to avoid plumes of high salinity water. Although marine or estuarine species are familiar to this fluctuation of salinity concentrations, they may not survive on this sudden augmentation of salinity due to brine disposal (Ahmed and Anwar 2012).

Similar to the impact analysis of impingement/entrainment, only the earliest life stages of fish (eggs and larvae) would likely be vulnerable to adverse effects of brine waste discharge due to their limited swimming abilities and inability to avoid the brine waste plumes. In particular, egg and larval life stages of Delta Smelt and Longfin Smelt are expected to be present in the project area during winter and spring months (CDFW 2009) and may be vulnerable to brine water discharge. Conversely, adult and juvenile fish will not occupy areas unsuitable for survival unless they have no other option. Therefore, while areas of brine water discharge may make habitat temporarily unavailable for juvenile and adult fishes, older life stages of fishes should be able to avoid direct impacts of brine water plumes.

In addition, fish species such as Chinook Salmon, Steelhead, Delta Smelt, and Longfin Smelt are generally believed to move through the upper half of the water column when migrating, and thus typically do not move along the river bottom in relatively deep channels like the San Joaquin River. Therefore, the vulnerability of these species to brine water plumes located near the channel bottom would be anticipated to be low, if these species were present during operations.

The reverse osmosis desalination process would generate on average, approximately 2 mgd of brine waste. Brine from the reverse osmosis system would be conveyed through an approximately

4.3-mile long, 12-inch-diameter dedicated pipeline (see Section 2.6.3, Brine Disposal for details). The diffuser pipe is 400 feet long and 42 inches in diameter, with three-inch diameter ports spaced eight feet on center and offset side to side, for a total of 50 ports discharging brine waste.

Extensive modeling of hydrologic and water quality conditions was performed using mixing and dispersion models to provide a quantitative basis from which to assess potential operational effects of the project alternatives associated with brine waste discharge on fisheries resources and aquatic habitats. Dilution of brine water discharge was evaluated using the Visual Plumes UM3 model. The model evaluated dilution achieved by the Delta Diablo Sanitation District (DDSD) diffuser at the edge of the zone of initial dilution (ZID) for the base (without-project) scenario and for a project scenario that assumed continuous operation of the proposed desalination facility.

The modeling used several conservative assumptions including a conservative assumption for the salinity of the brine water discharge. The brine water discharge was assumed to have a salinity of 32,000 mg/L expressed as TDS, corresponding to a river TDS of 8,000 mg/L; a river TDS concentration of 8,000 mg/L is near the peak salinity simulated to occur at the City's intake over the 16-year DSM2 modeling period of record. Under actual project operating conditions, the brine water discharge would be expected to have a concentration of approximately four times the river source water and, like the river source water, its salinity will vary over the tidal cycle. Therefore, the use of the peak brine concentration in the modeling is a conservative assumption that will result in lower simulated dilution than using a brine salinity calculated from the river (source) water for a given tidal cycle.

The ZID is defined as the area where mixing is driven primarily by the buoyancy and/or initial momentum of the discharge, and defines area where the process of initial dilution is completed. Therefore, the cumulative ZID across the 50 ports was used to determine the potential area of influence of brine discharge on aquatic species, since it was assumed that salinities returned to near-ambient levels outside of the ZID.

Modeling of brine water discharge across different operation scenarios showed relatively minor increases in salinities in the effluent plume under the proposed project versus existing conditions (see **Appendix D**, Table 8 of the Near-Field modeling results). Salinities at ZID under the minimum dilution modeling alternative ranged from 0.3 to 1.1 psu across operation scenarios (see **Appendix D**, Table 8 of the Near-Field modeling results). The maximum difference in salinity at ZID between the proposed project and existing conditions was 0.7 psu. In addition to small differences in plume salinities between the proposed project and existing conditions, the maximum ZID along the channel over the tidal cycle for all project alternatives under the proposed project ranged from 53 to 881 feet, resulting in an extremely small area of impact relative the expansive amount of fish habitat adjacent to the project site.

The modeled absolute values of salinities of brine discharge plumes and difference in salinities between proposed project and existing conditions scenarios, are unlikely to significantly impact early life stages of Delta Smelt and Longfin Smelt present in the project area. Delta smelt can tolerate a wide range of salinity conditions, mostly inhabiting salinities from 0 to 7 psu, but can tolerate up to 19 psu (Swanson and Cech 2000; Moyle 2002) and even sea water for short periods of time (Komoroske et al. 2014). Data from trawling surveys indicate that over 70 percent of juvenile and 60 percent of pre-adult Delta Smelt are caught at salinities less than 2 psu, with over 90 percent occurring at less than 7 psu (Bennett, 2005). Similarly, Longfin Smelt can tolerate a wide range of salinities, with larvae tolerating salinites up to 6-8 psu within weeks of hatching (USFWS 2012). Therefore, the modeled salinities are well-within the tolerance range of smelt species, and relatively small increases in salinity due to the proposed project fell within expected changes in salinities at the project site due to natural daily variation caused by the tidal cycle.

Also, recent distributional studies indicate that Delta Smelt can tolerate a much wider range of salinity conditions than previously believed (Moyle et al. 2016). For example, an increasingly higher percentage of smelt caught in various surveys are found in freshwater areas, year around, such as the Sacramento Deepwater Ship Channel and the Toe Drain of the Yolo Bypass (Merz et al. 2011; Sommer et al. 2011; Sommer and Mejia 2013). Therefore, due to their observed high tolerance for wide ranging salinity conditions, it is unlikely that minor local increases in turbidity levels within the tolerance range of the species due to brine water discharge outputs will significantly impact smelt that are present.

In conclusion, brine water discharge plumes are expected to only result in minor increases in salinities that are well within the tolerance range of Delta smelt and Longfin Smelt present in the project area. In addition, brine water plumes are expected to be relatively small relative to the available fish habitat present adjacent to the project site, and are expected to be easily avoided by juvenile and adult life stages of listed fish species. As a result, the potential for the operation of the new intake to result in increased mortality of Delta and Longfin Smelt and other special-status fish species would be a **less than significant**.

Cumulative Impacts

This section presents an analysis of the cumulative effects of the proposed project in combination with other past, present, and reasonably foreseeable future projects that could cause cumulatively considerable impacts.

The geographic area affected by the proposed project and its potential to contribute to cumulative impacts varies based on the environmental resource under consideration. The geographic scope of analysis for cumulative aquatic species impacts encompasses and is limited to the project site and its immediately adjacent area. This is because impacts relative to aquatic species are generally site-specific. For example, the effect of turbidity increases associated with construction would tend to be limited to the localized area of a project and could only be cumulative if increased turbidities occurred as the result of two or more adjacent projects that spatially overlapped.

The cumulative actions and projects considered in this cumulative effects analysis for aquatic resources include the following and are fully described in **Table 3-1** in Section 3.0, *Environmental Analysis Introduction*:

- California WaterFix (CA WaterFix), California Department of Water Resources (DWR) and U.S. Bureau of Reclamation (Reclamation)
- Los Vaqueros Reservoir Expansion Project, Contra Costa Water District and Reclamation

Impact 3.3-C-1 through C-4: Construction of the proposed intake facility in combination with other cumulative projects, could result in short-term degradation of aquatic habitat from (C-1) accidental spills or seepage of hazardous materials, (C-2) increased sedimentation and turbidity, (C-3) direct disturbance and mortality of fish from installation of cofferdams and dewatering, and (C-4) short-term degradation of aquatic habitat caused by an increase in hydrostatic pressure, underwater noise, and vibrations. ***(Less than Significant)***

The CA WaterFix project is expected to have substantial construction components that may lead to short-term degradation of aquatic habitat in the Delta, temporary increases in sedimentation and turbidity, direct disturbance or mortality of fish from construction and dewatering, and short-term habitat degradation due to hydrostatic pressure, underwater noise, or vibrations. While the CA WaterFix project would occur in the Delta, it is not expected to geographically overlap with the proposed project. As discussed above in Impacts 3.3-1 through 3.3-4, the state Construction General Permit would require each project to implement BMPs, water quality monitoring and reporting, post construction-period requirements, and other water quality pollutant-reduction techniques to protect degradation of beneficial uses. Adherence to the conditions of the General Construction Permit, construction windows, and permit requirements would minimize the risk of release of pollutants into receiving waters during construction activities and would minimize potential degradation of aquatic habitat and the associated harm to aquatic species. Additionally, the CA WaterFix project would be required to implement mitigation measures designed to minimize impacts associated with cofferdam installation, dewatering, and pile driving. Therefore, temporary impacts to aquatic habitat due to construction of multiple projects at the same time would not be cumulatively considerable and **less than significant**.

Impact 3.3-C-5: Construction of the proposed intake facility in combination with other cumulative projects would result in a loss of shallow water habitat. ***(Less than Significant)***

Similar to the proposed project, construction for CA WaterFix would require the alteration, or loss, of shallow water habitat. However, similar to the proposed project, implementation of mitigation measures as part of the CA WaterFix would likely reduce this impact to a less-than-significant level through restoration of habitat or the purchase of mitigation credits to ensure no net loss of shallow water habitat as a result of the project. Therefore, the impacts to shallow water habitat due to construction of multiple projects would not be cumulatively considerable and **less than significant**.

Impact 3.3-C-6: Operation of the proposed intake facility in combination with other cumulative projects could result in increased predation of fish. ***(Less than Significant)***

Similar to the proposed project, construction for CA WaterFix could lead to increased predation at newly constructed or expanded diversion facilities if conditions were favorable for predators to ambush or otherwise prey upon juvenile fish that may become injured or disoriented as they passed by the intake structure (including supporting infrastructure). However, similar to the proposed project, fish screens as part of CA WaterFix would be designed to avoid and/or minimize velocity gradients and in-water structures where predation on juvenile fish may be increased and attraction of predatory fish to the intake screen would be expected to be small to indiscernible relative to surrounding habitat conditions. As a result, the potential for the operation of the new intakes due to construction of multiple projects to result in increased predation on Chinook Salmon, Steelhead, Delta and Longfin Smelt, and other special-status fish species would be **less than significant**.

Impact 3.3-C-7: Operation of the proposed intake facility in combination with other cumulative projects could impinge and/or entrain fish, including fish eggs and larvae. ***(Less than Significant)***

Similar to the proposed project, construction for CA WaterFix and the Los Vaqueros Reservoir Expansion could lead to entrainment/impingement risks at new or expanded water diversion facilities to listed fish species. However, similar to the proposed project, new or expanded intake structures constructed for CA WaterFix or Los Vaqueros Reservoir expansion would be designed to minimize the potential for entrainment and impingement. Both projects would include intakes with fish screens designed to meet or exceed applicable NMFS and CDFW criteria (and USFWS recommended guidelines for tidal waters), which would minimize the potential for fish entrainment and impingement for most species and life stages. Specifically, entrainment or impingement of Chinook Salmon, Steelhead, and Green Sturgeon would be unlikely because these species would only be present in the vicinity of the intake as juvenile or adult life stages, which are not vulnerable to entrainment or impingement because fish screen design and operating criteria would be protective.

In addition to modeling the entrainment vulnerability of the new City of Antioch water intake under existing hydrology conditions (see Impact 3.3-7), a future scenario assuming CA WaterFix is operational was also modeled. Entrainment vulnerability modeling was conducted to evaluate the impact of CA WaterFix hydrology on the potential entrainment of egg and larval Delta Smelt and Longfin Smelt at the new City of Antioch water intake (**Tables 3.3-9** and **3.3-10**). Modeling results show a negligible effect associated with future CA WaterFix hydrology on potential entrainment, with maximum differences of only 0.09 and 0.21 percent entrainment across all months and water year types between with-project and existing conditions for Delta Smelt and Longfin Smelt, respectively.

Table 3.3-9
Results for Entrainment Vulnerability Modeling Simulations for Delta Smelt under Future Conditions (CA WaterFix)

Month	Potential Entrainment (%)						Change from Existing Conditions (%)		
	No Project (Existing Conditions)			With Project					
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Jan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Feb	0.031	0.000	0.126	0.080	0.009	0.183	0.049	0.009	0.057
Mar	0.036	0.000	0.091	0.073	0.007	0.169	0.038	0.007	0.078
Apr	0.081	0.000	0.170	0.122	0.016	0.186	0.042	0.016	0.016
May	0.046	0.000	0.152	0.127	0.030	0.217	0.080	0.030	0.065
Jun	0.029	0.000	0.112	0.115	0.035	0.158	0.086	0.035	0.046
Jul	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aug	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Oct	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dec	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

NOTE: N/A = not applicable (no data).

Table 3.3-10
Results for Entrainment Vulnerability Modeling Simulations for Longfin Smelt under Future Conditions (CA WaterFix)

Month	Potential Entrainment (%)						Change from Existing Conditions (%)		
	No Project (Existing Conditions)			With Project					
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Jan	0.013	0.000	0.047	0.095	0.014	0.260	0.082	0.014	0.213
Feb	0.031	0.000	0.126	0.080	0.009	0.183	0.049	0.009	0.057
Mar	0.036	0.000	0.091	0.073	0.007	0.169	0.038	0.007	0.078
Apr	0.081	0.000	0.170	0.122	0.016	0.186	0.042	0.016	0.016
May	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jun	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jul	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aug	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sep	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Oct	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nov	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dec	0.008	0.000	0.071	0.129	0.010	0.219	0.121	0.010	0.148

NOTE: N/A = not applicable (no data).

Therefore, the potential for the operation of the new intakes due to construction of multiple projects to result in increased entrainment/impingement on Delta Smelt and Longfin Smelt, and other special-status fish species would be **less than significant**.

Impact 3.3-C-8: Operation of the proposed project facility in combination with other cumulative projects, including discharge of brine waste, could result in direct mortality of fish species or degradation and/or loss of aquatic habitat. ***(Less than Significant)***

Construction of CA WaterFix and the Los Vaqueros Reservoir Expansion would not result in increased brine water discharge. Therefore, the cumulative impact of brine water discharge is expected to be **less than significant**.

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3.4 Terrestrial Biological Resources

Sections	Figures	Tables
3.4.1 Environmental Setting 3.4.2 Regulatory Framework 3.4.3 Analysis, Impacts, and Mitigation	3.4-1 Special-Status Vegetation Communities in the Vicinity of the Project Area 3.4-2 Critical Habitat in the Vicinity of the Project Area	3.4-1 Summary of Impacts – Terrestrial Biological Resources

This section describes and assesses the potential of the proposed project to result in significant adverse environmental impacts to special-status plants and wildlife, sensitive vegetation communities, and wetland resources. Aquatic resources are described and analyzed separately in Section 3.3*, Aquatic Biological Resources.*

No public comments were received during the scoping period that relate to terrestrial biological resources.

3.4.1 Environmental Setting

Regional Setting

The proposed project is located in the Bay Area-Delta Bioregion, as defined by the State's Natural Communities Conservation Program.[1] This bioregion includes a variety of natural communities such as shoreline areas that range from the open waters of San Francisco Bay and Delta to salt and brackish marshes, as well as upland habitats that include grassland, chaparral, and oak woodlands. The Bay Area Region has a Mediterranean climate with dry, hot summers and cool, wet winters. The high diversity of vegetation and wildlife found in the region is a result of soil, and topographic and microclimate variations that combine to promote relatively high levels of local plant and wildlife endemism, and species rarity.[2]

Project Setting

The proposed project is located in the northern end of Contra Costa County in the cities of Antioch and Pittsburg, California (**Figure 2-3**). For the purposes of this terrestrial biological resources section of the EIR, the project vicinity is defined as areas outside of the project footprint (area of direct impacts and pipeline alignment) but within the surrounding area. The project footprint is situated in an urban matrix and the project components are predominantly located in developed areas. The proposed project consists of three components: (1) intake pump

1 A bioregion is an area defined by a combination of ecological, geographic, and social criteria and consists of a system of related interconnected ecosystems. The Bay-Delta bioregion is considered the immediate watershed of the Bay Area and the Delta, not including the major rivers that flow into the Delta. It is bounded on the north by the northern edge of Sonoma and Napa Counties and the Delta and extends east to the edge of the valley floor; on the south, it is bounded by the southern edge of San Joaquin County, the eastern edge of the Diablo Range, and the southern edge of Santa Clara and San Mateo Counties.

2 *Endemism* refers to the degree to which organisms or taxa are restricted to a geographical region or locality and thus are individually characterized as endemic to that area.

station replacement and raw water pipeline connection; (2) desalination facility; and (3) brine discharge pipeline.

The intake pump station at the northern end of the project is at the edge of the San Joaquin River, the brine discharge pipeline and raw water connection pipeline routes traverse mostly urbanized areas. The Antioch Dunes National Wildlife Refuge (NWR) is a sensitive sand dune area located on the south shore of the San Joaquin River, approximately 0.15-miles to the east of the intake pump station.

The proposed project facilities, as described in Chapter 2, *Project Description* would be built over approximately 14 months, with various components proceeding in parallel. . Construction activities would use designated staging areas that are primarily on paved areas or gravel located in highly disturbed areas. This section discusses the location of the project components, the construction activities at each location, and the pipeline installation methods.

Vegetation Communities Habitats

This section describes the vegetation communities and habitats that occur in the project footprint. When possible, the vegetation community descriptions and terminology used are based on *A Manual of California Flora* (Sawyer and Keeler-Wolf, 1995), the California Department of Fish and Wildlife's (CDFW) *List of California Terrestrial Natural Communities Recognized by The California Natural Diversity Database* (CDFW, 2017), and Holland's *Preliminary Description of Terrestrial Natural Communities of California* (Holland, 1986). Vegetation communities are assemblages of plant species that occur together in the same area and are defined by species composition and relative abundance.

Habitat types occurring within the project footprint were directly observed by ESA biologists during a site visit in December 2017 and derived from review of satellite imagery. Habitats in the project footprint consist of barren and urban (developed) habitats and aquatic habitat in the San Joaquin River Delta. Other habitats that occur in the local vicinity of the project include non-native annual grasslands and riparian. The Antioch Water Treatment Plant and the Delta Diablo Wastewater Treatment Plant facilities support developed habitat that was examined using aerial imagery analysis.

Developed Habitats: Urban and Barren

The most abundant habitat type in the project footprint can be classified as urban. This habitat type includes unvegetated areas occupied by buildings, roads, parking lots, paved areas, and other developed facilities, as well vegetated areas that support ornamental landscaping (e.g., tree groves, street strips, shade tree/lawn, lawn, and shrub cover) or heavily disturbed areas. The proposed project is located mainly in the unvegetated road rights-of-way throughout the cities of Antioch and Pittsburg.

Urban portions of the project footprint are landscaped with non-native plant species, with few native species. Species observed in these habitats include eucalyptus species (*Eucalyptus* spp.), Washington fan palm (*Washingtonia robusta*), olive trees (*Olea* ssp.), coast live oak (*Quercus agrifolia*), Italian stone pine (*Pinus pinea*), lemon tree (*Citrus limon* sp.), fig tree (*Ficus carica*), California black walnut (*Juglans californica*), Peruvian pepper tree (*Schinus molle*), coast redwood (*Sequoia sempervirens*), and maple trees (*Acer* spp.). Other species observed include: giant reed (*Arundo donax*), crabgrass (*Digitaria* ssp.), and tobacco tree (*Nicotiana glauca*).

Landscape hedges and trees, which could support nesting birds tolerant of human activity, such as house sparrows, are present across the project vicinity. Eucalyptus trees and groves can serve as roosts, perches, and nest sites for raptors, such as red-tailed hawk (*Buteo jamaicensis*) and other birds, including American crow (*Corvus brachyrhynchos*). Wildlife species in urban areas must be able to tolerate the presence of humans and their activities and are typically generalists, capable of utilizing the limited food sources available, such as garbage and horticultural plants and their fruit. Urban wildlife species observed in developed areas of the project component sites include common grackle (*Quiscalus quiscula*), American crow, Eurasian collared-dove (*Streptopelia decaocto*), gull species (*Larus* spp.), and western scrub jay (*Aphelocoma californica*).

Delta

The Delta and associated aquatic biological resources are discussed in Section 3.3*, Aquatic Biological Resources*. The delta habitat type along the shoreline margins may provide resources for specific plants and birds and therefore is briefly discussed here. The delta is a large network of tidally influenced channels located at the confluence of the Sacramento and San Joaquin rivers, providing shallow open-water and emergent marsh habitat along the shoreline margins of sloughs and channels.

In the project vicinity near the existing river intake pump station, a narrow band of tules (*Scirpus* spp.) and floating vegetation including water hyacinth (*Eichhornia crassipes*) and other aquatic vegetation species are present at the waters' edge. The edge of the San Joaquin River in the project vicinity is characterized by development and riprap along the banks, and by a lack of near-shore structure, shading, and backwater areas, with relatively swift currents. Upland habitat near the water's edge within the project footprint includes a paved parking lot, paved boat launch, and a maintained non-native turfgrass field with landscaping trees including palms.

Non-Native Annual Grasslands

There is no annual grasslands habitat directly within the project footprint, although there are several locations where a chain-link fence is all that separates grasslands from the road rights-of-way. The largest such area is to the north of the Pittsburg-Antioch Highway near the Delta Diablo WWTP and at the Antioch Dunes NWR.

Annual grasslands consist of sparse to dense coverage of non-native grasses often associated with numerous other annual and perennial herbs. These grasslands typically occur on deeper soils in the gaps between oak and riparian forests, and also form the understory of several other plant communities. Annual grassland includes mostly non-native annual grasses and few non-native herbaceous forbs. Exotic grassland species generally respond well to moderate disturbance, such as grazing, which may have played a role in their widespread establishment. Annual grasslands provide a nearly continuous ground coverage, and generally have low habitat structure and diversity as a result of historic management and disturbances. Ruderal species, which are typically aggressively-growing, nonnative plants, appear where repeated disturbance such as vehicular traffic alters the natural ecosystem.

The dominant grass species observed in the project vicinity was wild oat (*Avena fatua*). Other common species associated with annual grasslands include: annual ryegrass (*Lolium multiflorum*), ripgut brome (*Bromus hordaceus*), and foxtail barley (*Hordeum murinum* var. *leporinum*). Herbaceous forbs observed include: great valley gumplant (*Grindelia* camporum), black mustard (*Brassica nigra*), and prickly Russian thistle (*Salsola tragus*). Other common species associated with annual grasslands include: California burclover (*Medicago polymorpha*), ox-tongue daisy (*Picris echioides*), star-thistles (*Centaurea* spp.), wild radish (*Raphanus sativa*), Italian thistle (*Carduus pycnocephalus*), filaree (*Erodium cicutarium*) and uncommonly, California poppy (*Eschscholzia californica*), California buttercup (*Ranunculus californica*), and dove lupine (*Lupinus bicolor*).

Many wildlife species use both native and non-native grasslands for refugia, nesting and foraging materials. The wooded habitats and landscaped trees adjacent to grasslands in the project footprint provide shelter and breeding and nesting habitat. No amphibians or reptiles were observed during the reconnaissance-level survey. Although, common amphibians that can be found in this community include: western toad (*Anaxyrus boreas*), Pacific tree frog (*Pseudacris regilla*), and California slender salamander (*Batrachoseps attenuatus*). Common reptiles in grassland habitats include: western fence lizard (*Sceloporus occidentals*), western skink (*Eumeces skiltonianus*), gopher snake (*Pituophis melanoleucus*), and western rattlesnake (*Crotalus viridus*), which are often found in association with woody debris or rocks.

Mammals observed during the reconnaissance-level survey include: California ground squirrel (*Otospermophilus beecheyi*) and fox squirrel (*Sciurus niger*). Expected common mammals in grassland habitats include: blacktail jackrabbit (*Lepus californicus*), Audubon’s cottontail (*Sylvilagus audubonii*), and Botta’s pocket gopher (*Thomomys bottae*). Raptors (birds of prey) including red-tailed hawk (*Buteo jamaicensis*), white-tailed kite (*Elanus leucurus*), red-shouldered hawk (*Buteo lineatus*), and northern harrier (*Circus cyaneus*) will forage for small rodents in these grassland areas, and use the surround landscaped trees as perches. Birds that nest and forage locally in grasslands include western meadowlark (*Sturnella neglecta*), red-winged blackbird (*Agelaius phoeniceus*), and song sparrow (*Melospiza melodia*). Avian species observed during the reconnaissance-level survey include: red-shouldered hawk, savannah sparrow (*Passerculus sandwichensis*), and white-crowned sparrow (*Zonotrichia leucophrys*).

Riparian

There is no riparian habitat directly within the project footprint, although there are two locations where this habitat type occurs in close proximity to the project. Both riparian corridors occur to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP. Riparian habitat throughout the project vicinity is formed by vegetation along drainage corridors that are sparse to dense woodlands and scrub, and in some disturbed areas riparian habitat is displaced by nonnative annual grassland. The dominate species observed in these areas include: arroyo willow (*Salix lasiolepis*), California black walnut, coast live oak, and Fremont's cottonwood (*Populus fremontii*). Other species common in riparian habitats include: Oregon ash (*Fraxinus latifolia*), red willow (*S. laevigata*), California bay (*Umbellularia californica*), and big-leaf maple (*Acer macrophyllum*). Below the tree canopy, a relatively dense understory of shrubs and sapling trees occurred and included: California and Himalayan blackberry (*Rubus ursinus* and *R. discolor*), rough cocklebur (*Xanthium strumarium*), and various rushes (*Juncus* spp.). Other species common as an understory include: mulefat (*Baccharis salicifolia*) and California wild rose (*Rosa californica*).

Riparian woodland (including mixed riparian and willow riparian scrub) habitat provides food, water, migration and dispersal corridors, breeding sites, and thermal cover for many resident and migratory wildlife species. Wooded stream edges serve as nesting sites and escape habitat for many species. Foliage, bark, and ground substrates provide a variety of foraging areas. Avian species observed during the reconnaissance-level survey include: Nuttall's woodpecker (*Picoides nuttalli*), bushtit (*Psaltriparus minimus*), and oak titmouse (*Baeolophus inornatus*). Other avian species that commonly forage for insects in riparian areas include: Bewick's wren (*Thryomanes bewickii*), black phoebe (*Sayornis nigricans*), and black-headed grosbeak (*Pheuticus melanocephalus*). Bark-insect foraging birds also occur in this habitat type include: acorn woodpecker (*Melanerpes formicivorus*), and white-breasted nuthatch (*Sitta canadensis*). Other bird species found in the riparian corridor include: dark-eyed junco (*Junco hyemalis*), chestnut-backed chickadee (*Poecile rufescens*), and brown creeper (*Certhia americana*).

No amphibians, reptiles or mammals were observed in the riparian corridor during the reconnaissance-level survey. Riparian woodlands provide habitat for reptiles and amphibians which include: western toad, Pacific tree frog, and Pacific slender salamander. Mammals that utilize these habits for nesting and foraging include: western harvest mouse (*Reithrodontomys megalotis*), deer mouse (*Peromyscus maniculatus*), western gray squirrel (*Sciurus griseus*), Virginia opossum (*Didelphis marsupialis*), and raccoon (*Procyon lotor*). Raptors such as red-shouldered hawk and red-tailed hawk, are attracted to these areas because of the presence of small rodents.

Special-Status Species

A number of plant and animal species known to occur in the proposed project vicinity are protected pursuant to federal and/or State endangered species laws, or are recognized as species of special concern by the California Department of Fish and Wildlife (CDFW). In addition, Section 15380(b) of the CEQA *Guidelines* provides a definition of rare, endangered, or threatened species that are not included in any listing. Species recognized under these terms are collectively referred to as "special-status species".

The initial analysis in this section was developed based on the following resources to prepare a list of plant and wildlife species considered for potential effects of the proposed project include:

- CDFW's California Natural Diversity Database ([CNDDB], (CDFW, 2017)),
- California Native Plant Society (CNPS) rare plant online inventory (CNPS, 2017), and
- U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) environmental conservation online system (USFWS, 2017).

Based on a review of the biological literature of the region, information provided by the CNDDB, and an evaluation of the habitat conditions of the project footprint and vicinity, a species was designated as:

- "absent" if: (1) the species' specific habitat requirements (e.g., serpentine grasslands, as opposed to grasslands occurring on other soils) are not present, or (2) the species is presumed, based on the best scientific information available, to be extirpated from the project footprint or region.
- "unlikely" for occurrence if: (1) its known current distribution or range is outside of the project footprint and vicinity or (2) only limited or marginally suitable habitat is present within the project footprint and vicinity.
- "moderate potential" for occurrence if: (1) there is low to moderate quality habitat present within the project footprint or immediately adjacent areas or (2) the project footprint is within the known range of the species, even though the species was not observed during biological surveys.
- "high potential" for occurrence if: (1) moderate to high quality habitat is present within the project footprint, and (2) the project footprint is within the known range of the species.

The initial analysis identified 62 special-status plants and 49 special-status wildlife species within the 9 USGS 7.5-minute topographic quadrangles surrounding the proposed project. These species, their potential habitat, and the potential for occurrence within the facilities or along the pipeline alignment as included in **Appendix C**. No buffer was given for alignments coincident with existing roadways. Along the pipeline alignment in road rights-of-way, the surrounding habitat and species likelihood of occurrence was considered and addressed in the table. Evaluations of habitat suitability for special-status species in the proposed project footprint and vicinity were based on a reconnaissance-level survey. No focused or protocol-level wildlife surveys were conducted in support of the proposed project. However, suitable habitat for several species occurs within the local project vicinity (e.g., within the Antioch Dunes NWR), though not necessarily in the project footprint. Species with the greatest potential to occur are discussed below.

Special-Status Plants

None of the special-status plant species identified in **Appendix C** are expected to occur on the project footprint due to the absence of habitat on the site, or because the project is outside of the species' known range. As discussed above, the project footprint is mostly developed and located in paved roads. The Antioch Dunes NWR, which is located approximately 0.15-mile from the pump station, provides habitat for several rare plant species, but is outside of the project footprint. The Dow Wetlands Preserve located north of the Pittsburg-Antioch Highway near the Delta Diablo WWTP also provides high quality grassland and marsh habitat, but is outside of the project footprint. Focused botanical surveys were not warranted for the project because the project component sites are entirely developed or disturbed and habitat for rare plant species was not identified on the San Joaquin River waterfront. In addition, no sensitive natural communities are present within the project footprint.

Special-Status Wildlife

Of the special-status animals listed in **Appendix C**, only species known to be present within the project footprint or classified as having a moderate or high potential for occurrence in the project vicinity were considered in the impact analysis and described in further detail below. There is only one listed species, Swainson's hawk (*Buteo swansonii*) that had moderate or high potential to occur in the project vicinity. There are several other California species of special concern that had a moderate or high potential to occur in the project vicinity and are also discussed below.

Species Accounts

Birds

Swainson's Hawk (Buteo swansonii)

Swainson's hawk is a state-listed threatened species. These medium-sized opportunistic predators feed on rodents, rabbits, bats, large arthropods, amphibians, reptiles, birds, and, rarely, fish. This species arrives in California in late February and departs for wintering grounds in early September. Eggs are typically laid in April and early May. Swainson's hawks reside in a wide variety of open habitats, including prairies, grasslands, and intensively farmed areas. Nests on platform of sticks, bark, fresh leaves in a tree, bush or utility pole that is 4-100 feet above ground. Nests are usually constructed in riparian corridors adjacent to agricultural fields or pastures. Swainson's hawks were historically distributed throughout the lowlands of California, absent only from the Sierra Nevada, north Coast Ranges and Klamath Mountains, and portions of the southern California deserts. Currently, the highest density occurs in the Central Valley, between Sacramento and Modesto, and in the northern San Joaquin Valley.

There is suitable nesting habitat located throughout the project vicinity due to large eucalyptus and other landscape trees. No nests were observed during the reconnaissance-level survey. Foraging grassland habitat is located in the vicinity of the project footprint, especially in a large swath located to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP. A 2015 nesting record is reported 1.6 miles to the east southeast of the project footprint (CDFW, 2017).

Cooper's Hawk (Accipiter cooperii)

Cooper's hawk is protected under Section 3503.5 of the California Fish and Game Code. Cooper's hawks are a mid-sized woodland raptor that breeds throughout much of the United

States. They nest in dense strands of live oak, riparian deciduous areas and other forest habitats near water. Nests are a stick platform with lined bark, located in tree crotches 10 to 80 feet above the ground. Cooper's hawks have also been documented nesting in residential neighborhoods in the East San Francisco Bay Area since the early 2000s (Pericoli, 2004), a sign of their tolerance for human disturbance and habitat fragmentation. Cooper's hawks hunt small songbirds at the woodland edge, as well as small mammals, reptiles and amphibians. This species use cover to hide, attack, and approach prey, but may also soar and make low gliding search flights.

Although there are no documented nesting sites near the project alignment, there is suitable nesting habitat located in the riparian corridors in the vicinity of the project footprint.

Burrowing Owl (Athene cunicularia)

Burrowing owl is a California species of special concern. Burrowing owls are year-round California residents of open, dry grassland and desert habitats. They are frequently found in low, open grasslands where large rodent burrows are available for nesting. Breeding takes place from March through August, with a peak in April and May. The young emerge from the burrow at about two weeks of age, and can fly at four weeks. Ground squirrel colonies provide a potential source of burrows for this owl. The burrows are often lined with grass, debris, and feathers.

Hunting occurs both day and night. Prey species are primarily insects, but also include small mammals, reptiles, birds, and carrion. Burrowing owls may hunt by hovering, diving from above, or pursuing their prey on the ground. However, they often hunt from a perch, and also use perches to thermoregulate. Although burrowing owls in northern California are thought to migrate, owls within central and southern California are predominantly non-migratory.

There is suitable habitat in the vicinity of the project footprint for burrowing owls. The annual grasslands with a few scattered shrubs for perches are located to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP. The nearest CNDDB record is located 0.3 miles to the south, in an area that was marked for development in 2008 (CDFW, 2017).

White-tailed Kite (Elanus leucurus)

White-tailed kite is a California Fully Protected species and is protected under Section 3503.5 of the California Fish and Game Code. This species is a yearlong resident in coastal and valley lowlands, inhabiting herbaceous and open stages of cismontane woodlands. White-tailed kites forage in undisturbed, open grasslands, meadows, farmlands, and emergent wetlands. They soar, glide and hover over prey items like voles, other small diurnal mammals, occasionally birds, insects, reptiles, and amphibians. White-tailed kites are monogamous and breed from February to October, with a peak from May to August. They place a loosely piled stick and twig nest on top of an oak, willow or other tree stand near foraging locations approximately 20 to 100 feet above the ground. The female will incubate 4 to 5 eggs for approximately 28 days, with young fledging in 35 to 40 days.

There is suitable nesting and foraging habitat located in the vicinity of the project footprint. The highest quality habitat in the vicinity of the project is to the north of the Pittsburg-Antioch

Highway near the Delta Diablo's WWTP. In 1985, a nesting record was recorded 0.2 miles away from the pipeline alignment near the Delta Diablo's WWTP. Potential nesting habitat at the Dow Wetlands Preserve and at the Antioch Dunes NWR provides potential nesting areas in the eucalyptus trees and willows, which is outside of the project footprint.

American Peregrine Falcon (Falco peregrinus anatum)

The American peregrine falcon is a state fully-protected species and is also protected under Section 3503.5 of the California Fish and Game Code. This species breeds near wetlands, lakes, rivers, or other water on high cliffs, banks, dunes, or mounds. The nest is a scrape on a depression or ledge in an open site, but peregrine falcons will nest on man-made structures and occasionally uses tree or snag cavities or old raptor nests. Peregrine falcons feed by swooping from flight onto flying prey, chases in flight, but rarely hunts from a perch. They feed on a variety of birds up to duck size, occasionally taking a mammal, insect or fish.

Potential foraging habitat occurs in the vicinity of the project footprint for this species; however, nesting habitat was not identified in the project footprint.

Salt Marsh Common Yellowthroat (Geothlypis trichas sinuosa)

Salt marsh common yellowthroat is a California species of special concern. It breeds and winters in wet meadows, riparian corridors, fresh and saline water emergent habitats, and occasionally grasslands. Nests are usually placed on or within 3 inches of the ground, but may be over water in emergent aquatic vegetation, dense shrubs, or other dense growth. Forage items primarily include terrestrial invertebrates such as insects, spiders, caterpillars and other larvae, but seeds are taken as well.

Low quality nesting habitat is available at the San Joaquin River waterfront at the River Intake Pump Station, within tules and water hyacinth. The nearest CNDDB record is located 1.5 miles to the north northwest of the project vicinity on Browns Island and Kimball Island (CDFW, 2017).

Loggerhead Shrike (Lanius ludovicianus)

Loggerhead shrike is a California species of special concern. It prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. The highest density of loggerhead shrikes occurs in open-canopied valley foothill hardwood, valley foothill hardwood-conifer, valley foothill riparian, pinyon-juniper, juniper, and desert riparian. This species will rarely occur in heavily urbanized areas. Loggerhead shrikes nest on a stable branch in a densely-foliaged shrub or tree, that is usually well concealed, and placed 2 to 50 feet above the ground. They forage on large insects, but will also take small birds, mammals, amphibians, reptiles, fish, carrion, and various other invertebrates. They search for prey from a perch and usually fly directly to prey on the ground. Loggerhead shrikes frequently skewer prey on thorns, sharp twigs, barb wire, or forces prey into a crotch to feed on or cache for feeding later.

There is suitable nesting habitat located in grasslands at the Antioch Dunes NWR and at the Dow Wetlands Preserve within the vicinity of the project footprint. The closest CNDDB record is located 5.6 miles to the east of the project footprint.

Other Nesting Birds

Fish and Game Code Sections 3503 and 3503.5, and the Migratory Bird Treaty Act protect raptors and passerines and their eggs and nests from incidental "take." These protections apply to special-status birds identified in **Appendix C** and other common birds that may nest in or near the project alignment.

Bat Species

The Western red bat (*Lasiurus blossevillii)*, a California species of concern, is the only special-status bat species that roosts locally. Though specific habitats vary among species, the sensitive species of bats identified generally inhabit woodlands and forests and roost in buildings, mines, caves, crevices, cliff faces, tunnels, bridges, or beneath tree bark. Bats are nocturnal feeders, that catch insects in flight. Prey items include: moths, flies, beetles, and other insects. Most bats require a nearby water source.

Western red bat (*Lasiurus blossevillii*)

This species roosts primarily in trees on edge habitats adjacent to streams, field or urban areas. Western red bats require a nearby water source. Their preferred roosting locations are protected from above, below, and located above dark ground cover for protection. Foraging begins 1 to 2 hours after sunset and they may forage throughout the night. This species is frequently seen foraging in large concentrations from high above tree tops to nearly ground level. Western red bats are a seasonal migratory movement species, but most individuals make relatively short trips between winter and summer ranges.

Large trees in riparian corridors near the project footprint may provide roosting habitat for this species. Two such corridors are located to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP. These riparian corridors are near the proposed brine discharge pipeline alignment.

Special-Status Vegetation Communities

A sensitive natural community or special-status vegetation community is a biological community that is regionally rare, provides important habitat for wildlife, is structurally or ecologically complex, or is in other ways of special concern to local, state, or federal agencies. Most sensitive natural communities are given special consideration because they perform important ecological functions, such as maintaining water quality and providing essential habitat for plants and wildlife. Some plant communities support a unique or diverse assemblage of plant species and therefore are considered sensitive from a botanical standpoint. The most current version of the CDFW's *List of California Terrestrial Natural Communities* (CDFW, 2010), available through the CNDDB, indicates which natural communities are of special-status given the current state of the California classification.

Stabilized interior dunes is the only sensitive natural community identified in the project vicinity, which occurs at the Antioch Dunes NWR, approximately 0.15-mile to the east of the intake pump station site (**Figure 3.4-1**). Field surveys verified that the boundary of this habitat does not overlap with the intake pump station site; thus the demolition of the existing pump station and construction of a new pump station are not near any stabilized interior dunes. There are no other sensitive natural communities found in the vicinity of the project footprint.

Critical Habitat for Listed Species

Critical habitats are areas considered essential for the conservation of a species listed as endangered or threatened under the federal Endangered Species Act. Critical habitats are specific geographic areas that contain features essential for conservation of listed species and may require special management and protection. Critical habitat may include an area not currently used by an endangered or threatened species, but that will be needed for species recovery. Projects involving a federal agency or federal funding are required to consult with the USFWS to ensure that project actions will not destroy or adversely modify critical habitat.

Critical habitat for the Contra Costa wallflower (*Erysimum capitatum* var. *angustatum*) and Antioch Dunes evening-primrose (*Oenothera deltoides* ssp. *howellii*) is present in the vicinity of the project footprint (**Figure 3.4-2**). The critical habitat is located at the Antioch Dunes NWR, approximately 0.15-mile east of the River Intake Pump Station. This critical habitat was designated, mapped and published in the Federal Register on February 8, 1977. The location of the critical habitat unit was additionally published on August 31, 1978 for these two species. The critical habitat designation included requirements that are necessary for the survival and recovery of these listed species, but excluded areas of "existing man-made structures of settlements which area not necessary to the normal needs of survival of the species" (Federal Register, 1978). The River Intake Pump Station is outside of critical habitat for these species.

Wetlands and Other Waters of the United States

The only jurisdictional aquatic feature within the project footprint is the San Joaquin River, which is regulated by the U.S. Army Corps of Engineers (USACE) as a navigable waters of the U.S. under Section 10 of the Rivers and Harbors Act of 1899 and as Waters of the U.S. under Section 404 of the Clean Water Act (CWA) (see Federal Regulation of Wetlands and Other Waters, below). A narrow band of shoreline vegetation (tules) may additionally be regulated as wetlands under Section 404 of the CWA. San Joaquin River is also regulated under Section 401 of the CWA by the Central Valley Regional Water Quality Control Board as Waters of the State.

Wildlife Movement Corridors

Wildlife movement corridors are considered an important ecological resource by CDFW and USFWS, and are regulated under CEQA. Movement corridors may provide favorable locations for wildlife to travel between different habitat areas such as foraging sites, breeding sites, cover areas, and preferred summer and winter range locations. They may also function as dispersal corridors allowing animals to move between various locations within their range. Topography and other natural factors, in combination with urbanization, can fragment or separate large open-

SOURCE: Contra Costa County 2014; ESA 2017; Carollo 2017; CNDDB 2017; NAIP 2016

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Brackish Water Desalination Facility

Figure 3.4-1
Special-Status Vegetation Communities in the Vicinity of the Project Area

ESA

SOURCE: Contra Costa County 2014; ESA 2017; Carollo 2017; CNDDB 2017; NAIP 2016

Brackish Water Desalination Facility

Figure 3.4-2
Critical Habitat in the Vicinity of the Project Area

ESA

space areas. Areas of human disturbance or urban development can fragment wildlife habitats and impede wildlife movement between areas of suitable habitat. This fragmentation creates isolated "islands" of vegetation that may not provide sufficient area to accommodate sustainable populations, and can adversely affect genetic and species diversity. Movement corridors mitigate the effects of this fragmentation by allowing animals to move between remaining habitats, which in turn allows depleted populations to be replenished and promotes genetic exchange between separate populations.

The CDFW's California Essential Habitat Connectivity (CEHC) online data viewer provides a resource to view statewide areas of natural landscape blocks, areas that connect these landscape blocks, and areas that are important for biological conservation (CDFW, 2017a). The project footprint is not located in any CEHC habitat classifications. The nearest landscape block is located to the south of the project footprint in the Black Diamond Mines Regional park, Contra Loma Regional Park, Antioch Community Park and Lone Tree Golf course. Along the San Joaquin River, Sherman Island and Chipps Island are also considered important landscape blocks. No wildlife corridors were identified in the project footprint.

3.4.2 Regulatory Framework

Federal

Federal Endangered Species Act

The Secretary of the Interior (represented by the USFWS) and the Secretary of Commerce (represented by the National Marine Fisheries Service [NMFS]) oversee the federal Endangered Species Act (FESA). Section 7 of the FESA mandates that all federal agencies consult with the USFWS and NMFS to ensure that federal agencies actions do not jeopardize the continued existence of a listed species or destroy or adversely modify critical habitat for listed species. The federal agency is required to consult with the USFWS and NMFS if it determines a "may effect" situation will occur in association with its action(s). The FESA prohibits the unlawful "take"[3] of any fish or wildlife species listed as threatened or endangered, including the destruction of habitat that could hinder species recovery.

Under Section 9 of the FESA, the take prohibition applies only to wildlife and fish species. However, Section 9 does prohibit the removal, possession, damage, or destruction of any endangered plant from federal land. Section 9 also prohibits acts to remove, cut, dig up, damage, or destroy an endangered plant species in non-federal areas in knowing violation of any state law or in the course of criminal trespass. Candidate species and species that are proposed or under petition for listing receive no protection under Section 9 of the FESA.

Section 10 of the FESA requires the issuance of an "incidental take" permit before any public or private action may be taken that would potentially harm, harass, injure, kill, capture, collect, or

[3] Take is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such conduct.

otherwise hurt (i.e., take) any individual of an endangered or threatened species. The permit requires preparation and implementation of a habitat conservation plan that would offset the take of individuals that may occur, incidental to implementation of the project by providing for the overall preservation of the affected species through specific mitigation measures.

Under FESA, the USFWS designates critical habitat for listed species. Critical habitat designations are specific areas within a geographic region that are occupied by a species and determined to be critical to its survival in accordance with FESA. Federal entities issuing permits or acting as a lead agency must show that their actions do not negatively affect the critical habitat to the extent that it impedes the recovery of the species. Within designated critical habitat, USFWS protects habitat that provides the primary constituent elements (PCEs) for survival of the listed species. PCEs are the physical and biological functions considered essential to species conservation that require special management considerations or protection.

Federal Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (MBTA) (16 USC, Section 703, Supp. I, 1989), as amended by the Migratory Bird Treaty Reform Act, prohibits killing, possessing, or trading in migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. The act addresses whole birds, parts of birds, and bird nests and eggs. For projects that would not cause direct mortality of birds, the MBTA is generally interpreted in CEQA analyses as protecting active nests of all species of birds that are included in the “List of Migratory Birds” published in the Federal Register in 1995 and as amended in 2005. Though the MBTA allows permits to be issued for import and export, banding, scientific collecting, taxidermy, and rehabilitation, among other reasons, there is no provision in the MBTA that allows for species take related to creation or other development (Code of Federal Regulations, Title 50: Wildlife and fisheries Part 21; Migratory Bird Permits).

Rivers and Harbor Act and Clean Water Act

The Secretary of the Army (represented by the USACE) has permitting authority over activities affecting waters of the U.S. under Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) and Section 404 of the CWA (33 USC 1344). Waters of the U.S. are defined in Title 33 CFR Part 328.3(a) and include a range of wet environments such as lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds. Section 10 of the Rivers and Harbor Act requires a federal license or permit prior to accomplishing any work in, over, or under navigable[4] waters of the U.S., or which affects the course, location, condition or capacity of such waters. Section 404 of the CWA requires a federal license or permit prior to discharging dredged or fill material into waters of the U.S., unless the activity is exempt (33 CFR 324.4) from Section 404 permit requirements (e.g., certain farming and forestry activities). To obtain a federal license or permit, project proponents must demonstrate that they have attempted to avoid the resource or minimize impacts on the

[4] “Navigable waters of the United States” (33 CFR Part 329) are defined as water that have been used in the past, are now used, or are susceptible to use as a means to transport interstate or foreign commerce up to the head of navigation.

resource; however, if it is not possible to avoid impacts or minimize impacts further, the project proponent is required to mitigate remaining project impacts on all federally-regulated waters of the U.S.

Section 401 of the CWA (33 USC 1341) requires any project proponents for a federal license or permit to conduct any activity including, but not limited to, the creation or operation of facilities, which may result in any discharge into navigable waters of the U.S. to obtain a certification from the state in which the discharge originates or would originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over the navigable waters at the point where the discharge originates or would originate, that the discharge will comply with the applicable effluent limitations and water quality standards. A certification obtained for the creation of any facility must also pertain to the subsequent operation of the facility. The responsibility for the protection of water quality in California rests with the SWRCB and its nine RWQCBs.

State

California Endangered Species Act

California implemented its own Endangered Species Act in 1970. The State act prohibits the take of endangered and threatened species; however, habitat destruction is not included in the State's definition of take. Section 2090 of California Endangered Species Act (CESA) requires State agencies to comply with endangered species protection and recovery and to promote conservation of these species. The CDFW administers the act and authorizes take through Section 2081 agreements (except for designated "fully protected species").

State-listed plants are protected mainly in cases where State agencies are involved in projects under CEQA. In this case, plants listed as rare under the California Native Plant Protection Act are not protected under CESA but can be protected under CEQA.

California Fully Protected Species and Species of Special Concern

The classification of "fully protected" was the CDFW's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction. Lists were created for fish, amphibian and reptiles, birds, and mammals. Most of the species on these lists have subsequently been listed under CESA and/or FESA. The California Fish and Game Code sections (fish at Section 5515, amphibian and reptiles at Section 5050, birds at Section 3511, and mammals at Section 4700) dealing with "fully protected" species states that these species "…may not be taken or possessed at any time and no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected species," although take may be authorized for necessary scientific research. This language makes the "fully protected" designation the strongest and most restrictive regarding the "take" of these species. In 2003, the code sections dealing with fully protected species were amended to allow the CDFW to authorize take resulting from recovery activities for State-listed species.

Species of Special Concern are broadly defined as animals not listed under the FESA or CESA, but which are nonetheless of concern to the CDFW because are declining at a rate that could result in listing or historically occurred in low numbers and known threats to their persistence currently exist. This designation is intended to result in special consideration for these animals by the CDFW, land managers, consulting biologists, and others, and is intended to focus attention on the species to help avert the need for costly listing under FESA and CESA and cumbersome recovery efforts that might ultimately be required. This designation also is intended to stimulate collection of additional information on the biology, distribution, and status of poorly known at-risk species, and focus research and management attention on them. Although these species generally have no special legal status, they are given special consideration under the CEQA during project review.

Regarding rare plant species, CESA defers to the California Native Plant Protection Act (NPPA) of 1977 (California Fish and Game Code Sections 1900-1913), which prohibits importing of rare and endangered plants into California, taking of rare and endangered plants, and selling of rare and endangered plants. The California Native Plant Society (CNPS) also identifies rare or endangered plants and ranks their rarity as 1A, 1B, 2, 3, and 4 species. Plant species with a California Rare Plant Rank 1A, 1B, or 2 are considered to meet CEQA significance criteria and Fish and Game Code sections 1901, 2062 and 2067 criteria as rare or endangered species.

California Fish and Game Code 3503

Fish and Game Code (FGC) Section 3503 establishes that 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. In addition, birds of prey are protected under FGC Section 3503.5, which states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes (diurnal birds of prey) or Strigiformes (owls) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to nest abandonment. The CDFW considers any disturbance that causes nest abandonment and/or loss of reproductive effort to be "taking."

California Department of Fish and Game Code Sections 1600-1616

The CDFW regulates activities that would interfere with the natural flow of, or substantially alter, the channel, bed, or bank of a lake, river, or stream. These activities are regulated under FGC Sections 1600 to 1616. Requirements to protect the integrity of biological resources and water quality are often conditions of streambed alteration agreements. Requirements may include avoidance or minimization of the use of heavy equipment, limitations on work periods to avoid impacts on wildlife and fisheries resources, and measures to restore degraded sites or compensate for permanent habitat losses. A Streambed Alteration Agreement may be required by CDFW for construction activities that have the potential to result in an accidental release into a jurisdictional area.

State Water Resources Control Board

The federal CWA requires that the discharge of dredged or fill material into waters of the U.S. does not violate state water quality standards. Applicants for Section 404 or Section 10 permits must obtain a certification from the state.

Pursuant to the Porter-Cologne Act, each of California's nine Regional Water Quality Control Board's (RWQCB) must prepare and periodically update basin plans that set forth water quality standards for surface and groundwater, as well as actions to control nonpoint and point sources of pollution to achieve and maintain these standards. Basin plans offer an opportunity to achieve wetlands protection based on water quality standards. Water quality for the area including the San Joaquin River is under the jurisdiction of the Central Valley RWQCB.

Local

The cities and county that the project footprint falls within contain goals and policies within their general plans that could apply to biological resources and the proposed project.

City of Antioch General Plan

The City of Antioch General Plan was last updated in 2003, and represents a comprehensive effort to achieve goals that address the expanding employment base, the residential growth, the ongoing traffic congestion, and re-establishing the Rivertown area and waterfront (City of Antioch, 2003). The general plan also provides goals and objectives that are relevant to resource management. The following goals and policies from the Antioch General Plan are relevant to biological resources in the vicinity of the project footprint.

> **10.2: Goals of the Resources Management Element.** Conserve and enhance the unique natural beauty of Antioch's physical setting, and control the expansion of urban development by protecting open space where it is important to preserve natural environmental processes and area of cultural and historical value.
>
> > ***Objective 10.4.1:*** Preserve natural streams and habitats supporting rare and endangered species of plants and animals.

City of Antioch Tree Ordinance

The City of Antioch Tree Ordinance from 1994, provides protection to specific native and non-native trees that greatly add to the aesthetic quality of the city, are horticultural landmarks, or areas of oak woodland that are worthy of protection. The intent of this ordinance is to regulate the removal of trees, with the goal of retaining as many trees as possible. The following is definitions from the ordinance that maybe relevant if any of the below trees are required for removal, and may require a removal permit (City of Antioch, 1994).

> **Tree:** Shall mean a usually a tall woody plant, distinguished from a shrub by having a comparatively greater height and, characteristically, a single trunk rather than several stems. To be considered a "tree", the subject species' height at maturity should be no less than 15 feet.

Established Tree: Shall be any tree which is at least 10 inches in diameter, measured at 4.5 feet above natural of finished grade. Established trees include Mature and Landmark trees as defined by this Ordinance.

Mature Tree: Shall be any tree which is at least 26 inches in diameter, measured at 4.5 feet above natural grade.

Landmark Tree: Shall be any tree which is at least 48 inches in diameter and/or in excess of 40 feet in height.

Indigenous Tree: Shall be naturally growing tree of the following species: Blue Oak (*Quercus douglasii*), Valley Oak (*Quercus lobata*), Coast Live Oak (*Quercus agerifolia*), Canyon Live Oak (*Quercus chrysolepis*), Interior Live Oak (*Quercus wislizennii*), California Buckeye (*Aesculus californica*), or California Bay (*Umbellularia californica*).

Street Tree: Shall be any tree planted within either the public right-of-way and/or tree planting easement, where applicable.

Protected Tree: Shall be defined as any of the following:

i) any tree required to be preserved as a condition of an approval from a “regular development application” as defined by this section, and/or any tree that is shown to be preserved on an approved development plan as submitted by the applicant and subsequently approved by the City;

ii) all established indigenous trees as defined by this section;

iii) all street trees as defined by this section;

iv) all mature and landmark trees defined by this section.

City of Pittsburg General Plan

The Pittsburg’s General Plan for 2020 addresses issues related to the physical development, growth, and conservation of resources in the City’s planning area. It outlines a vision of long-range physical and economic development and hillside and resource conservation that reflects the aspirations of the community (City of Pittsburg, 2001). The following goals and policies from the Pittsburg’s General Plan are relevant to the biological resources in the project vicinity.

Goal RC 9-G-1: Biological Resources and Habitat. Protect conservation areas, particularly habitats that support special status species, including species that are State or Federally listed as endangered, threatened, or rare.

Policy RC 9-P-1: Ensure that development does not substantially affect special status species, as required by State and federal agencies. Conduct assessments of biological resources as required by CEQA prior to approval of development within habitat areas of identified special status species.

Policy RC 9-P-9: Establish creek setbacks along riparian corridors, extending a minimum of 50 to 150 feet laterally on each side of the creekbed. Setback buffers for habitat areas of identified special status species and wetlands may be expanded as needed to preserve ecological resources.

East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan

The East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (East County HCP/NCCP), approved in July 2007, provides a comprehensive framework for species and ecosystem conservation, short- and long-term local land use decision-making in a rapidly urbanizing region, and environmental permitting processes (East County HCPA, 2007). The East County HCP/NCCP was developed by the East Contra Costa County Habitat Conservation Plan Association (East County HCPA), which was formed in 2000. The East County HCPA was a Joint Powers Authority consisting of seven entities: Contra Costa County, Contra County Water District, East Bay Regional Park District, and the Cities of Brentwood, Clayton, Oakley, and Pittsburg. Upon approval of the HCP/NCCP and issuance of the permits, the HCPA ceased to exist, and implementation of the plan is now managed by the East Contra Costa County Habitat Conservancy, which is composed of Contra Costa County and the cities of Brentwood, Clayton, Oakley, and Pittsburg.

The East County HCP/NCCP's primary goals are to prevent or minimize incidental take of covered species under FESA and CESA from reasonable and expected urban growth and to provide adequate safeguards for the protection of covered species in the plan area. As part of the East County HCP/NCCP approval, the East Contra Costa County Habitat Conservancy received permits from USFWS and CDFW authorizing incidental take. Participating local jurisdictions will be able to authorize development and other activities without proposing additional mitigation or conservation measures for covered species. The take permits are for 30 years, which coincides with the timeline applicable to all assessments made in the plan.

The East County HCP/NCCP's geographic scope or "inventory area," the area covered in the impact evaluation and by the conservation plan, is in eastern Contra Costa County. The inventory area covers about one-third (173,680 acres) of the 435,000-acre Contra Costa County and consists primarily of unincorporated agricultural and public lands. A combination of political, ecological, and hydrologic (watershed and shoreline) boundaries defines the inventory area.

3.4.3 Analysis, Impacts and Mitigation

Significance Criteria

Based on Appendix G of the CEQA *Guidelines*, the project would have a significant impact on biological resources 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 the California Department of Fish and Wildlife, the National Marine Fisheries Service, or U.S. Fish and Wildlife Service;

- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to, marsh, vernal pool, coastal, etc.) 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 tree preservation policy or ordinance; or
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan.

Methodology and Assumptions

Project components were evaluated using the above significance criteria. For purposes of this EIR, three principal factors were considered:

- Magnitude of the impact (e.g., substantial/not substantial),
- Uniqueness of the affected resource (rarity), and
- Susceptibility of the affected resource to perturbation (sensitivity).

The evaluation of significance considers the interrelationship of these three factors. For example, a relatively small magnitude impact to a state or federally listed species could be considered significant because the species is very rare and is believed to be very susceptible to disturbance. Conversely, a plant community such as California annual grassland is not necessarily rare or sensitive to disturbance. Therefore, a much larger magnitude of impact would be required to result in a significant impact. Impacts are generally considered less than significant if the habitats and species affected are common and widespread in the region and the state. Impacts are considered beneficial if the action causes no detrimental impacts and results in an increase of habitat quantity and quality.

Impacts and Mitigation Measures

Table 3.4-1 summarizes the proposed project's impacts and significance determinations related to terrestrial biological resources.

TABLE 3.4-1
SUMMARY OF IMPACTS – TERRESTRIAL BIOLOGICAL RESOURCES

Impacts	Significance Determinations
Impact 3.4-1: The proposed project could result in significant impacts, either directly or through habitat modifications, on species identified as sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service.	LSM
Impact 3.4-2: Development facilitated by the proposed project would not have a substantial adverse effect on riparian habitat or other sensitive natural communities identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.	NI
Impact 3.4-3: The proposed project could have a substantial adverse effect on state or federally-protected wetlands, 'other waters', and navigable waters through direct removal, filling, hydrological interruption, or other means	LSM
Impact 3.4-4: Development facilitated by the proposed project would not conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	LSM
Impact 3.4-5: Development facilitated by the proposed project would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.	NI
Impact 3.4-C-1: Cumulative impacts related to terrestrial biological resources.	LSM

NOTES:
NI = No Impact
LS = Less than Significant
LSM = Less than Significant with Mitigation

Impact 3.4-1: The proposed project could result in significant impacts, either directly or through habitat modifications, on species identified as sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service. (*Less than Significant with Mitigation*)

Potential project impacts were identified to a select number of special-status birds, migratory bird species, and one bat species, each of which has the potential to occur within or in the general vicinity of the project footprint. These potential impacts are described below in greater detail.

Nesting Birds

Migratory birds, including native raptor and passerine bird species, are known from the local project vicinity and may be expected to nest in the landscape trees, riparian corridors, and non-native annual grasslands surrounding the project footprint. Birds such as the western scrub jay and house finch (*Carpodacus mexicanus*) nest in landscape vegetation such as that found at the project footprint, and are protected by the MBTA and FGC. As discussed above, Swainson's hawk, Cooper's hawk, and white-tailed kite could potentially nest in trees in the project vicinity. Burrowing owl could potentially nest in the annual grasslands to the north of Pittsburg-Antioch Highway in the vicinity of the project footprint. Other species, such as loggerhead shrike and salt marsh common yellowthroat may nest in the vicinity of the project footprint but are more likely to just use the areas for foraging.

Construction disturbance from trenching, pipeline installment, building demolition, and building construction during breeding bird season in support of the proposed project could result in incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment of active nests within the vicinity of the proposed project footprint. Equipment staging and construction activities may result in indirect impacts to protected breeding birds resulting from construction noise and activity, even when the physical nest is unaffected. This impact would be considered significant. However, with implementation of **Mitigation Measure 3.4-1a (Pre-construction Nesting Bird Surveys)**, impacts to nesting birds would be reduced to less-than-significant.

<u>Mitigation Measure:</u>

Mitigation Measure 3.4-1a: Pre-construction Nesting Bird Surveys

The general raptor and passerine bird nesting period cited by CDFW is often cautiously interpreted as the period between February 1 and August 31. Breeding birds are protected under Section 3503 of the California Fish and Game Code (Code), and raptors are protected under Section 3503.5. In addition, both Section 3513 of the Code and the Federal Migratory Bird Treaty Act (16 USC, Sec. 703 Supp. I, 1989) prohibit the killing, possession, or trading of migratory birds. Finally, Section 3800 of the Code prohibits the taking of non-game birds, which are defined as birds occurring naturally in California that are neither game birds nor fully protected species.

In general, CDFW recommends a 250-foot construction exclusion zone around the nests of active passerine songbirds during the breeding season, and a 500-foot buffer for nesting raptors. These buffer distances are considered initial starting distances once a nest has been identified, and are sometimes revised downward to 100 feet and 250 feet, respectively, based on site conditions and the nature of the work being performed. These buffer distances may also be modified if obstacles such as buildings or trees obscure the construction area from active bird nests, or existing disturbances create an ambient background disturbance similar to the proposed disturbance.

a) Avian surveys shall be performed during breeding bird season (February 1 to August 31) no more than 14 days prior to ground disturbing or in-water construction activities in order to locate any active passerine nests within 250 feet of the project footprint and any active raptor nests within 500 feet of the project footprint. Building demolition, trenching, pipeline installation, and new construction activities performed between September 1 and January 31 avoid the general nesting period for birds and therefore would not require pre-construction surveys.

b) If active nests are found on either the proposed construction site, no-work buffer zones shall be established around the nests (100 to 150 feet for passerine birds and 150 to 250 feet for raptors, depending upon species sensitivity to disturbance) in coordination with CDFW. No staging, ground-disturbing, or construction activities shall occur within a buffer zone until young have fledged or the nest is otherwise abandoned as determined by the qualified biologist. If work during the nesting season stops for 14 days or more and then resumes, then nesting bird surveys shall be repeated, to ensure that no new birds have begun nesting in the area.

Significance After Mitigation: With the implementation of **Mitigation Measure 3.4-1a**, above, this impact would be reduced to a **less-than-significant** level because it proactively prevents impacts to bird species by determining presence or absence prior to construction activities. The use of no-impact buffer zones would also avoid impacts to active nests.

Special-status Bats

The Western red bat (*Lasiurus blossevillii*) may roost locally in trees adjacent to streams, field or urban areas. Several large trees in the riparian corridors in the vicinity of the project footprint may provide roosting habitat for this species. These corridors are located to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP.

If bats are present, project construction disturbances during the breeding season (April 15 through August 15) could result in incidental loss of pups, or otherwise lead to maternity roost abandonment of active colonies within the vicinity of the proposed project. Equipment staging and construction activities may result in indirect impacts to protected maternity roosts resulting from construction noise and activity, even when the physical location is unaffected. Noise pollution can be detrimental to wildlife, and bat populations can be particularly susceptible because they rely on acoustic signals for mating, predator evasion, and communication between adults and offspring, among other behaviors. This impact would be considered significant. However, with implementation of **Mitigation Measure 3.4-1b (Pre-construction Bat Survey)**, impacts to special-status bats would be reduced to less-than-significant.

<u>Mitigation Measure:</u>

Mitigation Measure 3.4-1b: Pre-construction Bat Survey

To minimize impacts on special-status bats, a preconstruction survey shall be performed from accessible lands, and no-disturbance buffers shall be created around active bat roosting sites, if found.

Prior to ground disturbing construction activities (i.e., ground clearing, trenching, and grading) within 200 feet of trees that could support special-status bats, a qualified bat biologist shall survey for special-status bats. If no evidence of bats (i.e., direct observation, guano, staining, or strong odors) is observed, no further mitigation shall be required.

If evidence of bats is observed, the following measures shall be implemented to avoid potential impacts on breeding populations:

a) A no-disturbance buffer of 200-feet shall be created around active bat roosts during the breeding season (April 15 through August 15). Bat roosts initiated during construction are presumed to be unaffected by the indirect effects of noise and construction disturbances. However, the direct take of individuals will be prohibited.

b) In the case that removal of trees showing evidence of bat activity is needed, tree removal shall occur during the period least likely to affect bats, as determined by a qualified bat biologist (generally between February 15 and October 15 for winter hibernacula, and between August 15 and April 15 for maternity roosts). Bat exclusion activities (e.g., installation of netting to block roost entrances) shall also be conducted during these periods.

The qualified biologist shall be present during any tree trimming and disturbance, if trees containing or suspected of containing bat roosts are present. Trees with roosts shall be disturbed only when no rain is occurring or is forecast to occur for 3 days and when daytime temperatures are at least 50 degrees Fahrenheit (°F). Branches and limbs not containing cavities or fissures in which bats could roost shall be cut only using chainsaws. Branches or limbs containing roost sites shall be trimmed the following day, under the supervision of the qualified biologist, also using chainsaws.

Significance After Mitigation: With the implementation of **Mitigation Measure 3.4-1b** listed above, this impact would be reduced to a **less-than-significant** level because it proactively prevents impacts to special-status bat species by determining presence or absence prior to construction activities and establishing buffer zones that avoid impacts.

Impact 3.4-2: Development facilitated by the proposed project would not have a substantial adverse effect on riparian habitat or other sensitive natural communities identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. (*No Impact*)

There is no riparian habitat located in the project footprint and no impacts would occur to riparian habitat that is located in the project vicinity. Stabilized interior dunes occur in the vicinity of the proposed project at the Antioch Dunes NWR, but will not be impacted by the intake pump station construction activities, approximately 0.15-mile away. No riparian habitat or sensitive natural communities were identified at the San Joaquin River waterfront. Therefore, **no impacts** would occur to riparian habitat or other sensitive natural communities.

<u>Mitigation Measure:</u>

None required.

Impact 3.4-3: The proposed project could have a substantial adverse effect on state or federally-protected wetlands, 'other waters', and navigable waters through direct removal, filling, hydrological interruption, or other means. (*Less than Significant with Mitigation*)

Before disturbing any jurisdictional water features, the City would obtain all required permit approvals from USACE, CDFW, RWQCB, and other agencies with permitting responsibilities for construction activities within jurisdictional waters. The San Joaquin River is the only jurisdictional feature that would be subject to construction impacts under the proposed project. Demolition of the existing River Intake Pump Station and construction of the new pump station pipelines and fish screens under the proposed project would result in in-water work in areas that are subject to regulation under the Rivers and Harbors Act and the Clean Water Act (Sections 404 and 401). In-water work would additionally include the installation of three 36-inch diameter pipelines and fish screens and removal of the existing pump station.

The aquatic work areas in the San Joaquin River support waters of the U.S. (and waters of the State), but no state or federally jurisdictional wetlands. A wetland delineation has not yet been performed for the proposed project; however, it is preliminarily estimated that removal of the intake pump station would result in the removal of approximately 0.02 acre (1,032 sq. ft.) of existing structures (pump station) and 0.02 acre (720 sq. ft.) of pipeline from the San Joaquin River; thereby reestablishing 0.04 acre of waters of the U.S. Construction of the new pipelines and fish screens would permanently fill a comparable amount of other waters of the U.S.; resulting in a rough balance in the amount of restored and impacted waters of the U.S. In addition, temporary impacts to aquatic habitat are anticipated that total from in-water construction area totaling approximately 0.28 acre. Effects to fisheries resources in the San Joaquin River resulting from these impacts are discussed in Section 3.3, *Aquatic Biological Resources*.

The project would involve installation of new pipelines and screened intakes, and the removal of piles and the existing pump station. As such, the project would have an adverse effect on federally protected waters of the U.S. through in-water fill and other in-water work. However, the City would be required to obtain and comply with the terms of authorizations from several resource agencies with jurisdiction over wetlands protection. For example, a Section 404 permit would be required from the USACE and a Section 401 permit needed from the RWQCB for the proposed project. The City would be required to comply with all applicable laws and by extension the terms of any required permits from the RWQCB, and other agencies, including consultation with the USFWS and NMFS under Section 7 of the Endangered Species Act, and with CDFW under Section 2080.1/2081of the California Fish and Game Code. Following such permitting and the implementation of **Mitigation Measure 3.4-3 (Recontour Aquatic Habitat and Remove Debris Following In-Water Construction)**, impacts related to federally protected wetlands would be **less than significant**.

<u>Mitigation Measure:</u>

Mitigation Measure 3.4-3: Recontour Aquatic Habitat and Remove Debris Following In-Water Construction

To mitigate impacts on waters of the U.S. in the San Joaquin River, it is estimated that the City will remove debris (e.g., concrete, the existing pipeline, and piers) and structures from the work area in an amount that is equal to or greater than the area of new facilities that will be introduced into the water. Because no wetlands (i.e., vegetated aquatic habitat) is present in the project footprint, the City need only restore the bottom contours of the San Joaquin River bed to emulate existing aquatic conditions at the site and no further shoreline restoration is needed. Specific water quality requirements during construction are identified in Section 3.10, *Local Hydrology and Water Quality*.

Significance After Mitigation: With the implementation of **Mitigation Measure 3.4-3**, this impact would be reduced to a **less-than-significant** level because it restores a comparable area of shoreline to the area that would be impacted by the proposed project.

Impact 3.4-4: Development facilitated by the proposed project would not interfere with the movement of 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. (*No Impact*)

The proposed project would not interfere with the movement of wildlife, such as native resident or migratory avian species; thus **no impact** would occur. This section only analyzed the project's potential impact on terrestrial species. Aquatic resources were described and analyzed separately in Section 3.3, *Aquatic Biological Resources.* No mitigation is required.

Mitigation Measure:

None required.

Impact 3.4-5: Development facilitated by the proposed project would not conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. (*Less than Significant with Mitigation*)

The proposed project does not conflict with any local policies or ordinances. The project is generally in road ROW, developed, and urban areas. Implementation of **Mitigation Measure 3.4-1a and 3.4-1b,** described above would appropriately protect biological resources in the vicinity of the project footprint. If the project must remove trees, the City shall consult their tree protection ordinance to ensure compliance prior to removal. Construction activities would use designated areas that are primarily on paved or gravel substrates and located in highly disturbed areas, and therefore do not conflict with the protection of trees. No mitigation is required.

Mitigation Measures:

Mitigation Measure 3.4-1a: Pre-construction Nesting Bird Surveys

Mitigation Measure 3.4-1b: Pre-construction Bat Survey

See Impact 3.4-1 above, for descriptions.

Significance after Mitigation: Implementation of **Mitigation Measure 3.4-1a and 3.4-1b** would protect biological resources in the vicinity of the project and reduce potential construction impacts to a **less than-significant** level.

Impact 3.4-6: Development facilitated by the proposed project would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. (*No Impact*)

The proposed project is within the biological inventory area under the East County HCP/NCCP for the city of Pittsburg, but is outside of the defined mitigation areas and is in the area zoned as "urban" in the biological inventory area. The project would not conflict with the conservation objectives or acquisition goals of the East County HCP/NCCP. Most of the proposed project is located in the City of Antioch, which is not part of the East County HCP/NCCP. No local ordinances protecting biological resources would be conflicted by the proposed project; therefore, **no impact** would occur.

Mitigation Measure:

None required.

Cumulative Impacts

This analysis evaluates whether the impacts of the proposed project, including development facilitated by the project, together with the impacts of cumulative development, would result in a cumulatively significant impact on special-status species, wetlands and other waters of the U.S., or other biological resources protected by federal, state, or local regulations or policies (based on the significance criteria and thresholds presented earlier). This analysis then considers whether the incremental contribution of the proposed project to this cumulative impact would be considerable. Both conditions must apply in order for a project's cumulative effects to rise to the level of significance.

Impact 3.4-C-1: Implementation of the proposed project, in combination with past, present, and reasonably foreseeable future development could result in a cumulatively significant impact related to terrestrial biological resources. (*Less than Significant with Mitigation)*

The proposed project and cumulative projects within the vicinity of the project footprint (as identified in **Table 3-1** in Section 3.0) are required to comply with local, State, and federal laws and policies, and all applicable permitting requirements of the regulatory and oversight agencies intended to address potential impacts on biological resources. Additionally, future projects would be required to demonstrate that they would not have significant effects on these biological resources, although it is possible that some projects may be approved even though they would have significant, unavoidable impacts on biological resources. These regulatory requirements should serve, in many cases, to reduce future contributions to cumulative impacts on biological resources in the project vicinity.

The proposed project is generally located in road rights-of-way, urban and highly disturbed habitats. With implementation of **Mitigation Measure 3.4-1a and 3.4-1b,** described above, the proposed project (during construction as well as during operations) would have a less-than-significant impact to: special-status species, sensitive natural communities, federally and state protected waters and wetlands, native movement wildlife corridors, or native wildlife nursery sites. The proposed project would not conflict with applicable local policies, ordinances, or the provisions of an adopted habitat conservation plan. Additionally, no projects were identified from **Table 3-1** in Section 3.0 that would cumulatively intensify the magnitude or extent of the anticipated impacts under the proposed project. The project's contribution would not be considered cumulatively considerable.

Therefore, the proposed project in combination with past, present, and reasonably foreseeable future projects, would have a **less-than-significant** cumulative effect on biological resources. No additional mitigation is required.

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3.5 Cultural Resources

Sections	Tables

This section presents and discusses the cultural resources associated with the project construction, implementation, and operation. Also discussed are the environmental setting, regulatory framework, the significance criteria used for determining environmental impacts, and potential impacts associated with construction and operation of the project. Cultural resources include architectural resources, prehistoric and historic-era archaeological resources, and human remains. Paleontological resources are discussed in Section 3.6, *Geology, Soils, and Paleontological Resources*.

During scoping for this EIR, there were no cultural resource-related concerns raised by the public and responsible agencies.

The analysis included in this section was based on the cultural resources study completed for the proposed project: *Antioch Brackish Water Desalination Project Cities of Antioch and Pittsburg, Contra Costa County Cultural Resources Survey Report* (ESA, 2017).

3.5.1 Environmental Setting

This section provides the natural and cultural background for the cultural resources analysis as well as a summary of the background research, survey effort, and an evaluation of existing cultural resources.

Natural and Cultural Context

Natural Environment

Prior to the arrival of the Spanish and Anglo-Europeans in the area, vegetation within the project vicinity consisted of a mosaic of tidal salt and brackish marshes and native coastal prairie, interspersed with scattered stands of coastal scrub. Riparian woodlands associated with the creeks would have provided the only tree cover on this alluvial plain. Vegetation and the wildlife habitat it affords have been highly disturbed throughout most of the project vicinity, with industrial development gradually replacing agricultural uses that began in the early nineteenth century. Today, remnants of the original habitat types exist only within minimal areas in what is left of the riparian corridors. The natural vegetation cover for the remainder of the project vicinity has either been replaced with buildings, concrete, and asphalt or converted almost entirely to non-native annual grasslands and ruderal vegetation.

The California coast has undergone dramatic landscape changes since humans began to inhabit the region more than 10,000 years ago. Rising sea levels and increased sedimentation into streams and rivers are among some of the changes (Helley et al., 1979). In many places, the interface between older land surfaces and Holocene-age landforms are marked by a well-developed buried soil profile, or a paleosol. Paleosols preserve the composition and character of the earth's surface prior to subsequent sediment deposition and thus have the potential to preserve archeological resources if the area was occupied or settled by humans (Meyer and Rosenthal, 2007). Because human populations have grown since the arrival of the area's first inhabitants, younger paleosols (late Holocene) are more likely to yield archeological resources than older paleosols (early Holocene or Pleistocene). Other criteria used to measure the archaeological sensitivity of a given area include the following:

- Archaeological sites tend to be located near perennial water sources.
- Archaeological deposits from successive time periods are more common because the density of human populations increased over time.
- The longer a landform remained at the surface, the greater the likelihood that any one spot on that landform was occupied (Meyer in Ruby, 2010).

As indicated by geologic maps, the Project Area is located primarily within Pleistocene-age alluvium, with a small section of the Brine Disposal Pipeline extending through Holocene-age alluvium. The water intake pump station is located in an area of artificial fill and the desalination facilities at the Antioch WTP is located on bedrock consisting of Pliocene sedimentary rocks (Witter et al., 2006). The Pleistocene-age soils are classified as clay loams of the Rincon complex and the Holocene-age soils are classified as silty clay loams of the Sycamore complex (NRCS, 2017). Pleistocene-age alluvium does not have the potential to contain archaeological sites buried by natural alluvial processes. Holocene-age alluvium does have the potential to contain buried soils surfaces that would have been available for human use and occupation (Meyer and Rosenthal, 2007); however, given the limited and narrow extent of ground disturbance for pipeline installation through Holocene alluvium (approximately 1,500 feet along the Pittsburg-Antioch Highway), the potential to uncover paleosols and related archaeological materials is significantly lessened.

Prehistoric Context

Categorizing the prehistoric period into cultural stages allows researchers to describe a range of archaeological resources with similar cultural patterns and components during a given time frame, creating a regional chronology. Milliken et al. (2007) provide a framework for the interpretation of the San Francisco Bay Area. The authors divided human history in California into three periods: the *Early Period*, the *Middle Period*, and the *Late Period*. In many parts of California four periods are defined; the fourth being the *Paleoindian Period* (11500–8000 B.C.), characterized by big-game hunters occupying broad geographic areas. Evidence of human habitation during the Paleoindian Period has not yet been discovered in the San Francisco Bay Area. Economic patterns, stylistic aspects, and regional phases further subdivide cultural periods into shorter phases. This scheme uses economic and technological types, socio-politics, trade networks, population density, and variations of artifact types to differentiate between cultural periods.

Ethnographic Setting

Based on a compilation of ethnographic, historic, and archaeological data, Milliken (1995) describes a group known as the Bay Miwok, who once occupied the general vicinity of the Project Area. Bay Miwok territory extended from East Contra Costa County eastward to the Sacramento–San Joaquin Delta. Miwok refers to the entire language family that was spoken by the Bay Miwok, as well as Coast, Lake, Valley, and Sierra Miwok. Along with the Ohlone peoples of the San Francisco Bay Area, the Miwok are members of the Utian language family. While traditional anthropological literature portrayed the Miwok peoples as having a static culture, today it is better understood that many variations of culture and ideology existed within and between villages. While these static descriptions of separations between native cultures of California make it an easier task for ethnographers to describe past behaviors, this masks Native adaptability and self-identity. California's Native Americans never saw themselves as members of larger cultural groups, as described by anthropologists. Instead, they saw themselves as members of specific villages, perhaps related to others by marriage or kinship ties, but viewing the village as the primary identifier of their origins.

By the mid-1800s Spanish missionization, diseases, raids by Mexican slave traders, and dense immigrant settlement had disrupted Bay Miwok culture, dramatically reducing the population, and displacing the native people from their villages and land-based resources.

Historic-era Background

The first Europeans to visit the East Bay area were the Spanish explorers Pedro Fages and Reverend Juan Crespi, who passed through in 1772. After Mexico won independence from Spain in 1821, large tracts of land in California were granted to military heroes and loyalists. The Mexican land grant of Rancho Los Medanos, granted in the 1830s, was located at the junction of the San Joaquin River and the Sacramento River, extending eastward along the south shore of Suisun Bay to Antioch (Hoover et al., 2002).

The discovery of gold in 1848 led to a huge population boom in California, with settlers establishing themselves on parcels of Rancho Los Medanos. The 1851 California Land Claims Act required Mexican landowners in California to prove the validity of their claim on land held under Mexican titles. Lands under rejected claims were deemed public and available for arriving settlers. As the average length of time required to prove ownership was 17 years after submitting a claim, many landowners were bankrupted and forced to sell large portions of their land to the settlers they had been attempting to evict (Rawls and Bean, 2002).

Orchards, cattle ranching, and sheep grazing dominated the landscape until the middle of the nineteenth century, when the discovery of coal on the slopes of Mount Diablo brought an influx of mining activity, increased population, and greater connectivity through a burgeoning network of railroads.

Identification Methods and Results

The effort to identify cultural resources in the Project Area consisted of archival research, conducting a field survey, and contacting Native Americans organizations/individuals.

Records Search Methods

The California Office of Historic Preservation is an information repository for historical resources in California. The Office of Historic Preservation administers the California Historical Resources Information System (CHRIS). CHRIS information is disseminated primarily through records searches and reviews of historical resource data files for specific geographic areas.

ESA completed a records search at the Northwest Information Center (NWIC) of the CHRIS at Sonoma State University on September 25, 2017 (File No. 17-0994). Records were accessed by reviewing the Antioch North 7.5-minute topographic quadrangle base maps. The records search included a ½-mile radius around the Project in order to (1) determine whether known cultural resources (both archaeological and built environment) had been recorded within or adjacent to the Project Area; (2) assess the likelihood of unrecorded cultural resources based on historical references and the distribution of environmental settings of nearby cultural resources; and (3) develop a context for identification and preliminary evaluation of cultural resources. Included in the review were the California Inventory of Historical Resources, California Historical Landmarks, California Points of Historical Interest, and the Historic Properties Directory Listing. The Historic Properties Directory includes listings of the National Register and the California Register, and the most recent listing of the California Historical Landmarks and California Points of Historical Interest. Historic-period maps and aerial imagery were also reviewed.

Records Search Results

The records search at the NWIC indicates that 21 cultural resource studies have been conducted within and adjacent to the Project Area. These studies include archaeological surface and subsurface investigations, architectural surveys and evaluations, and general overviews of historic and environmental conditions.

No archaeological resources have been recorded in the Project Area. Two archaeological resources have been previously recorded in the records search radius: prehistoric site P-07-000458 and historic-era site P-07-002876.

The nearest prehistoric archaeological site to the Project Area is a prehistoric occupation site designated P-07-000458. Originally recorded in 1981, the site consisted of midden and associated obsidian debitage, charcoal, burnt clay, and faunal fragments (Chavez, 1981a). The property owner at the time indicated that human burials and shell-laden soil had been uncovered during construction of a detached garage in the 1930s. Archaeologists subsequently completed a subsurface archaeological investigation to define site boundaries, which consisted of excavating approximately 70 2-inch-diameter auger borings (Chavez, 1981b). Cultural constituents were restricted to a 25-square-meter area adjacent to a small east-facing cove. The site was determined to be either 1) peripheral elements of an undisturbed deposit associated with a site focused on the adjacent high ground in the location of the garage, or 2) a secondary archaeological deposit that originated from the higher area. Further archaeological testing was recommended; however, the NWIC has no record of additional testing.

The nearest historic-era site to the Project Area is a refuse scatter designated P-07-002876. Recorded in 2003, the site consisted of a concentration of mid-twentieth century glass fragments, terra cotta pipe fragments, ceramic fragments, and metal fragments. The site was recommended not eligible for listing in the California Register of Historical Resources (California Register) or National Register of Historic Places (National Register) (Parsons, Inc., 2003).

Six architectural resources have been previously recorded and evaluated within the records search radius: a railroad, two residential subdivisions, two schools, and a fairground complex. All of the resources were recommended and/or determined not eligible for listing in the California or National Registers (Dobkin and Hill, 2006; ICF, 2014a; ICF, 2014b; JRP, 2002a; JRP, 2002b).

Native American Correspondence

On August 2, 2017, the City sent a letter to seven culturally-affiliated Native American tribes and individuals that may have interest in the proposed project. The letters included a brief description of the Project and a map. On August 14, 2017, Roger Aguilar representing the Ione Band of Miwok Indians responded that the tribe was requesting official consultation on the project. The City responded on August 22, 2017 that they would provide this draft Cultural Resources Survey Report. Following the tribe's review, the City would organize a meeting to discuss the results and interpretations. The draft Cultural Resources Survey Report was provided to Mr. Aguilar on January 17, 2018. No additional responses have been received as of this writing.

Survey Methods and Findings

A Registered Professional Archaeologist completed a survey of the Project Area on October 4, 2017. The survey consisted of a mixed strategy of surface survey (walking) and cursory survey (some "windshield" and surface survey) methods. The intensity of the survey used was dependent on the environmental conditions and predicted archaeological sensitivity of a given area.

Because a large percentage of the pipeline alignment would be within established, paved road rights-of-way, standard pedestrian methods for identifying surface evidence of archaeological resources are less valuable and effective in obtaining results. As a consequence, all roadway segments of the proposed pipelines were subjected to a windshield survey. Areas that exhibited large shoulders were more closely examined by walking and examining the surface. In addition, segments of roadway that intersected with perennial or intermittent streams and creeks were also examined more closely.

During the surface survey, exposed ground surface was checked for evidence of cultural materials or other evidence of past human use and occupation. Photographs were taken to document the typical styles of each neighborhood through which the pipeline extends. Encountered cultural resources were formally recorded on the appropriate Department of Parks and Recreation 523 forms.

Architectural Findings

The San Joaquin River intake structure and pier were originally constructed in 1957 and reconstructed in 1988. As the new structures do not meet the minimum age threshold for listing in the California or National Registers no further consideration was necessary.

The Antioch WTP was constructed in 1947 and does meet the minimum age threshold for consideration. Population growth leading up to World War II resulted in increased demands on the local water supply, and in 1945 a bond measure was passed to fund the construction of the new water plant. The Antioch WTP was designed by engineers John S. Bates and Charles Gillman Hyde, and construction began in 1947. The plant went into operation in 1949, treating water pumped from the San Joaquin River and Contra Costa Canal to the Municipal Reservoir. The original plant had a maximum capacity of 6 mgd, and consisted of two settling basins, four filters, a one-million gallon filtered water reservoir, a wash water storage reservoir, and the operations building. In 1957, the capacity of the plant was doubled by the addition of four new filters and an additional 500,000-gallon water storage tank. In 1968, the City expanded the capacity of the treatment plant through system upgrades, expanding to 20.0 mgd. The city expanded and approved the facility again circa 1997.

ESA evaluated the Antioch WTP for inclusion in the National Register and California Register based on the criteria for evaluation.

Research did not reveal that the Antioch WTP is associated with events that have made a significant contribution to the broad patterns of history (Criterion A/1). While the Antioch WTP was constructed in the post-World War II period in order to meet Antioch's growing need for municipal water, it is not significantly associated with this development. Mere association with growth is not enough to meet the significance requirements of listing in the California or National registers. As such, the Antioch WTP facility does not appear to be individually significant as an historical resource under Criterion A/1 (Association with Events).

Research did not reveal any important associations with any prominent individuals. While locally recognized engineer Charles Gillman Hyde helped design the water treatment plant, Hyde does not appear to have gained any prominence for his association with the WTP. The facility was one of many local projects Hyde consulted on following his retirement from teaching at UC Berkeley. Therefore, the Antioch WTP does not appear to be individually significant under Criterion B/2 (Association with Individuals).

The Antioch WTP does not appear to embody the distinctive characteristics of a type, period, or method of construction. The structure is primarily a vernacular industrial complex with some Mid-Century Modern architectural elements (the flat roof, varying massing, block windows, smooth concrete finishes). However, none of the components of the facility would be considered exemplary examples of this style, nor the engineering processes reflected by the plant. The plant does not represent the work of a master – as noted above archival research does not indicate any significant associations with the Charles Hyde, the original engineer. As such, the Antioch WTP does not embody the distinctive characteristics of a type, period, or method of construction and does not appear significant under Criterion C/3 (Architectural Distinction).

Criterion D/4 asks whether a proposed project has the potential to yield information important to pre-history or history. With regard to historical information potential, it does not seem likely that the plant would yield significant information that would expand our current knowledge or theories of water treatment plant design, methods of construction, operation, or other information that is not already known. As such, the Antioch WTP does not appear to be significant under Criterion D/4.

While some of the original components of the plant are still in use, the plant has undergone several significant expansions/alterations since its original design. As early as 1957, expansions and upgrades to the plant began, with significant renovations in the 1960s and again in the 1990s. The operations building is the most prominent remaining component of the original design, but the surrounding components have all been modified since their original construction. The plant was expanded and adopted new technology and practices in water treatment. The plant retains its integrity of location, but its setting, workmanship, materials, design, feeling, and association have all been impacted by the introduction of newer, modern equipment to the site as well as the various expansions/alterations to the facility. As such, the Antioch WTP does not retain sufficient physical integrity to convey any potential historical significance.

While the Antioch WTP meets the criteria for age, it does not appear to meet any of the aforementioned criteria A/1 through D/4, nor does it appear to possess sufficient physical integrity. As such, the Antioch WTP is recommended ineligible for listing in the National and California Registers and does not qualify as a historic property for purposes of Section 106 or a historical resource under CEQA.

Archaeological Findings

During the survey and records search review, the archaeologist did not identify any prehistoric archaeological resources in the Project Area. The records search results indicate that no previously recorded prehistoric archaeological sites are within the Project Area. The nearest prehistoric site (P-07-000458) would not be impacted by the proposed Project. There are no other previously recorded prehistoric sites within a ½-mile radius of the Project Area. Based on the results of the records search and survey effort, the potential to impact prehistoric archaeological resources is considered low for the proposed Project.

No evidence of historic-era archaeological resources from past human use or occupation was identified in the Project Area. Given that most of the proposed Project is within the road right-of-way, there is a low sensitivity for historic-era archaeological resources (such as foundations, artifact-filled privies, or other historic deposits) to be within the Project Area. Based on the results of the records search and survey effort, and the urban/disturbed context of the Project

Area, the potential to impact historic-era archaeological resources considered low for the proposed Project.

3.5.2 Regulatory Framework

Federal

National Historic Preservation Act of 1966, as amended

Effects of federal undertakings on historical and archaeological resources are considered through the National Historic Preservation Act (NHPA) of 1966, as amended (54 United States Code [U.S.C.] 306108), and its implementing regulations. Before an undertaking (e.g., federal funding or issuance of a federal permit) is implemented, Section 106 of the NHPA requires federal agencies to consider the effects of the undertaking on historic properties (i.e., properties listed in or eligible for listing in the National Register) and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on any undertaking that would adversely affect properties eligible for listing in the National Register. Under the NHPA, a property is considered significant if it meets the National Register listing criteria A through D, at 36 Code of Federal Regulations 60.4, as follows:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and that:
>
> a) Are associated with events that have made a significant contribution to the broad patterns of our history, or
>
> b) Are associated with the lives of persons significant in our past, or
>
> c) Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, or
>
> d) Have yielded, or may be likely to yield, information important in prehistory or history

For a resource to be eligible for the National Register, it must also retain enough integrity to be recognizable as a historical resource and to convey its significance. Resources that are less than 50 years old are generally not considered eligible for the National Register.

Federal review of the effects of undertakings on significant cultural resources is carried out under Section 106 of the NHPA and is often referred to as the Section 106 review. This process is the responsibility of the federal lead agency. The Section 106 review typically involves a four-step procedure, which is described in detail in the implementing regulations of the NHPA:

- Define the Area of Potential Effects in which an undertaking could directly or indirectly affect historic properties.
- Identify historic properties in consultation with the State Historic Preservation Officer (SHPO) and interested parties.

- Assess the significance of effects of the undertaking on historic properties.
- Consult with the SHPO, other agencies, and interested parties to develop an agreement that addresses the treatment of historic properties and notify the Advisory Council on Historic Preservation and proceed with the project according to the conditions of the agreement.

State

The State of California consults on implementation of the NHPA of 1966, as amended, and also oversees statewide comprehensive cultural resource surveys and preservation programs. The California Office of Historic Preservation, as an office of the California Department of Parks and Recreation, implements the policies of the NHPA statewide. The Office of Historic Preservation also maintains the California Historical Resources Inventory. The State Historic Preservation Officer is an appointed official who implements historic preservation programs within the state's jurisdictions.

California Environmental Quality Act

The California Environmental Quality Act (CEQA), as codified in Public Resources Code (PRC) Section 21000 et seq., is the principal statute governing the environmental review of projects in the state. CEQA requires lead agencies to determine if a project would have a significant effect on historical resources, including archaeological resources. The CEQA *Guidelines* define a historical resource as: (1) a resource in the California Register; (2) a resource included in a local register of historical resources, as defined in PRC Section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); or (3) any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

CEQA requires lead agencies to determine if a project would have a significant effect on important archaeological resources, either historical resources or unique archaeological resources. If a lead agency determines that an archaeological site is a historical resource, the provisions of Public Resources Code Section 21084.1 would apply and CEQA *Guidelines* Sections 15064.5(c) and 15126.4 and the limits in Public Resources Code Section 21083.2 would not apply. If a lead agency determines that an archaeological site is an historical resource, the provisions of PRC Section 21084.1 and CEQA *Guidelines* Section 15064.5 would apply. If an archaeological site does not meet the CEQA *Guidelines* criteria for a historical resource, then the site may meet the threshold of PRC Section 21083 regarding unique archaeological resources. A unique archaeological resource is "an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria.

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

- Has a special and particular quality such as being the oldest of its type or the best available example of its type.
- Is directly associated with a scientifically recognized important prehistoric or historic event or person" (PRC Section 21083.2 [g]).

The CEQA *Guidelines* note that if a resource is neither a unique archaeological resource nor a historical resource, the effects of the project on that resource shall not be considered a significant effect on the environment (CEQA *Guidelines* Section 15064[c][4]).

Local

City of Antioch General Plan

The following goals and policies from the Antioch General Plan are relevant to cultural resources for the proposed Project.

> **Goal ER 6.1:** Preserve archaeological, paleontological, and historic resources within the Antioch Planning Area for the benefit and education of future residents.
>
> > ***Policy 10.9.2.a:*** Require new development to analyze, and therefore avoid or mitigate impacts to archaeological, paleontological, and historic resources in accordance with applicable CEQA Guidelines and provisions of the California Public Resources Code.
> >
> > ***Policy 10.9.2.b:*** As a standard condition of approval for new development projects, require that if cultural or paleontological resources are encountered during grading, alteration of earth materials in the vicinity of the find be halted until a qualified expert has evaluated the find and recorded identified. cultural resources.

City of Pittsburg General Plan

The following goals and policies from the Pittsburg General Plan are relevant to cultural resources for the proposed Project.

> **Goal 9-G-13:** Encourage municipal and community awareness, appreciation, and support for Pittsburg's historic, cultural, and archeological resources.
>
> > ***Policy 9-P-40:*** In accordance with State law, ensure the preparation of a resource mitigation plan and monitoring program by a qualified archeologist in the event that archeological resources are uncovered. CEQA requires the evaluation of any archeological resource on the site of a development project. State law also protects these resources. City involvement in the identification, mitigation, and monitoring of project impacts on these resources will ensure the protection of Pittsburg's cultural heritage.
> >
> > ***Policy 9-P-41:*** If archeological resources are found during ground-breaking for new urban development, halt construction immediately and conduct an archeological investigation to collect all valuable remnants.

3.5.3 Analysis, Impacts and Mitigation

Significance Criteria

Based on Appendix G of the CEQA *Guidelines*, the project would have a significant impact on cultural resources if it would:

- Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5;
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5;
- Disturb any human remains, including those interred outside of formal cemeteries;

Methodology and Assumptions

Architectural Resources

Potential impacts on architectural resources are assessed by identifying any activities (either during construction or operations) that could affect resources identified as historical resources for the purposes of CEQA. Once a resource has been identified as a CEQA historical resource, it then must be determined whether the impacts of the Project would "cause a substantial adverse change in the significance" of the resource (CEQA *Guidelines* Section 15064.5[b]). A substantial adverse change in the significance of a historical resource means "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historic resource would be materially impaired" (CEQA *Guidelines* Section 15064[b][1]). A historical resource is materially impaired through the demolition or alteration of the resource's physical characteristics that convey its historical significance and that justify its inclusion in the California Register (CEQA *Guidelines* Section 15064.5[b][2][A]).

Archaeological Resources

Archaeological resources can include historical resources according to CEQA *Guidelines* Section 15064.5 as well as unique archaeological resources as defined in PRC Section 21083.2(g). The significance of most prehistoric and historical archaeological sites is usually assessed under National Register and California Register Criteria D/4. These criteria stress the importance of the information potential contained within the site, rather than its significance as a surviving example of a type or its association with an important person or event. Although it is less common, archaeological resources also may be assessed under California Register Criteria 1, 2, and/or 3. Archaeological resources also may be assessed under CEQA as unique archaeological resources, defined as archaeological artifacts, objects, or sites that contain information needed to answer important scientific research questions.

Impacts on unique archaeological resources or archaeological resources that qualify as historical resources are assessed pursuant to PRC Section 21083.2 which states that the lead agency shall determine whether the Project may have a significant effect on archaeological resources. As with architectural resources above, whether the impacts of the Project would "cause a substantial adverse change in the significance" of the resource must be determined (CEQA *Guidelines* Section 15064.5[b]).

Human Remains

Human remains, including those buried outside of formal cemeteries, are protected under several state laws, including Public Resources Code Section 5097.98 and Health and Safety Code Section 7050.5. These laws are identified above in Section 3.5.2, Regulatory Framework. This analysis considers impacts on human remains including intentional disturbance, mutilation, or removal of interred human remains.

Impacts and Mitigation Measures

Table 3.5-1 summarizes the proposed project's impacts and significance determinations related to cultural resources.

TABLE 3.5-1
SUMMARY OF IMPACTS – CULTURAL RESOURCES

Impacts	Significance Determinations
Impact 3.5-1: The proposed project would not cause a substantial adverse change in the significance of a historical resource or a landmark of local cultural or historical importance.	NI
Impact 3.5-2: The project could cause a substantial adverse change in the significance of an archaeological resource.	LSM
Impact 3.5-3: The proposed project could disturb human remains, including those interred outside of dedicated cemeteries	LSM
Impact 3.5-C-1: Cumulative impacts related to archaeological resources.	LSM
Impact 3.5-C-2: Cumulative impacts related to human remains.	LSM

NOTES:
NI = No Impact
LSM = Less than Significant with Mitigation

Impact 3.5-1: The proposed project would not cause a substantial adverse change in the significance of a historical resource or a landmark of local cultural or historical importance. *(No Impact)*

The following discussion focuses on architectural and structural resources. Archaeological resources, including archaeological resources that are potentially historical resources according to CEQA *Guidelines* Section 15064.5, are addressed under Impact 3.5-2.

Based on the results of the background research, survey, and evaluation provided above, there are no historical resources eligible for listing in the California Register in the project area. ESA staff evaluated the Antioch WTP in the project area and recommends that it does not meet the California or National Register criteria and is therefore not a historical resource for the purposes of CEQA. As there are no historical resources in the project area, there would be **no impact** on historical resources and no mitigation is required.

Mitigation Measure:

None required.

Impact 3.5-2: The project could cause a substantial adverse change in the significance of an archaeological resource. ***(Less than Significant with Mitigation)***

This section discusses archaeological resources that are potentially historical resources according to CEQA Guidelines Section 15064.5 as well as unique archaeological resources defined in Section 21083.2(g).

Based on the results of the background research, surface survey, and subsurface survey, there are no archaeological resources in the Project Area. Despite the effort to identify archaeological resources, the inadvertent discovery of unknown archaeological resources cannot be entirely discounted. Impacts on previously unknown archaeological resources would be potentially significant if the proposed project would disturb or destroy the resource during ground disturbing activities associated with construction. In the event that archaeological resources are uncovered during project-related ground disturbing activities, implementation of **Mitigation Measure 3.5-2 (Inadvertent Discovery of Archaeological Resources)** would reduce impacts to a less-than-significant level.

Mitigation Measure:

Mitigation Measure 3.5-2: Inadvertent Discovery of Archaeological Resources.

If prehistoric or historic-era archaeological resources are encountered by construction personnel during project implementation, all construction activities within 100 feet shall halt until a qualified archaeologist, defined as one meeting the Secretary of the Interior's Professional Qualification Standards for archaeology, can assess the significance of the find. Prehistoric archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil (midden) containing heat-affected rocks, artifacts, or shellfish remains; stone milling equipment (e.g., mortars, pestles, hand stones, or milling slabs); and battered stone tools, such as hammer stones and pitted stones. Historic-era materials might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and/or ceramic refuse.

If a find is evaluated and determined to be significant, a mitigation plan shall be developed that recommends preservation in place as a preference or, if preservation in place is not feasible, data recovery through excavation. The mitigation plan will be developed in consultation with the affiliated Native American tribe(s), as appropriate. If preservation in place is feasible, this may be accomplished through one of the following means: (1) modifying the construction plan to avoid the resource; (2) incorporating the resource within open space; (3) capping and covering the resource before building appropriate facilities on the resource site; or (4) deeding the resource site into a permanent conservation easement. If preservation in place is not feasible, a qualified archaeologist shall prepare and implement a detailed treatment plan to recover scientifically consequential information from the resource prior to any excavation at the site. Treatment for most resources would consist of (but would not necessarily be limited to) sample excavation, artifact collection, site documentation, and historical research, with the aim to target the recovery of important scientific data contained in the portion(s) of the significant resource to be impacted by the project. The treatment plan shall include provisions for analysis of data in a regional context; reporting of results within a timely manner; curation of artifacts and data at an approved facility; and dissemination of reports to local and state repositories, libraries, and interested professionals.

Should the project include federal funding or oversight or otherwise qualify as a federal undertaking, the archaeological study shall be prepared in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended.

Significance after Mitigation: With the implementation of **Mitigation Measure 3.5-2** listed above, this impact would be reduced to a **less-than-significant** level because the resource would be either be avoided or a treatment plan would be developed by a qualified archaeologist, in consultation with the affiliated Native American tribe(s).

Impact 3.5-3: The proposed project could disturb human remains, including those interred outside of dedicated cemeteries. (*Less than Significant with Mitigation*)

Prehistoric archaeological resources may contain human burials. Based on the background research, surface survey, and subsurface survey there is no indication that the Project Area has been used for human burial purposes. However, the possibility of encountering human remains, including those interred outside of dedicated cemeteries, during project-related ground disturbing activities cannot be entirely discounted. This impact would be considered significant. However, with implementation of **Mitigation Measure 3.5-3 (Inadvertent Discovery of Human Remains)**, this impact would be reduced to a less-than-significant level.

<u>Mitigation Measure:</u>

Mitigation Measure 3.5-3: Inadvertent Discovery of Human Remains.

In the event human remains are uncovered during construction activities for the project, the City shall immediately halt work, contact the Contra Costa County Coroner to evaluate the remains, and follow the procedures and protocols pursuant to Section 15064.5(e)(1) of the CEQA *Guidelines*. State Health and Safety Code Section 7050.5 requires that no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to PRC Section 5097.98. If the remains are determined to be of Native American descent, the coroner has 48 hours to notify the Native American Heritage Commission (NAHC). The NAHC will then identify the person thought to be the Most Likely Descendent of the deceased Native American. The Most Likely Descendent will make recommendations for means of treating, with appropriate dignity, the human remains and any associated grave goods as provided in PRC Section 5097.98.

Significance after Mitigation: With the implementation of **Mitigation Measure 3.5-3** listed above, this impact would be reduced to a **less-than-significant** level because the Native American Heritage Commission and the Most Likely Descendant would be contacted if the remains were found to be Native American and the provisions of PRC Section 5097.98 would be implemented.

Cumulative Impacts

Impacts related to cultural resources are generally site-specific and depend on the specific localized resources and resource potential. As a result, they are not typically additive or cumulative in nature.

The geographic scope for the analysis of cumulative impacts on cultural resources includes projects within or in the immediate vicinity of the project area. The project would contribute to a cumulative impact on unknown buried archaeological resources, or human remains, if the cumulative projects listed in **Table 3-1** were to adversely affect the same cultural resources affected by the project or would affect other cultural resources in the project vicinity.

As described in Impact 3.5-1, no historical resources listed in or eligible for listing in the California Register or historic properties listed in or eligible for listing in the National Register are within or in close proximity of project components. Therefore, no cumulative impacts on historical resources or properties would occur, and this criterion is not discussed further.

Impact 3.5-C-1: Implementation of the proposed project, in combination with other cumulative development, could contribute to cumulative impacts to archaeological resources. ***(Less than Significant with Mitigation)***

The geographic scope for cumulative effects to archaeological resources includes the immediate vicinity of locations where the project would cause ground disturbance. Similar to the proposed project as described under Impact 3.5-2, cumulative projects in the project vicinity listed in **Table 3-1** could have a significant impact to archaeological resources from construction-related ground disturbance if previously unrecorded archaeological resources are encountered. The potential impacts of the project when considered together with similar impacts from other cumulative projects in the vicinity could result in a significant cumulative impact to archaeological resources. The proposed project’s contribution to this impact could be cumulatively considerable. However, implementation of **Mitigation Measure 3.5-2** would require avoidance of the resource or if avoidance is not feasible appropriate treatment and documentation of the resource. Therefore, with implementation of Mitigation Measure 3.5-2, the proposed project’s contribution to cumulative impacts would not be considerable, and the impact would be **less than significant with mitigation**.

Impact 3.5-C-2: Implementation of the proposed project, in combination with other cumulative development, could contribute to cumulative impacts to human remains. ***(Less than Significant with Mitigation)***

The geographic scope for cumulative effects to human remains includes the immediate vicinity of locations where the project would cause ground disturbance. Similar to the proposed project as described under Impact 3.5-3, cumulative projects in the project vicinity listed in **Table 3-1** could have a significant impact on human remains interred outside of formal cemeteries from construction-related ground disturbance. The potential impacts of the project when considered together with similar impacts from other cumulative projects in the vicinity could result in a significant cumulative impact to human remains. The proposed project's contribution to this impact could be cumulatively considerable. However, implementation of **Mitigation Measure 3.5-3** would require implementation of legally-required appropriate treatment of human remains. Therefore, with implementation of Mitigation Measure 3.5-3, the proposed project's contribution to cumulative impacts would not be considerable, and the impact would be **less than significant with mitigation**.

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3.6 Geology, Soils, and Paleontological Resources

Sections	Figures	Tables
3.6.1 Environmental Setting 3.6.2 Regulatory Framework 3.6.3 Analysis, Impacts, and Mitigation	3.6-1 Regional Faults	3.6-1 Summary of Soil Properties 3.6-2 Modified Mercalli Intensity Scale 3.6-3 Active Faults 3.6-4 Summary of Impacts – Geology, Soils, and Paleontology

This section evaluates the potential for implementation of the proposed project to result in adverse impacts associated with geologic, soils, and seismic hazards, including faulting, seismically-induced ground failures (e.g., landslides, liquefaction), erosion, expansive or corrosive soils, and coastal retreat. In addition, this section analyzes for potential adverse impacts to paleontological resources. The analysis is based on review of available geologic, geotechnical, and paleontological resources maps and reports of the project area and vicinity, including reports and information published by the U.S. Geological Survey (USGS) and the California Geological Survey (CGS), the General Plans for the Cities of Antioch and Pittsburg, and a 2005 geotechnical investigation conducted for the expansion of the Antioch WTP in 2005. No public comments were received during the scoping period that relate to geology, soils, and seismicity.

3.6.1 Environmental Setting

Regional and Local Geology

The project area lies within the geologically complex Coast Ranges area along the western part of California (CGS, 2002a). The tectonics of the San Andreas Fault and other major faults in the western part of California have played a major role in the geologic history of the area, driven by the interaction of the Pacific and North American Tectonic Plates. The region is marked by northwest-trending elongated ranges and narrow valleys that roughly parallel the coast and the San Andreas Fault Zone. Geologic materials are mostly composed of marine sedimentary deposits, metamorphic rocks, and volcanic rocks.

The project area is located in the City of Antioch in northeastern Contra Costa County. The topography of the project area gently slopes from about 150 feet above mean sea level at the Antioch WTP to about 10 feet above mean sea level at the river intake pump station. Antioch consists of two topographic areas: the Lowland Area and Upland Area (City of Antioch, 2003). The project area is entirely within the Lowland Area, which is underlain by Quaternary alluvium that is less than 1.6 million years old and consists of unconsolidated floodplain deposits of sand, silt, gravel, and clay. The project area is mostly in a highly developed urban area with fill and disturbed native materials. The geotechnical investigation for the previous Antioch WTP expansion indicated the WTP is underlain by artificial (imported) fill or colluvium (general name for loose, unconsolidated sediments that have been deposited at the base of hillslopes) on top of bedrock (Geomatrix, 2005). The fill materials ranged in thickness from about 2.5 to 6.25 feet;

colluvium materials were 0.5 to 5 feet thick. The underlying bedrock consisted of interbedded sandstone and siltstone.

Soils

Soil mapping indicates that the project components would mostly traverse clay and silty clay loam[1] soil units where not replaced with fill (NCRS, 2017). Soil properties that could impact project components are summarized below in **Table 3.6-1**.

TABLE 3.6-1
SUMMARY OF SOIL PROPERTIES

Soil Criteria	Pump Station	Desalination Facility	New Raw Water Connection Pipeline	New Brine Disposal Pipeline
Expansive Soils (a)	Low	Low to High	Low	Moderate to High
Erosion - Water	Low	Moderate	Moderate	Moderate
Erosion - Wind	Low	Moderate	Moderate	Moderate
Corrosion - Concrete	Low	Low	Low	Low
Corrosion - Steel	Moderate	Low	High	High

NOTES:
[a] Also referred to as shrink-swell potential or linear extensibility.

SOURCES: NCRS, 2017; Geomatrix, 2005

Expansive Soil

Expansion and contraction of expansive soils in response to changes in moisture content can cause differential and cyclical movements that can cause damage and/or stress to shallow founded structures and equipment. Issues with expansive soils typically occur near the ground surface where changes in moisture content typically occur. As listed in **Table 3.6-1**, the brine disposal pipeline would be constructed in soils with a moderate to high potential for expansive soils. In addition, the geotechnical investigation observed some of the fill and clay materials in colluvium beneath the previous Antioch WTP expansion project may be expansive; expansive soils could be present beneath the proposed desalination location (Geomatrix, 2005).

Erosion

Erosion is the wearing away of soil and rock by processes such as mechanical or chemical weathering, mass wasting, and the action of water and wind. Excessive soil erosion can eventually lead to damage of building foundations and roadways. At the project site, areas that are susceptible to erosion are those that would be exposed during the construction phase. Typically, the soil erosion potential is reduced once the soil is graded and covered with concrete,

[1] Loam is a general term for soil composed of a lix of sand, silt, and clay.

structures, asphalt, or slope protection. As listed in **Table 3.6-1**, all of the project components would be located in soils moderately susceptible to erosion.

Corrosion

Corrosion refers to potential soil-induced electrochemical or chemical action that could corrode or deteriorate concrete, reinforcing steel in concrete structures, and bare-metal structures exposed to these soils. The rate of corrosion is related to factors such as soil moisture, particle-size distribution, and the chemical composition and electrical conductivity of the soil. As listed in **Table 3.6-1**, the conveyance pipelines would be constructed in soils with a high potential to corrode steel, and the pump station would be constructed in soils with a moderate potential to corrode steel.

Seismicity and Faults

This section characterizes the region's existing faults, describes historical earthquakes, estimates the likelihood of future earthquakes, and describes probable ground shaking effects.

Earthquake Terminology and Concepts

Earthquake Mechanisms and Fault Activity

Faults are planar features within the earth's crust that have formed to release strain caused by the dynamic movements of the earth's major tectonic plates. An earthquake on a fault is produced when these strains overcome the inherent strength of the earth's crust, and the rock ruptures. The rupture causes seismic waves that propagate through the earth's crust, producing the ground shaking effect known as an earthquake. The rupture also causes variable amounts of slip along the fault, which may or may not be visible at the earth's surface.

Geologists commonly use the age of offset rocks as evidence of fault activity—the younger the displaced rocks, the more recently earthquakes have occurred. To evaluate the likelihood that a fault would produce an earthquake, geologists examine the magnitude and frequency of recorded earthquakes and evidence of past displacement along a fault. The California Geological Survey (CGS) defines an active fault as one that has had surface displacement within Holocene time (within the last 11,000 years; the U.S. Geological Survey [USGS] uses within the last 15,000 years). A Quaternary fault is defined as a fault that has shown evidence of surface displacement during the Quaternary period (the last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. This definition does not mean that a fault lacking evidence of surface displacement is necessarily inactive. The term "sufficiently active" is also sometimes used to describe a fault if there is some evidence that Holocene displacement has occurred on one or more of its segments or branches (CGS, 2007).

For the purpose of delineating fault rupture zones, the CGS historically sought to zone faults defined as potentially active, which are faults that have shown evidence of surface displacement during the Quaternary period (the last 1.6 million years). In late 1975, the State Geologist made a policy decision to zone only those faults that had a relatively high potential for ground rupture, determining that a fault should be considered for zoning only if it was sufficiently active and "well defined."[2] Faults that are confined to pre-Quaternary rocks (more than 1.6 million years old) are considered inactive and incapable of generating an earthquake.

Earthquake Magnitude

When an earthquake occurs along a fault, its size can be determined by measuring the energy released during the event. A network of seismographs records the amplitude and frequency of the seismic waves that an earthquake generates. The Richter magnitude (ML) of an earthquake represents the highest amplitude measured by the seismograph at a distance of 100 kilometers from the epicenter. Richter magnitudes vary logarithmically with each whole-number step, representing a tenfold increase in the amplitude of the recorded seismic waves and 32 times the amount of energy released. While Richter magnitude was historically the primary measure of earthquake magnitude, seismologists now use Moment Magnitude (Mw) as the preferred way to express the size of an earthquake. The Mw scale is related to the physical characteristics of a fault, including the rigidity of the rock, the size of fault rupture, and the style of movement or displacement across the fault. Although the formulae of the scales are different, they both contain a similar continuum of magnitude values, except that Mw can reliably measure larger earthquakes and do so from greater distances.

Peak Ground Acceleration

A common measure of ground motion at any particular site during an earthquake is the peak ground acceleration (PGA). The PGA for a given component of motion is the largest value of horizontal acceleration obtained from a seismograph. PGA is expressed as the percentage of the acceleration due to gravity (g), which is approximately 980 centimeters per second squared. In terms of automobile acceleration, one "g" of acceleration is equivalent to the motion of a car traveling 328 feet from rest in 4.5 seconds. For comparison purposes, the maximum PGA value recorded during the 1994 Northridge earthquake in the vicinity of the epicenter exceeded 1 g in several areas. Unlike measures of magnitude, which provide a single measure of earthquake energy, PGA varies from place to place and is dependent on the distance from the epicenter and the character of the underlying geology (e.g., hard bedrock, soft sediments, or artificial fills).

Modified Mercalli Intensity Scale

The Modified Mercalli Intensity Scale assigns an intensity value based on the observed effects of groundshaking produced by an earthquake. Unlike measures of earthquake magnitude and PGA, the Modified Mercalli Intensity Scale is qualitative in nature in that it is based on actual observed effects rather than measured values. Similar to PGA, Modified Mercalli values for an earthquake at any one place can vary depending on the earthquake's magnitude, the distance from its epicenter, the focus of its energy, and the type of geologic material. The Modified Mercalli values for intensity range from I (earthquake not felt) to XII (damage nearly total), and intensities ranging from IV to X can cause moderate to significant structural damage. Because the Modified

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2 A well-defined fault has a clearly trace detectable by a trained geologist as a physical feature at or just below the ground surface.

Mercalli scale is a measure of groundshaking effects, intensity values can be correlated to a range of average PGA values, as shown in **Table 3.6-2**.

TABLE 3.6-2
MODIFIED MERCALLI INTENSITY SCALE

Intensity Value	Intensity Description	Average Peak Ground Acceleration[a]
I	Not felt	< 0.0017 g
II	Felt by people sitting or on upper floors of buildings	0.0017 to 0.014 g
III	Felt by almost all indoors. Hanging objects swing. Vibration like passing of light trucks. May not be recognized as an earthquake.	0.0017 to 0.014 g
IV	Vibration felt like passing of heavy trucks. Stopped cars rock. Hanging objects swing. Windows, dishes, doors rattle. Glasses clink. In the upper range of IV, wooden walls and frames creak.	0.014 to 0.039 g
V (Light)	Felt outdoors. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing. Pictures move. Pendulum clocks stop.	0.035 to 0.092 g
VI (Moderate)	Felt by all. People walk unsteadily. Many frightened. Windows crack. Dishes, glassware, knickknacks, and books fall off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster, adobe buildings, and some poorly built masonry buildings cracked. Trees and bushes shake visibly.	0.092 to 0.18 g
VII (Strong)	Difficult to stand or walk. Noticed by drivers of cars. Furniture broken. Damage to poorly built masonry buildings. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices, unbraced parapets and porches. Some cracks in better masonry buildings. Waves on ponds.	0.18 to 0.34 g
VIII (Very Strong)	Steering of cars affected. Extensive damage to unreinforced masonry buildings, including partial collapse. Fall of some masonry walls. Twisting, falling of chimneys and monuments. Wood-frame houses moved on foundations if not bolted; loose partition walls thrown out. Tree branches broken.	0.34 to 0.65 g
IX (Violent)	General panic. Damage to masonry buildings ranges from collapse to serious damage unless modern design. Wood-frame structures rack, and, if not bolted, shifted off foundations. Underground pipes broken.	0.65 to 1.24 g
X (Very Violent)	Poorly built structures destroyed with their foundations. Even some well-built wooden structures and bridges heavily damaged and needing replacement. Water thrown on banks of canals, rivers, lakes, etc.	> 1.24 g
XI (Very Violent)	Few, if any, masonry structures remain standing. Bridges destroyed. Rails bent greatly. Underground pipelines completely out of service.	> 1.24 g
XII (Very Violent)	Damage nearly total. Practically all works of construction are damaged greatly or destroyed. Large rock masses displaced. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown into the air.	> 1.24 g

NOTES:

[a] Value is expressed as a fraction of the acceleration due to gravity (g). Gravity (g) is 9.8 meters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.

SOURCES: ABAG, 2016a; CGS, 2002b.

Seismicity and Faults

The project area is located in a seismically active region of California that contains both active (Holocene age within the last 11,000 years; the USGS uses 15,000 years) and potentially active (Quaternary age or within the last 1.6 million years) faults. Throughout the project region, there is the potential for damage resulting from movement along any one of a number of the active faults, seismic shaking, and seismically induced ground failures (e.g., liquefaction). Several active faults have been mapped close to the project area as shown on **Figure 3.6-1** and listed on **Table 3.6-3**.

TABLE 3.6-3
ACTIVE FAULTS

Fault or Fault Zone	Approximate Distance[a]	Fault Classification[b]	Historical Seismicity[c]	Maximum Credible Earthquake[d]
Clayton-Marsh Creek-Greenville	7 miles southwest	Active	M 5.6 in 1980	6.9
Concord-Green Valley	12 miles southwest	Active	Active creep	6.9
Mount Diablo Thrust	16 miles south	Active	Active creep	6.8
Calaveras	16 miles	Active	M5.6 to M6.4 in 1861 M4 to M4.5 in 1970 and 1990	6.8
Hayward	25 miles southwest	Active	M6.8 in 1868 Many <M4.5	7.1
San Andreas	45 miles west	Active	M7.1 in 1989 M8.25 in 1906 M7.0 in 1838 Many <M6	7.9

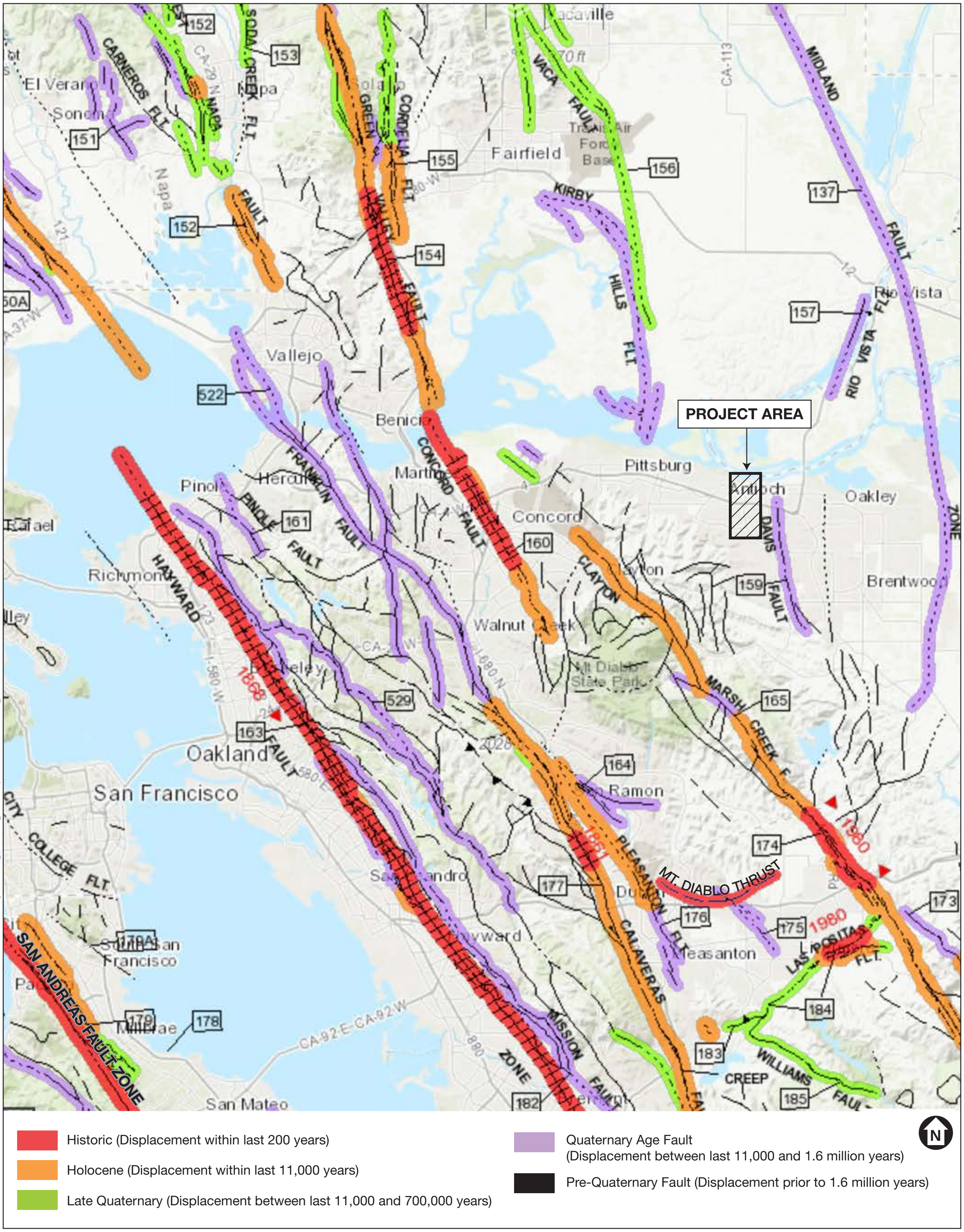
NOTES:
[a] Distance from proposed desalination plant.
[b] An "active fault" is defined by the California Geological Survey as one that has displayed displacement within the last 10,000 years.
[c] M denoted magnitude and does not differentiate between the older Richter and more recent moment magnitude measurement scales.
[d] The maximum credible earthquake is an estimated moment magnitude (M) for the largest earthquake capable of occurring on a fault.

SOURCES: WGCEP, 2015; LSA, 2003

The Working Group on California Earthquake Probabilities (WGCEP), comprised of the USGS, the CGS, and the Southern California Earthquake Center, evaluates the probability of one or more earthquakes of Mw 6.7 or higher occurring in the state of California over the next 30 years. It is estimated that the San Francisco Bay Area as a whole has a 72 percent chance of experiencing an earthquake of Mw 6.7 or higher over the next 30 years; among the various active faults in the region, the Hayward and Calaveras Faults are the most likely to cause such an event (WGCEP, 2015a). The nearby active faults are discussed below.

Clayton-Marsh Creek-Greenville Fault Zone

The Clayton-Marsh Creek-Greenville Fault Zone is a major zone of faults of the San Andreas Fault System extending about 56 miles northwest from Mount Diablo north to Suisun Bay. It is designated as an Alquist-Priolo Earthquake Fault Zone (see Alquist-Priolo Earthquake Fault Zoning Act discussed in Section 3.6.2, *Regulatory Framework* further below). The overall



U:\PROJECTS\SFO\15xxxx\D150433.02 - Brackish Water Desalination Facility Planning_Funding\05 Graphics-GIS-Modeling\Illustrator

SOURCE: CGS, 2010

Brackish Water Desalination Facility

Figure 3.6-1
Regional Faults

ESA

movement of the fault zone consists of right-lateral,[3] strike-slip[4] movement. The fault zone is not a single trace, but contains numerous splays and en-echelon segments. On January 24, 1980, an earthquake of Mw 5.8 struck approximately 11 miles north of Livermore on the Greenville Fault portion of this fault zone. The earthquake caused discontinuous surface rupture along several fault traces. This fault zone has a 2.8 percent probability of generating an earthquake with a magnitude equal to or greater than 6.7 over the next 30 years (WGCEP, 2015b).

Concord-Green Valley Fault

Formerly considered two faults because their surface expressions are separated by Suisun Bay, the Concord-Green Valley Fault is right-lateral, strike-slip fault and is the easternmost expression of the northwest movement in the San Andreas Fault System in the San Francisco Bay Area. Segments of the fault on both sides of Suisun Bay are historically active and the fault is designated as an Alquist-Priolo Earthquake Fault Zone. The Concord-Green Valley Fault has a 3.53 percent probability of generating an earthquake with a magnitude equal to or greater than 6.7 over the next 30 years (WGCEP, 2015b).

Mount Diablo Thrust Fault

The Mount Diablo Thrust fault is a buried thrust fault/inferred fault, located about 16 miles south of the project area. ABAG identifies the Mount Diablo Thrust as “the most active thrust fault” in the Bay Area (ABAG, 2016b). The Mount Diablo Thrust Fault has a 2.5 percent probability of generating an earthquake in the San Francisco Bay Area with a magnitude equal to or greater than 6.7 Mw over the next 30 years (WGCEP, 2015b). The State recognizes that buried thrust faults exist; however, their fault planes tend to extend under a wide area and are extremely difficult to identify and characterize. Consequently, the Mount Diablo Thrust has not been designated as an Alquist-Priolo Earthquake Fault Zone.

Calaveras Fault Zone

The 75-mile-long Calaveras Fault Zone extends north from Hollister through the Diablo Range, east of San Jose, and along the Pleasanton-Dublin-San Ramon urban corridor. The Calaveras Fault is not a single fault trace but rather a system of active faults designated as an Alquist-Priolo Earthquake Fault Zone. The Calaveras Fault has a 6.98 percent probability of generating an earthquake with a magnitude equal to or greater than 6.7 over the next 30 years (WGCEP, 2015b).

Hayward Fault Zone

The Hayward Fault Zone extends northwest approximately 55 miles from San Jose to Point Pinole. It is a right-lateral, strike-slip fault and is designated as an Alquist-Priolo Earthquake Fault Zone. The fault is active, producing large historic earthquakes, fault creep, and abundant geomorphic evidence of fault rupture. The Hayward Fault Zone has a 14.11 percent probability of

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[3] To an observer straddling a right-lateral fault, the right-hand block or plate would move towards the observer.

[4] A strike-slip fault creates vertical (or nearly vertical) fractures (i.e., the blocks primarily move horizontally).

generating an earthquake with a magnitude equal to or greater than 6.7 Mw over the next 30 years (WGCEP, 2015b).

San Andreas Fault Zone

The San Andreas Fault Zone is the major structural feature in the region and forms a boundary between the North American and Pacific tectonic plates (CGS, 2002a). The San Andreas Fault is a major northwest-trending, right-lateral, strike-slip fault zone. The fault zone extends for about 600 miles from the Gulf of California in the south to Cape Mendocino in the north. The San Andreas is not a single fault trace but rather a system of active faults that diverges from the main fault south of the city of San Jose, California. The San Andreas Fault Zone has produced numerous large earthquakes, including the 1906 San Francisco earthquake. That event had an estimated ML 8.3 or Mw 7.8 (WGCEP 2008a, 2008b) and was associated with up to 21 feet of displacement and widespread ground failure (Lawson, 1908). The San Andreas Fault Zone has a 6.4 percent probability of generating an earthquake in the San Francisco Bay Area with a magnitude equal to or greater than 6.7 Mw over the next 30 years (WGCEP, 2015b).

Seismic Hazards

The project area could be affected by a major earthquake along seismically active or potentially active fault lineaments during the project life. Seismically induced hazards include ground shaking, liquefaction and lateral spreading, landslides, and settlement.

Ground Shaking

The amplitude and frequency content of ground shaking is related to the size of an earthquake, the distance from the causative fault, the type of fault (e.g., strike-slip), and the response of the geologic materials at the site. Ground shaking can be described in terms of acceleration, velocity, and displacement of the ground. As a rule, the greater the earthquake magnitude and the closer the fault rupture to a site, the greater the intensity of ground shaking. The ground shaking hazard estimated at the proposed desalination plant using the CGS Ground Motion Interpolator estimates a PGA of 0.417g (CGS, 2008a). Based on the Modified Mercalli Intensity Scale (see **Table 3.6-2**), this PGA would result in an Intensity Value of VIII, very strong shaking, at the proposed desalination plant. The City of Antioch also conducted a city-wide earthquake scenario study that estimated that the level of shaking in the areas where the desalination plant and new conveyance pipelines would be constructed that would result from a Mw 7.05 earthquake occurring in San Pablo Bay on the Hayward Fault would be about Intensity Value VII, strong shaking (LSA, 2008).

Liquefaction and Lateral Spreading

Liquefaction is the rapid loss of shear strength experienced in saturated, predominantly loose granular soils below the groundwater level during strong earthquake ground shaking and occurs due to an increase in pore water pressure (VT, 2013). Liquefaction-induced lateral spreading is defined as the finite, lateral displacement of gently sloping ground as a result of pore-pressure buildup or liquefaction in a shallow underlying deposit during an earthquake. The occurrence of this phenomenon is dependent on many complex factors, including the intensity and duration of ground shaking, particle-size distribution, and density of the soil.

The potential damaging effects of liquefaction include differential settlement, loss of ground support for foundations, ground cracking, heaving and cracking of structure slabs due to sand boiling, and buckling of deep foundations due to ground settlement. Dynamic settlement (i.e., pronounced consolidation and settlement from seismic shaking) may also occur in loose, dry sands above the water table, resulting in settlement of and possible damage to overlying structures. In general, a relatively high potential for liquefaction exists in loose, sandy soils that are within 50 feet of the ground surface and are saturated (below the groundwater table). Lateral spreading can move blocks of soil, placing strain on buried pipelines that can lead to leaks or pipe failure.

The geotechnical investigation for the previous Antioch WTP expansion did not encounter groundwater in the borings that were drilled to 15.5 feet in depth (Geomatrix, 2005). With no shallow groundwater, the area of the proposed desalination plant, along with pipeline alignments away from the San Joaquin River, would not be anticipated to be susceptible to liquefaction. Shallow groundwater may be encountered in the portions of the new brine pipeline closer to the bay.

Landslides

Slope failures, commonly referred to as landslides, include many phenomena that involve the downslope displacement and movement of material, either triggered by static (i.e., gravity) or dynamic (i.e., earthquake) forces. Slope stability can depend on several complex variables, including the geology, structure, and the amount of groundwater present, as well as external processes such as climate, topography, slope geometry, and human activity. Landslides can occur on slopes of 15 percent or less, but the probability is greater on steeper slopes that exhibit old landslide features such as scarps, slanted vegetation, and transverse ridges. Landslides typically occur within slide-prone geologic units that contain excessive amounts of water or are located on steep slopes, or where planes of weakness are parallel to the slope angle.

The project area is located on broad, gently sloping alluvium deposits. According to the Contra Costa County Hazard Mitigation Plan Update Volume 2 (Contra Costa County, 2011), the Antioch WTP is located in an area that is at risk of “Few Landslides,” which contains few, if any, large mapped landslides, but locally contains scattered small landslides. The intake pump station and proposed pipeline alignment areas are not located in areas of mapped landslides. The gently sloping nature of the project area would have a very low potential, if any, for landslides.

Settlement

Ground surface settlement can be accelerated and accentuated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid compaction and settling of surface materials—particularly loose, non-compacted and variable sandy sediments—due to the rearrangement of soil particles during prolonged ground shaking. The geotechnical investigation at the Antioch WTP observed that some areas consisted of undocumented and variable fill with uncertain levels of compaction (Geomatrix, 2005). Such materials may be susceptible to differential settlement. The pipeline alignments would be predominantly in shallow fill along existing streets. The base material under the streets would have been compacted during construction; additional settlement would not be expected. Similarly, the proposed location for the pump station is in a previously disturbed area; additional settlement would not be expected.

Subsidence

Subsidence is the gradual lowering of the land surface due to compaction of underlying materials. Subsidence can occur as a result of the extraction of groundwater and oil, which can cause subsurface clay layers to compress and lower the overlying land surface. The proposed project does not include the extraction of water or oil.

Paleontological Resources

Paleontological resources are the fossilized remains or impressions of plants and animals, including vertebrates (animals with backbones; mammals, birds, fish, etc.), invertebrates (animals without backbones; starfish, clams, coral, etc.), and microscopic plants and animals (microfossils). They are valuable, nonrenewable, scientific resources used to document the existence of extinct life forms and to reconstruct the environments in which they lived. Fossils can be used to determine the relative ages of the depositional layers in which they occur and of the geologic events that created those deposits. The age, abundance, and distribution of fossils depend on the geologic formation in which they occur and the topography of the area in which they are exposed. The geologic environments within which the plants or animals became fossilized usually were quite different from the present environments in which the geologic formations now exist.

As previously discussed, the project area is underlain by Quaternary alluvium that is less than 1.6 million years old and imported fill materials. The project area is mostly in a highly developed urban area with fill and disturbed native materials. The fill materials would not contain paleontological resources. Paleontological resources, if there were any, in the disturbed native materials would have been destroyed as a result of the urban construction activities. In addition, the shallow surficial disturbed native material deposits are likely recent, that is, less than 11,000 years old. A search of the University of California Museum of Paleontology database for the City of Antioch did not identify any known Holocene paleontological resources (UCMP, 2018).

Because the project area consists of recently deposited sediments, and no fossil specimens in institutional collections have been found near the project site, surficial exposures of Holocene alluvium are considered to have low potential for paleontological resources.

3.6.2 Regulatory Framework

Federal

Federal regulations that apply directly to addressing the seismic and geotechnical aspects of the project have been delegated to the state level.

State

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting in structures for human occupancy. In accordance with this act, the state geologist established regulatory zones, called "earthquake fault zones," around the surface traces of active faults and has published maps showing these zones. Within these zones, buildings for human occupancy cannot be constructed across the surface trace of active faults and must be set back from the fault (generally 50 feet). Each earthquake fault zone extends approximately 200 to 500 feet on either side of the mapped fault trace because many active faults are complex and consist of more than one branch that may experience ground surface rupture. The act does not apply to the project because no active faults cross the project area, or anywhere else in the Cities of Antioch and Pittsburg.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was passed in 1990 following the Loma Prieta earthquake to reduce threats to public health and safety and to minimize property damage caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones, and cities, counties, and other local permitting agencies to regulate certain development projects within these zones. For projects that would locate structures for human occupancy within designated Zones of Required Investigation, the Seismic Hazards Mapping Act requires project applicants to perform a site-specific geotechnical investigation to identify the potential site-specific seismic hazards and corrective measures, as appropriate, prior to receiving building permits. The *CGS Guidelines for Evaluating and Mitigating Seismic Hazards* (Special Publication 117A) provides guidance for evaluating and mitigating seismic hazards (CGS, 2008b). The CGS is in the process of producing official maps based on USGS topographic quadrangles, as required by the Act. To date, the CGS has not completed delineations for any of the USGS quadrangles in which project components are proposed.

California Building Code

The California Building Code (CBC), which is codified in Title 24 of the California Code of Regulations, Part 2, was promulgated to safeguard the public health, safety, and general welfare by establishing minimum standards related to structural strength, means of egress to facilities (entering and exiting), and general stability of buildings. The purpose of the CBC is to regulate and control the design, construction, quality of materials, use/occupancy, location, and maintenance of all buildings and structures within its jurisdiction. Title 24 is administered by the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under State law, all building standards must be centralized in Title 24 or they are not enforceable. The provisions of the CBC apply to the construction, alteration, movement, replacement, location, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California.

The 2016 edition of the CBC is based on the 2015 International Building Code (IBC) published by the International Code Council, which replaced the Uniform Building Code (UBC). The code is updated triennially, and the 2016 edition of the CBC was published by the California Building Standards Commission on July 1, 2016, and took effect starting January 1, 2017. The 2016 CBC contains California amendments based on the American Society of Civil Engineers (ASCE) Minimum Design Standard ASCE/SEI 7-16, Minimum Design Loads for Buildings and Other Structures, provides requirements for general structural design and includes means for determining earthquake loads, as well as other loads (such as wind loads) for inclusion into building codes. Seismic design provisions of the building code generally prescribe minimum lateral forces applied statically to the structure, combined with the gravity forces of the dead and live loads of the structure, which the structure then must be designed to withstand. The prescribed lateral forces are generally smaller than the actual peak forces that would be associated with a major earthquake. Consequently, structures should be able to (1) resist minor earthquakes without damage; (2) resist moderate earthquakes without structural damage but with some nonstructural damage; and (3) resist major earthquakes without collapse, but with some structural as well as nonstructural damage. Conformance to the current building code recommendations does not constitute any kind of guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake; however, it is reasonable to expect that a structure designed in accordance with the seismic requirements of the CBC should not collapse in a major earthquake.

The earthquake design requirements take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients, all of which are used to determine a seismic design category (SDC) for a project. The SDC is a classification system that combines the occupancy categories with the level of expected ground motions at the site; SDC ranges from A (very small seismic vulnerability) to E/F (very high seismic vulnerability and near a major fault). Seismic design specifications are determined according to the SDC in accordance with CBC Chapter 16. CBC Chapter 18 covers the requirements of geotechnical investigations (Section 1803), excavation, grading, and fills (Section 1804), load-bearing of soils (Section 1806), as well as foundations (Section 1808), shallow foundations (Section 1809), and deep foundations (Section 1810). For Seismic Design Categories D, E, and F, Chapter 18 requires analysis of slope instability, liquefaction, and surface rupture attributable to faulting or lateral spreading, plus an evaluation of lateral pressures on basement and retaining walls, liquefaction and soil strength loss, and lateral movement or reduction in foundation soil-bearing capacity. It also addresses measures to be considered in structural design, which may include ground stabilization, selecting appropriate foundation type and depths, selecting appropriate structural systems to accommodate anticipated displacements, or any combination of these measures. The potential for liquefaction and soil strength loss must be evaluated for site-specific peak ground acceleration magnitudes and source characteristics consistent with the design earthquake ground motions.

Requirements for geotechnical investigations are included in Appendix J, CBC Section J104, Engineered Grading Requirements. As outlined in Section J104, applications for a grading permit are required to be accompanied by plans, specifications, and supporting data consisting of a soils engineering report and engineering geology report. Additional requirements for subdivisions requiring tentative and final maps and for other specified types of structures are in California Health and Safety Code Sections 17953 to 17955 and in 2013 CBC Section 1802. Testing of samples from subsurface investigations is required, such as from borings or test pits. Studies must be done as needed to evaluate slope stability, soil strength, position and adequacy of load-bearing soils, the effect of moisture variation on load-bearing capacity, compressibility, liquefaction, differential settlement, and expansiveness.

The design of the proposed project is required to comply with CBC requirements, which would make the proposed project consistent with the CBC.

California Excavation Notification Requirements

California Code of Regulations Section 4216 requires that construction contractors report a project that involves excavation 48-hours prior to breaking ground. This program allows owners of buried installations to identify and mark the location of its facilities before any nearby excavation projects commence. Adherence to this law by contractors of projects reduces the potential of inadvertent pipeline and utility damage and leaks. All contractors are required to comply with California excavation notification requirements, which would make the proposed project consistent with California excavation notification requirements.

California Occupational Safety and Health Administration Regulations

Occupational safety standards exist in federal and state laws to minimize worker safety risks from both physical and chemical hazards in the workplace. In California, the California Division of Occupational Safety and Health (Cal/OSHA) and the federal OSHA are the agencies responsible for ensuring worker safety in the workplace.

The OSHA Excavation and Trenching standard (29 CFR 1926.650) covers requirements for excavation and trenching operations, which are among the most hazardous construction activities. OSHA requires that all excavations in which employees could potentially be exposed to cave-ins be protected by sloping or benching the sides of the excavation, supporting the sides of the excavation, or placing a shield between the side of the excavation and the work area. Cal/OSHA is the implementing agency for both state and federal OSHA standards. All contractors are required to comply with OSHA regulations, which would make the proposed project would be consistent with OSHA.

NPDES Construction General Permit

Construction associated with the proposed project would disturb more than one acre of land surface potentially affecting the quality of stormwater discharges into waters of the U.S. The proposed project would therefore be subject to the *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Order 2009-0009-DWQ, NPDES No. CAS000002, Construction General Permit; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ). The Construction General Permit regulates discharges of pollutants in stormwater associated with construction activity to waters of the U.S. from construction sites that disturb one or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface. The permit regulates stormwater discharges associated with construction or demolition activities, such as clearing and excavation; construction of buildings; and linear underground projects (LUP), including installation of water pipelines and other utility lines.

The Construction General Permit requires that construction sites be assigned a Risk Level of 1 (low), 2 (medium), or 3 (high), based both on the sediment transport risk at the site and the receiving waters risk during periods of soil exposure (e.g., grading and site stabilization). The sediment risk level reflects the relative amount of sediment that could potentially be discharged to receiving water bodies and is based on the nature of the construction activities and the location of the site relative to receiving water bodies. The receiving waters risk level reflects the risk to the receiving waters from the sediment discharge. Depending on the risk level, the construction projects could be subject to the following requirements:

- Effluent standards
- Good site management "housekeeping"
- Non-stormwater management
- Erosion and sediment controls
- Runon and runoff controls
- Inspection, maintenance, and repair
- Monitoring and reporting requirements

The Construction General Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) that includes specific best management practices (BMPs) designed to prevent sediment and pollutants from contacting stormwater from moving off site into receiving waters. The BMPs fall into several categories, including erosion control, sediment control, waste management and good housekeeping, and are intended to protect surface water quality by preventing the off-site migration of eroded soil and construction-related pollutants from the construction area. Routine inspection of all BMPs is required under the provisions of the Construction General Permit. In addition, the SWPPP is required to contain a visual monitoring program, a chemical monitoring program for non-visible pollutants, and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment.

The SWPPP must be prepared before the construction begins. The SWPPP must contain a site map(s) that delineates the construction work area, existing and proposed buildings, parcel boundaries, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the project area. The SWPPP must list BMPs and the placement of those BMPs that the applicant would use to protect stormwater runoff. Additionally, the SWPPP must contain a visual monitoring program; a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. Examples of typical construction BMPs include scheduling or limiting certain activities to dry periods, installing sediment barriers such as silt fence and fiber rolls, and maintaining equipment and vehicles used for construction. Non-stormwater management measures include installing specific discharge controls during certain activities, such as paving operations, vehicle and equipment washing and fueling. The Construction General Permit also sets post-construction standards (i.e., implementation of BMPs to reduce pollutants in stormwater discharges from the site following construction).

In the project area, the Construction General Permit is implemented and enforced by the Central Coast Regional Water Quality Control Board (RWQCB), which administers the stormwater permitting program. Dischargers are required to electronically submit a notice of intent and permit registration documents in order to obtain coverage under this Construction General Permit. Dischargers are responsible for notifying the RWQCB of violations or incidents of non-compliance, as well as for submitting annual reports identifying deficiencies of the BMPs and how the deficiencies were corrected. The risk assessment and SWPPP must be prepared by a State Qualified SWPPP Developer and implementation of the SWPPP must be overseen by a State Qualified SWPPP Practitioner. A Legally Responsible Person, who is legally authorized to sign and certify PRDs, is responsible for obtaining coverage under the permit.

Local

East Contra Costa County Municipal NPDES Permit, Waste Discharge Requirements Order R5-2016-0040 (includes Antioch) and R2-2015-0049 (includes Pittsburg) (MS4 Permit)

The boundary between the San Francisco RWQCB and the Central Valley RWQCB passes between the Cities of Pittsburg and of Antioch. However, the requirements of the previously discussed NPDES municipal general permits issued by the two RWQCBs are very similar; most of the project components would be under the jurisdiction of the Central Valley RWQCB and its municipal permit (RWQCB, 2016a). The permits establish regulations covering discharge prohibitions, receiving water limitations, municipal operations (such as the proposed project), new development, construction site controls (construction site runoff), and other regulations to regulate surface water quality.

The discharge prohibitions prohibit the discharge of non-stormwater (materials other than stormwater) into, storm drain systems and watercourses and includes a tiered categorization of non-stormwater discharges based on potential for pollutant content that may be discharged upon adequate assurance that the discharge contains no pollutants of concern at concentrations that will impact beneficial uses or cause exceedances of water quality standards. The receiving water limitations provide narrative and numeric water quality standards. The municipal operations regulations include a number of requirements to control and reduce non-stormwater discharges and polluted stormwater to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure, such as the proposed project. The requirements include source control, site design, and stormwater treatment requirements, such as minimizing disturbance of natural infiltration areas and the addition of impervious surfaces, controlling and directing runoff, and the use of infiltration and bioretention measures, among other measures.

To more efficiently address the requirements, the Contra Costa Clean Water Program (CCCWP) was established in 1991 in response to the federal stormwater regulations and covers Contra Costa County, its 19 cities/towns (including the Cities of Antioch and Pittsburg), and the Contra Costa County Flood Control and Water Conservation District (collectively referred to as Permittees). The CCCWP is discussed below and includes the requirements for municipalities and new developments.

Contra Costa Clean Water Program (CCCWP)

The Cities of Antioch and Pittsburg are members of the CCCWP, established in 1991 in response to the federal stormwater regulations and the NPDES municipal general permits. The CCCWP comprises Contra Costa County, its 19 cities and towns, and the Contra Costa County Flood Control and Water Conservation District (collectively referred to as Permittees). Through the CCCWP, Contra Costa municipalities have prepared a Stormwater C.3 Guidebook to assist applicants through the process of submittals and reviews (CCCWP, 2017).

Provision C.3 in the municipal general permit requires site designs to minimize the addition of impervious surfaces, controlling the rates and durations of site runoff, install pervious surfaces where feasible to facilitate onsite infiltration, treat remaining runoff from impervious areas using bioretention, and maintain stormwater treatment and flow-control facilities in perpetuity. The C.3 requirements are separate from, and in addition to, requirements for erosion and sediment control and for pollution prevention measures during construction.

City of Antioch General Plan

Environmental Hazards Element

Policy: New construction in Antioch is required to meet the requirements of the California Building Code.

Objective 11.3.1: Minimize the potential for loss of life, physical injury, property damage, and social disruption resulting from seismic ground shaking and other geologic events.

***Policy 11.3.2.a*:** Require geologic and soils reports to be prepared for proposed development sites, and incorporate the findings and recommendations of these studies into project development requirements. As determined by the City of Antioch Building Division, a site-specific assessment shall be prepared to ascertain potential ground shaking impacts on new development. The site-specific ground shaking assessment shall incorporate up-to-date data from government and non-government sources and may be included as part of any site-specific geotechnical investigation. The site-specific ground shaking assessment shall include specific measures to reduce the significance of potential ground shaking hazards. This site-specific ground shaking assessment shall be prepared by a licensed geologist and shall be submitted to the City of Antioch Building Division for review and approval prior to the issuance of building permits. For purposes of this policy, "development" applies to new structures and existing structures or facilities that undergo expansion, remodeling, renovation, refurbishment or other modification.

***Policy 11.3.2.k*:** Require specialized soils reports in areas suspected of having problems with potential bearing strength, expansion, settlement, or subsidence, including implementation of the recommendations of these reports into the project development, such that structures designed for human occupancy are not in danger of collapse or significant structural damage with corresponding hazards to human occupants. Where structural damage can be mitigated through structural design, ensure that potential soils hazards do not pose risks of human injury or loss of life in outdoor areas of a development site.

Public Services and Facilities Element

Objective 8.7.1: Conduct all storm water via adequately sized storm drains and channels.

***Policy 8.7.2.e*:** Require new developments to provide erosion and sedimentation control measures to maintain the capacity of area storm drains and protect water quality.

***Policy 8.7.2.f*:** Require implementation of Best Management Practices [BMPs] in the design of drainage systems to reduce discharge on non-point source pollutants originating in streets, parking lots, paved industrial work area, and open spaces involved with pesticide applications. New developments to provide erosion and sedimentation control measures to maintain the capacity of area storm drains and protect water quality.

Resources Element

Objective 10.9.2: Preserve archaeological, paleontological, and historic resources within the Antioch Planning Area for the benefit and education of future residents.

***Policy 10.9.2.a*:** Require new developments to analyze, and therefore avoid or mitigate impacts to archaeological, paleontological, and historic resources. Require surveys for projects having the potential to impact archaeological, paleontological, and historic resources. If significant resources are found to be present, provide mitigation in accordance with applicable CEQA guidelines and provisions of the California Public Resources Code.

City of Antioch Municipal Code

Chapter 9, Section 6-9.05: Stormwater Control Plan Required. Every application for a development project, including but not limited to a rezoning, tentative map, parcel map, conditional use permit, variance, site development permit, design review, or building permit that is subject to the development runoff requirements in the city’s NPDES permit shall be accompanied by a stormwater control plan that meets the criteria in the most recent version of the Contra Costa Clean Water Program Stormwater C.3. Guidebook. Implementation of an approved stormwater control plan and submittal of an approved stormwater control operation and maintenance plan by the applicant shall be a condition precedent to the issuance of a certificate of occupancy for a project subject to this section.

Chapter 9, Section 6-9.09: Best Management Practices and Standards. (E) *Construction Activities.* All construction shall conform to the requirements of the CASQA Stormwater Best Management Practices Handbooks for Construction Activities and New Development and Redevelopment, the ABAG Manual of Standards for Erosion & Sediment Control Measures, the city's grading and erosion control ordinance and other generally accepted engineering practices for erosion control as required by the Director when undertaking construction activities. The Director may establish controls on the rate of stormwater runoff from new development and redevelopment as may be appropriate to minimize the discharge and transport of pollutants. (Note: CASQA BMPS are incorporated into SWPPPs).

Chapter 9, Section 6-9.09: The California Building Code, 2016 Edition, is hereby adopted by reference. Also adopted by reference is Appendix Chapters J; Grading.

Chapter 9, Section 8-1.01: The California Building Code, 2016 Edition, is hereby adopted by reference. Also adopted by reference is Appendix Chapters J; Grading.

Chapter 9, Section 8-13.01: Storm water pollution control measures shall be implemented during all construction phases of development to prevent pollution from entering the waterways.

City of Pittsburg General Plan

Health and Safety Element

***Policy 10-P-1*:** Ensure preparation of a soils report by a City-approved engineer or geologist in areas identified as having geological hazards in Figure 10-1, as part of development review.

***Policy 10-P-9*:** Ensure geotechnical studies prior to development approval in geologic hazard areas, as shown in Figure 10-1. Contract comprehensive geologic and engineering studies of critical structures regardless of location.

***Policy 10-P-16*:** Ensure compliance with the current Uniform Building Code during development review. Explore programs that would build incentives to retrofit unreinforced masonry buildings. (Note: The California Building Code is based on the Uniform Building Code).

***Policy 10-P-17*:** Ensure detailed analysis and mitigation of seismic hazard risk for new development in unstable slope or potential liquefaction areas (as designated in Figure 10-1). Limit the location of critical facilities, such as hospitals, schools, and police stations, in such areas.

Resources Element

***Policy 9-G-4*:** Minimize the runoff and erosion caused by earth movement by requiring development to use best construction management practices (BMPs).

***Policy 10-P-9*:** Ensure geotechnical studies prior to development approval in geologic hazard areas, as shown in Figure 10-1. Contract comprehensive geologic and engineering studies of critical structures regardless of location.

***Policy 10-P-16*:** Ensure compliance with the current Uniform Building Code during development review. Explore programs that would build incentives to retrofit unreinforced masonry buildings. (Note: The California Building Code is based on the Uniform Building Code).

***Policy 10-P-17*:** Ensure detailed analysis and mitigation of seismic hazard risk for new development in unstable slope or potential liquefaction areas (as designated in Figure 10-1). Limit the location of critical facilities, such as hospitals, schools, and police stations, in such areas.

City of Pittsburg Municipal Code

Title 15 Buildings and Construction

Chapter 15.60 Existing Building Code: 15.60.010 Adoption. A. Pursuant to Sections 50022.1 to 50022.10, inclusive, of the Government Code, the city council adopts and enacts as the existing building code of the city the 2016 Existing Building Code (CEBC), California Code of Regulations, Title 24, Part 10 (based upon portions of the 2015 International Existing Building Code published by the International Code Council). (Note: This includes the California Building Code).

Chapter 15.88 Grading, Erosion, and Sediment Control: 15.88.030 Permit Required. B. All land-disturbing or land-filling activities or soil storage shall be undertaken in a manner designed to minimize surface runoff, erosion and sedimentation.

Chapter 15.88.050 Data and documents to accompany application. The application shall be accompanied by not less than the following material:

A. General Plans and Data.

Erosion and sediment control plan;

a. Maximum surface runoff from the site shall be calculated using methods approved by the Contra Costa flood control district;

b. A delineation and brief description of the measures to be undertaken to retain sediment on the site, including, but not limited to, the designs and specifications for berms and sediment detention basins and a schedule for their maintenance and upkeep;

c. A delineation and brief description of the surface runoff and erosion control measures to be implemented, including, but not limited to, types and method of applying mulches, and designs and specifications for diverters, dikes and drains, and a schedule for their maintenance and upkeep;

d. A delineation and brief description of the vegetative measures to be taken, including, but not limited to, seeding methods, the type, location and extent of preexisting and undisturbed vegetation types, and a schedule for maintenance and upkeep;

e. The location of all the measures listed by the applicant under subsection (B)(2)(b) of this section shall be depicted on the site map and/or grading plan;

f. An estimate of the cost of implementing and maintaining all interim erosion and sediment control measures must be submitted in a form acceptable to the city engineer;

g. The applicant may propose the use of any erosion and sediment control techniques in the interim plan provided such techniques are proven to be as or more effective than the equivalent best management practices contained in the manual of standards;

Soils engineering report, where required; The soils and geology report required in this chapter shall be prepared by a professional soil investigation firm under the direction of a registered soils engineer and an engineering geologist.

a. Sufficient soil samples to represent a true cross-section of the cut and fill areas and of the material to be used as fill shall be taken and tested under the supervision of the soils engineer. All soils shall be classified in accordance with the Unified Soil Classification system.

b. A complete and detailed specification shall be prepared by the soils engineer for clearing, grubbing, and all aspects of grading, including utility trench backfill, with special emphasis on the depth of fill layers, compaction methods, moisture content, frequency of field density tests, and minimum density to be obtained in the field as related to laboratory density tests;

c. A statement regarding specified grading and slopes shall be prepared by the soils engineer, giving professional opinion including the following:

    i. Shrinkage or settlement of a fill constructed in compliance with the proposed specification for controlled earthwork,

    ii. The safe load-bearing capacity of such controlled sites,

    iii. The maximum slope ratios necessary for slope stability for proposed fill and cut slopes, with recommended planting on the slope to assure freedom from erosion,

    iv. The remaining movement, if any, anticipated in cut areas. Any forecast of appreciable settlement shall be supported by appropriate site soils data;

d. Recommendations included in this report and approved by the city shall be incorporated in the grading plans and/or specifications;

Geology engineering report, where required;

3.6.3 Analysis, Impacts, and Mitigation

Significance Criteria

The criteria used to determine the significance of impacts related to geology, soils and minerals are based on Appendix G of the *CEQA Guidelines*, as modified by *California Building Industry Association v. Bay Area Air Quality Management District* (see Methodology discussion further below). The project would have a significant impact on geology, soils, seismicity, and paleontological resources if it would:

- Directly or indirectly cause 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

  - 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-site or offsite landslide, lateral spreading, subsidence (i.e., settlement), liquefaction, or collapse;
- Be located on expansive[5] or corrosive creating direct or indirect substantial risks to life or property;
- Have soils incapable of adequately supporting the use of septic tanks or alternative reclaimed water disposal systems where sewers are not available for the disposal of reclaimed water; and
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

Methodology and Assumptions

General

Information for this assessment of impacts relative to geology, soils, and paleontological resources is based on a review of literature research (geologic, seismic, soils, and paleontological resources reports and maps), information from seismic and paleontological databases, and the General Plans for the Cities of Antioch and Pittsburg. This information was used to identify potential impacts to workers, the public, or the environment.

The project would be regulated by the various laws, regulations, and policies summarized in the Regulatory Framework. Compliance by the project with applicable federal, state, and local laws and regulations is assumed in this analysis, and local and state agencies would be expected to continue to enforce applicable requirements to the extent that they do so now. Note that compliance with many of the regulations is a condition of permit approval.

As described in more detail below, the analysis of geologic, soils, and seismic impacts in this section takes into account that the City would incorporate into their facility designs the engineering recommendations provided by the geotechnical investigation that the CBC would require be conducted for the final design of the proposed project. The analysis also considers the various existing state and local regulations that apply to geotechnical design and construction, which include the CBC and local ordinances for building and grading. Through compliance with the existing CBC and local ordinances, the City would be required to demonstrate that the project design would be compatible with the local subsurface geology, soil, and seismic conditions; this must occur before building permits are issued. Additionally, it is assumed that the City would require its pipeline engineers and construction contractors to adhere to the American Water

5 The CBC, based on the International Building Code and the now defunct Uniform Building Code, no longer includes a Table 18-1-B. Instead, Section 1803.5.3 of the CBC describes the criteria for analyzing expansive soils.

Works Association (AWWA; see discussion further below) standards, or its equivalent for pipeline construction.

A significant impact would occur if, after considering the features described in the Project Description and the required compliance with regulatory requirements, a significant impact would still occur. For those impacts considered to be significant, mitigation measures are proposed to reduce the identified impacts.

American Water Works Association Standards for Proposed Pipelines

Pipelines are constructed to various industry standards. The AWWA is a worldwide nonprofit scientific and educational association that, among its many activities, establishes recommended standards for the construction and operation of public water supply systems, including standards for pipe and water treatment facility materials and sizing, installation, and facility operations. While the AWWA's recommended standards are not enforceable code requirements, they nevertheless can dictate how pipelines for water conveyance are designed and constructed. The City has committed to requiring its contractors to incorporate AWWA Standards into the construction of the proposed pipelines.

California Building Industry Association v. Bay Area Air Quality Management District (2015) 62 Cal. 4th 369)

In 2015, the California Supreme Court held that CEQA generally does not require a lead agency to consider the impacts of the existing environment on the future residents or users of a project. *California Building Industry Association v. Bay Area Air Quality Management District* (2015) 62 Cal. 4th 369. However, if a project exacerbates a condition in the existing environment, the lead agency is required to analyze the impact of that exacerbated condition on the environment, which may include future occupants of the project. As stated in *Ballona Wetlands Land Trust v. City of Los Angeles* (2011) 201 Cal.App.4th 455, 473: "[T]he purpose of an EIR is to identify the significant effects of a project on the environment, not the significant effects of the environment on the project." While the potential for increased exposure of people or structures to risks associated with seismic occurrences and location of people or structures on unstable geologic units as a result of the location of the proposed project are discussed in this section for informational purposes, the effects of the preexisting hazards on users of the proposed project and structures are not environmental impacts under CEQA.

Issues Not Discussed in Impacts

Due to the nature of the project, there would be no impact related to the following topics for the reasons described below:

- ***Risk of loss, injury, or death involving fault rupture and landslides.*** The proposed project would not directly or indirectly cause or expose people or structures to injury, death, or damage from fault rupture because none of the components intersect any active faults, as determined by CGS mapping performed in accordance with the Alquist-Priolo Earthquake Fault Zoning Act. The proposed project is not located on landslide susceptible areas. Accordingly, this significance criterion is not applicable to the proposed project and is not discussed further.

- ***Located on a geologic unit or soils that are unstable or that would be unstable as a result of the project, which could result in subsidence or collapse.*** Soils that are susceptible to subsidence or collapse are typically associated with projects that include the injection or extraction of groundwater and/or oil, or are located in Karst terrain (carbonate rock terrains where dissolution cavities occur). This project does not include those activities or conditions. Therefore, this significance criterion is not applicable to the proposed project and is not discussed further. an

- ***Result in substantial loss of topsoil.*** The entire project footprint is located in a disturbed urban area that does not have valuable topsoil in the sense of agricultural farmland soil. Therefore, there would be no impact relative to loss of topsoil and topsoil. This significance criterion is not applicable to the proposed project and is not discussed further.

- ***Have soils incapable of adequately supporting use of septic tanks or alternative wastewater disposal systems.*** The project would not use septic tanks or other onsite wastewater disposal systems; therefore, there would be no impact related to the adequacy of soils to support such systems. This significance criterion is not applicable to the proposed project and is not discussed further. Disposal of the brine is discussed in Section 3.11, *Brine Disposal*.

- ***Directly or indirectly destroy unique paleontological or unique geological resources.*** As discussed in the Setting, the project is not located in areas with paleontological resources. The fill and recent disturbed Holocene alluvium would not be considered a unique geological resource. Therefore, there would be no impact related to paleontological or unique geological resources. This significance criterion is not applicable to the proposed project and is not discussed further.

Impacts and Mitigation Measures

Table 3.6-4 summarizes the proposed project's impacts and significance determinations related to geology and soils.

TABLE 3.6-4
SUMMARY OF IMPACTS – GEOLOGY, SOILS, AND PALEONTOLOGY

Impacts	Significance Determinations
Impact 3.6-1: The proposed project would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury or death involving strong ground shaking or seismically induced ground failure, including liquefaction and lateral spreading.	LS
Impact 3.6-2: The proposed project would not result in substantial soil erosion.	LS
Impact 3.6-3: The proposed project would not create substantial risks to life or property due to expansive or corrosive soils.	LS
Impact 3.6-C-1: Cumulative impacts related to geology and soils.	LS

NOTES:
LS = Less than Significant

Impact 3.6-1: The proposed project would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury or death involving strong ground shaking or seismically induced ground failure, including liquefaction and lateral spreading. *(Less than Significant)*

As discussed above in Section 3.6.1, *Environmental Setting*, the region will likely experience a large regional earthquake within the operational life of the project. There is a potential for strong to very strong intensity groundshaking at the project site that would be associated with such an earthquake. The intensity of such an event would depend on the causative fault and the distance to the epicenter, the magnitude, the duration of shaking, and the nature of the geologic materials on which the project components would be constructed. Intense groundshaking and high ground accelerations would affect the entire area around the proposed facilities, pipelines, and associated infrastructure. The primary and secondary effects of groundshaking could damage structural foundations, distort or break pipelines, and place people at risk of injury or death.

Construction

Construction activities would be temporary, and thus, are not anticipated to exacerbate the exposure of people or structures to substantial adverse effects involving seismic hazards. In addition, the proposed project would not exacerbate the potential for earthquakes because the project does not include the injection or extraction of groundwater or oil. Therefore, relative to seismicity, a **less than significant** impact would occur during construction.

Operations

As discussed above in Section 3.6.2, *Regulatory Framework*, the CBC and local ordinances would require that the structural elements of the proposed project would undergo appropriate design-level geotechnical evaluations prior to final design and construction. The geotechnical investigation would include any necessary recommendations for soils remediation and/or foundation systems necessary to reduce seismic-related hazards to less than significant. Implementing the regulatory requirements in the CBC and local ordinances, and ensuring that buildings and structures are constructed in compliance with the law is the responsibility of the project engineers and building officials. The CBC describes required standards for the construction, alteration, movement, replacement, location, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California. The standards include earthquake design requirements that determine the seismic design category and then describe the structural design requirements. The geotechnical engineer, as a registered professional with the State of California, is required to comply with the CBC and local codes while applying standard engineering practice and the appropriate standard of care for the particular region in California, which, in the case of the proposed project, would be the City of Antioch. The California Professional Engineers Act (Building and Professions Code Sections 6700–6799), and the Codes of Professional Conduct, as administered by the California Board of Professional Engineers and Land Surveyors, provides the basis for regulating and enforcing engineering practice in California. The local building officials are typically with the local jurisdiction (i.e., the City) and are responsible for inspections and ensuring CBC and local code compliance prior to approval of the building permit. As discussed above, the geotechnical investigations would include recommendations to address geotechnical issues, including seismic shaking and seismically inducted ground failures, such as liquefaction and lateral spreading. With compliance with the regulatory requirements and the implementation of geotechnical design recommendations, impacts relative to seismic shaking and seismically induced ground failure during operations would be **less than significant**.

Mitigation Measure:

None required.

Impact 3.6-2: The proposed project would not result in substantial soil erosion. *(Less than Significant)*

Construction

Construction of the proposed project would have the potential to result in soil erosion during excavation, grading, trenching, and soil stockpiling. Because the overall footprint of construction activities would exceed one acre, the proposed project would be required to comply with the *NPDES General Permit for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities* (Order 2009-0009-DWQ, NPDES No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ) (Construction General Permit) and the local stormwater ordinances, all of which are described above in Section 3.6.2, *Regulatory Framework*. These state and local requirements were developed to ensure that stormwater is managed and erosion is controlled on construction sites. The Construction General Permit requires preparation and implementation of a SWPPP, which requires applications of BMPs to control runon and runoff from construction work sites. The BMPs would include, but would not be limited to, physical barriers to prevent erosion and sedimentation, construction of sedimentation basins, limitations on work periods during storm events, use of infiltration swales, protection of stockpiled materials, and a variety of other measures that would substantially reduce or prevent erosion from occurring during construction. With compliance with existing regulations, impacts associated with soil erosion during construction would be **less than significant**.

Operations

Once constructed, there would be no further ground disturbance and no potential for erosion. The project would be constructed using BMPs that would provide erosion and sedimentation control measures to maintain the capacity of area storm drains and protect water quality in compliance with the regional MS4 permit. Therefore, there would be **no impact** relative to erosion during operations.

Mitigation Measure:

None required.

Impact 3.6-3: The proposed project would not create direct or indirect substantial risks to life or property due to expansive or corrosive soils. ***(Less than Significant)***

Expansive and corrosive soils can damage structures and buried utilities and can also increase required maintenance. Expansion and contraction of expansive soils in response to changes in moisture content can cause differential and cyclical movements that can result in damage and/or distress to structures and equipment. There would be no construction-related impacts relative to expansive or corrosive soils; impacts would only occur under post-construction and operational conditions, as discussed below.

As listed in Table 3.6-1, the brine disposal pipeline would be constructed in soils with a moderate to high potential for expansive soils, which could result in lateral pipeline stress and stress of structural joints. Lateral stresses could, over time, lead to pipeline rupture or leaks in the coupling joints. However, the brine disposal pipeline would be constructed of relatively flexible and non-corrosive HDPE or PVC (plastic) pipes. Therefore, the impact relative to expansive or corrosive soil would be **less than significant**.

The geotechnical investigation observed some of the fill and clay materials in colluvium beneath the previous Antioch WTP expansion project may be expansive; expansive soils could be present beneath the proposed desalination facility location. The expansive soils could damage aboveground project components at the proposed desalination facility.

As listed in **Table 3.6-1**, the conveyance pipelines would be constructed in soils with the potential to corrode unprotected steel. Soils with high corrosivity can corrode unprotected pipelines, which over time could lead to pipeline failure. The pipelines at the proposed desalination facility would be constructed of ductile iron or cement mortar lined steel. The ductile iron pipe for the 30-inch return water extension pipeline would be susceptible to damage from corrosive soil.

As listed in **Table 3.6-1**, the pump station would be constructed in soils with a moderate potential to corrode unprotected steel. Corrosive soils can corrode unprotected pipelines, which over time could lead to pipeline failure. The pump station would include steel parts that could be susceptible to damage from corrosive soil.

As a requirement of the CBC and local codes, the City would be required to prepare a final geotechnical investigation that would include site-specific recommendations to address potentially expansive and corrosive soils as a condition of permit approval. The site-specific analysis of site foundation soils guides the recommended building foundation design, such that damage from expansive and corrosive soils is minimized and reduced to levels that can be accommodated by the final design. The potential measures could include replacement of native soils with engineered fill, treatment of native soils, or addition of soil amendments which are effective means of reducing the risk from expansive soils. The shallow and flexible nature of pipelines makes them less susceptible to damage from expansive soils. Damage to structures and pipelines due to corrosion can be addressed by removal and replacement of corrosive soils, or by applying protective coatings to concrete and steel. The pipelines would be constructed using AWWA guidelines, which would include incorporating flexibility in the pipelines to accommodate minor movement and settling. The geotechnical investigation would also evaluate for corrosive soils and provide recommendations to protect the ductile iron pipe such as protective coatings or encasement in cement or concrete. Therefore, implementation of standard geotechnical engineering practices and adherence to building code requirements would reduce potential impacts from expansive soils during operations to **less than significant**.

Mitigation Measure:

None required.

Cumulative Impacts

This section presents an analysis of the cumulative effects of the proposed project in combination with other past, present, and reasonably foreseeable future projects that could cause cumulatively considerable impacts.

As previously discussed, the proposed project would have no impact with respect to fault rupture, landslides, subsidence or collapse, loss of topsoil, septic tanks or paleontological or unique geological resources. Accordingly, the proposed project could not contribute to cumulative impacts related to these topics and are not discussed further. Disposal of the brine is discussed in Section 3.10b, *Water Quality*.

The geographic area affected by the proposed project and its potential to contribute to cumulative impacts varies based on the environmental resource under consideration. The geographic scope of analysis for cumulative geologic impacts encompasses and is limited to the project site and its immediately adjacent area. This is because impacts relative to geologic hazards are generally site-specific. For example, the effect of erosion would tend to be limited to the localized area of a project and could only be cumulative if erosion occurred as the result of two or more adjacent projects that spatially overlapped.

The timeframe during which proposed project could contribute to cumulative geologic hazards includes the construction and operations phases. For the proposed project, the operations phase is permanent. However, similar to the geographic limitations discussed above, it should be noted that impacts relative to geologic hazards are generally time-specific. Geologic hazards could only be cumulative if two or more geologic hazards occurred at the same time, as well as overlapping at the same location.

Impact 3.6-C-1: Implementation of the proposed project, in combination with past, present, and reasonably foreseeable future development would not result in a cumulatively significant impact related to geology and soils. *(Less than Significant)*

Cumulative Impacts during Project Construction

Significant cumulative impacts related to geologic hazard could occur if the incremental impacts of the proposed project combined with the incremental impacts of one or more of the cumulative projects identified in **Table 3-1** to substantially increase risk that people or the environment would be exposed to geologic hazards. The only cumulative project that could be geographically adjacent or overlap components of the proposed project would be project number 15 (East County Bioenergy Project) on **Figure 3-1**. This cumulative project would involve the construction of a new bio-refinery, co-located with the Delta Diablo water resource recovery facilities in Pittsburg. The East County Bioenergy Project would convert food waste and wastewater sludge via an anaerobic digestion process into a range of bio-products and biogas, which can be used to generate energy to provide renewable energy.

If the projects are constructed at the same time, the erosion effects could be cumulatively significant. However, the state Construction General Permit would require each project to prepare and implement a SWPPP. The SWPPPs would describe BMPs to control runoff and prevent erosion for each project. Through compliance with this requirement, the potential for erosion impacts would be reduced. The Construction General Permit has been developed to address cumulative conditions arising from construction throughout the state, and is intended to maintain cumulative effects of projects subject to this requirement below levels that would be considered significant. For example, two adjacent construction sites would be required to implement BMPs to reduce and control the release of sediment and/or other pollutants in any runoff leaving their respective sites. The runoff water from both sites would be required to achieve the same action levels, measured as a maximum amount of sediment or pollutant allowed per unit volume of runoff water. Thus, even if the runoff waters were to combine after leaving the sites, the sediments and/or pollutants in the combined runoff would still be at concentrations (amount of sediment or pollutants per volume of runoff water) below action levels and would not be cumulatively considerable (**less than significant**).

Seismically induced groundshaking, liquefaction and lateral spreading, and expansive or corrosive soils could cause structural damage or pipeline leaks or ruptures. State and local building regulations and standards, described in the Regulatory Framework, have been established to address and reduce the potential for such impacts to occur. The proposed project and cumulative projects would be required to comply with applicable provisions of these laws and regulations. Through compliance with these requirements, the potential for impacts would be reduced. As explained in the Regulatory Framework, the purpose of the CBC and local ordinances is to regulate and control the design, construction, quality of materials, use/occupancy, location, and maintenance of all buildings and structures within its jurisdiction; by design, it is intended to reduce the cumulative risks from buildings and structures. Therefore, based on compliance with these requirements, the incremental impacts of the proposed project combined with impacts of other projects in the area would not cause a significant cumulative impact related to seismically induced groundshaking, liquefaction and lateral spreading, or expansive or corrosive soils and the proposed project's contribution to cumulative effects would not be cumulatively considerable and this impact would be **less than significant**.

Cumulative Impacts during Project Operations

Seismically induced groundshaking, liquefaction and lateral spreading, and expansive or corrosive soils could cause structural damage or pipeline leaks or ruptures. State and local building regulations and standards, described in the Regulatory Framework, have been established to address and reduce the potential for such impacts to occur. The proposed project and cumulative projects would be required to comply with applicable provisions of these laws and regulations. Through compliance with these requirements, the potential for impacts would be reduced. As explained in the Regulatory Framework, the purpose of the CBC and local ordinances is to regulate and control the design, construction, quality of materials, use/occupancy, location, and maintenance of all buildings and structures within its jurisdiction; by design, it is intended to reduce the cumulative risks from buildings and structures. Therefore, based on compliance with these requirements, the incremental impacts of the proposed project combined with impacts of other projects in the area would not cause a significant cumulative impact related to seismically induced groundshaking, liquefaction and lateral spreading, or expansive or corrosive soils and the proposed project's contribution to cumulative effects would not be cumulatively considerable and this impact would be **less than significant**.

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3.7 Energy Conservation

Sections	Tables

This section evaluates the potential for construction and operation of the proposed project to result in adverse impacts associated with energy conservation. The environmental setting with respect to energy is described in Section 3.7.1, *Environmental Setting*, and the regulatory framework that governs energy conservation are discussed in Section 3.7.2, *Regulatory Setting*. Section 3.7.3, *Analysis, Impacts, and Mitigation*, defines significance criteria used for the impact assessment, and analyzes the potential impacts of the proposed project, including cumulative effects. The analysis is based on review of available reports prepared by agencies, such as the California Energy Commission (CEC), as well the local utility provider, Pacific Gas and Electric Company (PG&E), and project-specific construction and operational features provided by the City of Antioch. No comments related to GHG emissions were received during the scoping period.

CEQA Section 21100(b) requires evaluation of the potential energy impacts of a proposed project, and consideration of mitigation measures that would avoid or reduce the wasteful, inefficient, and unnecessary consumption of energy associated with the project. Appendix F of the CEQA *Guidelines* provides three goals for energy conservation:

- Decrease overall per capita energy consumption;
- Decrease reliance on natural gas and oil; and
- Increase reliance on renewable energy sources.

In addition, Appendix F of the CEQA *Guidelines* indicates that EIRs may include consideration of the following six energy conservation-related environmental impact types:

1. The project's energy requirements and its energy use efficiencies by amount and fuel type for each stage of the project including construction, operation, maintenance and/or removal. If appropriate, the energy intensiveness of materials may be discussed.
2. The effects of the project on local and regional energy supplies and on requirements for additional capacity.
3. The effects of the project on peak and base period demands for electricity and other forms of energy.
4. The degree to which the project complies with existing energy standards.
5. The effects of the project on energy resources.

6. The project's projected transportation energy use requirements and its overall use of efficient transportation alternatives.

This section does not address the potential air pollutant or greenhouse gas emissions associated with various forms of energy consumption. See Sections 3.2, *Air Quality*, and 3.8, *Greenhouse Gas Emissions*, for such discussions.

3.7.1 Environmental Setting

The study area for the analysis of energy conservation impacts is state-wide in terms of energy supplies, and site specific in terms of energy consumption.

California's Energy Supplies

With a relatively mild Mediterranean climate and strict energy efficiency and conservation requirements, California's per capita energy consumption ranked 49th in the nation (including the District of Columbia), indicating a low per capita use of energy; the state's low use of energy is due in part to its mild climate and its energy efficiency programs (USEIA, 2018a). Nevertheless, with a population of 38.7 million people, California is the second largest energy-consuming state in the U.S. (USEIA, 2018b).

Electricity

The production of electricity requires the consumption or conversion of energy resources such as water, wind, oil, gas, coal, solar, geothermal, and nuclear sources. Of the electricity generated in California in 2016, approximately 49.9 percent was generated by natural gas-fired power plants, 12.3 percent from hydroelectric, 0.2 percent of total net electricity generated came from coal-fired sources, 9.6 percent from nuclear, and 27.9 percent from renewable sources including solar and wind. The remaining balance came from oil and other unspecified sources of power (CEC, 2017a).

Gasoline and Diesel

Gasoline is by far the largest transportation fuel by volume used in California. Nearly all of the gasoline used in California is obtained through the retail market. In 2016, 13.8 billion gallons of gasoline were sold in California's retail market (CEC, 2018a). Diesel fuel is the second largest transportation fuel by volume used in California. In 2016, approximately 1.7 billion gallons of diesel were sold in California's retail market (CEC, 2018a).

Local Energy Systems

Electricity

Electricity is generated and distributed via a network of high voltage transmission lines commonly referred to as the power grid. PG&E provides electrical power to approximately 5.4 million customer accounts throughout a 70,000 square mile service area in Northern and Central California, including Contra Costa County (PG&E, 2018a). PG&E's service area extends from

Eureka to Bakersfield (north to south), and from the Sierra Nevada to the Pacific Ocean (east to west). PG&E produces and purchases energy from a mix of conventional and renewable generating sources. **Table 3.7-1** shows the electric power mix that PG&E delivered to its customers in California in 2016.

TABLE 3.7-1
PG&ES 2016 ELECTRIC POWER MIX DELIVERED TO CUSTOMERS

Power Source	Percentage of Total
Nuclear	24%
Large Hydroelectric	12%
Eligible Renewables	33%
Natural Gas	17%
Unspecified Power[a]	14%

NOTE:
[a] This electricity is not traceable to specific sources by any auditable contract trail.

SOURCE: PG&E, 2018b

Of the electricity delivered by PG&E to its customers in 2016, 24 percent was generated by nuclear power plants, 12 percent came from large hydroelectric dams, 33 percent came from renewable sources, 17 percent was from natural gas, and 14 percent from unspecified sources (PG&E, 2018b). Total electricity consumed in Contra Costa County in 2016 was 9,643,548 megawatt-hours (MWh) (CEC, 2018b).

Gasoline and Diesel Fuel

In 2016, all retail sales of gasoline and diesel in Contra Costa County were 431 million gallons, and 26 million gallons, respectively (CEC, 2018c).

3.7.2 Regulatory Framework

Federal

Energy Policy and Conservation Act

The Energy Policy and Conservation Act of 1975 was established in response to the oil crisis of 1973, which increased oil prices due to a shortage of reserves. The Act required that all vehicles sold in the U.S. meet certain fuel economy goals. Since 1990, the fuel economy standard for new passenger cars has been 27.5 miles per gallon. Since 1996, the fuel economy standard for new light trucks (gross vehicle weight of 8,500 pounds or less) has been 20.7 miles per gallon. Heavy-duty vehicles (i.e., vehicles and trucks over 8,500 pounds gross vehicle weight) are not subject to fuel economy standards. The proposed project would be consistent with the Act because all passenger cars and light trucks that would be used directly or indirectly associated with the project would be required to comply with the applicable fuel economy standards.

Energy Policy Act of 2005

The Energy Policy Act of 2005 seeks to reduce reliance on non-renewable energy resources and provide incentives to reduce current demand on these resources. For example, under the Act, consumers and businesses can obtain federal tax credits for fuel-efficient appliances and products, including buying hybrid vehicles, building energy-efficient buildings, and improving the energy efficiency of commercial buildings. Additionally, tax credits are available for the installation of qualified fuel cells, stationary microturbine power plants, and solar power equipment. It is unknown whether or not the City would attempt to obtain any federal tax credits associated with the project under the Energy Policy Act of 2005.

State

State of California Integrated Energy Policy

In 2002, the Legislature passed Senate Bill 1389, which required the CEC to develop an integrated energy plan every two years for electricity, natural gas, and transportation fuels, for the California Energy Policy Report. The plan calls for the state to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies a number of strategies, including assistance to public agencies and fleet operators in implementing incentive programs for Zero Emission Vehicles and their infrastructure needs, and encouragement of urban designs that reduce vehicle miles traveled and accommodate pedestrian and bicycle access.

The CEC adopted the 2016 Integrated Energy Policy Report on February, 2017. The 2016 Integrated Energy Policy Report provides the results of the CEC's assessment of a variety of issues, and covers a broad range of topics including: initiatives to reduce greenhouse gas emissions; transformation of the electricity system towards renewable energy sources; the management of aging energy infrastructure; the environmental performance of the electricity generation system; landscape-scale planning the response to the leak at the Aliso Canyon natural gas storage facility, transportation fuel supply reliability issues; updates on Southern California electricity reliability; methane leakage; climate adaptation activities for the energy sector; climate and sea level rise scenarios; and the California Energy Demand Forecast (CEC, 2017b). Although the integrated energy plan is not directly applicable to the proposed project given that the project would not include utility-scale energy generation or transmission infrastructure, it is applicable to the operations of PG&E, which is the public utility that would provide the required electricity for the project. Given that PG&E is required to comply with the applicable provisions of the integrated energy plan, electricity obtained for the project would be generated in a manner consistent with the spirit of the integrated energy plan.

Title 24 Building Energy Efficiency Standards (California Energy Code)

The California Building Standards Commission first established Energy Efficiency Standards for California in 1978, in response to a legislative mandate to reduce California's energy consumption. The standards, which are contained in the California Code of Regulations, Title 24, Part 6 (also known as the California Energy Code) are updated periodically by the CEC to allow consideration and possible incorporation of new energy efficiency technologies and methods. The standards regulate energy consumed in nonresidential buildings for heating, cooling, ventilation, water heating, and lighting. Title 24 is implemented through the local planning and permit process and therefore project components requiring building permits would be required to comply with Title 24. Title 24 is updated approximately every three years. The newest version became effective January 1, 2017, and continues to improve upon the standards for new construction of, and additions and alterations to, residential and nonresidential buildings. However, the proposed facilities evaluated in this EIR all relate exclusively to the production, generation, treatment, and transmission of water and are, therefore, exempt from the Cities of Antioch and Pittsburg building ordinances pursuant to California Government Code Section 53091(d). Therefore, the proposed project is exempt from the Title 24 requirements.

California Green Building Standards Code (Cal Green)

On January 1, 2017, the California Building Standards Commission adopted the California Green Building Standards Code (Part 11 of the Title 24 Building Standards Code) for all new construction statewide. The code sets targets for energy efficiency, water consumption, dual plumbing systems for potable and recyclable water, diversion of construction waste from landfills, and use of environmentally sensitive materials in construction and design, including eco-friendly flooring, carpeting, paint, coatings, thermal insulation, and acoustical wall and ceiling panels. As described above, as a water production, treatment and transmission facility, the proposed project would be exempt from these requirements pursuant to California Government Code Section 53091(d).

Local

City of Antioch General Plan

The following energy conservation policies from the City of Antioch General Plan may be relevant to proposed project:

> ***Policy 10.8.2.d:*** Encourage the installation of energy-efficient lighting, reduced thermostat settings, and elimination of unnecessary lighting in public facilities.

> ***Policy 10.8.2.e:*** Facilitate the installation of environmentally acceptable forms of distributed generation[1], where such systems can be safely and economically provided.

[1] Distributed generation includes small-scale forms of electrical generation such as microturbins, fuel cells, photovoltaics, and co-generation.

3.7.3 Analysis, Impacts, and Mitigation

Significance Criteria

Based on Appendix F of the CEQA *Guidelines*, implementation of the proposed project would have a significant impact related to energy conservation if it would:

- Use large amounts of fuel or energy in an unnecessary, wasteful, or inefficient manner;
- Constrain local or regional energy supplies, require additional capacity, or affect peak and base periods of electrical demand;
- Require or result in the construction of new electrical generation and/or transmission facilities, or expansion of existing facilities, the construction of which could cause significant environmental effects; or
- Conflict with existing energy standards, including standards for energy conservation.

Methodology and Assumptions

This analysis is based, in part, on basic assumptions regarding construction-related diesel and gasoline consumption for the proposed project, the City's proposed energy efficiency design elements for the proposed project, and the City's estimates of the operational electricity requirements of the proposed project. The analysis focuses on the anticipated energy demand and energy efficiency of the proposed project as a whole, including during construction, operation, and maintenance. This analysis assumes all electrical power needed for project operations would be provided by the local PG&E electrical power grid.

Fuel Consumption

Off-road equipment inventories and construction and maintenance activity assumptions were used to estimate fuel amounts that would be consumed by off-road equipment during construction and maintenance of the proposed project. Fuel consumption factors for off-road equipment were derived from equipment inventory data using CARB's off-road emissions inventory database. Fuel use that would be associated with commuting workers and truck hauling during construction and operation of the proposed project were also estimated using trip data projected for the project (see **Appendix B** for all fuel consumption factors and assumptions).

Energy Efficient Design Elements for the Proposed Project

As discussed in Chapter 2, *Background and Project Description*, the project would use variable speed pumps at the new river intake and reverse osmosis (RO) technology to remove salts and other minerals from water. During the RO process pretreated source water is forced at very high pressures through RO membranes. Generating the necessary high pressure can require a large amount of energy particularly for sea water desalination facilities. However, the proposed project uses desalination facilities for brackish water desalination, which requires much lower pressure and power usage and would incorporate various technological advancements to reduce the operational energy demand as much as possible. These advances include the use of the latest generation of RO membranes that utilize the lowest operating pressure requirements (Pacific Institute, 2013).

Energy efficiency elements would also be incorporated into the process design associated with the proposed desalination facility and new intake pump station. Electrical and treatment equipment would include variable frequency drives to reduce the operating speed of pumps to match the pump discharge pressure requirements and reduce energy usage.

Areas of No Project Impact

Based on the nature of the proposed project, the following significance criterion is not addressed further in the EIR:

- ***Conflict with energy standards, including standards for energy conservation.*** The local government building permit application review process would ensure that the Project would be compliant with all applicable State and local energy conservation standards. In addition, the Project would not conflict with applicable plans, policies, or regulations related to energy use and conservation. Therefore, no impact related to compliance with applicable energy conservation standards would result, and this criterion is not discussed further in this section.

Impacts and Mitigation Measures

Impact Summary

Table 3.7-2 summarizes the project's energy use and conservation impacts and significance determinations.

TABLE 3.7-2
SUMMARY OF IMPACTS – ENERGY CONSERVATION

Impacts	Significance Determinations
Impact 3.7-1: The project would not use large amounts of fuel or energy in an unnecessary, wasteful, or inefficient manner.	LSM
Impact 3.7-2: The project would not constrain local or regional energy supplies, require additional capacity, affect peak and base periods of electrical demand, or otherwise require or result in the construction of new electrical generation and/or transmission facilities, or expansion of existing facilities, the construction of which could cause significant environmental effects.	LS
Impact 3.7-C-1: Implementation of the project, in combination with past, present, and reasonably foreseeable future development, would not use large amounts of fuel or energy in an unnecessary, wasteful, or inefficient manner.	LSM
Impact 3.7-C-2: Implementation of the project, in combination with past, present, and reasonably foreseeable future development, would not constrain local or regional energy supplies, require additional capacity, affect peak and base periods of electrical demand, or otherwise require or result in the construction of new electrical generation and/or transmission facilities, or expansion of existing facilities, the construction of which could cause significant environmental effects.	LS

NOTES:
LS = Less than Significant
LSM = Less than Significant with Mitigation

Impact 3.7-1: The project would not use large amounts of fuel or energy in an unnecessary, wasteful, or inefficient manner. (*Less than Significant with Mitigation*)

Construction

Construction of the proposed project would require the use of fuels (primarily gasoline and diesel) for operation of construction equipment (e.g., excavators and cranes), construction vehicles (e.g., dump and delivery trucks), and construction worker vehicles. Direct energy use may also include the limited use of electricity required to power construction equipment (e.g., electric power tools). In addition, construction of the proposed project would result in indirect energy use associated with the extraction, manufacturing, and transportation of raw materials to make construction materials. Indirect energy use typically represents about three-quarters of the total construction energy consumed, while direct energy use represents about one-quarter (Hannon et al., 1978).

Although the precise amount of construction-related direct energy consumption that would occur under the proposed project is unknown, fuel use amounts that would be required for construction of the following project components have been estimated: the new intake pump station (including demolition of the existing pump station); the desalination facility, the brine disposal pipeline, raw water pipeline connection to the WTP. It is estimated that off-road construction equipment would operate for a total of approximately 23,547 hours and would consume a total of approximately 90,163 gallons of diesel fuel at an average rate of 3.8 gallons per hour. With regard to vehicle use during construction, workers' personal vehicles would travel approximately 104,890 miles and consume approximately 5,267 gallons of gasoline (assuming an average fuel economy of 20.7 miles per gallon) and heavy haul trucks would travel 239,840 miles and consume approximately 37,417 gallons of diesel fuel (assuming an average consumption rate of 7.0 miles per gallon) (see **Appendix B** for all assumptions and fuel use factors). When considered over the project construction period, which would occur over a period of approximately 14 months, maximum annual fuel use for off-road construction equipment and haul trucks would be up to approximately 109,355 gallons of diesel fuel per year and construction workers' personal vehicles would consume up to approximately 4,515 gallons of gasoline per year.

These annual average fuel use amounts are equivalent to less than 0.01 percent and 0.42 percent of the total amounts of gasoline and diesel fuel, respectively, sold in Contra Costa County in 2016. With regard to decommissioning of the proposed project, amounts of direct energy consumption that would occur at the end of the useful life of the proposed project (in approximately 30 years) related to decommissioning is unknown; however, it is anticipated that the amounts would be similar to those required for construction, discussed above.

The amount of electricity and indirect energy consumption that would be associated with construction of the proposed project is unknown and cannot be estimated as it would be too speculative given existing data; however, the amounts would not be expected to be substantial.

Operations

With regard to long-term operations, employee personal vehicles would consume an estimated 1,625 gallons of gasoline per year, which would equate to substantially less than 0.01 percent of the total amount of gasoline sold in Contra Costa County in 2016. In addition to fuel use, implementation of the proposed project would increase the City's total electrical demand by approximately 1,447 MWh per year, which would represent substantially less than 0.01 percent of the total electricity used in in Contra Costa County in 2016 (CEC, 2018b).

Impact Determination

While the overall transportation energy use requirements would not be significant relative to the overall sales of transportation fuels in the county, construction and decommissioning activities could result in wasteful or inefficient use of energy if: construction and decommissioning equipment is not well maintained; if equipment is left to idle when not in use; or if haul trips are not planned efficiently. For all project components, the potential for construction and decommissioning to use large amounts of fuel or energy in a wasteful or inefficient manner is considered a significant impact. However, with implementation of **Mitigation Measures 3.7-1 (Construction Equipment Efficiency)** and **3.2-1 (BAAQMD Basic Construction Measures)**, which would ensure construction activities are conducted in a fuel-efficient manner and minimize idling times for construction equipment and vehicles, the impact would be reduced to a less-than-significant level. Regarding operations, the impact associated with the potential for the proposed project to use large amounts of fuel or energy in a wasteful or inefficient manner is considered to be less than significant.

<u>Mitigation Measure:</u>

Mitigation Measure 3.7-1: Construction Equipment Efficiency

The City shall retain a qualified professional (i.e., construction planner/energy efficiency expert) to identify the specific measures that the City (and its construction contractors) will implement as part of project construction and decommissioning to increase the efficient use of construction equipment to the maximum extent feasible. Such measures shall include, but not necessarily be limited to: procedures to ensure that all construction equipment is properly tuned and maintained at all times; a commitment to utilize existing electricity sources where feasible rather than portable diesel-powered generators; and identification of procedures (including the routing of haul trips) that will be followed to ensure that all materials and debris hauling is conducted in a fuel-efficient manner. The measures shall be incorporated into construction specifications and implemented throughout the construction and decommissioning periods.

Mitigation Measure 3.2-1: BAAQMD Basic Construction Measures

(See Impact 3.2-1 in Section 3.2, *Air Quality*, for description.)

Significance after Mitigation: Implementation of **Mitigation Measures 3.7-1** and **3.2-1** would reduce construction related fuel and energy use to a **less-than-significant** level.

Impact 3.7-2: The project would not constrain local or regional energy supplies, require additional capacity, affect peak and base periods of electrical demand, or otherwise require or result in the construction of new electrical generation and/or transmission facilities, or expansion of existing facilities, the construction of which could cause significant environmental effects. *(Less than Significant)*

The project's impact on local and regional energy supplies depends on several factors; however, the primary energy source of concern associated with the operation of project is electrical power provided by PG&E. The proposed project's estimated electrical demand would be roughly 1,447 MWh per year, which would represent substantially less than 0.01 percent of the total electricity used in Contra Costa County in 2016 (CEC, 2018b). Therefore, it is reasonable to expect that the demands that would be associated with the proposed project could be accommodated within the capacity of existing available electrical generation and transmission facilities. New underground and/or aboveground power line connections would be required to connect the proposed facilities to the existing local PG&E power grid. However, for the reasons above, the project would be expected to be accommodated by the existing local and regional energy supplies and transmission infrastructure, and the impact would be less than significant.

<u>Mitigation Measure:</u>

None required.

Cumulative Impacts

Impact 3.7-C-1: Implementation of the project, in combination with past, present, and reasonably foreseeable future development, would not use large amounts of fuel or energy in an unnecessary, wasteful, or inefficient manner. (*Less than Significant with Mitigation*)

As described under Impact 3.7-1, the project would have no impact related to conflicting with energy standards. Therefore, it would not contribute to cumulative impacts related to these topics. Cumulative impacts associated with energy conservation are considered in the context of both local and regional energy supply and demand. As described under Impact 3.7-1, project construction could use large amounts of fuel or energy in a wasteful or inefficient manner, which in the context of local and regional energy supplies, in combination with the energy demands of the projects described in **Table 3-1**, could result in a significant cumulative impact. Implementation of **Mitigation Measures 3.7-1** and **3.2-1** identified in Impact 3.7-1 would help improve the fuel efficiency of and limit idling times for construction equipment. Energy used during construction would primarily be in the form of gasoline and diesel fuel. Even if project construction were to occur simultaneously with other cumulative projects, the cumulative use of energy resources during construction would be consistent with normal construction practices and would comply with efficiency- and conservation-related policies intended to address cumulative energy consumption statewide. Therefore, after mitigation, the proposed project construction would have a **less-than-significant** contribution to the overall cumulative impact related to the inefficient use of fuel sources.

Impact 3.7-C-2: Implementation of the project, in combination with past, present, and reasonably foreseeable future development, would not constrain local or regional energy supplies, require additional capacity, affect peak and base periods of electrical demand, or otherwise require or result in the construction of new electrical generation and/or transmission facilities, or expansion of existing facilities, the construction of which could cause significant environmental effects. (*Less than Significant*)

As discussed under Impact 3.7-2, the anticipated increase in electricity consumption for the project would represent less than 0.01 percent of Contra Costa County's annual usage. It should be noted that PG&E purchases wholesale electric energy and capacity from generators and suppliers and periodically conducts solicitations / requests for offers (RFO) for additional supplies of conventional and renewable electricity. Therefore, in the event that many other cumulative projects listed in **Table 3-1** that would be high demand electricity users, request electrical service from PG&E, additional wholesale electric energy may need to be purchased by PG&E. In addition, some reinforcement or upgrades of the existing distribution system may also be required, but this would not substantially constrain local or regional energy supplies. Therefore, the project would have a **less-than-significant** contribution to the cumulative impact associated with constraining local or regional energy supplies, requiring additional capacity, affecting peak and base periods of electrical demand, or otherwise require or result in the construction of new electrical generation and/or transmission facilities, or the expansion of existing facilities.

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3.8 Greenhouse Gas Emissions

Sections	Tables

This section evaluates the potential for construction and operation of the proposed project to result in adverse impacts associated with greenhouse gas (GHG) emissions. The environmental setting with respect to climate change, GHG emissions, and GHG sources is described in Section 3.8.1, *Environmental Setting*, and the regulatory framework that governs GHG emissions are discussed in Section 3.8.2, *Regulatory Setting*. Section 3.8.3, *Analysis, Impacts, and Mitigation*, defines significance criteria used for the impact assessment, and analyzes the potential impacts of the proposed project, including cumulative effects. The analysis is based on review of available reports, plans, and guidance prepared by agencies such as U.S. Environmental Protection Agency (USEPA), the California Air Resources Board (CARB), and the Bay Area Air Quality Management District (BAAQMD) as well as project-specific construction and operational features provided by the City of Antioch. No comments related to GHG emissions were received during the scoping period.

3.8.1 Environmental Setting

Climate Change

According to the USEPA, the term "climate change" refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (over several decades or longer). There is scientific consensus that climate change is occurring and that human activity contributes in some measure (perhaps substantially) to that change. Gases that trap heat in the atmosphere are often called GHGs. Emissions of GHGs, if not sufficiently curtailed, are likely to contribute further to increases in global temperatures. The potential effects of climate change in California include sea level rise and reductions in snowpack, as well as an increased number of extreme-heat days per year, high ozone days, large forest fires, and drought years (CARB, 2014). Globally, climate change could affect numerous environmental resources through potential, though uncertain, changes in future air temperatures and precipitation patterns. According to the International Panel on Climate Change (IPCC), the observed and/or projected effects of climate change vary regionally, but include the following direct effects (IPCC, 2014):

- Changing precipitation and snow melt patterns;
- Negative effect on crop yield;
- Increased heat waves, drought, flood, wildfires, and storm events;
- Reduced renewable water resources in most dry subtropical regions; and
- Ocean acidification damage to marine ecosystems.

In addition, many secondary effects are projected to result from climate change, including a global rise in sea level, ocean acidification, impacts on agriculture, changes in disease vectors, and changes in habitat and biodiversity. The possible outcomes and feedback mechanisms involved are not fully understood, and much research remains to be done; however, over the long term, the potential exists for substantial environmental, social, and economic consequences.

Greenhouse Gas Emissions

GHG emissions that result from human activities primarily include carbon dioxide (CO_2), with much smaller amounts of nitrous oxide (N_2O), methane (CH_4, often from unburned natural gas), sulfur hexafluoride (SF_6) from high-voltage power equipment, and hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) from refrigeration/chiller equipment. Because these GHGs have different warming potentials (i.e., the amount of heat trapped in the atmosphere by a certain mass of the gas), and CO_2 is the most common reference gas for climate change, GHG emissions are often quantified and reported as CO_2-equivalent (CO_2e) emissions. For example, while SF_6 represents a small fraction of the total annual GHGs emitted worldwide, this gas is very potent, with 23,900 times the global warming potential of CO_2. Therefore, an emission of 1 metric ton of SF_6 would be reported as 23,900 metric tons CO_2e. The global warming potential of CH_4 and N_2O are 25 times and 298 times that of CO_2, respectively (CARB, 2016a). The principal GHGs resulting from human activity that enter and accumulate in the atmosphere are described below.

Carbon Dioxide

CO_2 is a naturally occurring gas that enters the atmosphere through natural as well as anthropogenic (human) sources. Key anthropogenic sources include the burning of fossil fuels (e.g., oil, natural gas, and coal), solid waste, trees, wood products, and other biomass, as well as industrially relevant chemical reactions such as those associated with manufacturing cement. CO_2 is removed from the atmosphere when it is absorbed by plants as part of the biological carbon cycle.

Methane

Like CO_2, CH_4 is emitted from both natural and anthropogenic sources. Key anthropogenic sources of CH_4 include gaseous emissions from landfills, releases associated with mining and materials extraction industries (in particular coal mining), and fugitive releases associated with the extraction and transport of natural gas and crude oil. CH_4 emissions also result from livestock and agricultural practices. Small quantities of CH_4 are released during fossil fuel combustion.

Nitrous Oxide

N_2O is also emitted from both natural and anthropogenic sources. Important anthropogenic sources include industrial activities, agricultural activities (primarily the application of nitrogen fertilizer), the use of explosives, combustion of fossil fuels, and decay of solid waste.

Fluorinated Gases

HFCs, PFCs, and SF_6 are synthetic gases emitted from a variety of industrial processes, and they contribute substantially more to the greenhouse effect on a pound for pound basis than the GHGs described previously. Fluorinated gases are often used as substitutes for ozone-depleting substances (i.e., chlorofluorocarbons, hydrochlorofluorocarbons, and halons). These gases are typically emitted in small quantities, but because of their potency they are sometimes referred to as "high global warming potential gases."

Greenhouse Gas Sources

Anthropogenic GHG emissions in the United States are derived mostly from the combustion of fossil fuels for transportation and power production. Energy-related CO_2 emissions resulting from fossil fuel exploration and use account for approximately three-quarters of the human-generated GHG emissions in the United States, primarily in the form of CO_2 emissions from burning fossil fuels. More than half of the energy-related emissions come from large stationary sources, such as power plants; over one-quarter derive from transportation; and a majority of the remaining sources include: industrial processes, agriculture, commercial, and residential (USEPA, 2017a).

Statewide emissions of GHG from relevant source categories for 2009 through 2015 are summarized in **Table 3.8-1**. Specific contributions from individual air basins, such as the San Francisco Bay Area Air Basin (Air Basin), which encompasses the project area, are included in the emissions inventory but are not itemized by air basin. In 2015, California produced 440 million gross metric tons of CO_2e emissions. Transportation was the source of 39 percent of the state's GHG emissions, followed by industrial at 23 percent, electricity generation at 19 percent, commercial and residential sources at 11 percent, and agriculture and forestry comprised the remaining 8 percent (CARB, 2017).

TABLE 3.8-1
CALIFORNIA GHG EMISSIONS (MILLION METRIC TONS CO_2E)

Emission Inventory Category	2009	2010	2011	2012	2013	2014	2015	
Electricity Generation (In State)	53.51	46.91	41.36	51.18	49.60	51.81	50.21	11.4%
Electricity Generation (Imports)	48.13	43.67	46.94	44.15	40.24	36.56	33.88	7.7%
Transportation	171.45	168.11	164.70	164.38	163.05	164.89	169.38	38.5%
Industrial	97.31	101.12	101.08	101.46	104.27	104.69	102.97	23.4%
Commercial	18.64	20.09	20.73	21.11	21.64	21.37	22.17	5.0%
Residential	30.21	31.26	32.03	30.04	31.19	26.26	26.93	6.1%
Agriculture and Forestry	33.83	34.64	35.28	36.42	34.93	36.03	34.65	7.9%
Not Specified (Solvents & Chemicals)	0.26	0.27	0.25	0.24	0.18	0.24	0.17	<0.1%
Total Gross Emissions	**453.34**	**446.06**	**442.38**	**448.97**	**445.08**	**441.85**	**440.36**	**100.00%**

SOURCE: CARB, 2017.

3.8.2 Regulatory Framework

Federal

Clean Air Act

On April 2, 2007, in *Massachusetts v. USEPA* (549 US 497), the Supreme Court found that GHGs are air pollutants covered by the Clean Air Act. The Court held that the USEPA must determine whether emissions of GHGs from new motor vehicles cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. In making such decisions, the USEPA is required to follow the language of Section 202(a) of the Clean Air Act, which obligates it to prescribe (and from time to time revise) standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines. The Supreme Court decision resulted from a petition for rulemaking under Section 202(a) filed by more than a dozen environmental, renewable energy and other organizations.

On April 17, 2009, the USEPA Administrator signed proposed “endangerment” and “cause or contribute” findings for GHGs under Section 202(a) of the Clean Air Act. The USEPA found that six GHGs, taken in combination, endanger both the public health and the public welfare of current and future generations. The USEPA also found that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the greenhouse effect as air pollution that endangers public health and welfare under Clean Air Act Section 202(a). Pursuant to 40 CFR Part 52*, Proposed Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule*, USEPA has mandated that Prevention of Significant Deterioration (PSD) and Title V requirements apply to facilities whose stationary source CO_2e emissions exceed 100,000 tons per year (USEPA, 2017b). The proposed project would not trigger PSD or Title V permitting under this regulation because it would generate substantially less than 100,000 tons of CO_2e emissions per year.

U.S. Supreme Court Decision in Utility Air Regulatory Group v. USEPA

On June 23, 2014, the U.S. Supreme Court held that USEPA may not treat GHG emissions as an air pollutant for purposes of determining whether a source is a major source required to obtain a PSD or Title V permit. The Court also held that PSD permits that are otherwise required (based on emissions of other pollutants) may continue to require limitations on GHG emissions based on the application of Best Available Control Technology (BACT). In accordance with the Supreme Court decision, on April 10, 2015, the D.C. Circuit issued an amended judgment in *Coalition for Responsible Regulation, Inc. v. U.S. Environmental Protection Agency*, which vacated the PSD and Title V regulations under review in that case to the extent that they require a stationary source to obtain a PSD or Title V permit solely because the source emits or has the potential to emit GHGs above the applicable major source thresholds. The D.C. Circuit also directed USEPA to consider whether any further revisions to its regulations are appropriate, and if so, to undertake to make such revisions. In response to the Supreme Court decision and the D.C. Circuit’s amended judgment, the USEPA intends to conduct future rulemaking action to make appropriate revisions to the PSD and operating permit rules (USEPA, 2017b).

State

A variety of statewide rules and regulations mandate the quantification and, if emissions exceed established thresholds, the reduction of GHGs. CEQA requires lead agencies to evaluate project-related GHG emissions and the potential for projects to contribute to climate change and to provide appropriate mitigation in cases where the lead agency determines that a project would result in a significant addition of GHGs to the atmosphere.

Executive Order S-3-05

Executive Order S-3-05 was established by Governor Arnold Schwarzenegger in June 2006, and establishes statewide emission reduction targets through the year 2050 as follows:

1. By 2010, reduce GHG emissions to 2000 levels;
2. By 2020, reduce GHG emissions to 1990 levels; and
3. By 2050, reduce GHG emissions to 80 percent below 1990 levels.

This executive order does not include any specific requirements that pertain to the proposed project; however, future actions taken by the State to implement these goals may affect the proposed project, depending on the specific implementation measures that are developed.

Assembly Bill 32

California Assembly Bill (AB) 32,[1] the Global Warming Solutions Act of 2006, is the cornerstone of state efforts to reduce GHG emissions. As described below, the law requires CARB to establish a statewide GHG emissions cap for 2020 based on 1990 emission levels, develop a mandatory reporting program of GHG emissions, adopt regulations for discrete early actions to reduce GHG emissions, prepare a scoping plan to identify how emissions reductions will be achieved, and adopt a regulation that establishes a market-based compliance mechanism (also referred to as “Cap and Trade”).

Statewide GHG Emissions Cap

In 2007, CARB established the statewide GHG emissions limit that must be achieved by 2020, equivalent to the statewide GHG emissions levels in 1990, at 427 million metric tons of CO_2e. This figure is approximately 30 percent below projected “business-as-usual” emissions of 596 million metric tons of CO_2e for 2020, and about 10 percent below average annual GHG emissions during the period of 2002 through 2004 (CARB, 2009).

1 AB 32 is codified in California Health and Safety Code Division 25.5, Sections 38500 et seq.

Climate Change Scoping Plan

In December 2008, CARB approved the AB 32 Scoping Plan outlining the state's strategy to achieve the 2020 GHG emissions limit (CARB, 2009). The Scoping Plan estimated a reduction of 174 million metric tons CO_2e from the transportation, energy, agriculture, forestry, and high climate-change-potential sectors, and proposed a comprehensive set of actions designed to reduce overall GHG emissions in California, improve the environment, reduce dependence on oil, diversify California's energy sources, save energy, create new jobs, and enhance public health. The Scoping Plan must be updated every 5 years to evaluate the mix of AB 32 policies to ensure that California is on track to achieve the 2020 GHG reduction goal. CARB released the First Update to the Climate Change Scoping Plan in May 2014 (CARB, 2014). The Update builds upon the initial Scoping Plan with new strategies and recommendations. The Update 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 set forth in Executive Orders S-3-05 and B-16-2012 (the latter of these ordered State agencies to facilitate the rapid commercialization of zero-emission vehicles (ZEVs), setting a target for the number of them on California roads and also set a goal for reduction of emissions from the transportation sector). The Update highlights California's progress toward meeting the near-term 2020 GHG emission reduction goals defined in the initial Scoping Plan. CARB is currently working on a second update to the Scoping Plan to reflect the 2030 target set by Executive Order B-30-15 (see below).

Senate Bill 97

In 2007, the California State Legislature passed Senate Bill (SB) 97, which required amendment of the CEQA *Guidelines* to incorporate analysis of, and mitigation for, GHG emissions from projects subject to CEQA. The amendments took effect March 18, 2010. The amendments add Section 15064.4 to the CEQA Guidelines, specifically addressing the potential significance of GHG emissions. Section 15064.4 neither requires nor recommends a specific analytical methodology or quantitative criteria for determining the significance of GHG emissions. Rather, the section calls for a "good faith effort" to "describe, calculate or estimate" GHG emissions and indicates that the analysis of the significance of any GHG impacts should include consideration of the extent to which the project would:

- Increase or reduce GHG emissions;
- Exceed a locally applicable threshold of significance; or
- Comply with "regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions."

Section 15064(h)(3) of the CEQA *Guidelines* also states that a project may be found to have a less-than-significant impact related to GHG emissions if it complies with an adopted plan that includes specific measures to sufficiently reduce GHG emissions.

Executive Order B-30-15

In April 2015, Governor Edmund G. Brown Jr. issued an executive order to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. Reaching this emission reduction target will make it possible for California to reach its ultimate goal of reducing emissions 80 percent under 1990 levels by 2050, as identified in Executive Order S-3-05. In 2016, the Legislature passed SB 32, which codifies a 2030 GHG emissions reduction target of 40 percent below 1990 levels. Executive Order B-30-15 also specifically addresses the need for climate adaptation and directs state government to:

- Incorporate climate change impacts into the State's 5-Year Infrastructure Plan;
- Update the Safeguarding California Plan, the state climate adaption strategy to identify how climate change will affect California infrastructure and industry and what actions the state can take to reduce the risks posed by climate change;
- Factor climate change into state agencies' planning and investment decisions; and
- Implement measures under existing agency and departmental authority to reduce GHG emissions (Office of the Governor, 2015).

Executive Order B-30-15 requires CARB to update the AB 32 Climate Change Scoping Plan to incorporate the 2030 target. The 2030 Draft Scoping Plan will serve as the framework to define the State’s climate change priorities for the next 15 years and beyond. In June 2016, CARB released the 2030 Target Scoping Plan Update Concept Paper to describe potential policy concepts to achieve the 2030 target that can be incorporated in the 2030 Draft Scoping Plan. The concept paper presents four potential high-level concepts for achieving the needed GHG reductions (CARB, 2016b). The proposed project would not conflict with Executive Order B-30-15’s GHG emissions goal because it would generate direct and indirect emissions of GHG emissions that would have a less than significant impact on the environment. This issue is addressed in Section 3.8.3, *Analysis, Impacts, and Mitigation*.

Local

City of Antioch

2011 Municipal Climate Action Plan

The 2011 Municipal Climate Action Plan (MCAP) is a malleable non-binding resolution that details policies and programs that can be implemented to help reduce the City of Antioch’s GHG emissions should funding or other opportunities become available. The City of Antioch’s MCAP outlines the policies and measures in energy efficiency and renewable energy, transportation, water, and solid waste management sectors that the City may implement and/or is already implementing to achieve its ultimate target goal of an 80 percent GHG emissions reduction by 2050. Based on a survey and report of the City’s water distribution system conducted by Pacific Gas and Electric Company (PG&E) that made recommendations on pumps that could be upgraded, the MCAP identifies a water and wastewater measure that includes upgrades designed to improve energy efficiency in water treatment and distribution. The proposed upgrades and installation of low maintenance landscaping were estimated to result in a five percent reduction in water and wastewater energy consumption compared emissions generated in 2005, which would equate to an emissions reduction of 165 metric tons CO_2e per year (City of Antioch, 2011).

In September 2016, the City approved its 2010 GHG emissions inventory for 2015. The inventory suggests that the City has reduced its municipal GHG emissions related to water and wastewater operations by approximately 1,385 metric tons per year from 2005 to 2015 (City of Antioch, 2016), which far exceeds the reduction goal of the MCAP water and wastewater measure. Although the proposed project would result in a modest increase in GHG emissions compared to existing conditions (see the Impact 3.8-1 discussion in Section 3.8.3, *Analysis, Impacts, and Mitigation*), the City's MCAP water and wastewater goals would continue to be met while improving water supply reliability and water quality during droughts and due to future changes in Delta water management.

Construction and Demolition Recycling Ordinance

In 2004 the City of Antioch adopted a construction and demolition debris (C&D) recycling ordinance. This C&D recycling ordinance requires the redirection from the waste stream of at least 50 percent of the total construction and demolition debris generated by a project via reuse or recycling. This ordinance also requires a Waste Management Plan (WMP) to be completed and approved by the City of Antioch for the purposes of complying with this ordinance. A completed WMP contains actual weight or volume of the material disposed or recycled (City of Antioch, 2011). Construction of the proposed project would be conducted in accordance with the Construction and Demolition Recycling Ordinance.

City of Pittsburg

The City of Pittsburg currently does not have an approved climate action plan (City of Pittsburg, 2017).

3.8.3 Analysis, Impacts, and Mitigation

Significance Criteria

Based on CEQA *Guidelines* Section 15064.4 and Section 15064.7(c), as well as Appendix G, a project would have significant impacts associated with GHG emissions if it would:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or

b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

For land use projects with operations that are not stationary sources, the BAAQMD's 2017 CEQA Guidelines recommend use of an operational significance threshold of 1,100 metric tons CO_2e per year and for stationary source projects the recommended significance threshold is 10,000 metric tons CO_2e per year (BAAQMD, 2017). The proposed project would include no new stationary sources of GHG emissions. Project operational emissions would primarily be indirect emissions generated by stationary sources at power plants due to the use of electricity from PG&E's electrical grid. These sources are regulated and permitted by local air districts throughout California; however, they are outside of the control and jurisdiction of the City of Antioch. Because the sources of the indirect emissions are already regulated and permitted by the local air districts where the power plants reside, no permit or other BAAQMD approval would be required for the project's demand for electricity. For this reason, the stationary source significance threshold of 10,000 metric tons CO_2e per year is not an appropriate threshold to gauge impact significance of the proposed project.

Therefore, even though the project is not a typical land use development project, this EIR nonetheless uses the significance threshold of 1,100 metric tons CO_2e per year to evaluate whether the project's GHG emissions could have a significant impact on the environment. Use of this threshold results in approximately 59 percent of all projects being above the significance threshold and having to implement feasible mitigation measures to meet their CEQA obligations. These projects account for approximately 92 percent of all GHG emissions anticipated to occur between now and 2020 from new land use development in the Bay Area (BAAQMD, 2017). If all land use-project emissions are mitigated to below this threshold, it would represent an overall reduction in new land use project-related emissions of up to 92 percent.

It is acknowledged that this significance threshold was developed to focus on emissions reductions by 2020, and that BAAQMD staff and CARB have not yet provided guidance or recommendations for significance thresholds to evaluate consistency with emissions reduction goals for years beyond 2020; however, since the Executive Order B-30-15 emissions reductions goal of lowering GHG emissions to 40 percent below 1990 levels by 2030 is roughly equivalent to reducing emissions by 42 percent below current levels and the Executive Order S-3-05 emissions reductions goal of lowering GHG emissions to 80 percent below 1990 levels by 2050 is roughly equivalent to reducing emissions by 81 percent below current levels, the 1,100 metric tons CO_2e per year threshold can be used as a rough gauge to determine if the project would be consistent with these post-2020 goals. For discussion relative to the potential for the project to result in emissions (including GHG emissions) that could conflict with the BAAQMD's 2017 Clean Air Plan, refer to Impact 3.2-3 in Section 3.2, *Air Quality*.

The BAAQMD has not adopted a significance threshold for construction-related GHG emissions; however, it requires that the lead agency disclose those emissions and make a determination of impacts in relation to meeting AB 32 reduction goals. For construction-related GHG emissions, other air districts (e.g., South Coast Air Quality Management District (SCAQMD)) have recommended that total emissions from construction be amortized over a period of 30 years (meant to represent the life of the project) and added to operational emissions and then compared to the operational significance threshold (SCAQMD, 2008). This approach to assessing short-term construction emissions is used in this EIR.

Methodology and Assumptions

The following discussions provide an overview of the approach to analysis for GHG emissions impacts. The assumptions used to estimate construction and operational GHG emissions are provided in **Appendix C**.

Construction Emissions

Off-road equipment and vehicle trip emissions were estimated using the California Emissions Estimator Model version 2016.3.2 (CalEEMod v2016.3.2) with assumptions for construction equipment inventories and use rates, haul truck and vehicle trips, and construction phasing developed by the City's engineering consultant for this EIR analysis.

Depending on the equipment type and activity, it is assumed that each piece of equipment associated with construction activities at each of the project component sites would operate for 1 to 8 hours per day. The equipment hours were multiplied by the required amount of workdays for each equipment type for the total hours of operation for each piece of equipment. The total hours operated for each equipment type were then divided by the total construction workdays for each project component for the average equipment hours of the project components that were used for CalEEMod input. The average daily trip rates for each project component vary from 12 to 16 one-way worker auto trips per day and up to 56 one-way haul truck trips per day depending on the project component type. CalEEMod default trip lengths of 10.8 miles and 20.0 miles for worker trips and haul truck trips, respectively, were used to estimate the on-road vehicle emissions.

Consistent with the SCAQMD's recommended approach for construction emissions, this analysis amortizes the project's construction emissions over a 30-year project lifetime, adds them to the Project's estimated annual operational emissions, and then compares the total combined emissions to the 1,100 metric tons CO_2e per year significance threshold.

Operational Emissions

Below are discussions of how the indirect and direct operational emissions that would be associated with the project have been estimated. See Appendix C for all emission factors and assumptions used to estimate GHG emissions that would be associated with operations of the proposed project.

Indirect Emissions

The indirect emissions that would be associated with the project's electricity use were estimated using PG&E's power grid emission factor for year 2020 [i.e., 290 pounds CO_2 per megawatt hour (MWh); PG&E, 2015], which is estimated to be the first year the project would be operational. The CalEEMod default N_2O and CH_4 electricity use emission factors were also used to estimate the indirect emissions associated with electricity use. Based on energy use data for the existing pump station and WTP for years 2014 through 2017, the pump station consumes an average of approximately 1,516 MWh per year and the WTP consumes an average of 3,450 MWh per year, for a total annual average energy use of 4,965 MWh per year. Operations of the new River Pump

Station and the Desalination Facility would increase the City's annual pump station and WTP energy use to approximately 6,413 MWh per year. The proposed project's net increase in annual electricity demand is estimated to be approximately 1,447 MWh per year.

CalEEMod also estimates indirect emissions that would be associated with water use and waste generation based on land use type and area of the site. GHG indirect emissions were estimated for CO_2, N_2O, and CH_4, and the total CO_2e associated with the project was calculated by multiplying the N_2O and CH_4 emissions by their respective global warming potential, and then those values were added to the CO_2 emissions.

Exhaust Emissions

GHG emissions would also be generated from project-related vehicle travel during operations and maintenance. GHG emissions from vehicles that would be used during project operations and maintenance were estimated using CalEEMod v2016.3.2. It is assumed that up to seven commuting workers would result in 14 one-way trips each day.

Impacts and Mitigation Measures

Table 3.8-2 summarizes the project's GHG-related impacts and significance determinations.

TABLE 3.8-2
SUMMARY OF IMPACTS – GHG EMISSIONS

Impacts	Significance Determinations
Impact 3.8-1: The project would not generate an amount of GHG emissions that would contribute substantially to climate change.	LS
Impact 3.8-2: The project would not conflict with the Executive Order B-30-15 Emissions Reduction Goal.	LS
Impact 3.8-C-1: Implementation of the project, in combination with past, present, and reasonably foreseeable future development, would not result in a cumulatively significant impact related to generating GHG emissions that would contribute substantially to climate change.	LS
Impact 3.8-C-2: The project, in combination with other cumulative development, would not conflict with the Executive Order B-30-15 Emissions Reduction Goal.	LS

NOTE:
LS = Less than Significant.

Impact 3.8-1: The project would not generate an amount of GHG emissions that would contribute substantially to climate change. *(Less than Significant)*

Implementation of the project would result in short-term construction and long-term operational emissions. Construction and operational emissions that would be associated with the project are discussed separately below; however, the impact conclusion is based on the sum of amortized construction emissions and the operational emissions (see *Methodology and Assumptions* discussion, above, for additional information regarding the methods used to estimate the project's short-term construction and long-term operation emissions).

Construction Emissions

As shown in **Table 3.8-3**, GHG emissions generated by construction of the Project would total approximately 1,127 metric tons CO_2e over an approximately 14-month construction period, which equates to a 30-year amortized annual average value of approximately 38 metric tons CO_2e (refer to the *Methodology and Assumptions - Construction Emissions* discussion for details on the approach this analysis uses relative to short-term construction emissions; and **Appendix B** for all assumptions associated with the GHG construction emissions.

TABLE 3.8-3
TOTAL GHG EMISSIONS FROM PROJECT CONSTRUCTION

Construction Emission Source	CO_2e (metric tons)
Demolition/Construction of River Pump Station	473.56
Raw Water Pipeline	44.78
Desal Facility Construction	441.67
WTP Pipeline Installation	18.82
Brine Discharge Pipeline	147.76
Total Emissions	1,126.58
30-Year Amortized Annual Average	37.55

SOURCE: ESA, 2018. See Appendix B.

Operational Emissions

The project would generate long-term GHG emissions associated with electrical power and water consumption, waste generation, and vehicle travel. As described in the *Methodology and Assumptions - Operational Emissions* discussion, indirect emissions would result from a total project-related net increase in electricity demand of approximately 1,447 MWh per year. Other emission sources that would occur during operations of the project would include up to 14 one-way vehicle trips per day associated with commuting workers. The estimated annual emissions that would be associated with these operational sources are presented in **Table 3.8-4**. As indicated in the table, total net CO_2e emissions associated with operation of the project would be approximately 220 metric tons per year.

TABLE 3.8-4
TOTAL GHG EMISSIONS FROM PROJECT OPERATIONS

Operation Emissions Source	CO_2e (metric tons)
Net Increase in Electricity Consumption	191.94
Vehicle Trips	17.08
Waste Generation and Water Consumption	10.60
Total	219.62

SOURCES: ESA, 2018. See Appendix B.

As listed in **Table 3.8-4**, the vast majority of GHG emissions associated with long-term operation of the project would be indirect emissions from the project's use of electricity, which would be provided by the local PG&E electrical power grid. Due to California's Renewables Portfolio Standard (RPS) program that requires investor-owned utilities to increase procurement from eligible renewable energy sources to 50 percent of total procurement by 2030, PG&E has steadily increased the amount of renewables in its energy production portfolio, which lowers the overall indirect emissions associated with use of its electricity. The mix of sources of electricity that PG&E delivered to its customers in 2016 is described in the *Local Electricity Systems* discussion in Section 3.7, *Energy Conservation*. In fact, indirect emissions associated with use of PG&E's electricity will continue to drop as more and more electricity from renewable power generators is brought onto the grid. PG&E estimates that its emissions rate for its current (i.e., year 2018) energy production portfolio is 328 pounds of CO_2 per MWh generated, and that its emissions rate estimate for year 2020 is 290 pounds of CO_2 per MWh generated (PG&E, 2015). This will equal a reduction in indirect GHG emissions associated with electricity use in the PG&E service area of approximately 12 percent over the next two years. PG&E's electricity emissions rate (and thus the carbon footprint of the project's electricity consumption) would continue to decrease throughout the life of the project.

Impact Conclusion

As shown in **Table 3.8-5**, the sum of the 40-year amortized construction GHG emissions and the total net operation emissions that would be associated with the project is approximately 257 metric tons CO_2e per year. These emissions would be less than the 1,100 metric tons per year significance threshold; therefore, a **less than significant impact** would occur, and the proposed project would not be considered to contribute substantially to the primary and secondary adverse effects of climate change, such as increases in global temperatures, global rise in sea level, ocean acidification, impacts on agriculture, changes in disease vectors, and changes in habitat and biodiversity.

TABLE 3.8-5
TOTAL AMORTIZED GHG EMISSIONS

Emissions Source	CO_2e (metric tons per year)
30-Year Amortized Construction Emissions	37.55
Total Net Operational Emissions	219.62
Total Project Emissions	257.17
Significance Threshold	1,100
Significant Impact?	No

SOURCE: ESA, 2018. See Appendix B.

<u>Mitigation Measure</u>:

None required.

Impact 3.8-2: The project would not conflict with the Executive Order B-30-15 Emissions Reduction Goal. (*Less than Significant*)

As noted in the *Significance Criteria* discussion above, the threshold of 1,100 metric tons CO_2e per year used to assess the significance of Impact 3.8-1 effectively requires mitigation for the top 92 percent of emissions generated by new land use projects, which would represent an overall reduction in new land use project-related emissions of up to 92 percent. Since the issuance of Executive Order B-30-15, the GHG emissions reductions goal of lowering GHG emissions to 40 percent below 1990 levels by 2030, is roughly equivalent to reducing emissions by 44 percent below current levels, this analysis uses the same significance threshold to determine if the project would generally be consistent with this goal. As discussed under Impact 3.8-1, the carbon footprint of the project and the impact associated with GHG emissions would be less than significant. Therefore, the project would not conflict with the Executive Order B-30-15 Emissions Reduction Goal, and the associated impact would be **less than significant**.

<u>Mitigation Measure</u>:

None required.

Cumulative Impacts

For the purposes of this analysis, the geographic context for cumulative impacts associated with GHG emissions is statewide.

Impact 3.8-C-1: Implementation of the project, in combination with past, present, and reasonably foreseeable future development, would not result in a cumulatively significant impact related to generating GHG emissions that would contribute substantially to climate change. (*Less than Significant*)

Because GHG emissions have global climate change implications, the evaluation of GHG emissions impacts is inherently a cumulative impact analysis. Through Executive Orders S-3-05 and B-30-15, the State has established goals and policies for reducing its contribution of GHG emissions. Accordingly, these policy documents provide goals against which the significance of individual projects' emissions can be measured. Consistent with the emissions reduction goal for 2030 identified in Executive Order B-30-15, the numeric significance criterion used to evaluate operational emissions plus construction emissions amortized over the project's estimated 30-year lifetime is 1,100 metric tons CO_2e per year. If project construction and operations would result in GHG emissions greater than 1,100 metric tons CO_2e per year, the project would not be considered consistent with the State's GHG reduction goals and the associated impact would be cumulatively significant. The timeframe during which the project could contribute to cumulative GHG emissions effects includes the 14-month construction phase, as well as the anticipated approximately 30-year operations phase.

As discussed under Impact 3.8-1, the amortized construction and operational emissions that would be associated with the project would be approximately 257 metric tons CO_2e per year (refer to **Appendix C** for all assumptions associated with the GHG emissions), which would result in a less than significant impact and a less than significant contribution to the overall significant cumulative impact associated with climate change. Therefore, the project would be consistent with the State's GHG reduction goals and the project's incremental contribution to the cumulative climate change impact related to GHG emissions would be **less than significant**.

Mitigation Measure:

None required.

Impact 3.8-C-2: The project, in combination with other cumulative development, would not conflict with the Executive Order B-30-15 Emissions Reduction Goal. (*Less than Significant*)

As noted above, the project would be consistent with the State's GHG reduction goals. Therefore, the project would not conflict with the Executive Order B-30-15 Emissions Reduction Goal, and the associated cumulative impact would be **less than significant**.

Mitigation Measure:

None required.

References – Greenhouse Gas Emissions

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3.9 Hazards and Hazardous Materials

This section evaluates the potential for implementation of the proposed project to result in adverse impacts associated with hazards and hazardous materials, including hazardous materials used for both construction and the operation of the proposed project. The analysis included in this section was developed based on project-specific construction and operational features, information provided by the City, and data from the Department of Toxic Substances Control (DTSC), State Water Resources Control Board (SWRCB), Regional Water Quality Control Board (RWQCB), the General Plans for the Cities of Antioch and Pittsburg, and regional disaster planning documents. Mitigation measures are identified to avoid or reduce significant adverse impacts, as appropriate.

Public comments were received during the scoping period that relate to hazards and hazardous materials. Some comments concerned the intersection of the proposed brine disposal pipeline with previously abandoned oil and fuel pipelines. This issue is discussed in the section below on Oil and Gas Pipelines and in Impact 3.9-3. Some comments concerned the storage and containment of chemicals that would be used in the water treatment process. This issue is discussed below in the relevant regulations in Section 3.9.2, *Regulatory Framework* and in Impact 3.9-1.

3.9.1 Environmental Setting

Definitions of Hazardous Materials

Definitions of terms used in the regulatory framework, characterization of baseline conditions, and impact analysis for hazards and hazardous materials are provided below.

Hazardous Material

The term “hazardous material” can have varying definitions depending on the regulatory programs. For the purposes of this EIR, the term refers to both hazardous materials and hazardous wastes. The California Health and Safety Code Section 25501(p) defines hazardous material as: Hazardous material means any material that because of its quantity, concentrations, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. Hazardous materials include, but are not limited to, hazardous substances, hazardous waste, and any material which a handler or the administering 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.

Hazardous Waste

A "hazardous waste" is a waste that because of its quantity, concentration, or physical, chemical, or infectious characteristic, causes or significantly contributes to an increase in mortality or illness or poses substantial or potential threats to public health or the environment (42 U.S.C. 6903(5)). Hazardous wastes are further defined under the Resource Conservation and Recovery Act (RCRA) as substances exhibiting the characteristics of ignitability, reactivity, corrosivity, or toxicity. Chemical-specific concentrations used to define whether a material is a hazardous, designated, or nonhazardous waste include Total Threshold Limit Concentrations (TTLCs), Soluble Threshold Limit Concentrations (STLCs), and Toxic Characteristic Leaching Procedure (TCLPs), listed in CCR Title 22, Chapter 11, Article 3, Section 66261, and used as waste acceptance criteria for landfills. Waste materials with chemical concentrations above TTLCs, STLCs, and TCLPs must be sent to Class I disposal facilities, may be sent to Class II disposal facilities depending on the waste material, and may not be sent to Class III disposal facilities.

Screening Levels for Hazardous Materials in Soil, Soil Gas, or Groundwater

The USEPA Regional Screening Levels (RSLs) and San Francisco Bay Area RWQCB Environmental Screening Levels (ESLs) are guidelines used to evaluate the potential risk associated with chemicals found in soil or groundwater where a release of hazardous materials has occurred. Although developed and maintained by the San Francisco Bay Area RWQCB, ESLs are used by regulatory agencies throughout the state. Screening levels have been established for both residential and commercial/industrial land uses, and for construction workers. Residential screening levels are the most restrictive; soil with chemical concentrations below these levels generally would not require remediation and would be suitable for unrestricted uses if disposed of offsite.

Commercial/industrial screening levels are generally less restrictive than residential screening levels because they are based on potential worker exposure to hazardous materials in the soil (and these are generally less than residential exposures). Screening levels for construction workers are also less restrictive than for commercial/industrial workers because construction workers are only exposed to the chemical of concern during the duration of construction, while industrial workers are assumed to be exposed over a working lifetime. Chemical concentrations below these screening levels generally would not require remediation and would be suitable for unrestricted uses. In addition, there are other more specific but similar screening levels used more narrowly focused human health or ecological risk assessment considerations.

Existing Hazardous Materials in Components to be Replaced or Removed

The demolition of the existing Intake Pump Station would not involve the handling of hazardous materials. The existing wooden pile-supported pier would be used as is and not replaced. No other existing structures or components that have hazardous materials would be replaced or removed and the proposed location for the desalination plant is on vacant land with a temporary storage shed.

Overlap with Oil and Natural Gas Pipelines

The proposed brine disposal pipeline would cross active and abandoned oil and natural gas pipes at the two locations shown on **Figure 3.9-1**. The location information was acquired from the Pipeline and Hazardous Materials Safety Administration map viewer (PHMSA, 2018). However, for homeland security reasons, the locations shown on map viewer are approximate. For more accurate locations, the pipeline owner or operator must be contacted. The available information on the identification numbers, status, and contacts are listed in **Table 3.9-1**.

TABLE 3.9-1
SUMMARY OF OIL AND GAS PIPELINES

Pipeline Identification Number	Owner	Status and Contents	Contact	Contact Information
G Street and Railroad Crossing				
485090CCFR	Kinder Morgan	Active; multiple products	Bayaneh Nikpour	714-560-4918 Bayaneh_nikpour@kindermorgan.com
31590	None listed	Abandoned; unknown if still present	NPMS Staff	703-317-6294 npms@dot.gov
CAL0002	Chevron	Active fuel	Garrett Parker	713-372-6847 ParkerG@chevron.com
Old Valley Pipeline & Tidewater Associated Oil Company Pipelines	Chevron	Abandoned; unknown if pipes still present	Mike Hurd Tan Hoang	510-466-7161 michael.t.hurd@leidos.com 916-979-3742 tan.t.hoang@leidos.com
West Tregallas Road Alignment				
19749.94 20206.44 20208.84 20213.64 20215.74 X6485_0 20539.2 20541.5 20217.94 20542.2	PG&E	Active Natural Gas	Customer Service	888-743-7431 PipelineRequests@pge.com

SOURCE: PHMSA, 2018, Chevron, 2017

During the scoping period, Chevron provided a comment letter with that noted that the alignment for the proposed disposal pipeline would cross over the alignment of previously abandoned Old Valley Pipeline (OVP) and the Tidewater Associated Oil Company (TOAC) Pipelines, included in the **Table 3.9-1** (Chevron, 2017). The portion of the proposed disposal pipeline alignments on G Street and L Street would cross the abandoned pipelines along the south side of the railroad tracks. Because the abandonment of the pipelines occurred many years ago, Chevron stated that the abandonment procedures and the condition of soil around the abandoned pipelines is uncertain. The pipelines were constructed in the early 1900's and carried crude oil from the San Joaquin Valley to the San Francisco Bay Area. The use of the pipelines ceased by the 1970's. The degree and method of decommissioning varied: in some instances, the pipelines were removed, while in others they remained in place. Because these pipelines have been decommissioned with the majority but not all of pipelines having been removed, they are not readily identified as underground utilities through the Underground Service Alert North System or utility surveys. The location of the pipelines is based on historical as-built drawings and the approximated positional accuracy of the alignments is generally no better than plus or minus 50 feet. The OVP and TAOC pipelines were installed at depths of up to 10 feet below ground surface. The steel pipelines were typically encased in a protective coating composed of coal tar and asbestos-containing materials (ACM). Chevron advised that construction at this location could encounter abandoned-in-place sections of pipeline, ACM insulation materials around the pipelines, and/or residual weather crude oil in soil.

Hazardous Materials in Soil and Groundwater

The DTSC's EnviroStor website and the SWRCB GeoTracker website were checked for known hazardous materials sites that may overlap the construction footprint of the proposed project. The existing Antioch WTP has no documented records of any hazardous materials releases. Other sites that may have hazardous materials issues that may overlap the footprint of the proposed project are discussed below.

Fulton Shipyard

The Fulton Shipyard, at 307 Fulton Shipyard Road, is located just north and east of the existing raw water pipeline and along the San Joaquin River, as shown on Figure 3-1a (DTSC, 2017; SGI, 2014). This site is an active cleanup site under the jurisdiction of the DTSC. From 1918 and 1999, the Fulton Shipyard fabricated and maintained tugboats, pleasure crafts, and manufactured crane equipment onsite. Soil sampling in the vicinity of an onsite marine railway in 1992 detected elevated concentrations of lead and zinc. Sediment samples collected and analyzed in 1994 suggested a potential release to the San Joaquin River of lead and mercury in the vicinity of the marine railway (see Figure 3-1a; the pier just east of the proposed project's intake station). Blast media was also observed in and around an onsite structure located in the northeast corner of the Fulton Shipyard during an onsite visit in 2002.

SOURCE: City of Antioch 2017; Carollo Engineers 2017; NAIP 2016, ESA 2018; OSM 2016

Brackish Water Desalination Facility Planning

Figure 3.9-1

Oil and Natural Gas Pipelines

ESA

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The Remedial Investigation (SGI, 2014) concluded that Removal Action Workplan should be prepared to remediate specific areas with chemical concentrations that exceed screening levels. The DTSC EnviroStor website indicated that the Removal Action Workplan has not yet been submitted for their review (DTSC, 2017). The investigation of the nature and extent of contaminants in river sediments is not complete. Note that the direction of flow in the San Joaquin River is to the west from the Fulton Shipyards along the proposed intake pump station site and downstream. Sediment samples collected from San Joaquin River sediment contained contaminants and maximum concentrations, as summarized below.

- Aluminum (27,719 milligrams per kilogram [mg/kg])
- Antimony (16.2 mg/kg)
- Arsenic (12.8 mg/kg)
- Barium (312 mg/kg)
- Cadmium (2 mg/kg)
- Chromium (174 mg/kg)
- Copper (2,890 mg/kg)
- Iron (50,600 mg/kg)
- Lead (828 mg/kg)
- Manganese (1,226 mg/kg)
- Mercury (3.6 mg/kg)
- Nickel (96.1 mg/kg)
- Silver (2.5 mg/kg)
- Vanadium (93.4 mg/kg)
- Zinc (589 mg/kg)
- Low Molecular Weight PAHs (21.7 mg/kg)
- High Molecular Weight PAHs (23.2 mg/kg, including benzo(a)pyrene)
- Arochlors (0.352 mg/kg)
- PCB Congeners (0.442 mg/kg)
- Tributyltin (0.931 mg/kg)

The concentrations of lead in sediments may exceed STLC levels (see definition of hazardous waste above), which would define the sediments as hazardous waste, if removed for offsite disposal. None of the other chemicals exceed their respective hazardous waste levels.

Closed Leaking Underground Fuel Tank Sites

The following sites located along the portion of Contra Loma Boulevard and L Street where the brine disposal pipeline would be installed are closed (previously cleaned up) leaking underground fuel tank sites (SWRCB, 2018):

- Tosco, 2701 Contra Loma Boulevard
- Former Exxon, 2610 Contra Loma Boulevard
- Chevron, 2100 L Street

The following sites located along the portion of West 10th Street where the brine disposal pipeline would be installed are closed (previously cleaned up) leaking underground fuel tank sites (SWRCB, 2018):

- Contra Costa County Fairgrounds, 1201 West 10th Street
- Al Eames Ford, 1400 West 10th Street
- Delta Dodge, 1725 West 10th Street
- Former Mazzei Automobile Dealership, 1530 West 10th Street
- Petrol Express, 1800 West 10th Street

Although these sites have been cleaned up to the satisfaction of the regulatory agencies and closure or no further action letters have been issued, residual levels of petroleum hydrocarbons may be present at concentrations below screening levels in soil at and near these sites.

Schools

The following schools are within 0.25 mile of project components:

- Park Middle School, at 1 Spartan Way, is west of and adjacent to the proposed brine discharge pipeline.
- Sutter Elementary School, at 3410 Longview Road, is about 1,250 feet southwest of the proposed desalination plant and bulk chemical storage building.
- Antioch High School, at 700 West 18th Street, is north, east, and adjacent to the proposed brine discharge pipeline alignment.
- Antioch Middle School, at 1500 D Street, is about 800 feet northeast of the proposed brine discharge pipeline alignment.
- Fremont Elementary School, at 1413 F Street, is about 1,320 (0.25 mile) northeast of the proposed brine discharge pipeline alignment.
- Marsh Elementary School, at 2304 G Street, is west of and adjacent to the proposed brine discharge pipeline alignment.
- Antioch Charter Academy School, at 1201 West 10th Street, is west of and adjacent to the proposed brine discharge pipeline alignment.

Airports

There are no public airports or private airstrips within 2 miles of the proposed project. The nearest airport is Buchanan Field Airport located about 12 miles to the west.

Emergency Response Plans

The City of Antioch's Office of Emergency Services (OES) utilizes a Standard Emergency Notification System for emergency purposes, a Community Warning System for chemical releases at fixed facilities, an evacuation plan that is predicated on the type of emergency and location, and a Disaster-Preparedness Plan that is updated and practiced by city employees annually (City of Antioch, 2017a). The plan does not identify specific emergency response or evacuation routes. The OES states that in the event of a disaster, local schools would be used as designated emergency shelters. As noted above, seven schools are adjacent to or near components of the project.

Wildfire Hazards

Based upon fire hazard mapping by the California Department of Forestry and Fire Protection (CAL FIRE) Forest Resource Assessment Program, the proposed project is not within identified high fire hazard areas (CAL FIRE, 2007).

3.9.2 Regulatory Framework

Federal

The primary federal agencies with responsibility for hazardous materials management include the U.S. Environmental Protection Agency (USEPA), U.S. Department of Labor Occupational Safety and Health Administration (Fed/OSHA), and the U.S. Department of Transportation (USDOT). Federal laws, regulations, and responsible agencies are summarized in **Table 3.9-2**.

TABLE 3.9-2
FEDERAL LAWS AND REGULATIONS RELATED TO HAZARDOUS MATERIALS MANAGEMENT

Classification	Law or Responsible Federal Agency	Description
Hazardous Materials Management	Community Right-to-Know Act of 1986 (also known as Title III of the Superfund Amendments and Reauthorization Act (SARA))	Imposes requirements to ensure that hazardous materials are properly handled, used, stored, and disposed of and to prevent or mitigate injury to human health or the environment in the event that such materials are accidentally released.
Hazardous Waste Handling	Resource Conservation and Recovery Act of 1976 (RCRA)	Under RCRA, the USEPA regulates the generation, transportation, treatment, storage, and disposal of hazardous waste from “cradle to grave.”
	Hazardous and Solid Waste Act	Amended RCRA in 1984, affirming and extending the “cradle to grave” system of regulating hazardous wastes. The amendments specifically prohibit the use of certain techniques for the disposal of some hazardous wastes.
Hazardous Materials Transportation	USDOT	USDOT has the regulatory responsibility for the safe transportation of hazardous materials. The USDOT regulations govern all means of transportation except packages shipped by mail (49 CFR).
	U.S. Postal Service (USPS)	USPS regulations govern the transportation of hazardous materials shipped by mail.
Occupational Safety	Occupational Safety and Health Act of 1970	Fed/OSHA sets standards for safe workplaces and work practices, including the reporting of accidents and occupational injuries (29 CFR 1910).
Structural and Building Components (Lead-based paint, polychlorinated biphenyls, and asbestos)	Toxic Substances Control Act	Regulates the use and management of polychlorinated biphenyls in electrical equipment, and sets forth detailed safeguards to be followed during the disposal of such items.
	USEPA	The USEPA monitors and regulates hazardous materials used in structural and building components and their effects on human health.

State and local agencies often have either parallel or more stringent rules than federal agencies. In most cases, state law mirrors or overlaps federal law and enforcement of these laws is the responsibility of the state or of a local agency to which enforcement powers are delegated. For these reasons, the requirements of the law and its enforcement are discussed under either the State or local agency section.

State

The primary State agencies with responsibility for hazardous materials management in the region include the DTSC and the RWQCB within the California Environmental Protection Agency (Cal

EPA), California Occupational Safety and Health Administration (Cal/OSHA), California Department of Health Services (CDHS), California Highway Patrol (CHP), and the California Department of Transportation (Caltrans). State laws, regulations, and responsible agencies are summarized in **Table 3.9-3**.

TABLE 3.9-3
STATE LAWS AND REGULATIONS RELATED TO HAZARDOUS MATERIALS MANAGEMENT

Classification	Law or Responsible State Agency	Description
Hazardous Materials Management	Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program); CUPA (Health and Safety Code Sections 25404 et seq)	In January 1996, Cal EPA adopted regulations, which implemented a Unified Program at the local level. The agency responsible for implementation of the Unified Program is called the Certified Unified Program Agency (CUPA), which for the City of Antioch, is the Contra Costa Health Services - Hazardous Materials Programs, discussed further below.
	State Hazardous Waste and Substances List (“Cortese List”); DTSC, RWQCB, SC EHD.	The Project site includes one hazardous materials site on the “Cortese List” compiled pursuant to Government Code section 65962.5 and referenced in Public Resources Code 21092.6. The oversight of hazardous materials sites often involves several different agencies that may have overlapping authority and jurisdiction. For the onsite hazardous materials cases and issues, the RWQCB is the lead agency. Other cases may be overseen by the DTSC, the RWQCB, the City of Antioch, or other agencies.
Hazardous Waste Handling	California Hazardous Materials Release Response Plan and Inventory Law of 1985; CUPA	The California Hazardous Materials Release Response Plan and Inventory Law of 1985 (Business Plan Act) requires that businesses that store hazardous materials onsite prepare a Hazardous Materials Business Plan (HMBP) and submit it to the local CUPA, which in this case is the Contra Costa Health Services - Hazardous Materials Programs.
	California Hazardous Waste Control Act; DTSC	Under the California Hazardous Waste Control Act, California Health and Safety Code, Division 20, Chapter 6.5, Article 2, Section 25100, et seq., DTSC regulates the generation, transportation, treatment, storage, and disposal of hazardous waste in California. The hazardous waste regulations establish criteria for identifying, packaging, and labeling hazardous wastes; dictate the management of hazardous waste; establish permit requirements for hazardous waste treatment, storage, disposal, and transportation; and identify hazardous wastes that cannot be disposed of in landfills. DTSC is also the administering agency for the California Hazardous Substance Account Act. California Health and Safety Code, Division 20, Chapter 6.8, Sections 25300 et seq., also known as the State Superfund law, providing for the investigation and remediation of hazardous substances pursuant to State law.
	California Fire Code	The California Fire Code regulates the storage and handling of hazardous materials, including the requirement for secondary containment, separation of incompatible materials, and preparation of spill response procedures.
Hazardous Materials Transportation	Titles 13, 22, and 26 of the California Code of Regulations	Regulates the transportation of hazardous waste originating in and passing through the state, including requirements for shipping, containers, and labeling.
	CHP and Caltrans	These two state agencies are primary responsibility for enforcing federal and state regulations and responding to hazardous materials transportation emergencies.

TABLE 3.9-3 (CONTINUED)
STATE LAWS AND REGULATIONS RELATED TO HAZARDOUS MATERIALS MANAGEMENT

Classification	Law or Responsible State Agency	Description
	Cal/OSHA	Cal/OSHA has primary responsibility for developing and enforcing workplace safety regulations in California. Because California has a federally approved OSHA program, it is required to adopt regulations that are at least as stringent as those found in Title 29 of the Code of Federal Regulations (CFR). Cal/OSHA standards are generally more stringent than federal regulations.
	Cal/OSHA regulations (Title 8 CCR)	Concerning the use of hazardous materials in the workplace require employee safety training, safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation.
	California Office of Statewide Health Planning and Development	The Office of Statewide Health Planning and Development serves as the regulatory building agency for all hospitals and nursing homes in California. Its primary goal in this regard is to ensure that patients in these facilities are safe in the event of an earthquake or other disaster, and to ensure that the facilities remain functional after such an event in order to meet the needs of the community affected by the disaster.
Construction Storm Water General Permit (Construction General Permit; Order 2009-0009-DWQ, NPDES No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ)	RWQCB	Dischargers whose project disturbs one or more acres of soil or where projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one of more acres, are required to obtain coverage under the *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Construction General Permit; Order 2009-0009-DWQ, NPDES No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ). Construction activity subject to this permit includes clearing, grading, grubbing, and other disturbances to the ground such as excavation and stockpiling, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of a facility. The Construction General Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) that includes specific Best Management Practices (BMPs) designed to prevent sediment and pollutants from contacting stormwater from moving offsite into receiving waters. The BMPs fall into several categories, including erosion control, sediment control, waste management and good housekeeping, and are intended to protect surface water quality by preventing the off-site migration of eroded soil and construction-related pollutants from the construction area.
Municipal Separate Storm Sewer System (MS4) Permit NPDES No. CAS082597 and Order No. R5-2016-0040	RWQCB	The MS4 permit requires permittees (in this case, the City of Antioch) to reduce pollutants and runoff flows from new development and redevelopment using BMPs to the maximum extent practical. The MS4 permittee also has its own development standards, also known as Low Impact Development (LID)/post-construction standards that include a hydromodification element. The MS4 permit requires specific design concepts for LID/post-construction BMPs in the early stages of a project during the entitlement and CEQA process and the development plan review process.
Industrial Storm Water General Permit Order No. 2014-0057-DWQ	RWQCB	Storm water discharges associated with industrial sites must comply with the regulations contained in the Industrial Storm Water General Permit Order No. 2014-0057-DWQ (IGP). The IGP regulates discharges associated with certain defined categories of industrial activities including manufacturing facilities; hazardous waste treatment, storage, or disposal facilities; landfills, land application sites, and open dumps; cement manufacturing; fertilizer manufacturing; petroleum refining; phosphate manufacturing; recycling facilities; steam electric power generating facilities; transportation facilities; and

TABLE 3.9-3 (CONTINUED)
STATE LAWS AND REGULATIONS RELATED TO HAZARDOUS MATERIALS MANAGEMENT

Classification	Law or Responsible State Agency	Description
		sewage or wastewater treatment works. The IGP requires the implementation of best management practices, a site-specific Storm Water Pollution Prevention Plan (SWPPP), and monitoring plan. The IGP also includes criteria for demonstrating no exposure of industrial activities or materials to storm water, and no discharges to waters of the United States.
Underground Infrastructure	California Code of Regulations Section 4216-4216.9	Section 4216-4216.9 "Protection of Underground Infrastructure" requires an excavator to contact a regional notification center (e.g., Underground Services Alert or Dig Alert) at least two days prior to excavation of any subsurface installations. Any utility provider seeking to begin a project that could damage underground infrastructure can call Underground Service Alert, the regional notification center for southern California. Underground Service Alert will notify the utilities that may have buried lines within 1,000 feet of the project. Representatives of the utilities are then notified and are required to mark the specific location of their facilities within the work area prior to the start of project activities in the area.

Asbestos-Containing Materials

Section 19827.5 of the California Health and Safety Code, adopted in January 1991, requires that local agencies not issue demolition or alteration permits until an applicant has demonstrated compliance with notification requirements under applicable federal regulations (Part 61 of Title 40 of the Code of Federal Regulations) regarding hazardous air pollutants in the Bay Area, including asbestos. The BAAQMD is vested by the California legislature with authority to regulate airborne pollutants, including asbestos, through both inspection and law enforcement, and implements the California regulatory requirements through Regulation 11, Rule 2 (Asbestos Demolition, Renovation, and Manufacturing).

In accordance with Regulation 11, Rule 2, the BAAQMD must be notified 10 days in advance of any proposed demolition or abatement work that would involve removal of ACM. Notification includes the names and addresses of operations and persons responsible; description and location of the structure(s) to be demolished/altered including size, age, and prior use, and the approximate amount of ACM; scheduled starting and completion dates of demolition or abatement; nature of planned work and methods to be employed; procedures to be employed to meet BAAQMD requirements; and the name and location of the waste disposal site to be used.

Contractors who conduct ACM-related work activities must follow state regulations where the work would involve 100 square feet or more of ACM (California Code of Regulations [CCR] 8 Sections 1529 and 341.6-341.14). Specifically, under CCR Title 8 Section 341.6, the California Occupational Safety and Health Administration (Cal/OSHA) must be notified of asbestos-related work activities to be carried out. Contractors must be licensed as an Asbestos Qualified Contractor by the Contractors Licensing Board of the State of California and registered as such with Cal/OSHA. Section 1529 regulates asbestos exposure in construction work. In addition, a one-time report of the use of carcinogens must be made to Cal/OSHA under CCR Title 8

Chapter 4 Section 5203. The contractor and hauler of the material are required to file a Hazardous Waste Manifest that details the hauling of the material from the site and its disposal.

Local

Unified Hazardous Waste and Hazardous Materials Management Regulatory Program

The Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program), codified in Health and Safety Code Sections 25404 et seq., requires the administrative consolidation of six hazardous materials and waste programs under one agency, a Certified Unified Program Agency (CUPA). The following programs are consolidated under the unified program:

- Hazardous Materials Release Response Plans, and Inventory (also referred to as Hazardous Materials Business Plans)
- California Accidental Release Program
- Underground Storage Tanks
- Aboveground Petroleum Storage Spill Prevention Control and Countermeasures
- Hazardous Waste Generation and Onsite Treatment
- Uniform Fire Code Plans and Inventory Requirements

The State Secretary for Environmental Protection designated the Contra Costa Health Services - Hazardous Materials Program as the local CUPA. The CUPA is charged with the responsibility of conducting compliance inspections of over hazardous materials facilities in Contra Costa County, including the Cities of Antioch and Pittsburg. These facilities handle hazardous materials, generate or treat a hazardous waste, and/or operate underground storage tanks. The CUPA uses education and enforcement to minimize the risk of chemical exposure to human health and the environment. The CUPA forwards important facility information to local fire prevention agencies that enables them to take appropriate protective action in the event of an emergency at regulated facilities. In order to legally store and use hazardous materials above the trigger quantities, users must apply for permits and demonstrate satisfactory compliance with regulations. The quantities that trigger disclosure are based on the maximum quantity on site at any time:

- 55 gallons, 500 pounds, or 200 cubic feet for 30 days or more at any time in the course of a year
- Any amount of hazardous waste
- Category I or II pesticides
- Explosives
- Extremely hazardous substances above the threshold planning quantity

East Contra Costa County Municipal NPDES Permit, Waste Discharge Requirements Order R5-2010-0102 and NPDES Permit No. CAS083313 (MS4 Permit)

The Municipal Storm Water Program regulates storm water discharges from municipal separate storm sewer systems (MS4s) throughout California. U.S. EPA defines an MS4 as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) owned or operated by a State (40 CFR 122.26(b)(8)). For Contra Costa County, the *Contra Costa Clean Water Program Stormwater C.3. Guidebook, Stormwater Quality Requirements for Development Applications* describes the requirements of the site-specific Stormwater Control Plan mandated by the Municipal Regional Permit (MS4 Permit). The Guidebook describes BMPs and Low Impact Development (LID) features to enable compliance with permit requirements, including the following goals:

- minimize imperviousness and reduce runoff
- slow runoff rates and retain or detain stormwater
- incorporate required source controls
- treat stormwater prior to discharge from the site
- control runoff rates and durations if required
- provide for operation and maintenance of stormwater facilities

City of Antioch General Plan

Chapter 11.0 Environmental Hazards Element

Hazardous Materials Objective 11.7.2: Minimize the negative impacts associated with the storage, use, generation, transport, and disposal of hazardous materials.

***Policy 11.7.2.b*:** Implement the provisions of the Contra Costa County Hazardous Waste Management Plan, including, but not limited to, provisions for pretreatment and disposal, storage, handling, and emergency response.

***Policy 11.7.2.k*:** Require emergency response plans for all hazardous waste processors and large generators to be submitted as part of use permit applications, and require training of employees of all facilities in emergency procedures, and that they be acquainted with the properties and health effects of the hazardous materials involved in service facilities' operations.

***Policy 11.7.2.n*:** Require the provision of spill containment facilities and monitoring devices in all facilities, and ensure that pipelines and other hazardous waste channels are properly designed to minimize leakage and require above ground pipelines to be surrounded by spill containment basins.

Storm Drainage and Flood Control Objective 8.7.2: Conduct all storm water via adequately sized storm drains and channels.

***Policy 8.7.2.e*:** Require new developments to provide erosion and sedimentation control measures to maintain the capacity of area storm drains and protect water quality.

***Policy 8.7.2.f*:** Require implementation of Best Management Practices [BMPs] in the design of drainage systems to reduce discharge on non-point source pollutants originating in streets, parking lots, paved industrial work area, and open spaces involved with pesticide applications. New developments to provide erosion and sedimentation control measures to maintain the capacity of area storm drains and protect water quality.

City of Antioch Municipal Code

Section 6-9.05: Stormwater Control Plan Required. Every application for a development project, including but not limited to a rezoning, tentative map, parcel map, conditional use permit, variance, site development permit, design review, or building permit that is subject to the development runoff requirements in the city's NPDES permit shall be accompanied by a stormwater control plan that meets the criteria in the most recent version of the Contra Costa Clean Water Program Stormwater C.3. Guidebook. Implementation of an approved stormwater control plan and submittal of an approved stormwater control operation and maintenance plan by the applicant shall be a condition precedent to the issuance of a certificate of occupancy for a project subject to this section.

Section 6-9.09: Best Management Practices and Standards. (E) *Construction Activities.* All construction shall conform to the requirements of the California Stormwater Quality Association (CASQA) Stormwater Best Management Practices Handbooks for Construction Activities and New Development and Redevelopment, the Association of Bay Area Governments (ABAG) Manual of Standards for Erosion & Sediment Control Measures, the city's grading and erosion control ordinance and other generally accepted engineering practices for erosion control as required by the Director when undertaking construction activities. The Director may establish controls on the rate of stormwater runoff from new development and redevelopment as may be appropriate to minimize the discharge and transport of pollutants. (Note: CASQA BMPS are incorporated into SWPPPs).

Section 8-13.01: Storm water pollution control measures shall be implemented during all construction phases of development to prevent pollution from entering the waterways.

City of Pittsburg General Plan

Chapter 10 Health & Safety Element

Goal 10-G-9: Minimize the risk to life and property from the generation, storage, and transportation of hazardous materials and waste by complying with all applicable State regulations.

Policy 10-P-33: Prevent the spread of hazardous leaks and spills from industrial facilities to residential neighborhoods and community focal points, such as Downtown.

Policy 10-P-34: Identify appropriate regional and local routes for transport of hazardous materials and wastes. Ensure that fire, police, and other emergency personnel are easily accessible for response to spill incidences on such routes.

Goal 10-G-8: Flood Control: Ensure that new development mitigates impacts to the City's storm drainage capacity from storm water runoff in excess of runoff occurring from the property in its undeveloped state.

Policy 10-P-18: Evaluate storm drainage needs for each development project in the context of demand and capacity when the drainage area is fully developed. Ensure drainage improvements or other mitigation of the project's impacts on the storm drainage system appropriate to the project's share of the cumulative effect.

Policy 10-P-19: Assure through the Master Drainage Plan and development ordinances that proposed new development adequately provides for on-site and downstream mitigation of potential flood hazards.

City of Pittsburg Municipal Code

Section 13.28.050: Stormwater Control Plan Required. Every application for a development project, including but not limited to a rezoning, tentative map, parcel map, conditional use permit, variance, site development permit, design review, or building permit that is subject to the development runoff requirements in the city's NPDES permit shall be accompanied by a stormwater control plan that meets the criteria in the most recent version of the Contra Costa Clean Water Program Stormwater C.3. Guidebook. Implementation of an approved stormwater control plan and submittal of an approved stormwater control operation and maintenance plan by the applicant shall be a condition precedent to the issuance of a certificate of occupancy for a project subject to this section.

Section 6-9.09: Best Management Practices and Standards. (E) *Construction Activities.* All construction shall conform to the requirements of the California Stormwater Quality Association (CASQA) Stormwater Best Management Practices Handbooks for Construction Activities and New Development and Redevelopment, the Association of Bay Area Governments (ABAG) Manual of Standards for Erosion & Sediment Control Measures, the city's grading and erosion control ordinance and other generally accepted engineering practices for erosion control as required by the Director when undertaking construction activities. The Director may establish controls on the rate of stormwater runoff from new development and redevelopment as may be appropriate to minimize the discharge and transport of pollutants. (Note: CASQA BMPs are incorporated into SWPPPs).

Section 8-13.01*:* Storm water pollution control measures shall be implemented during all construction phases of development to prevent pollution from entering the waterways.

3.9.3 Analysis, Impacts, and Mitigation

Significance Criteria

Based on Appendix G of the *CEQA Guidelines,* the project would have a significant impact related 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;
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school;

- Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment;

- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the area;

- For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area;

- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; and

- Expose people or structures to a significant risk of loss, injury or death involving wildland fires including where wildlands.

Methodology and Assumptions

General

Information for this assessment of impacts to workers, the public, or the environment relative to hazards and hazardous materials is based on a review of information from hazardous materials and pipeline databases, maps showing airports, schools, and fire hazard zones, and city and county plans.

The project would be regulated by the various laws, regulations, and policies summarized in Section 3.9.2, *Regulatory Framework*. Compliance by the project with applicable federal, state, and local laws and regulations is assumed in this analysis, and local and state agencies would be expected to continue to enforce applicable requirements to the extent that they do so now. Note that compliance with many of the regulations is a condition of permit approval.

A significant impact would occur if, after considering the features described in the Chapter 2, *Project Description* and the required compliance with regulatory requirements, a significant impact would still occur. For those impacts considered to be significant, mitigation measures are proposed to reduce the identified impacts.

Issues not Discussed in Impacts

Due to the nature of the project, there would be no impact related to the following topics for the reasons described below:

- ***Public or private airports or airstrips.*** The project would not be located within two miles of an airport or airstrip. Therefore, there would be no impact related to airports or airstrips.

- ***Wildland fires.*** The project would not be located in areas susceptible to wildland fires. Therefore, there would be no impact related to wildland fires and this topic is not discussed further.

Impacts and Mitigation Measures

Table 3.9-4 summarizes the proposed project's impacts and significance determinations related to hazards and hazardous materials.

TABLE 3.9-4
SUMMARY OF IMPACTS – HAZARDS AND HAZARDOUS MATERIALS

Impacts	Significance Determinations
Impact 3.9-1: The proposed project would not create a significant hazard to the public or the environment through the routine transport, use, disposal, or accidental release of hazardous materials.	LS
Impact 3.9-2: The proposed project could emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.	LSM
Impact 3.9-3: The proposed project would be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, could create a significant hazard to the public or the environment.	LSM
Impact 3.9-4: The proposed project could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	LSM
Impact 3.9-C-1: Cumulative impacts related to hazards and hazardous materials	LS

NOTES:
LS = Less than Significant
LSM = Less than Significant Impact with Mitigation

Impact 3.9-1: The proposed project would not create a significant hazard to the public or the environment through the routine transport, use, disposal, or accidental release of hazardous materials. *(Less than Significant)*

Construction

During the construction phase, construction equipment and materials would include fuels, oils and lubricants, solvents and cleaners, cements and adhesives, paints and thinners, degreasers, cement and concrete, and asphalt mixtures, which are all commonly used in construction. The routine use or an accidental spill of hazardous materials could result in inadvertent releases, which could adversely affect construction workers, the public, and the environment. The potential impacts from encountering ACM on pipelines and/or contaminated soil are analyzed further below in Impact 3.9-3.

Construction activities would be required to comply with numerous hazardous materials regulations designed to ensure that hazardous materials are transported, used, stored, and disposed of in a safe manner to protect worker safety, and to reduce the potential for a release of construction-related fuels or other hazardous materials into the environment, including stormwater and downstream receiving water bodies. Contractors would be required to prepare and implement HMBPs that would require that hazardous materials used for construction would be used properly and stored in appropriate containers with secondary containment to contain a potential release. The California Fire Code would also require measures for the safe storage and handling of hazardous materials.

As discussed in Section 3.7, *Geology, Soils, and Paleontological Resources*, construction contractors would be required to prepare a Stormwater Pollution Prevention Plan (SWPPP) for construction activities according to the National Pollutant Discharge Elimination System (NPDES) General Construction Permit requirements. The SWPPP would list the hazardous materials (including petroleum products) proposed for use during construction; describe spill prevention measures, equipment inspections, equipment and fuel storage; protocols for responding immediately to spills; and describe BMPs for controlling site runoff.

In addition, the transportation of hazardous materials would be regulated by the USDOT, Caltrans, and the CHP. Together, federal and state agencies determine driver-training requirements, load labeling procedures, and container specifications designed to minimize the risk of accidental release.

Finally, in the event of a spill that releases hazardous materials at the project component sites, a coordinated response would occur at the federal, state, and local levels, including the City of Antioch. The Contra Costa County Fire Protection District is the local hazardous materials response team. In the event of a hazardous materials spill, the police and fire departments would be simultaneously notified and sent to the scene to respond and assess the situation.

The required compliance with the numerous laws and regulations discussed above that govern the transportation, use, handling, and disposal of hazardous materials would limit the potential for creation of hazardous conditions due to the use or accidental release of hazardous materials, and would render this impact less than significant.

Operations

The desalination facility would use and store chemicals that are not currently used at the Antioch WTP. The chemicals are described in Section 2.6.2.5, *Chemical Use and Storage* and would be used for post treatment of the desalination water and for cleaning the RO membranes. As listed in **Table 2-3**, the volume of chemicals exceeds the triggering volumes of 500 pounds for reporting the quantities to the Contra Costa County Health Services - Hazardous Materials Program, the local CUPA (see *Unified Hazardous Waste and Hazardous Materials Management Regulatory Program* in Section 3.9.2 *Regulatory Framework*). Some of the chemicals are considered hazardous materials (e.g., sulfuric acid, sodium hydroxide). The routine use or an accidental spill of hazardous materials could result in inadvertent releases, which could adversely affect construction workers, the public, and the environment. The disposal of brine into the San Joaquin River is analyzed in Section 3.11, *Water Quality*.

As required by the Hazardous Materials Management Program, the City, as the operator of the desalination facility would be required to prepare and submit a HMBP to the Contra Costa County Health Services - Hazardous Materials Program, the local CUPA for the desalination facility prior to the start of operations. The HMBP is required to include information on hazardous material handling and storage, including site layout, storage in appropriate containers with secondary containment to contain a potential release, and emergency response and notification procedures in the event of a spill or release. In addition, the plan requires annual employee health and safety training. The plan must be approved by the CUPA prior to commencement of project construction and the proposed project would be subject to post-construction compliance inspections. The HMBP would also provide the local agencies with the information they need to plan appropriately for a chemical release, fire, or other incident, which would reduce the potential for an accidental release to cause harmful health effects to workers or the public or substantial degradation to soil or water quality. All hazardous materials are required to be stored and handled according to manufacturer's directions and local, state and federal regulations. The California Fire Code would also require measures for the safe storage and handling of hazardous materials.

Transportation and disposal of wastes, such as spent cleaning solutions, would also be subject to regulations for the safe handling, transportation, and disposal that would include appropriate containerization and labeling, transportation by licensed hazardous materials haulers, and disposal at licensed facilities permitted to accept the waste.

Finally, the desalination facility would be required to comply with the local MS4 permit development standards, which would reduce pollutants and runoff flows from new development and redevelopment using BMPs and Low Impact Development (LID)/post-construction standards.

The required compliance with the numerous laws and regulations discussed above that govern the transportation, use, handling, and disposal of hazardous materials would limit the potential for creation of hazardous conditions due to the use or accidental release of hazardous materials, and would render this impact less than significant.

<u>Mitigation Measure:</u>

None required.

Impact 3.9-2: The proposed project could emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school. *(Less than Significant with Mitigation)*

As discussed in Section 3.9.1, *Environmental Setting,* there are seven schools adjacent or within 0.25 miles of the proposed project components. The construction and operation of the project would include the handling of hazardous materials. The accidental release or spill of hazardous materials transported or used near schools could adversely affect schools by exposure of school children and workers to hazardous materials.

Construction

As discussed in Impact 3.9-1, there are numerous regulations covering the transportation, use, storage, and disposal of hazardous materials during construction activities. The required compliance with these regulations would ensure that the nearby schools would not be exposed to hazardous materials. In addition, as discussed in Section 3.17, *Transportation and Circulation*, the proposed project would be required to prepare and implement Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan, which would manage the movement of vehicles, including those transporting hazardous materials on roads, including those adjacent to or near schools. With the implementation of **Mitigation Measure 3.17-1b (Construction Traffic Control/Traffic Management Plan)**, the impact relative to hazardous materials, substances, or waste in proximity to schools would be less than significant.

Operations

Once constructed, the use of hazardous materials would be confined to the desalination facility. As discussed in Impact 3.9-1, there are numerous regulations covering the transportation, use, storage, and disposal of hazardous materials during operations. The HMBP and fire code would require procedures for the safe handling, storage, secondary containment, and spill response. The required compliance with these regulations would ensure that the nearby schools would not be exposed to hazardous materials. The impact relative to proximity to schools would be less than significant.

Mitigation Measure:

> **Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan** (see Section 3.17, *Transportation and Circulation*).
>
> **Significance after Mitigation:** Implementation of Mitigation Measure 3.17-1b would reduce construction-related impacts relative to hazardous materials and proximity to schools to a **less-than-significant** level.

Impact 3.9-3: The proposed project would be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, could create a significant hazard to the public or the environment. *(Less than Significant with Mitigation)*

Construction

As discussed in Section 3.9.1, *Environmental Setting*, the components of the proposed project are not located on any active hazardous materials sites. However, several former hazardous materials sites are located along the brine disposal pipeline alignment and excavation may encounter soil with residual levels of petroleum hydrocarbons. In addition, although not listed on the Cortese List, the disposal pipeline would cross the alignment of several active and abandoned pipelines, including former petroleum product pipelines whose abandonment procedures and current status are unknown. Chevron has advised that the pipelines may have been abandoned in place, could still contain some residual product, could be coated with an asbestos insulation, and could have leaked product in place (Chevron, 2017). The excavation activities could encounter petroleum hydrocarbons and/or ACM that could expose workers, the public, and the environment to hazardous materials.

The impact of encountering hazardous materials would be reduced to less than significant through the implementation of **Mitigation Measures 3.9-3a (Health and Safety Plan)**, **3.9-3b (Soil Management Plan),** and **3.9-3c (ACM Management Plan)**. These plans would ensure that workers are provided appropriate training in the recognition and response to encountering hazardous materials, and that plans are in place that provide procedures for the testing, handling, and disposal of hazardous materials. This planned removal action, along with implementing Mitigation Measures 3.9-3a, 3.9-3b, and 3.9-3c would remove the hazardous materials and reduce the impact associated with contaminated soil to less than significant.

Operations

Upon completion of the construction activities, the contaminated materials would have been removed, if encountered. There would be ongoing no impact during operations due to being located on a listed hazardous materials site.

<u>Mitigation Measures:</u>

Mitigation Measure 3.9-3a: Health and Safety Plan

The construction contractor(s) shall prepare and implement site-specific Health and Safety Plans (HASP) in accordance with 29 CFR 1910.120 to protect construction workers and the public during all excavation and grading activities. This HASP shall be submitted to the City of Antioch for review prior to commencement of demolition and construction activities and as a condition of the grading, construction, and/or demolition permit(s). The HASP shall include, but is not limited to, the following elements:

- Designation of a trained, experienced site safety and health supervisor who has the responsibility and authority to develop and implement the site HASP;
- A summary of all potential risks to demolition and construction workers and maximum exposure limits for all known and reasonably foreseeable site chemicals;
- Specified personal protective equipment and decontamination procedures, if needed;
- Emergency procedures, including route to the nearest hospital; and
- Procedures to be followed in the event that evidence of potential soil or groundwater contamination (such as soil staining, noxious odors, debris or buried storage containers) is encountered. These procedures shall be in accordance with hazardous waste operations regulations and specifically include, but are not limited to, the following: immediately stopping work in the vicinity of the unknown hazardous materials release, notifying Contra Costa Health Services - Hazardous Materials Programs, and retaining a qualified environmental firm to perform sampling and remediation.

Mitigation Measure 3.9-3b: Soil Management Plan

In support of the HASP described above in Mitigation Measure 3.9-3a, the contractor shall develop and implement a Soil Management Plan (SMP) that includes a materials disposal plan specifying how the construction contractor(s) will remove, handle, transport, and dispose of all excavated materials in a safe, appropriate, and lawful manner. This SMP shall be submitted to the City of Antioch for review prior to commencement of demolition and construction activities and as a condition of the grading, construction, and/or demolition permit(s). The SMP must identify protocols for soil testing and disposal, identify the approved disposal site, and include written documentation that the disposal site can accept the waste. Contract specifications shall mandate full compliance with all applicable local, state, and federal regulations related to the identification, transportation, and disposal of hazardous materials, including those encountered in excavated soil. In addition, the City or its contractor shall contact the Fulton Shipyards to acquire the most current information regarding chemicals in sediments around the proposed intake pump station. The contact is Deltech, LLC, c/o Mr. Shannon Creson, 2200 Wymore Way, Antioch, California 94509, shannon@drilltechdrilling.com.

Mitigation Measure 3.9-3c: ACM Management Plan

Prior to commencement of demolition and construction activities and as a condition of the grading, construction, and/or demolition permit(s), the contractor that would be excavating at the location of the oil pipes that may be covered with ACM shall conduct a survey to determine if the oil pipes are present and if they are coated with ACM. In the event that the abandoned petroleum pipelines are coated with ACM and in support of the HASP described above in Mitigation Measure 3.9-3a, the contractor shall develop and implement an ACM Management Plan (ACMMP) that includes a materials disposal plan specifying how the construction contractor will remove, handle, transport, and dispose of all ACM-insulated pipe materials in a safe, appropriate, and lawful manner. The ACMMP must identify protocols for worker protection, ACM testing and disposal, identification of the approved disposal site, and include written documentation that the disposal site can accept the waste. The ACMMP shall be submitted to the BAAQMD for their review and approval. Contract specifications shall mandate full compliance with all applicable local, state, and federal regulations related to the identification, transportation, and disposal of ACM.

Significance after Mitigation: Implementation of **Mitigation Measures 3.9-3a, 3.9-3b**, and **3.9-3c** would reduce construction-related impacts related to encountering hazardous materials to a **less-than-significant** level.

Impact 3.9-4: The proposed project could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. ***(Less than Significant with Mitigation)***

Construction

Although the Cities of Antioch and Pittsburg do not identify specific emergency response or evacuation routes, the construction activities for the raw water connection pipeline and brine disposal pipeline would occur within roadways and would require temporary road closures. These closures could interfere with emergency traffic on those roads. In addition, some of the road closures would occur adjacent to schools.

As discussed in Section 3.17, *Transportation and Circulation*, the proposed project would be required to prepare and implement **Mitigation Measure 3.17-1b (Construction Traffic Control/Traffic Management Plan)**, which would manage the movement of vehicles, including those transporting hazardous materials, on roads, including those roads adjacent to or near schools. With the implementation of Mitigation Measure 3.17-1b, the impact relative to proximity to schools would be less than significant.

Operations

Once operational, there would be no lane closure and no substantial additional traffic. Therefore, there would be no impact relative to interference with an emergency response plan or emergency evacuation plan.

Mitigation Measure:

> **Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan** (see Section 3.17, *Transportation and Circulation*).
>
> **Significance after Mitigation:** Less than Significant.

Cumulative Impacts

This section presents an analysis of the cumulative effects of the proposed project in combination with other past, present, and reasonably foreseeable future projects that could cause cumulatively considerable impacts.

As previously discussed, the proposed project would have no impact with respect to being located within 2 miles of an airport or airstrip, or in an area susceptible to wildland fire hazards. Accordingly, the proposed project could not contribute to cumulative impacts related to these topics and are not discussed further.

The geographic area affected by the proposed project and its potential to contribute to cumulative impacts varies based on the environmental resource under consideration. The geographic scope of analysis for cumulative hazardous materials impacts encompasses and is limited to the project site and its immediately adjacent area. This is because impacts relative to hazardous materials are generally site-specific and depend on the nature and extent of the hazardous materials release, and existing and future soil and groundwater conditions. For example, hazardous materials incidents tend to be limited to a smaller more localized area surrounding the immediate spill location and extent of the release, and could only be cumulative if two or more hazardous materials releases spatially overlapped.

The timeframe during which proposed project could contribute to cumulative hazards and hazardous materials effects includes the construction and operations phases. For the proposed project, the operations phase is permanent. However, similar to the geographic limitations discussed above, it should be noted that impacts relative to hazardous materials are generally time-specific. Hazardous materials events could only be cumulative if two or more hazardous materials releases occurred at the same time, as well as overlapping at the same location.

Impact 3.9-C-1: The proposed project, in combination with other cumulative development, would not result in a cumulatively significant impact related to hazards and hazardous materials. *(Less than Significant)*

Cumulative Impacts during Project Construction

Significant cumulative impacts related to hazards and hazardous material could occur if the incremental impacts of the project combined with the incremental impacts of one or more of the cumulative projects identified in **Table 3-1** and **Figure 3-1** to substantially increase risk that people or the environment would be exposed to hazardous materials. Cumulative projects that would potentially be geographically adjacent or overlap components of the project include project numbers 1 (Almond Knolls), 2 (Water Treatment Plant Disinfection Improvements Project), 8 (West Antioch Creek Channel Improvements), and 15 (East County Bioenergy Project). All of these projects would be subject to the same regulatory requirements discussed for the proposed project, including the implementation of health and safety plans and soil management plans, as needed. That is, cumulative projects involving releases of or encountering hazardous materials also would be required to remediate their respective sites to established regulatory standards. This would be the case regardless of the number, frequency, or size of the release(s), or the residual amount of chemicals present in the soil from previous spills. While it is possible that the project and cumulative projects could result in releases of hazardous materials at the same location and time, the responsible party associated with each spill would be required to remediate site conditions to the same established regulatory standards. The residual less-than-significant effects of the project that would remain after mitigation would not combine with the potential residual effects of cumulative projects to cause a potential significant cumulative impact because residual impacts would be highly site-specific. Accordingly, no significant cumulative impact with respect to the use of hazardous materials would result. For the above reasons, the project would not cause or contribute to a cumulatively significant impact with respect to the use of hazardous materials, and impacts would be **less than significant**.

Cumulative Impacts during Project Operations

Significant cumulative impacts related to operational hazards could occur if the incremental impacts of the project combined with those of one or more of the above-listed projects to cause a substantial increase in risk that people or the environment would be exposed to hazardous materials used or encountered during the operations phase.

As discussed in Impact 3.9-1, the operation of the project facilities would require use of water treatment chemicals, introducing potential for inadvertent releases of hazardous materials. Compliance with the various regulations regarding the safe transport, use, storage, and disposal of hazardous materials would reduce the project-specific incremental impact to a less-than-significant level.

Of the overlapping or adjacent cumulative projects, only cumulative project number 15 (East County Bioenergy Project) would also would require the transport, use, and storage of hazardous chemicals. However, similar to the proposed project, the cumulative project components involving the handling, storage, and disposal of hazardous materials would also be required to prepare and implement an HMBP and comply with applicable regulations, including those governing containment, site layout, and emergency response and notification procedures in the event of a spill or release. Transportation and disposal of wastes, such as spent cleaning solutions, would also be subject to regulations for the safe handling, transportation, and disposal of chemicals and wastes. As noted previously, such regulations include standards to which parties responsible for hazardous materials releases must return spill sites, regardless of location, frequency, or size of release, or existing background contaminant concentrations to their original conditions. Therefore, compliance with existing regulations regarding hazardous materials transport would reduce the risk of environmental or human exposure to such materials. The combined effects of the project and cumulative projects would not result in a significant cumulative impact, and impacts would be **less than significant**.

References – Hazards and Hazardous Materials

Chevron, 2017, *Comments on the Notice of Preparation of an Environmental Impact Report for the City of Antioch Brackish Water Desalination Project, Chevron Environmental Management Company, Historical Pipeline Portfolio–Bakersfield to Richmond*, August 31.

Pipeline and Hazardous Materials Safety Administration (PHMSA), 2018, National Pipeline Mapping System (NPMS) Public Viewer, available at pvnpms.phmsa.dot.gov/PublicViewer/, accessed on January 19, 2018.

SGI Environmental, 2014, *Remedial Investigation Report, Former Fulton Shipyard Property, 307 Fulton Shipyard Road, Antioch, California*, January.

3.10 Local Hydrology and Water Quality

Sections	Figures	Tables
3.10.1 Environmental Setting 3.10.2 Regulatory Framework 3.10.3 Analysis, Impacts, and Mitigation	3.10-1 Flood Zones	3.10-1 Beneficial Uses of San Joaquin River 3.10-2 Summary of Impacts – Hydrology and Water Quality

This section discusses and evaluates the potential for implementation of the proposed project to result in adverse impacts associated with local hydrology, water quality, drainage, and flooding potential within the immediate vicinity of the project component sites. Regional water supply issues and the operations-related effects of the project on system-wide and Delta hydrology, hydrodynamics, water quality, and water elevations are discussed in in Section 3.11, *Delta Hydrology and Water Quality*.

Existing conditions are described for the project area and potential impacts associated with short-term construction and long-term operation activities are evaluated, including potential for erosion and sedimentation or discharge of pollutants to local surface waters and resulting water quality impacts. The analysis is based on review of available hydrology and water reports and maps, the General Plans for the Cities of Antioch and Pittsburg, and a 2005 geotechnical investigation conducted for the expansion of the Antioch WTP.

Public comments were received during the scoping period that relate to hydrology and water quality. The Central Valley Flood Protection Board and the Central Valley Regional Water Quality Control Board (RWQCB) noted various permits and regulations that may apply to the proposed project. The required permits are listed in Section 2.9, *Regulatory Requirements, Permits, and Approvals,* of Chapter 2, *Project Description*, and discussed in the Regulatory Framework section below, as well as the Regulatory Framework sections of each impact analysis section in Chapter 3.

3.10.1 Environmental Setting

Surface Water Hydrology

The project area lies south of the San Joaquin River and within the East Antioch, West Antioch, and Kirker Creek Watersheds, with the River Intake Pump Station extending into the river. All three watersheds generally drain from south to north into the San Joaquin River. The watersheds and the river are discussed below.

San Joaquin River

The San Joaquin River flows east to west, and drains into San Pablo Bay, then San Francisco Bay to the west. The existing intake pump station extends about 200 feet from the shore into the San Joaquin River with the pump intake about 8 feet above the river bed so as to minimize the intake of river bottom sediment. The existing Delta Diablo WWTP outfall pipeline also extends into the river at New York Slough.

East Antioch Creek Watershed

The proposed raw water pipeline connection, desalination facility, and the portion of the brine disposal pipeline north of East 18th Street would be located in the East Antioch Creek Watershed (CCC CDD, 2004). The drainage area of 11 square miles includes the City of Antioch and some unincorporated parts of Contra Costa County. East Antioch Creek and several unnamed tributaries drain the watershed from south to north into the San Joaquin River. None of the creeks are listed on the States 303(d) Impaired Water Bodies list. Rainfall averages about 13 inches per year. Impervious surfaces make up approximately 60 percent of the watershed. None of the proposed project components would cross East Antioch Creek. The portion of the raw water pipeline that crosses the creek is an existing section of pipeline.

West Antioch Creek Watershed

The portion of the proposed brine disposal pipeline from west of G Street to Auto Center Drive would be located in the West Antioch Creek Watershed (CCC CDD, 2004). The drainage area of 13 square miles includes the City of Antioch and some unincorporated parts of Contra Costa County. Markley Canyon Creek, West Antioch Creek, and several unnamed tributaries drain the watershed from south to north into the San Joaquin River. None of the creeks are listed on the States 303(d) Impaired Water Bodies list. Rainfall averages about 15 inches per year. Impervious surfaces make up approximately 35 percent of the watershed. The brine disposal pipeline would cross the constructed portion of the West Antioch Creek.

Kirker Creek Watershed

The portion of the brine disposal pipeline west of Auto Center Drive would be located in the Kirker Creek Watershed (CCC CDD, 2004). The drainage area of about 16 square miles includes the City of Pittsburg and some unincorporated parts of Contra Costa County. Kirker Creek and several unnamed tributaries drain the watershed from south to north into the San Joaquin River. None of the creeks are listed on the States 303(d) Impaired Water Bodies list. Rainfall averages about 16 inches per year. Impervious surfaces make up approximately 30 percent of the watershed. The section of the brine disposal pipeline on 10th Street would cross the Los Medanos Waterway.

Surface Water Quality

As discussed in Section 2.2.2, *Sources of Water Supply*, water quality in the San Joaquin River is affected by precipitation, regional water management activities, tides, and drought conditions. The ability to utilize the river water to meet water supply needs is currently limited by the river's water quality, which is affected by periodic high concentrations of total dissolved solids (TDS), chloride, and salinity. The existing WTP is unable to remove these water quality parameters. The City generally stops pumping water when the chloride concentration in the river exceed 75 mg/l. Generally, the City is able to pump river water from January to July and relies on other water sources for the remainder of the year.

Between 1995 and 2012, the 10th and 95th percentile of chloride concentrations in the river were 20 mg/l and 1,200 mg/L (RMC Water and Environment, 2015). The recommended Maximum Concentration Level (MCL; also referred to as the secondary drinking water standard) for chloride is 250 mg/L with an upper limit of 500 mg/L.

Flood Hazard Zones

The Federal Emergency Management Agency delineates regional flooding hazard areas in Contra Costa County as part of the National Flood Insurance Program. Areas that have a 1 percent chance of flooding in any given year are referred to as 100-year flood hazard zones. The 100-year flood hazard zones along the coast experience flooding coincident with high tide events typically combined with a wintertime storm surge. The proposed intake pump station and intake pipelines, and the brine disposal pipeline where it crosses the Los Medanos Waterway would both be sited within 100-year flood hazard zones, as shown on **Figure 3.10-1** (FEMA, 2015). None of the other proposed project facilities would be located within designated flood hazard areas.

Tsunami and Seiche Hazard Zones

A tsunami is a large wave or series of waves generated by an earthquake, volcanic eruption, or coastal landslide. Similar in cause to a tsunami, a seiche is a standing wave that occurs on rivers, reservoirs, ponds, and lakes when seismic waves from an earthquake pass through the area. Tsunami and seiche damage is typically confined to low-lying coastal areas. The Association of Bay Area Governments provides tsunami hazard mapping (ABAG, 2018). The project area is not located within a tsunami hazard zone. Given the similar seismic cause, the project area is also not located within a seiche zone.

Stormwater Drainage System

Stormwater collection is overseen by the Contra Costa County Flood Control and Water Conservation District (Flood Control District) through underground trunk lines that are independent from the wastewater collection system. The stormwater trunk lines discharge to channels and then to the San Joaquin River as permitted by a NPDES permit. CCCWP staff monitor the quality of the released water to comply with the specifications of the NPDES permit.

River Intake Pump Station Area

Brine Disposal Pipeline Area Crossing Los Medanos Waterway

Areas shaded in light blue are in 100-year flood zone

SOURCE: FEMA, 2015

Figure 3.10-1
Flood Zones

Stormwater Drainage at Antioch WTP

The existing Antioch WTP is permitted under Domestic Water Supply Permit No. 02-04-02P0710009, dated May 30, 2008, and issued by the California Department of Public Health, as discussed in the Regulatory Framework below. Stormwater from the site is collected into storm drain grates throughout the WTP and directed into stormwater system overseen by the Flood Control District.

Groundwater

The proposed project would not extract groundwater and would not inject water into a subsurface aquifer. Therefore, given that there would be no impacts on groundwater, no description of groundwater conditions is provided.

3.10.2 Regulatory Framework

The following discussion summarizes the applicable federal, state, and local regulations relevant to this section. Note that regulations relevant to the disposal of brine into the San Joaquin River are discussed in Section 3.11, *Delta Hydrology and Water Quality*.

Federal

Clean Water Act

The federal Clean Water Act and subsequent amendments, under the enforcement authority of the U.S. Environmental Protection Agency (USEPA), was enacted “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” The Clean Water Act gave the USEPA the authority to implement pollution control programs such as setting wastewater standards for industry. In California, implementation and enforcement of the National Pollutant Discharge Elimination System (NPDES) program is conducted through the California State Water Resources Control Board (SWRCB) and the nine RWQCBs. The Clean Water Act also sets water quality standards for surface waters and established the NPDES program to protect water quality. Under Section 402 of the Act, discharge of pollutants is prohibited unless the discharge is in compliance with an NPDES permit. The NPDES program requires all facilities that discharge pollutants into waters of the United States to obtain a permit. The discharge permit provides limitations on pollutant concentrations to protect the water quality of the receiving waters. In 1972, the NPDES regulations initially focused on municipal and industrial wastewater discharges, followed by stormwater discharge regulations, which became effective in November 1990. NPDES permits for wastewater and industrial discharges specify discharge prohibitions and effluent limitations and also include other provisions (such as monitoring and reporting programs) deemed necessary to protect water quality.

Federal Emergency Management Agency

Under Executive Order 11988, FEMA is responsible for the management and mapping of areas subject to flooding during a 100-year flood event (i.e., one percent chance of occurring in a given year). FEMA requires that local governments covered by federal flood insurance pass and enforce a floodplain management ordinance that specifies minimum requirements for any construction within the 100-year flood plain, as depicted on FEMA maps.

State

Porter-Cologne Water Quality Act

The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code) is California's statutory authority for the protection of water quality. Under this act, the State must adopt water quality policies, plans, and objectives that protect the State's waters. The act sets forth the obligations of the SWRCB and RWQCBs pertaining to the adoption of Basin Plans and establishment of water quality objectives. Unlike the federal CWA, which regulates only surface water, the Porter-Cologne Act regulates both surface water and groundwater and this authority serves as the basis for Waste Discharge Requirements issued to municipal sewage treatment facilities by the RWQCBs. The Porter-Cologne Water Quality Act is promulgated in the California Code of Regulations Title 22. Title 22 includes treatment and reuse requirements for recycled water projects throughout California. The project area lies within the jurisdiction of the Central Valley RWQCB.

Anti-Degradation Policy

The SWRCB's Anti-Degradation Policy, otherwise known as Resolution No. 68-16, sets specific restrictions for surface and groundwater that have higher than the required quality in order to avoid degradation of those water bodies. Requirements of this policy must be included within all Basin Plans throughout California (discussed below). Under this policy, actions that would lower the water quality in designated water bodies would only be allowed if the action would provide a maximum benefit to the people of California, if it will not unreasonably affect beneficial uses, and if it will not lower water quality below applicable standards.

NPDES Construction General Permit

As discussed in Section 3.6 *Geology, Soils, and Paleontological Resources*, construction associated with the proposed project would disturb more than one acre of land surface potentially affecting the quality of stormwater discharges into waters of the U.S and is therefore subject to the NPDES Construction General Permit. The Construction General Permit regulates discharges of pollutants in stormwater associated with construction activity to waters of the U.S. from construction sites that disturb one or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface. The permit regulates stormwater discharges associated with construction or demolition activities, such as clearing and excavation; construction of buildings; and linear underground projects, including installation of water pipelines and other utility lines. Further details are provided in Section 3.6.2 Regulatory Framework in Section 3.6 *Geology, Soils, and Paleontological Resources*.

NPDES Municipal General Permits

In 1987, amendments to the Clean Water Act expanded the NPDES permit program to regulate discharges from storm drains owned and operated by municipalities. In November 1990, USEPA published regulations that established application requirements for stormwater permits for municipal stormwater discharges. In California, the NPDES stormwater permit program is administered and enforced by the SWRCB through the nine RWQCBs by issuing Waste Discharge Requirements and NPDES permits. These permits are reissued approximately every five (5) years and also include applicable provisions of the state Porter-Cologne Act, which is the principal legislation for controlling stormwater pollutants in California. The regional municipal general permits are discussed below.

Regional and Local

Central Valley Water Quality Control Plan (Basin Plan)

The river intake pump station and most of the project components would be located within the area under the jurisdiction of the Central Valley RWQCB and its Basin Plan, discussed below. The brine disposal pipeline and the disposal of brine into the San Joaquin River would be located within the area under the jurisdiction of the San Francisco RWQCB, which is discussed in Section 3.11, *Delta Hydrology and Water Quality*.

The SWRCB and the Central Valley RWQCB share the responsibility, under the Porter-Cologne Act, to formulate and adopt water policies and plans and to adopt and implement measures to fulfill CWA requirements. The Central Coast Water Quality Control Plan (Basin Plan), last updated in July 2016b, identifies surface water and groundwater resources in the watershed and establishes beneficial uses and numeric water quality objectives for each resource. The beneficial uses for the San Joaquin River are listed below. The Basin Plan does not specifically identify the East and West Antioch Creeks, stating “that it is impractical to list every surface water body in the Region. The beneficial uses of any specifically identified water body generally apply to its tributary streams,” with a few exceptions that do not include Antioch Creek. As previously noted, the disposal of brine that would be generated at the desalination plant is discussed in Section 3.11 *Delta Hydrology and Water Quality*. The beneficial uses for the San Joaquin River at this location within the Delta are listed below in **Table 3.10-1**.

TABLE 3.10-1
BENEFICIAL USES OF SAN JOAQUIN RIVER

Beneficial Use	Description
Municipal and Domestic Supply (MUN)	Waters are used for community, military, municipal or individual water supply systems. These uses may include, but are not limited to, drinking water supply.
Agricultural Supply (AGR)	Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
Industrial Service Supply (IND)	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.
Water Contact Recreation (REC 1)	Uses of water for recreational activities involving body contact with water, 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.

TABLE 3.10-1 (CONTINUED)
BENEFICIAL USES OF SAN JOAQUIN RIVER

Beneficial Use	Description
Non-Contact Water Recreation (REC 2)	Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. 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.
Wildlife Habitat (WILD)	Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
Cold Freshwater Habitat (COLD)	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.
Warm Freshwater Habitat (WARM)	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.
Migration of Aquatic Organisms (MIGR)	Uses of water that support habitats necessary for migration or other temporary activities by aquatic organism, such as anadromous fish.
Spawning, Reproduction, and/or Early Development (SPWN)	Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.
Navigation (NAV)	Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

SOURCE: RWQCB Basin Plan, 2016

The Sacramento-San Joaquin River Delta is the indirect receiving water body surface water drains into the Delta and river. The San Joaquin River is listed on the 2006 303(d) listing as part of the Delta Waterways (Western Portion) and is listed due to chloropyrifos, DDT (dichlorodiphenyl trichloroethane), diazinon, electrical conductivity, Group A pesticides, mercury, and invasive species (RWQCB, 2006). These contaminants are transported into the Delta water system through watersheds that drain into the Delta as a result of agricultural activities, urban runoff, and abandoned mine discharges.

Municipal NPDES Permits No. R5-2016-0040 (includes Antioch) and R2-2015-0049 (includes Pittsburg)

The boundary between the San Francisco RWQCB and the Central Valley RWQCB passes between the Cities of Pittsburg and of Antioch. However, the requirements of the previously discussed NPDES municipal general permits issued by the two RWQCBs are very similar; most of the project components would be under the jurisdiction of the Central Valley RWQCB and its municipal permit (RWQCB, 2016a). The permits establish regulations covering discharge prohibitions, receiving water limitations, municipal operations (such as the proposed project), new development, construction site controls (construction site runoff), and other regulations to regulate surface water quality.

The discharge prohibitions prohibit the discharge of non-stormwater (materials other than stormwater) into, storm drain systems and watercourses and includes a tiered categorization of non-stormwater discharges based on potential for pollutant content that may be discharged upon adequate assurance that the discharge contains no pollutants of concern at concentrations that will impact beneficial uses or cause exceedances of water quality standards. The receiving water limitations provide narrative and numeric water quality standards. The municipal operations regulations include a number of requirements to control and reduce non-stormwater discharges and polluted stormwater to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure, such as the proposed project. The requirements include source control, site design, and stormwater treatment requirements, such as minimizing disturbance of natural infiltration areas and the addition of impervious surfaces, controlling and directing runoff, and the use of infiltration and bioretention measures, among other measures.

To more efficiently address the requirements, the Contra Costa Clean Water Program (CCCWP) was established in 1991 in response to the federal stormwater regulations and covers Contra Costa County, its 19 cities/towns (including the Cities of Antioch and Pittsburg), and the Contra Costa County Flood Control and Water Conservation District (collectively referred to as Permittees). The CCCWP is discussed below and includes the requirements for municipalities and new developments.

Contra Costa Clean Water Program (CCCWP)

The Cities of Antioch and Pittsburg are members of the CCCWP, established in 1991 in response to the federal stormwater regulations and the NPDES municipal general permits. The CCCWP comprises Contra Costa County, its 19 cities and towns, and the Contra Costa County Flood Control and Water Conservation District (collectively referred to as Permittees). Through the CCCWP, Contra Costa municipalities have prepared a Stormwater C.3 Guidebook to assist applicants through the process of submittals and reviews (CCCWP, 2017).

Provision C.3 in the municipal general permit requires site designs to minimize the addition of impervious surfaces, controlling the rates and durations of site runoff, install pervious surfaces where feasible to facilitate onsite infiltration, treat remaining runoff from impervious areas using bioretention, and maintain stormwater treatment and flow-control facilities in perpetuity. The C.3 requirements are separate from, and in addition to, requirements for erosion and sediment control and for pollution prevention measures during construction.

Antioch Water Treatment Plant (WTP)

The existing Antioch WTP is permitted under Domestic Water Supply Permit No. 02-04-02P0710009, issued by the California Department of Public Health on March 22, 1996 (CDHS, 1996)), and amended on May 30, 2008 (CDPH, 2008). The WTP is required to only use approved water supply sources (which include the San Joaquin River), monitor plant performance to ensure the water quality is to drinking water standards, implement an equipment maintenance program, and comply with CCR Title 17 CCR water treatment regulations. The permit includes the results of the engineering report providing further details on the operations.

Delta Diablo NPDES Permit No. CA0038547

The Delta Diablo WWTP is permitted under San Francisco RWQCB Waste Discharge Requirements (WDR) Order No. R2-2014-0030, NPDES No. CA0038547, adopted on August 13, 2014. The Delta Diablo WWTP provides domestic and industrial wastewater treatment and disposal for the Cities of Pittsburg and Antioch, and the unincorporated community of Bay Point. Residential, commercial, and industrial wastewater is conveyed to the Delta Diablo WWTP located at 2500 Pittsburg-Antioch Highway. The WWTP has an average dry weather design capacity of 19.5 million gallons per day (mgd) and peak wet weather design capacity of 31.1 mgd (SFRWQCB, 2014).

The WWTP treats all of its influent (approximately 13.1 mgd) to secondary treatment standards. About 6.3 mgd after secondary treatment is routed to tertiary treatment units. Most of the tertiary-treated water is recycled and used for cooling tower makeup water at the Delta and Los Medanos Energy Centers, with about 10 percent of the recycled water used for landscape irrigation at local parks and golf courses. The power plants return approximately 2 mgd of cooling tower blowdown to the WWTP, where it is combined with the secondary-treated water, chlorinated and dechlorinated, and the effluent is discharged through the deep-water diffuser approximately 500 feet offshore at a depth of 26 feet. The diffuser is permitted to convey 19.5 mgd of average dry weather flow, which is based on the plant’s design treatment capacity.

The treated wastewater discharge is regulated by the RWQCB under the Waste Discharge Requirements for the San Francisco Bay Regional Water Quality Control Board (Order No. R2-2014-0030, NPDES Permit No. CA0038547). The minimum initial dilution (Dm) established in the NPDES permit at the point of discharge for operations by Delta Diablo is 61:1 for calculating the ammonia limit. The Dm is used by the RWQCB to determine compliance with the water quality effluent limitations established in the NPDES permit that are based on acute water quality objectives contained in the San Francisco Bay Area Basin Plan.

City of Antioch General Plan

The following objectives and policies from the Antioch General Plan are relevant to hydrology and water quality. The proposed project components would include the River Intake Pump Station, the Raw Water Pipeline, the Desalination Plant, and the portion of the brine disposal pipeline within the Antioch city limits.

Public Services and Facilities Element

8.4.1 Water Facilities Objective: Ensure a water system capable of providing high quality water to existing and future residences, businesses, institutions, recreational facilities, and other uses within the City of Antioch during peak use conditions, with sufficient water in storage reservoirs for emergency and fire protection needs.

> ***Policy 8.4.2.a*:** As part of the design of water systems, provide adequate pumping and storage capacity for both drought and emergency conditions, as well as the ability to provide fire flows required by the Contra Costa County Fire Protection District.

8.7.1 Storm Drainage and Flood Control Objective: Conduct all storm water via adequately sized storm drains and channels.

> ***Policy 8.7.2.b:*** Require adequate infrastructure to be in place and operational prior to occupancy of new development, such that: new development will not negatively impact the performance of storm drain facilities serving existing developed areas and the performance standards set forth in the Growth Management Element will continue to be met.

> ***Policy 8.7.2.e:*** Require new developments to provide erosion and sedimentation control measures to maintain the capacity of area storm drains and protect water quality.

> ***Policy 8.7.2.f:*** Require implementation of Best Management Practices in the design of drainage systems to reduce discharge of non-point source pollutants originating in streets, parking lots, paved industrial work areas, and open spaces involved with pesticide applications.

Resource Management Element

10.7.1 Water Resources Objective: Ensure that an adequate supply of water is available to serve existing and future needs of the City.

> ***Policy 10.7.2.a:*** As part of the implementing the City's residential growth management program and its development review process for non-residential development, ensure that adequate long-term water supplies are available to serve the development being granted new allocations, including consideration of peak drought and peak firefighting needs.

> ***Policy 10.7.2.f:*** Participate in the Contra Costa Clean Water program to reduce storm water pollution and protect the water quality of the City's waterways.

> ***Policy 10.7.2.g:*** Require public and private development projects to be in compliance with applicable National Pollution Discharge Elimination System (NPDES) permit requirements, and require the implementation of best management practices to minimize erosion and sedimentation resulting from new development.

> ***Policy 10.7.2.i:*** Design drainage within urban areas to avoid runoff from landscaped areas and impervious surfaces from carrying pesticides, fertilizers, and urban and other contaminants into natural streams.

Environmental Hazards Element

11.4.1 Flood Protection Objective: Minimize the potential for loss of life, physical injury, property damage, and social disruption resulting from flooding.

> ***Policy 11.4.2.a:*** Prohibit all development within the 100-year floodplain, unless mitigation measures consistent with the National Flood Insurance Program are provided.
>
> ***Policy 11.4.2.c:*** Prohibit alteration of floodways and channelization of natural creeks if alternative methods of flood control are technically and financially feasible. The intent of this policy is to balance the need for protection devices with land use solutions, recreation needs, and habitat preservation.
>
> ***Policy 11.4.2.d:*** Require new development to prepare drainage studies to assess storm runoff impacts on the local and regional storm drain and flood control system, along with implementation of appropriate detention and drainage facilities to ensure that the community's storm drainage system capacity will be maintained and peak flow limitations will not be exceeded.

The proposed project would be consistent with the City of Antioch General Plan policies because:

- Construction contractors would be required to prepare and implement a SWPPP to control construction site runoff (see Impact 3.10-1).
- Construction contractors would be required to prepare and implement a HMBP to manage hazardous materials used during construction (see Impact 3.10-1).
- The project design would be required to evaluate the volume of runoff from the WTP and manage the volume of runoff such that the existing stormwater drainage system would be able to handle the volume (see Impacts 3.10-2 and 3.10-3).
- The project design would be required to evaluate the drainage of the WTP to prevent erosion or flooding due to drainage pattern changes (see Impact 3.10-2).
- The project design of the WTP would be required to prepare and implement a HMBP to manage hazardous materials used at the WTP (see Impact 3.10-1).

City of Antioch Municipal Code

The following City of Antioch municipal codes are relevant to hydrology and water quality. The proposed project components would include the River Intake Pump Station, the Raw Water Pipeline, the Desalination Plant, and the portion of the brine disposal pipeline within the Antioch city limits.

> **Chapter 9, Section 6-9.05**: Stormwater Control Plan Required. Every application for a development project, including but not limited to a rezoning, tentative map, parcel map, conditional use permit, variance, site development permit, design review, or building permit that is subject to the development runoff requirements in the city's NPDES permit shall be accompanied by a stormwater control plan that meets the criteria in the most

recent version of the Contra Costa Clean Water Program Stormwater C.3. Guidebook. Implementation of an approved stormwater control plan and submittal of an approved stormwater control operation and maintenance plan by the applicant shall be a condition precedent to the issuance of a certificate of occupancy for a project subject to this section.

Chapter 9, Section 6-9.09: Best Management Practices and Standards. (E) *Construction Activities.* All construction shall conform to the requirements of the CASQA Stormwater Best Management Practices Handbooks for Construction Activities and New Development and Redevelopment, the ABAG Manual of Standards for Erosion & Sediment Control Measures, the city's grading and erosion control ordinance and other generally accepted engineering practices for erosion control as required by the Director when undertaking construction activities. The Director may establish controls on the rate of stormwater runoff from new development and redevelopment as may be appropriate to minimize the discharge and transport of pollutants. (Note: CASQA BMPs are incorporated into SWPPPs).

Chapter 9, Section 8-13.01: Storm water pollution control measures shall be implemented during all construction phases of development to prevent pollution from entering the waterways.

City of Pittsburg General Plan

The following objectives and policies from the Pittsburg General Plan are relevant to hydrology and water quality. The proposed project components the portion of the brine disposal pipeline within the Pittsburg city limits.

Resource Conservation Element

Chapter 9.2 Drainage and Erosion

Goal 9-G-4: Minimize the runoff and erosion caused by earth movement by requiring development to use best construction management practices (BMPs).

Policy 9-P-15: As part of development plans, require evaluation and implementation of appropriate measures for creek bank stabilization, as well as necessary Best Management Practices (BMPs) to reduce erosion and sedimentation. Encourage preservation of natural creeks and riparian habitat as best as possible.

Goal 9-G-7: Water Quality - Comply with Regional Water Quality Control Board regulations and standards to maintain and improve the quality of both surface water and groundwater resources.

Policy 9-P-22: Continue working with the Regional Water Quality Control Board in the implementation of the National Pollutant Discharge Elimination System (NPDES), with specific requirements established in each NPDES permit.

> ***Policy 9-P-23:*** Require new urban development to use Best Management Practices to minimize creek bank instability, runoff of construction sediment, and flooding. The City's BMPs will ensure that new development projects consider the effects of construction debris and sediment on local water supplies.

Health and Safety Element

Chapter 10.2 Flood Control

Goal 10-G-7: Locate development outside of flood-prone areas unless mitigation of flood risk is assured.

> ***Policy 10-P-18:*** Evaluate storm drainage needs for each development project in the context of demand and capacity when the drainage area is fully developed. Ensure drainage improvements or other mitigation of the project's impacts on the storm drainage system appropriate to the project's share of the cumulative effect.

The proposed project would be consistent with the City of Pittsburg General Plan policies because construction contractors would be required to prepare and implement a SWPPP to control construction site runoff (see Impact 3.10-1), and construction contractors would be required to prepare and implement a HMBP to manage hazardous materials used during construction (see Impact 3.10-1).

City of Pittsburg Municipal Code

The following City of Pittsburg municipal codes are relevant to hydrology and water quality. The proposed project components the portion of the brine disposal pipeline within the Pittsburg city limits.

Chapter 15.88 Grading, Erosion, and Sediment Control: 15.88.030 Permit Required. B. All land-disturbing or land-filling activities or soil storage shall be undertaken in a manner designed to minimize surface runoff, erosion, and sedimentation.

Chapter 15.88.050 Data and documents to accompany application. The application shall be accompanied by not less than the following material:

A. General Plans and Data.

Erosion and sediment control plan;

a. Maximum surface runoff from the site shall be calculated using methods approved by the Contra Costa flood control district;
b. A delineation and brief description of the measures to be undertaken to retain sediment on the site, including, but not limited to, the designs and specifications for berms and sediment detention basins and a schedule for their maintenance and upkeep;

c. A delineation and brief description of the surface runoff and erosion control measures to be implemented, including, but not limited to, types and method of applying mulches, and designs and specifications for diverters, dikes and drains, and a schedule for their maintenance and upkeep;
d. A delineation and brief description of the vegetative measures to be taken, including, but not limited to, seeding methods, the type, location and extent of preexisting and undisturbed vegetation types, and a schedule for maintenance and upkeep;
e. The location of all the measures listed by the applicant under subsection (B)(2)(b) of this section shall be depicted on the site map and/or grading plan;
f. An estimate of the cost of implementing and maintaining all interim erosion and sediment control measures must be submitted in a form acceptable to the city engineer;
g. The applicant may propose the use of any erosion and sediment control techniques in the interim plan provided such techniques are proven to be as or more effective than the equivalent best management practices contained in the manual of standards.

3.10.3 Analysis, Impacts and Mitigation

Significance Criteria

Based on Appendix G of the CEQA *Guidelines*, the project would have a significant impact on hydrology and water quality if it would:

- Violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality;
- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede the sustainable groundwater management of the basin;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would:
  - Result in substantial erosion or siltation onsite or offsite;
  - Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;
  - 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;
  - Impede or redirect flood flows;
- Risk release of pollutants due to project inundation from being located in flood hazard, tsunami, or seiche zones;
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan

Methodology and Assumptions

General

Information for this assessment of impacts relative to hydrology is based on a review of reports, maps, and the General Plans and municipal codes for the Cities of Antioch and Pittsburg. This information was used to identify potential impacts to workers, the public, or the environment.

The project would be regulated by the various laws, regulations, and policies summarized in Section 3.10.2, *Regulatory Framework*. Compliance by the project with applicable federal, state, and local laws and regulations is assumed in this analysis, and local and state agencies would be expected to continue to enforce applicable requirements to the extent that they do so now. Note that compliance with many of the regulations are conditions of permit approvals.

As described in more detail below, the analysis of hydrology impacts in this section takes into account that the City would incorporate into their facility designs the engineering recommendations provided by the geotechnical investigation that the CBC and local ordinances would require be conducted for the final design of the proposed project, which would include managing stormwater to prevent erosion, flooding, and adverse effects on the existing stormwater drainage system. The analysis also considers the various existing state and local regulations that apply to geotechnical design and construction, which include the CBC and local ordinances for buildings and grading. Through compliance with the existing CBC and local ordinances, the City would be required to demonstrate that the project design would be compatible with the local hydrology and water quality conditions; this must occur before building permits are issued. Additionally, it is assumed that the City would require its pipeline engineers and construction contractors to adhere to the American Water Works Association standards (AWWA; see discussion further below), or its equivalent for pipeline construction.

A significant impact would occur if, after considering the features described in Chapter 2, *Project Description* and the required compliance with regulatory requirements, a significant impact would still occur. For those impacts considered to be significant, mitigation measures are proposed to reduce the identified impacts.

American Water Works Association Standards for Proposed Pipelines

The AWWA is a worldwide nonprofit scientific and educational association that, among its many activities, establishes recommended standards for the construction and operation of public water supply systems, including standards for pipe and water treatment facility materials and sizing, installation, and facility operations. While the AWWA's recommended standards are not enforceable code requirements, they nevertheless can dictate how pipelines for water conveyance are designed and constructed. The City has committed to requiring its contractors to incorporate AWWA Standards into the construction of the proposed pipelines.

Issues Not Discussed in Impacts

Due to the nature of the proposed project, there would be no impacts related to the following evaluation criteria for the reasons described below:

- ***Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede the sustainable groundwater management of the basin.*** The proposed project does not include the extraction of groundwater nor the injection of water into a subsurface aquifer. Therefore, the evaluation criterion related to groundwater supplies or quality is not applicable to the proposed project and is not discussed further.

- ***Risk release of pollutants due to project inundation from being located in a tsunami or seiche hazard zone***. The proposed project would have no potential to release pollutants due to a tsunami or seiche because the proposed project would not be located in an area susceptible to a tsunami or a seiche. Therefore, the evaluation criterion related to a inundation by a tsunami or seiche is not applicable to the proposed project and is not discussed further.

- ***Conflict with or obstruct implementation of a sustainable groundwater management plan***. The proposed project does not include the extraction of groundwater nor the injection of water into a subsurface aquifer. Therefore, the evaluation criterion related to a groundwater management plan is not applicable to the proposed project and is not discussed further.

Impacts and Mitigation Measures

Table 3.10-2 summarizes the proposed project's impacts and significance determinations related to geology and soils.

TABLE 3.10-2
SUMMARY OF IMPACTS – HYDROLOGY AND WATER QUALITY

Impacts	Significance Determinations
Impact 3.10-1: The proposed project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality.	LS
Impact 3.10-2: The proposed project would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would: result in substantial erosion or siltation onsite or offsite; substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite; 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; impede or redirect flood flows.	LS
Impact 3.10-3: The proposed project would not risk release of pollutants due to project inundation from being located in flood hazard zones.	LS
Impact 3.10-C-1: Cumulative impacts related to hydrology and water quality.	LS

NOTES:
LS = Less than Significant

Impact 3.10-1: The proposed project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality. *(Less than Significant)*

Construction

Construction of the project components would require the use of materials such as fuels, oils and lubricants, solvents and cleaners, cements and adhesives, paints and thinners, degreasers, cement and concrete, and asphalt mixtures, which are all commonly used in construction. The routine use or an accidental spill of hazardous materials could result in inadvertent releases, which could adversely affect the water quality of stormwater and/or surface water bodies (e.g., San Joaquin River). In addition, construction of the proposed project would have the potential to result in soil erosion during excavation, grading, trenching, and soil stockpiling. Erosion could result in sediment and other pollutants entering surface water bodies and adversely affecting water quality.

As discussed in Impact 3.9-1 in Section 3.9 *Hazards and Hazardous Materials*, construction activities would be required to comply with numerous hazardous materials regulations designed to ensure that hazardous materials are transported, used, stored, and disposed of in a safe manner to protect worker safety, and to reduce the potential for a release of construction-related fuels or other hazardous materials into the environment, including stormwater and downstream receiving water bodies. Contractors would be required to prepare and implement HMBPs that would require that hazardous materials used for construction would be used properly and stored in appropriate containers, spill prevention measures be implemented, and that spill response procedures are in place to respond to accidental releases. The California Fire Code would also require measures for the safe storage and handling of hazardous materials.

As discussed in Impact 3.6-2 in Section 3.6 *Geology, Soils, and Paleontological Resources*, because the overall footprint of construction activities would exceed one acre, the proposed project would be required to comply with the Construction General Permit and the local stormwater ordinances. These state and local requirements were developed to ensure that stormwater is managed and erosion is controlled on construction sites. The Construction General Permit requires preparation and implementation of a SWPPP, which requires applications of BMPs to control runon and runoff from construction work sites. The BMPs would include, but would not be limited to, physical barriers to prevent erosion and sedimentation, construction of sedimentation basins, limitations on work periods during storm events, use of infiltration swales, protection of stockpiled materials, and a variety of other measures that would substantially reduce or prevent erosion and the potential for impacts to surface water quality from occurring during construction.

The required compliance with the regulations discussed above that govern the transportation, use, handling, and disposal of hazardous materials, and controlling runoff from construction activities would reduce the potential for adverse effects to water quality to **less than significant**.

Operation

River Intake Pump Station

Once the project components are constructed, there would be no further ground disturbance and no potential for erosion that could affect water quality. The intake for the new pump station would still be at 8 feet above the river bed and would not cause erosion that could affect water quality of the river. Therefore, relative to erosion causing water quality impacts during operations of the intake pump station, there would be **no impact**.

Desalination Facility

As described in Section 2.6.2.5, *Chemical Use and Storage* and listed in **Table 2-3**, the desalination plant would use chemicals that are not currently used at the Antioch WTP. The accidental release of these chemicals could adversely affect the water quality of surface water bodies (e.g., San Joaquin River), which could be transported offsite by stormwater.

As discussed in Impact 3.9-1 in Section 3.9 *Hazards and Hazardous Materials*, the volume of chemicals that would be used exceeds the triggering volumes of 500 pounds for reporting the quantities to the Contra Costa County Health Services - Hazardous Materials Program, the local CUPA. As required by the Hazardous Materials Management Program, the City, as the operator of the desalination facility, would be required to prepare and submit a HMBP to the CUPA for the desalination facility prior to the start of operations that would describe hazardous material handling and storage, storage in appropriate containers with secondary containment to contain a potential release, and emergency response and notification procedures in the event of a spill or release. Transportation and disposal of wastes, such as spent cleaning solutions, would also be subject to regulations for the safe handling, transportation, and disposal that would include appropriate containerization and labeling, transportation by licensed hazardous materials haulers, and disposal at licensed facilities permitted to accept the waste.

Development of the desalination facility would result in approximately 0.3-acre of additional impervious area at the WTP site. Stormwater runoff from the desalination facility area would be routed to the existing stormwater drainage system, as it is now. The project would be required to comply with the post-construction MS4 permit development standards (see CCCWP described in Section 3.10.2, *Regulatory Framework*). Compliance with the post-construction stormwater requirements under the MS4 permit would ensure that siting and operation of the above ground facilities would not substantially increase the existing amount or rate of runoff as compared to pre-construction conditions and that stormwater generated on site does contain substantially increased levels of pollutants, as compared to baseline conditions, that impair or degrade the beneficial uses of receiving water bodies. Therefore, mandatory compliance with the numerous laws and regulations discussed above that govern post-construction stormwater runoff would limit the potential for adverse impacts to water quality, and would render this impact **less than significant**.

Raw Water Connection and Brine Disposal Pipelines

Once the pipelines are constructed, there would be no further ground disturbance and no potential for erosion that could affect water quality. The brine disposal pipeline would be constructed using AWWA standards that would reduce the potential for leaks of the brine as it flows to the Delta Diablo WWTP, which would render this impact **less than significant**. The disposal of brine into the San Joaquin River is analyzed in Section 3.11 *Delta Hydrology and Water Quality*.

<u>Mitigation Measure:</u>

None required.

Impact 3.10-2: The proposed project would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would: result in substantial erosion or siltation onsite or offsite; substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite; 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; impede or redirect flood flows. ***(Less Than Significant)***

Construction

As discussed above in Impact 3.10-1, during the construction phase, the proposed project would be required to comply with the Construction General Permit and local stormwater ordinances, which would require obtaining coverage under the Construction General Permit and the preparation and implementation of a SWPPP to control runon and runoff from construction work sites. The required compliance with the regulations discussed in Impact 3.10-1 that require controlling runoff from construction activities would reduce the potential for erosion, siltation, flooding, and exceeding stormwater drainage systems capacities to a **less than significant**.

Operation

River Intake Pump Station

The existing river intake pump station is located on a pier extending into the San Joaquin River, and as such is located with the FEMA mapped 100-year flood plain (**Figure 3.10-1**). Project implementation would relocate the pump station to the parking lot area inland from the current pier, and outside of the FEMA mapped 100-year floodplain. Design review would confirm pump station floor elevations relative to the mapped 100-year floodplain elevations. The new intake pump station and raw water pipeline connections are currently covered with impervious surfaces. Following construction, these areas would be restored to consist of impervious surfaces as it does currently, and drainage patterns would remain the same. The new intake pump station would also be required to incorporate post-construction stormwater management features at the site in accordance with the MS4 permit development standards, which would ensure that the siting and operation of the above ground pump station facility would not increase the existing amount or rate of runoff as compared to pre-construction conditions. Therefore, the new intake pump station would not substantially alter the existing drainage pattern, place new structures within the FEMA mapped 100-year floodplain, and impacts would be **less than significant**.

Desalination Plant

The desalination plant is located in an upland area and is not located on a drainage. In addition, as discussed above in Impact 3.10-1, the design of the desalination plant would ensure that the existing stormwater drainage system can accept the stormwater runoff and not cause erosion, siltation, or flooding. There would be no effect on the surrounding drainages and therefore there would **no impact**.

Brine Disposal Pipeline

The majority of the brine disposal pipeline would be constructed underground and within existing streets. The brine disposal pipeline would be constructed beneath the Los Medanos Waterway using jack and bore drilling techniques. Therefore, the brine disposal pipeline would have no effect on surface drainage patterns and would not interfere with flow in the Los Medanos Waterway and therefore would have **no impact**.

Mitigation Measure:

None required.

Impact 3.10-3: The proposed project would not risk release of pollutants due to project inundation from being located in flood hazard zones. *(Less than Significant)*

As discussed above in Section 3.10.1, *Environmental Setting*, there are two locations where the project components would be located within the 100-year flood hazard zone: The intake pump station and intake pipelines, and the portion of the brine disposal pipeline that crosses the Los Medanos Waterway. No other components of the project would be located within the 100-year flood hazard zone.

Construction

The construction of the project components would be short-term and temporary activities unlikely to occur during a 100-year flood event. The impact would be **less than significant**.

Operation

River Intake Pump Station

The new intake pump station and intake pipelines would pump and convey river water to the WTP. In the event of damage from a 100-year flood event, only river water would be released; no pollutants would be released. Therefore, the impact would be **less than significant**.

Brine Disposal Pipeline

Once constructed, the brine disposal pipeline would be buried underground and would not be accessible to damage from a flooding event. Therefore, there would be **no impact**.

Mitigation Measure:

None required.

Cumulative Impacts

This section presents an analysis of the cumulative effects of the proposed project in combination with other past, present, and reasonably foreseeable future projects that could cause cumulatively considerable impacts.

As previously discussed, the proposed project would have no impact with respect to groundwater supplies, groundwater recharge, sustainable groundwater management of the basin, or being located in a tsunami or seiche hazard zone. Accordingly, the proposed project could not contribute to cumulative impacts related to these topics and are not discussed further. Disposal of the brine is discussed in Section 3.11, *Delta Hydrology and Water Quality*.

The geographic area affected by the proposed project and its potential to contribute to cumulative impacts varies based on the environmental resource under consideration. The geographic scope of analysis for cumulative hydrology and water quality impacts encompasses and is limited to the project site and its immediately adjacent area, with the exception of brine disposal, which is discussed in Section 3.11, *Delta Hydrology and Water Quality*. This is because impacts relative to hydrology and water quality are generally site-specific. For example, the effect of erosion resulting in the release of pollutants to surface water would tend to be limited to the localized area of a project and could only be cumulative if erosion occurred as the result of two or more adjacent projects that spatially overlapped.

The timeframe during which proposed project could contribute to cumulative hydrology and water quality impacts includes the construction and operations phases. For the proposed project, the operations phase is permanent. However, similar to the geographic limitations discussed above, it should be noted that impacts relative to hydrology and water quality are generally time-specific. Geologic hazards could only be cumulative if two or more hydrology and water quality impacts occurred at the same time, as well as overlapping at the same location.

Impact 3.10-C-1: Implementation of the proposed project, in combination with past, present, and reasonably foreseeable future development would not result in a cumulatively significant impact related to local hydrology and water quality. ***(Less than Significant)***

Cumulative Impacts during Project Construction

Water Quality

Significant cumulative impacts related to hydrology and water quality could occur if the incremental impacts of the proposed project combined with the incremental impacts of one or more of the cumulative projects identified in **Table 3-1** to substantially increase risks of impacts to hydrology and water quality. The only cumulative project that could be geographically adjacent or overlap components of the proposed project would be cumulative project number 15 (East County Bioenergy Project) on **Figure 3-1**. This cumulative project would involve the construction of a new bio-refinery, co-located with the Delta Diablo water resource recovery facilities in Pittsburg. The East County Bioenergy Project would convert food waste and wastewater sludge via an anaerobic digestion process into a range of bio-products and biogas, which can be used to generate energy to provide renewable energy.

If the projects are constructed at the same time, the erosion effects with a potential for the release of sediment and/or other pollutants affecting water quality could be cumulatively considerable. However, the state Construction General Permit would require each project to prepare and implement a SWPPP, and local grading and erosion control codes would similarly require preventing erosion that could affect water quality. The SWPPPs and local codes would describe BMPs to control runoff and prevent erosion for each project. Through compliance with these requirements, the potential for erosion impacts would be reduced and thus water quality would be protected. The Construction General Permit has been developed to address cumulative conditions arising from construction throughout the state, and is intended to maintain cumulative effects of projects subject to this requirement below levels that would be considered significant. For example, two adjacent construction sites would be required to implement BMPs to reduce and control the release of sediment and/or other pollutants in any runoff leaving their respective sites. The runoff water from both sites would be required to achieve the same action levels, measured as a maximum amount of sediment or pollutant allowed per unit volume of runoff water. Thus, even if the runoff waters were to combine after leaving the sites, the sediments and/or pollutants in the combined runoff would still be at concentrations (amount of sediment or pollutants per volume of runoff water) below action levels and would not be cumulatively considerable (**less than significant**).

Drainage Patterns

Similar to the Water Quality cumulative discussion above, the proposed project and all cumulative projects would be required to comply with the state Construction General Permit and local codes that would require the design of projects prevent changing drainage patterns that could result in erosion, siltation, and flooding. Therefore, the construction of multiple projects at the same time would not be cumulatively considerable and **less than significant.**

Flood Hazard Zone

Cumulative impacts relative to being located in flood hazard zones would require that projects spatially overlap. The only cumulative project that would be located near the proposed project would be the previously noted East County Bioenergy Project. However, the East County Bioenergy Project is not located within the 100-year flood hazard zone of the Los Medanos Waterway. Therefore, cumulative construction impacts in the event the two projects were constructed at the same time would not be cumulatively considerable and **less than significant**.

Water Quality Control Plan

The construction of projects would be short-term and temporary activities. Until operational, the proposed project and cumulative projects would have no impacts relative to the Basin Plan and would not be cumulatively considerable (**no impact).**

Cumulative Impacts during Project Operations

Water Quality

Once operational and as discussed in Impact 3.9-1 in Section 3.9 *Hazards and Hazardous Materials*, all projects that use hazardous materials that exceed triggering volumes would be required to prepare a HMBP and submit that HMBP to the CUPA for their review for compliance with regulations. Each HMBP would describe hazardous material handling and storage, storage in appropriate containers with secondary containment to contain a potential release, and emergency response and notification procedures in the event of a spill or release. Transportation and disposal of wastes, such as spent cleaning solutions, would also be subject to regulations for the safe handling, transportation, and disposal that would include appropriate containerization and labeling, transportation by licensed hazardous materials haulers, and disposal at licensed facilities permitted to accept the waste. Finally, each facility that handles hazardous materials would be required to comply with the local MS4 permit development standards (see CCCWP in Section 3.10.2, *Regulatory Framework*), which would reduce pollutants and runoff flows using BMPs and LID/post-construction standards. Note that each facility would be required to comply with the same regulations that would include procedures to cleanup spills to the same cleanup standards. Thus, even if two adjacent facilities were to have simultaneous hazardous materials releases that might affect water quality, both facilities would be required to control and cleanup each of their releases to the same regulatory standards (the amount of sediment or pollutants per volume of runoff water) and would not be cumulatively considerable. Therefore, cumulative impacts would be **less than significant**.

Drainage Patterns

Similar to the Water Quality cumulative discussion above, the proposed project and all cumulative projects would be required to comply with the state Construction General Permit and local codes that would require the design of projects prevent changing drainage patterns and preventing erosion, siltation, and flooding. Therefore, the construction multiple projects at the same time would not be cumulatively considerable and **less than significant.**

Flood Hazard Zone

Cumulative impacts relative to being located in flood hazard zones would require that projects spatially overlap. The only cumulative project that would be located near the proposed project would be the previously noted East County Bioenergy Project. However, the East County Bioenergy Project is not located within the 100-year flood hazard zone of the Los Medanos Waterway. Therefore, cumulative construction impacts in the event the two projects were constructed at the same time would not be cumulatively considerable and **less than significant.**

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3.11 Delta Hydrology and Water Quality

This section describes the surface water hydrology, relevant water management infrastructure, and water quality of the Sacramento–San Joaquin Delta (Delta), including key Delta hydrology concepts and issues, and Antioch's existing water use patterns. It also provides an overview of relevant hydrodynamics in the western Delta, existing relevant surface water intakes and outfalls, and various Delta water quality issues and concerns. This section reviews the applicable regulatory setting, including federal, state, and local regulations and requirements, and finally provides an analysis of potential hydrology and water quality impacts resulting from project implementation.

Several comments were received in response to the NOP addressing surface water hydrology and water quality. These included a summary of applicability of the Basin Plan and policies therein from the Central Valley Regional Water Quality Control Board (CVRWQCB); a request from the Delta Stewardship Council to review the impact analysis related to surface water withdrawals including effects on ecosystems and regional water supply reliability, and that the EIR should consider potential for conflict with the Delta Plan; a request from Contra Costa Water District to consider specific parameters and model assumptions when analyzing the effects of brine disposal on Delta waterways; a request from the City of Pittsburg to consider the effects of brine disposal; and a request by Delta Diablo to consider specific issues relating to brine discharge impacts and Delta Diablo's existing wastewater National Pollutant Discharge Elimination System (NPDES) permit. See **Appendix A** for the full text of all NOP comment letters.

3.11.1 Environmental Setting

Delta Overview

The Sacramento-San Joaquin Delta (the Delta) is a network of leveed islands and channels that lies at the confluence of the Sacramento and San Joaquin Rivers. The Delta, together with Suisun Marsh and greater San Francisco Bay, make up the largest estuary on the west coast of North and South America. It is through the Delta that water from roughly two thirds of California's land area passes into the San Francisco Bay estuary and into the Pacific Ocean. Flows of surface water through the Delta provide and support critical ecosystem function, as well as drinking water supply for local purveyors and the state and federal water projects. The Delta also is the major collection and distribution point for water that serves more than 25 million people. Management actions and changes to those actions must consider these interlinked beneficial uses of water in the Delta, which range from habitat for fish and wildlife to agricultural, industrial, and municipal water supply.

Much of the flow that passes through the Delta is regulated by upstream reservoirs that are operated for flood management, water supply, water quality, power generation, wildlife and fisheries habitat, and recreation. Similarly, the system of river and bypass channels, levees, and water control structures in the Delta supports agricultural uses, serves as valued recreational and open space areas, supports management of surface water supplies as well as groundwater and water quality, and provides critical remnant riparian and wetland habitat for numerous fish and wildlife species.

Overview of Delta Hydrology

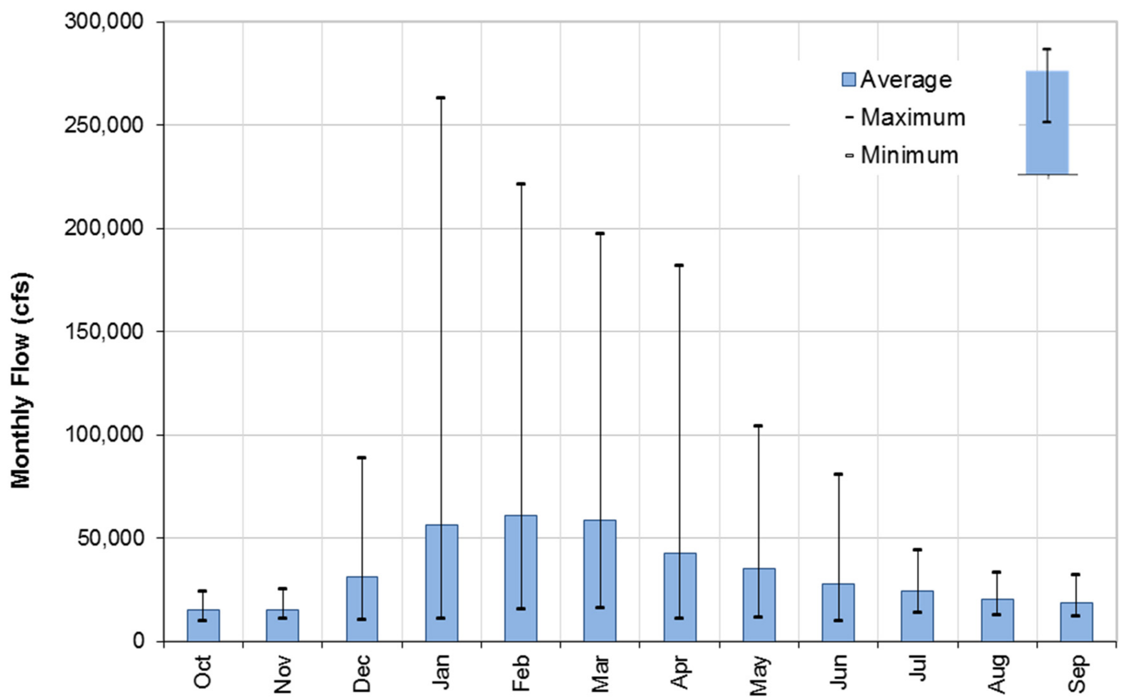
Several key factors affect Delta hydrology and water quality. These include the following:

Tidal Cycles

Except during major stormwater runoff events, flows of water along Delta channels are dominated by the 25-hour cycle of tidal flushing. The Delta, along with the San Francisco Bay, is subject to a mixed diurnal tide, which includes two tides of unequal magnitude each lunar day (24.9 hours). A higher-high and a lower-high tide occur each day. In almost all months, maximum tidal flows at Martinez—that is at the mouth of the Delta where the Delta transitions into San Francisco Bay--range from approximately 600,000 to 700,000 cubic feet per second (cfs). Tidal flows transport water into the Delta on the flood (landward) stage of the tide and withdraw water on the ebb (seaward) stage of the tide. Tidal currents routinely create reverse flows (i.e., landward flows) in select Delta waterways. However, the magnitude of reverse flows also depends on other factors such as Delta inflows, Central Valley Project/State Water Project (CVP/SWP) operational parameters, and local pumping.

Delta Inflow

Tides strongly influence the day-to-day movement of water through the Delta (except during very large storm events). Salinity within the Delta is determined by the balance between freshwater inflows to the Delta and salinity from the Bay, which enters the Delta from tidal dispersion. The vast majority of freshwater inflow to the Delta is derived from the Sacramento and San Joaquin Rivers. Sacramento River flows, when combined with flood flows routed through the Yolo Bypass and flows from Cache and Putah creeks, account for approximately 80 percent of total Delta inflow on an average annual basis. The San Joaquin River contributes about 15 percent of Delta inflow, while flows from the eastside tributaries (Mokelumne, Calaveras, and Cosumnes Rivers) account for most of the remainder, about 5 percent (DWR, 2018a). **Figure 3.11-1** presents monthly and average monthly Delta inflows from 1994 to 2013. The average annual Delta inflow for this period was approximately 24.5 million acre-feet (MAF). Inflows to the Delta are augmented slightly by local precipitation and runoff, drainage and seepage from Delta islands, and discharges from local wastewater treatment plants. Average annual precipitation over the Delta is approximately 0.9 MAF.



Source: DWR, 2018b

Figure 3.11-1
Average, Minimum, and Maximum Delta Inflow, 1994 to 2013

Delta Outflow

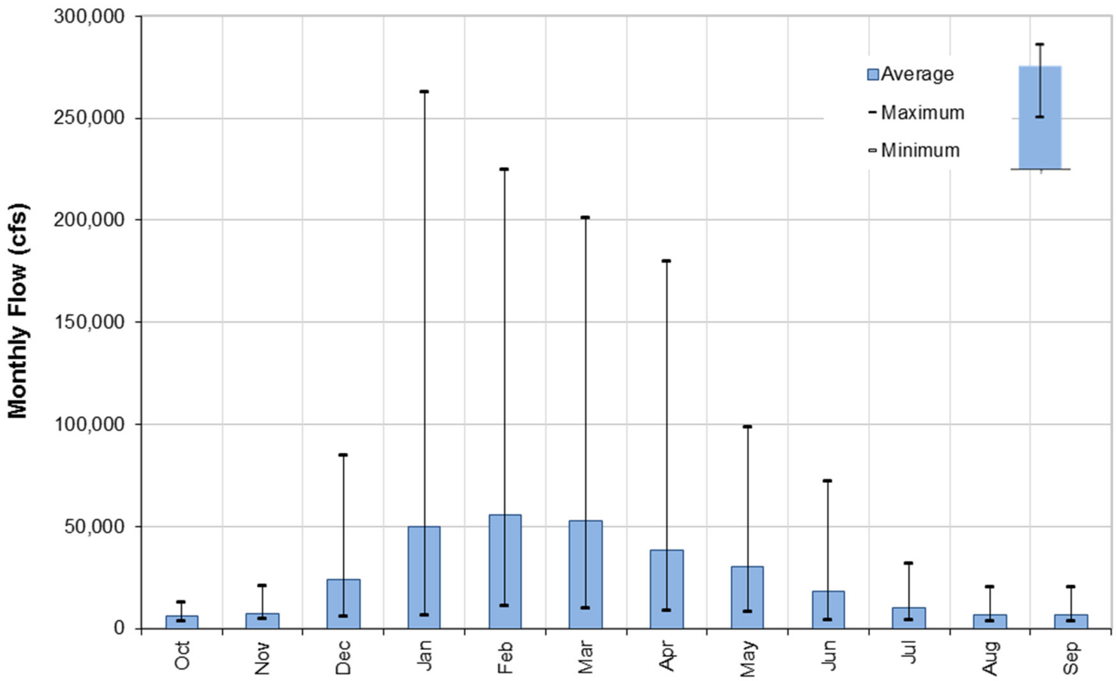
Freshwater that enters the Delta may be diverted for in-Delta agricultural or municipal use, exported by the CVP and SWP to meet contractor demands, or flow as Delta Outflow through Carquinez Strait into San Pablo Bay, San Francisco Bay, and the Pacific Ocean. Net Delta

Outflow is the net freshwater flow or tidally-averaged flow of water from the Delta into San Pablo Bay. Direct estimates of net Delta outflow are generated using U.S. Geological Survey (USGS) flow monitoring data from Rio Vista, Three Mile Slough, Jersey Point, and Dutch Slough, based on a methodology developed by Oltmann (1998).

As water flows out of the Delta, it pushes salty ocean water out of the Delta and downstream towards the San Francisco Bay and Pacific Ocean. The CVP and SWP ("the projects") manage reservoir releases and export pumping to attempt to achieve sufficient Delta outflow to repel salinity intrusion into the western Delta and comply with water rights requirements, including the agreement between the United States and the State for the coordinated operation of the CVP and SWP (otherwise commonly known as the "Coordinated Operations Agreement (COA)") and State Water Resources Control Board Water Rights Decision 1641 (D-1641). Various other regulatory requirements for Delta outflow, including the 2008 USFWS Biological Opinion (BiOp) and the 2009 NMFS BiOp and associated Reasonable and Prudent Alternatives (RPA), must also be met.

Because Delta outflow determines the extent to which salty water intrudes into the Delta (see discussion of X2 below), it also determines the ability of the CVP, SWP, and local purveyors (including the City) to divert and export water from the Delta. The Net Delta Outflow Index (NDOI) as defined in the State Water Resources Control Board D-1641 is a measure of the net Delta outflow. It is calculated using a volumetric balance of the Delta inflow less net Delta consumptive use, less inflows to Clifton Court Forebay, and less pumping at CVP's C.W. "Bill" Jones Pumping Plant (Jones Pumping Plant), SWP's Barker Slough intake, and Contra Costa Water District (CCWD) intakes. D-1641 specifies flow requirements for NDOI which varies by month and by water year type between 3,000 and 8,000 cfs. The highest flow requirement for NDOI (8,000 cfs) is in the month of July during Wet and Above Normal years (as defined in D-1641) and the lowest requirement (3,000 cfs) is in September of any given year and during August through December in critical years.

Figure 3.11-2 summarizes minimum, average, and maximum monthly Delta outflows for 1994 to 2013. On average, about 75 percent of Delta inflow contributes to Delta outflow to the San Francisco Bay with approximately 20 to 25 percent contributing to the flow to meet minimum outflow requirements for salinity control, and remaining 50 to 55 percent for additional requirements for fishery protection. The remaining 25 percent of the Delta inflow is used by local diversions and water exports (DWR, 2014).



Source: DWR, 2018b

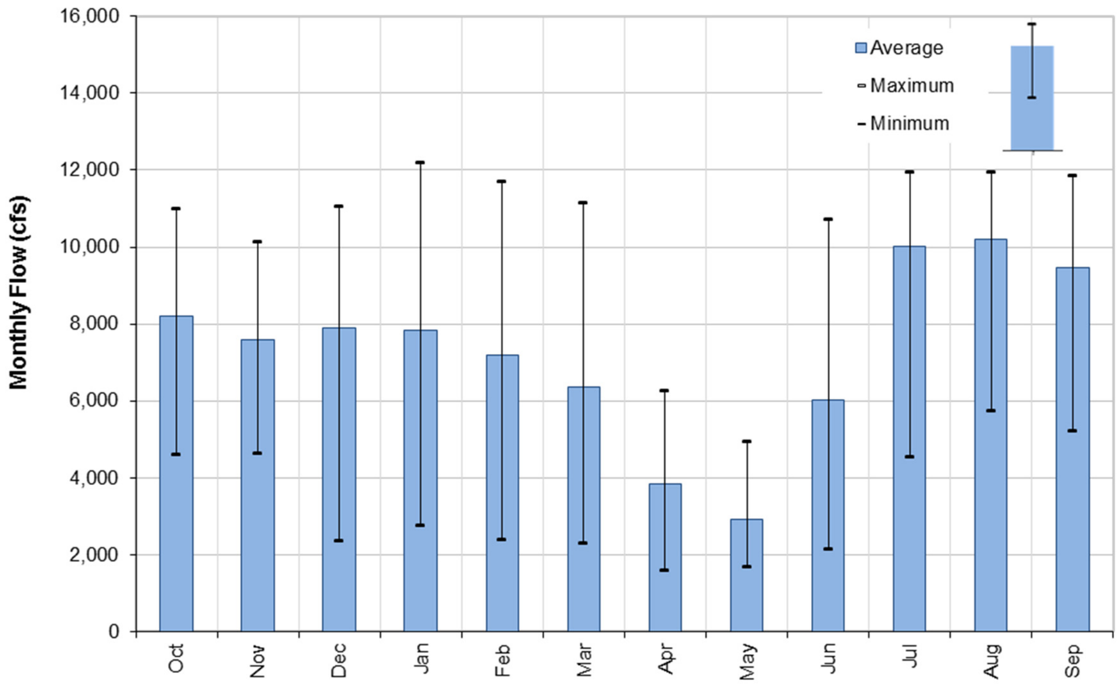
Figure 3.11-2
Average, Minimum, and Maximum Monthly Delta Outflow, 1994-2013

Delta Diversions and Exports

Delta diversions are distinguished from Delta exports by the place of use. For the purposes of this section, a diversion is defined as a withdrawal of water for use within or adjacent to the Delta; an export is defined as water that is withdrawn from the Delta and conveyed to areas distant from the Delta. Delta exports are regulated by D-1641 as a function of Delta inflow and are constrained by BiOp reasonable and prudent alternatives (RPAs).

Combined, the CVP and SWP are by far the largest users of Delta water. The projects export water from the South Delta through CVP's Jones Pumping Plant and SWP's Harvey O. Banks Pumping Plant (Banks Pumping Plant) for delivery to project contractors located in the San Francisco Bay Area, San Joaquin Valley, Central Coast, and Southern California. The SWP also diverts water into the North Bay Aqueduct, while local agencies, including the City, other municipalities, private entities, and agricultural users operate their own diversion infrastructure independent of the CVP and SWP. Examples include the City's diversion, approximately 1,800 agricultural diversions within the Delta, CCWD's Los Vaqueros Project, and the City of Stockton's Delta Water Supply Project.

Figure 3.11-3 presents minimum, average and maximum monthly Delta CVP and SWP diversions and exports from the south Delta only during 1994 to 2013. Annual exports range from 9 to 43 percent of Delta inflow, averaging 21 percent of inflow. In-Delta agricultural use accounts for about 7 percent of Delta inflow, CCWD diversions are less than 1 percent of Delta inflow, diversions to the North Bay Aqueduct are less than 0.2 percent of Delta inflow, and City diversions are less than 0.1 percent of Delta inflow (DWR, 2014).



Source: DWR, 2018b

Figure 3.11-3
South Delta Exports, 1994 to 2013

Water management activities, especially export pumping, can affect the direction of flow in Delta channels. Under natural conditions, net flow of Delta waters is westward from the San Joaquin and Sacramento Rivers, across the Delta and toward San Francisco Bay. However, under certain tidal, river inflow, and south Delta export pumping conditions, net reverse flows may occur over a tidal cycle in the western Delta so that the net flow direction in those channels is eastward. The estimated net westward flow of the San Joaquin River at Jersey Point is used as a measure of net reverse flow conditions (exclusive of tides) within certain Delta channels, including the San Joaquin River at Blind Point, Three Mile Slough, and Dutch Slough.[1] CVP and SWP export pumping also may cause reverse flows (i.e., from north to south) in the Old and Middle Rivers (OMR) and other central and south Delta channels

[1] Flow at those three points is collectively referred to as "QWEST" under relevant Delta surface water modeling literature and reporting.

Delta Water Quality

According to the Water Quality Control Plan for the San Francisco Bay / Sacramento-San Joaquin Delta Estuary (the Basin Plan; see also regulatory discussion below), water quality in the Delta supports the following beneficial uses:

- Municipal and Domestic Supply (MUN)
- Industrial Service Supply (IND)
- Industrial Process Supply (PRO)
- Agricultural Supply (AGR)
- Ground Water Recharge (GWR)
- Navigation (NAV)
- Water Contact Recreation (REC-1)
- Non-Contact Water Recreation (REC-2)
- Shellfish Harvesting (SHELL)
- Commercial and Sport Fishing (COMM)
- Warm Freshwater Habitat (WARM)
- Cold Freshwater Habitat (COLD)
- Migration of Aquatic Organisms (MIGR)
- Spawning, Reproduction, and/or Early Development (SPWN)
- Estuarine Habitat (EST)
- Wildlife Habitat (WILD)
- Rare, Threatened, or Endangered Species (RARE)

Delta Drinking Water Constituents of Concern

Various drinking water constituents of concern are present in Delta waters. While Delta outflow controls the extent of seawater intrusion, constituents of concern are primarily released from urban and agricultural runoff as well as upstream point source discharges, and constitute a major factor affecting Delta water quality. Delta waterways in the vicinity of the project fall within the jurisdiction of the San Francisco Bay Regional Water Quality Control Board (SFRWQCB) and Central Valley RWQCB. Waterways that are considered water quality limited—that is, that have been identified as having existing water quality impairments—are summarized in the State Water Resources Control Board's 2014 and 2016 Clean Water Act Section 303(d) List. As shown in **Table 3.11-1**, waterways in the Western Delta in the vicinity of the project are considered impaired under the 303(d) list for the following constituents: pesticides including chlorpyrifos, DDT, diazinon, and group A pesticides; electrical conductivity; invasive species; mercury; and unknown toxicity.

Water quality in the Delta is highly variable temporally and spatially. Trends in Delta water quality reflect the effects of river inflows, tidal exchanges with San Francisco Bay, diversions, and discharges to Delta waters. The existing water quality problems of the Delta system may be characterized by the presence of toxic materials, salinity, presence of suspended sediments and turbidity, presence of bacteria, and eutrophication (the overgrowth of aquatic plants due to excess nutrients) and the associated fluctuations in dissolved oxygen. Generally, flow through the Delta is one of the major determining factors for water quality. Delta flows and water quality are controlled or influenced by the following factors:

- Inflow of freshwater from tributary rivers, as influenced by upstream reservoirs, diversions, and other infrastructure and management activities

- In-Delta diversions for export and local use, including NBA, CCWD, CVP, and SWP pumping
- Upstream and in-Delta wastewater treatment plant discharges
- Upstream and in-Delta agricultural return flows and local rainfall runoff with elevated concentrations of TOC, salts, nutrients, suspended solids, boron, and pesticides
- Tidal action that forces high-salinity seawater, including bromide associated with seawater, from Suisun and San Francisco bays into the lower Delta
- Upstream inflows carrying heavy metals, including cadmium, copper, mercury, and zinc, from abandoned mine sites, tailing deposits, urban runoff, and industrial and municipal wastewater

Water quality in the western Delta is strongly influenced by tidal exchange with San Francisco Bay; during low-flow periods, seawater intrusion causes increased salinity.

TABLE 3.11-1
CLEAN WATER ACT SECTION 303(D) LIST OF IMPAIRED WATER BODIES IN THE PROJECT VICINITY

Water Body Name	Affected Area/ Reach Length	Pollutant/Stressor	Pollutant Category	TMDL Status
Delta Waterways (western portion)	14,523 acres	Arsenic	Metals/metalloids	TMDL in place
		Chlordane	Pesticides	TMDL in place
		Chlorpyrifos	Pesticides	TMDL in place
		DDT	Pesticides	TMDL in place
		Diazinon	Pesticides	TMDL in place
		Dieldrin	Pesticides	TMDL in place
		Electrical Conductivity	Other	TMDL in place
		Group A Pesticides	Pesticides	TMDL in place
		Invasive Species	Miscellaneous	TMDL in place
		Mercury	Metals/metalloids	TMDL in place
		Polycyclic Aromatic Hydrocarbons	Toxics	TMDL in place
		Polychlorinated Biphenyls	Toxics	TMDL in place
		Total DDT	Pesticides	TMDL in place
		Toxicity	Toxics	TMDL in place

Key:
DDT = dichlorodiphenyltrichloroethane
PCB = polychlorinated biphenyl
TCDD = tetrachlorodibenzodioxin
TMDL = Total Maximum Daily Load
SOURCE: State Water Resources Control Board, 2017

Variability of Delta Salinity and Total Dissolved Solids Concentrations[2]

Salinity and related constituents, such as chloride and bromide, tend to occur toward the southern and western portions of the Delta (CALFED, 2000). Salinity is an important and regulated parameter in the Delta because water diverted and exported from the Delta is used for a variety of municipal, industrial, and agricultural uses, and elevated levels of salinity in these waters could could affect beneficial uses.

Salinity enters the Delta from various sources, including saline water intrusion from the San Francisco Bay, mineral-laden river inflows from tributaries, agricultural tailwater, and wastewater treatment plant outfalls within the watershed. Saline water intrusion from the San Francisco Bay is the primary determinant of salinity in the western Delta. Daily tidal cycles force saline water into and out of the Delta, with the extent of intrusion determined by tidal height, freshwater inflow from the Sacramento, San Joaquin, and eastside rivers, the rate of pumping at Delta water intakes, and the operation of various flow control structures (e.g., Delta Cross-Channel Gates and Suisun Marsh Salinity Control System) (DWR, 2001).

During winter and early spring, flows through the Delta are usually above the minimum levels required to control salinity. During the summer and autumn, salinity in the Delta typically increases because of decreased inflows or discharges from agricultural runoff. Decreased Delta outflow, combined with exports, may increase instances of net reverse flow drawing saltwater intrusion further into the Delta.

The X2 Objective

The 1995 Bay-Delta Basin Plan (predecessor to the current Basin Plan; see additional discussion below) established the estuarine habitat (X2) objectives for Suisun Bay and the western Delta. The X2 objective required specific daily or 14-day surface EC criteria, or 3-day averaged outflow requirements to be met for a certain number of days each month, from February through June. These requirements were designed to provide improved shallow water habitat for fish species in spring. Because of the relationship between seawater intrusion and interior Delta water quality, the X2 criteria also improved water quality at Delta drinking water intakes, including the City's intake. As a parameter, X2 is measured as the distance from the Golden Gate Bridge (in km) where salinity is equivalent to 2 parts per thousand (ppt). Due to the variable nature of Delta

2 Salinity is a measure of the amount of salts contained in water, including chloride and bromide, as well as many others. Chloride anion concentration and electrical conductivity (EC) are commonly used measurements of salinity. Like salinity, total dissolved solids (TDS) also describes the amount of salts in water. TDS also includes small amounts of other constituents, mainly organic carbon; however, the amount of organic carbon in Delta samples near the project is usually miniscule in comparison to the amount of salt in samples. Therefore, salinity, chloride anion concentration, EC, and TDS are all different ways of describing the amount of salts contained in a water sample. As much as possible, data are presented in this document in the form in which they were originally collected or modeled, to minimize the introduction of inaccuracies. As such, TDS and EC data are presented throughout the document, and EC and TDS are frequently used as indicators of salinity or chloride concentrations.

Typically, for Delta samples near the project site, salinity is described in terms of electrical conductivity (EC), with units of uS/cm. DSM2 simulations model EC but results can be converted to TDS or chloride concentrations. The conversion of salinity to TDS or chloride is different at different locations within the Delta due to the change in EC source (e.g. saltwater from the San Francisco Bay, or salts originating from agricultural drainage).

flows as well as tidal influence, the location of X2 can vary in its location from the western-central Delta during very dry periods, to the Golden Gate Bridge.

Local Setting

Local Hydrology

Antioch and Delta Diablo are located in a strongly tidally influenced area characterized by high tidal flows, and strong seasonal variability that is heavily influenced by upstream flows and management activities. Twice daily tidal cycles at Antioch cause water to ebb and flow at high rates, with peak flows ranging from 70,000 cfs to 200,000 cfs or more. At high and low tides, the waterway temporarily achieves slack water conditions, with limited movement, twice during each tidal cycle. Delta outflow past the City is measured as the net movement of water, discounting tidal flows, out of the Delta. Seasonally, hydrology in the vicinity of the City and the project components (i.e. the diffuser site and the existing intake pump station), reflects the patterns and seasonality trends discussed previously for the Delta.

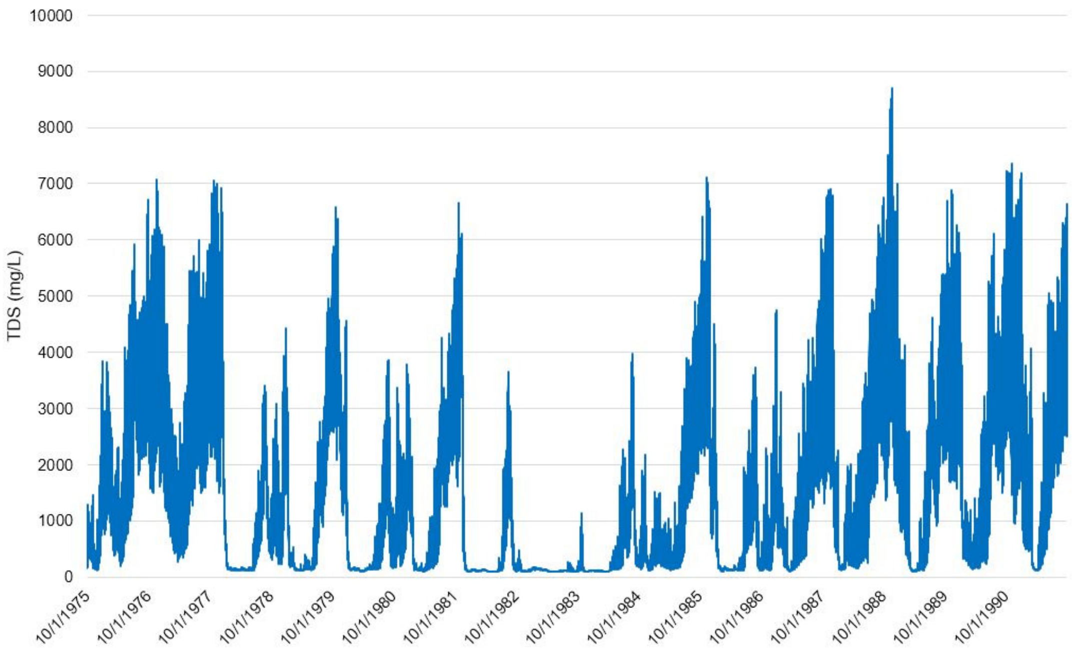
Local Water Quality

New York Slough is tidally influenced and the Basin Plan classifies it as estuarine. Salinity data collected at the Regional Monitoring Program (RMP) BG30 sampling station between 1993 and 2011 indicate that the salinity is greater than 1 ppt about 5 percent of the time, but never greater than 10 ppt. More specifically, salinity in New York Slough and the San Joaquin River near Antioch varies seasonally and based on the hydrologic year type. Seasonally, salinity is lowest during February through May, when large storms combine with snowmelt and other runoff to force saline Bay/ocean waters out west of the project area. Salinity typically begins to increase in June and continues to increase through the summer and autumn months. Salinity typically peaks during late autumn, before major runoff events start to freshen the system.

On an annual basis, drier years reduce Delta outflow and therefore reduce flushing of saline water out of the Delta. This results in increased saline water intrusion in the project vicinity, and salinity levels increase. During the driest of years, salinity can be elevated even during the February through May runoff season. During wet years, salinity can remain very low even during summer and late autumn months, when salinities typically rise.

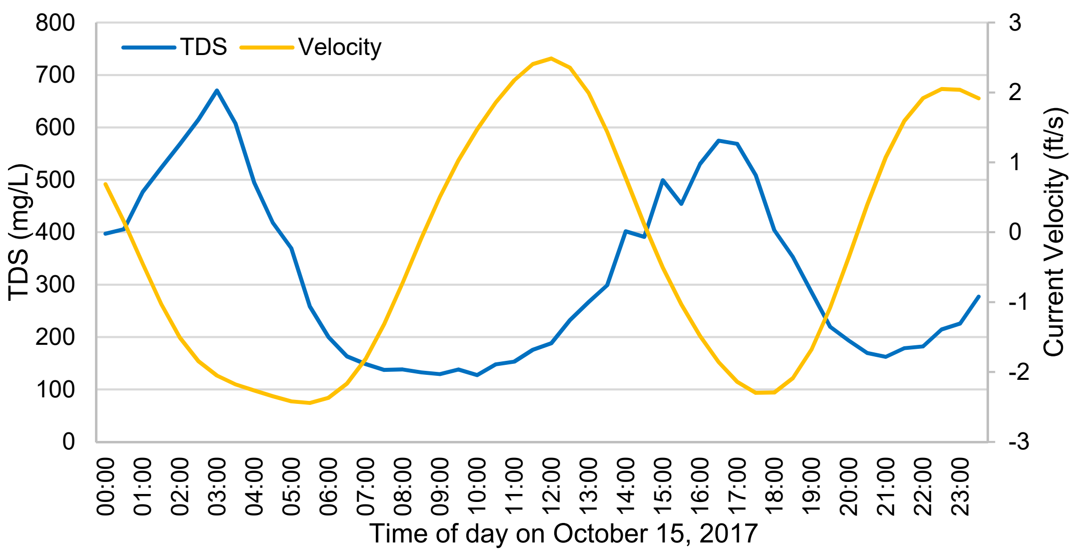
Figure 3.11-4 summarizes historic concentrations of total dissolved solids (TDS) at Antioch near the Delta Diablo outfall diffuser site, as modeled by the California Department of Water Resources during a prior DSM2 analysis (Exponent, 2018). As shown, TDS concentrations vary seasonally and annually. TDS concentrations are highest during periods with lower freshwater input from upstream, and lowest when freshwater inflows to the Delta push tidal salts further out toward the Golden Gate.

Salinity and TDS also vary considerably on a diurnal basis, along with the tidal cycle. **Figure 3.11-5** below provides a snapshot of ambient TDS concentrations at Antioch (i.e., in close proximity to the existing diffuser outfall) during a 24-hour period on October 15, 2017. As shown, TDS concentrations lag behind tidal velocity, with peak TDS concentrations occurring as saline tidal flows pass upstream (negative current velocities) and minimum TDS concentrations occurring as fresh water flows from the central Delta pass downstream (positive current velocities).



Source: Exponent, 2018. Figure shows the TDS concentration in receiving waters at Antioch's drinking water intake as modeled by the Delta Simulation Model (DSM2) for the EBC2 existing conditions scenario. The EBC2 scenario includes the Fall X2 requirement and was generated by the Department of Water Resources (DWR) for the March 2013 Revised Administrative Bay Delta Conservation Plan to represent existing conditions.

Figure 3.11-4
Total Dissolved Solids of Receiving Water Near Delta Diablo Outfall Diffuser



Source: CDEC and Exponent, 2018.

Figure 3.11-5
Tidal Current Velocity and Receiving Water TDS Concentration, at New York Slough, October 15, 2017

3.11.2 Regulatory Framework

Federal

Clean Water Act

The federal Clean Water Act (CWA) seeks to "to restore and maintain the chemical, physical, and biological integrity of the nation's waters." The CWA is the major federal legislation that governs federal oversight of discharges into "jurisdictional waters" by federal, State, local, and private activities. Jurisdictional waters are waters of the United States, including wetlands, lakes, rivers, streams, and their tributaries. The CWA establishes the basic structure for regulating discharge of pollutants into the waters of the United States and gives the United States Environmental Protection Agency (USEPA) the authority to implement pollution control programs, such as setting effluent limitations for wastewater discharges by industries. In California, USEPA has given the State Water Resources Control Board (State Water Board) and its nine Regional Water Quality Control Boards (Regional Water Boards) the authority to identify beneficial uses and adopt applicable water quality objectives. Where multiple beneficial uses exist, water quality standards must protect the most sensitive use.

Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. Water quality standards include designation of beneficial uses, water quality criteria, and an antidegradation policy to prevent deterioration of existing levels of high water quality. Reductions in pollutant loading are achieved by implementing strategies authorized by the CWA through Sections 401, 402 and 404.

Note that site-specific CWA requirements and associated issues such as Section 401 and 404 compliance are addressed separately in the biological resources and local hydrology sections.

Federal Antidegradation

Section 303(c) of the CWA is designed to protect existing uses and water quality and national water resources. At a minimum, the policy and implementation methods must be consistent with the following:

- Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
- Where the quality of the waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds that allowing lower water quality is necessary to accommodate important economic or social development in the area. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices (BMP) for nonpoint source control.
- Where high-quality waters constitute an outstanding national resource, such as waters of national and state parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

Although the quality of water in the Delta is relatively good, water quality problems do occur, including the presence of mercury, pesticides such as organochlorine pesticides, trace metals, turbidity, and toxicity from unknown origin (CALFED 2000).

Federal Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) was established to protect the quality of drinking water in the United States. The SDWA authorized USEPA to set national health-based standards for drinking water and requires many actions to protect drinking water and its sources, including rivers, lakes, reservoirs, springs, and groundwater wells. Furthermore, the SDWA requires owners or operators of public water systems to comply with primary (health-related) standards. USEPA has delegated the responsibility for administering California's drinking-water program to the State Water Board. The State Water Board is accountable to USEPA for program implementation and for adopting standards and regulations that are at least as stringent as those developed by USEPA. Contaminants of concern relevant to domestic water supply are defined as those that pose a public health threat or that alter the aesthetic acceptability of the water. These types of contaminants are regulated by USEPA primary and secondary maximum contaminant levels (MCLs) that are applicable to treated water supplies delivered to the distribution system. The MCLs and the process for setting these standards are reviewed triennially.

Surface Water Treatment Rule

The California Surface Water Treatment Rule is contained in Title 22, Article 7 of the California Code of Regulations. Under the rule, surface water supplies are assumed to contain pathogenic and microbial contaminants. As a result, inadequately treated surface water will cause waterborne disease. The rule therefore requires every public water system that relies on surface water for supply to conduct a comprehensive sanitary survey of its watersheds. The purpose of the surveys is to identify actual or potential sources of contamination, or any other watershed-related factor, which might adversely affect the quality of water used for domestic drinking water.

Disinfection Byproducts Rule

Reactions between naturally occurring organic carbon contained in natural waters and disinfectants such as chlorine and chloramines have been proven to result in the formation of disinfection byproducts such as trihalomethanes (THM) and haloacetic acids (HAA). Concentrations of THM and HAA in finished drinking water are regulated by the USEPA Disinfectants/Disinfection Byproducts Rule. Current regulations for disinfection byproducts (DBPs) at (80 ppb for THM and 60 ppb for HAA5) must be met by municipal/public water suppliers. DBP concentrations are determined based on running annual averages from quarterly measurements.

State

Porter-Cologne Water Quality Act

The Porter-Cologne Act is California's statutory authority for the protection of water quality. Under the act, the State must adopt water quality policies, plans, and objectives protecting the State's waters for the use and enjoyment of the people. The act also obligates the State and

Regional Water Boards to adopt and periodically update their basin plans A basin plan identifies the designated beneficial uses for specific surface water and groundwater resources, applicable water quality objectives necessary to support the beneficial uses, and implementation programs that are established to maintain and protect water quality from degradation for each of the Regional Water Boards. The act also requires waste dischargers to notify the regional Water Boards of their activities through the filing of reports of waste discharge and authorizes the State Water Board and Regional Water Boards to issue and enforce waste discharge requirements (WDR), NPDES permits, Section 401 water quality certifications, or other approvals. The Regional Water Boards also have authority to issue waivers to reports of waste discharge, WDRs for broad categories of "low threat" discharge activities that have minimal potential for adverse water quality effects when implemented according to prescribed terms and conditions.

Regional Water Quality Control Board and the Basin Plan

The Porter-Cologne Act provides for the development and periodic review of water quality control plans that designate beneficial uses of California's major rivers and groundwater basins and establish narrative and numerical water quality objectives for those waters. Beneficial uses defined in Water Code Section 13050(f) include domestic, municipal, agricultural, and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and the preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. The State Water Board, the Central Valley Regional Water Board (Region 5) and San Francisco Bay Regional Water Board (Region 2), through their regulatory authorities, are also engaged in the development of water quality water objectives and other source water protection objectives for the Bay-Delta system. Beneficial uses represent the services and qualities of a water body (i.e., the reasons why the water body is considered valuable), while water quality objectives represent the standards necessary to protect and support those beneficial uses.

Bay-Delta Water Quality Control Plan

The 1995 Bay-Delta Water Quality Control Plan (Basin Plan) established water quality control measures that contribute to the protection of beneficial uses in the Delta (State Water Board 1995). The Bay-Delta Water Quality Control Plan (WQCP) identified (1) beneficial uses of the Delta to be protected, (2) water quality objectives for the reasonable protection of beneficial uses, and (3) a program of implementation for achieving the water quality objectives. Amendments made in 1995 as part of the December 15, 1994, Bay-Delta Accord, committed the CVP and SWP to new Delta habitat objectives. The new objectives were adopted in 1995 through Resolution No. 95-24.

One key feature of the 1995 Bay-Delta Basin Plan was the estuarine habitat (X2) objectives for Suisun Bay and the western Delta. The X2 objective required specific daily or 14-day surface EC criteria, or 3-day average outflow requirements to be met for a certain number of days each month, from February through June. These requirements were designed to provide improved shallow water habitat for fish species in spring. Because of the relationship between seawater intrusion and interior Delta water quality, the X2 criteria also improved water quality at Delta drinking water intakes. Other new elements of the 1995 Bay-Delta Basin Plan included export-to-inflow (E/I) ratios intended to reduce entrainment of fish at the export pumps, Delta Cross Channel gate closures, and San Joaquin River EC and flow standards.

California Toxics Rule

The California Toxics Rule establishes numeric water quality criteria for approximately 130 priority pollutant trace metals and organic compounds. The State Water Board subsequently adopted its Policy for the Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries (State Implementation Policy, or SIP). The SIP outlines procedures for NPDES permitting for toxic-pollutant objectives that have been adopted in basin plans and in the California Toxics Rule.

State Antidegradation

The California Antidegradation Policy (Resolution No. 68-16) is a statement of policy with respect to maintaining high quality waters in California. As part of the state's policy for water quality control, it is incorporated into all regional water quality control plans. The antidegradation policy applies only to high quality waters and requires that that existing high quality be maintained to the maximum extent possible. The policy allows lowering only if that change is consistent with maximum benefit to the people of the state, will not unreasonably affect present and potential beneficial uses, will not result in water quality lower than applicable standards, and if waste discharge requirements for a proposed discharge would result in the best practicable treatment or control of the discharge. Such controls must be sufficient to ensure no pollution or nuisance, and the highest quality of water to afford maximum benefit to the people of the state. The state antidegradation policy applies to permits, waste discharge requirements, waivers for surface water discharges, basin planning and policies affecting surface water, clean water act Section 401 certifications, and surface water cleanups.

Water Right Decision 1641

The 1995 Bay-Delta Basin Plan was implemented through Water Right Decision 1641 (D-1641) in December 1999, Revised Water Right Decision 1641 (D-1641) in March 2000, and Order WR 2001-05. D-1641 incorporates water rights settlement agreements between DWR and Reclamation and certain water users in the Delta and upstream watersheds regarding contributions of flows to meet water quality objectives. However, DWR and/or Reclamation have the responsibility to ensure that WQCP objectives are met in the Delta.

As previously described, the COA between DWR and Reclamation describes how the CVP and SWP share their joint responsibility to meet Delta water quality standards and meet the water demands of senior water right holders. Many of the permit terms and conditions contained in the 1995 Bay-Delta Basin Plan for the Delta and Suisun Marsh and in water rights decisions implementing the Basin Plan have substantial influence on Delta operations, flows, water quality and ecosystem functions.

Delta Stewardship Council – Delta Plan

The Sacramento–San Joaquin Delta Reform Act (Reform Act), passed in 2009, created the Delta Stewardship Council (DSC) and empowered it to develop a comprehensive management plan (i.e., the Delta Plan), which was adopted in 2013 as a policy plan. The Reform Act also created the Sacramento–San Joaquin Delta Conservancy to support efforts that advance environmental protection and the economic well-being of Delta residents. The DSC and Delta Conservancy are independent agencies of the State. Under current requirements, state and local agencies proposing certain kinds of actions or projects in the Delta need to certify for the DSC that those efforts are consistent with the Delta Plan.

The DSC was created in legislation to achieve the state mandated coequal goals for the Delta. 'Coequal goals' means the two goals of providing more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place. (CA Water Code §85054)

The Delta Plan, adopted by the DSC in 2013, is a comprehensive, long-term management plan for the Delta. It creates new rules and recommendations to further the state's coequal goals for the Delta: Improve statewide water supply reliability, and protect and restore a vibrant and healthy Delta ecosystem, all in a manner that preserves, protects and enhances the unique agricultural, cultural, and recreational characteristics of the Delta.

The city of Antioch is within the Delta Secondary Zone, as shown in Appendix 6 of the Delta Plan; therefore, Delta Plan policies need to be evaluated to determine whether the proposed project would conflict with the Delta Plan.

The following policies from the Delta Plan are relevant to water quality:

> ***Policy WQ R1:*** Water quality in the Delta should be maintained at a level that supports, enhances, and protects beneficial uses identified in the applicable State Water Resources Control Board or regional water quality control board water quality control plans.
>
> ***Policy WQ R2:*** Covered actions should identify any significant impacts to water quality.

Local

City of Antioch General Plan

The City of Antioch's General Plan, Public Services and Facilities Element, contains the following water facilities objective and policies relevant to the project.

Water Facilities Objective. Ensure a water system capable of providing high quality water to existing and future residences, businesses, institutions, recreational facilities, and other users within the City of Antioch during peak use conditions, with sufficient water in storage reservoirs for emergency and fire protection needs.

Water Facilities Policies:

a. As part of the design of water systems, provide adequate pumping and storage capacity for both drought and emergency conditions, as well as the ability to provide fire flows required by the Contra Costa County Fire Protection District.

d. Maintain existing levels of water service by protecting and improving infrastructure, replacing water mains and pumping facilities as necessary, and improving the efficiency of water transmission facilities.

f. Periodically evaluate local water consumption patterns, the adequacy of existing facilities, and the need for new facilities, including this information in the comparison of proposed development projects to the performance standards of the Growth Management Element.

City of Pittsburg General Plan

The City of Pittsburg's General Plan, Public Facilities element, Water Supply and Distribution section contains the following water facilities goal and policies relevant to the project. The project would be consistent with the goal and policies identified below.

> ***Goal 11-G-1:*** Available water supply and distribution capacity should grow proportionally with development patterns and water usage trends. Update City's Water Master Plan to implement General Plan growth projections.
>
> ***Policy 11-P-3:*** Continue water district and user conservation efforts to help reduce demand in light of recent Contra Costa Water District raw water reductions.
>
> ***Policy 11-P-4:*** Work with Contra Costa Water District to develop a program ensuring adequate provision of raw water supplies during potential emergency water demands.

3.11.3 Permitting Framework

Delta Diablo NPDES Permit

Delta Diablo discharges wastewater from its municipal wastewater treatment plant under NPDES No. CA0038547 (Order No. R2-2014-0030). The order became effective on October 1, 2014, and will expire on September 30, 2019; it allows discharge of treated effluent into New York Slough. The permit allows for average dry weather effluent flows up to 19.5 million gallons per day (mgd), and specifies effluent limitations shown in **Table 3.11-2.**

In addition to these limitations, the order also requires the following:

- Percent Removal. The average monthly percent removal of BOD and TSS shall not be less than 85 percent.
- Enterococcus Bacteria. The geometric mean enterococcus bacteria concentration of all samples collected in a calendar month shall not exceed 35 most probable number per 100 mL (MPN/mL).
- Whole Effluent Acute Toxicity. Effluent shall comply with the following limitations, tested based on current USEPA bioassay protocols and species:
    - An 11-sample median value of not less than 90 percent survival
    - An 11-sample 90th percentile value of not less than 70 percent survival

TABLE 3.11-2
APPLICABLE EFFLUENT LIMITATIONS

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Biochemical Oxygen Demand, 5-day at 20 degrees C (BOD)	mg/L	30	45	—	—	—
Total Suspended Solids (TSS)	mg/L	30	45	—	—	—
Oil and Grease	mg/L	10	—	20	—	—
pH	Standard units	—	—	n/a	6.0	n/a
Total Residual Chlorine	mg/L	—	—	—	—	0.0
Copper, Total Recoverable	μg/L	35	—	53	—	—
Cyanide, Total	μg/L	18	—	39	—	—
Dioxin-TEQ	μg/L	1.4×10^{-8}	—	2.8×10^{-8}	—	—
Total Ammonia, as N	mg/L	170	—	220	—	—

Source: SFRWQCB, 2014.

- Whole Effluent Chronic Toxicity. Effluent shall not contain chronic toxicity at a level that would cause or contribute to toxicity in the receiving water, as determined by analysis of indicator organisms and toxicity tests

Finally, the order also incorporates the following receiving water limitations:

- The discharge shall not cause any of the following conditions to exist in receiving waters at any place:
    - Floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses;
    - Alteration of suspended sediment in such a manner as to cause nuisance or adversely affect beneficial uses, or detrimental increase in the concentrations of toxic pollutants in sediment or aquatic life;
    - Suspended material in concentrations that cause nuisance or adversely affect beneficial uses;
    - Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;
    - Alteration of temperature beyond present natural background levels;
        - Changes in turbidity that cause nuisance or adversely affect beneficial uses, or increases from normal background light penetration or turbidity greater than 10

percent in areas where natural turbidity is greater than 50 Nephelometric Turbidity Unit (NTU)

- Coloration that causes nuisance or adversely affects beneficial uses;
- Visible floating, suspended, or deposited oil or other products of petroleum origin; or
- Toxic or other deleterious substances in concentrations or quantities that cause deleterious effects on wildlife, waterfowl, or other aquatic biota, or render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration.

- The discharge shall not cause the following limits to be exceeded in receiving waters at any place within one foot of the water surface:

Dissolved Oxygen:	7.0 mg/L The median dissolved oxygen concentration for any three consecutive months shall not be less than 80% of saturation. When natural factors cause concentrations less than that specified above, the discharge shall not cause further reduction in ambient dissolved oxygen concentrations.
Dissolved Sulfide	Natural background levels
pH	The pH shall not be depressed below 6.5 or raised above 8.5, and the discharge shall not cause changes greater than 0.5 pH units in normal ambient pH levels.
Nutrients	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

- The discharge shall not cause a violation of any applicable water quality standard for receiving waters.

3.1.4 Analysis, Impacts and Mitigation

Significance Criteria

According to Appendix G of the CEQA *Guidelines*, a project would result in a significant water quality impact if it would:

- Violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality
- Result in substantial water quality changes that would adversely affect beneficial uses
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan

Methodology and Assumptions

Impacts in this section are analyzed based upon the significance criteria listed above and by assessing the change in the existing conditions resulting from the proposed project.

Modeling Approach

In order to evaluate potential impacts from project operations, three modeling tools were used to evaluate near-field effects from the brine disposal and far-field effects from the change in City diversions at the river intake and brine disposal. A discussion of each model, and its application to the impact analysis, is provided below.

Modeling Tools

DSM2

The Delta Simulation Model II (DSM2) is a Delta hydrodynamic and salinity model developed by DWR to simulate Delta hydrodynamics and water quality. Input to the model includes upstream river flows and salinities, downstream tidal stage and salinity, diversion rates and other relevant data as boundary conditions. The model can be used to simulate Delta channel flows, velocities, water surface elevations, and salinity. Existing model runs conducted by DWR for the WaterFix project were used as input in the analysis and as the basis for new runs conducted specifically for this project. DSM2 modeling files were developed by DWR for WaterFix for a 16-year period (water years 1976-1991).

Antioch Operations Model

The proposed project would change the timing and amount of water the City diverts from its river intake. In order to simulate City of Antioch water supply operations with and without the project, Carollo Engineers developed a spreadsheet operations model. The key inputs to the model are:

- City of Antioch water demands
- Source water quality at the City's River Intake
- River intake diversion capacity (16 mgd)
- Desalination Plant Capacity (6 mgd finished water)

City of Antioch water supply operations are based on factors including Delta conditions, real time City demands, and operator judgment. To simulate operations, simplified operating rules were developed for implementation in the spreadsheet model. For the without project simulations, which are generally representative of existing operations, the intake operating criteria were:

- River salinity below 100 mg/L: meet City demand using the river intake (up to 16 mgd pump station capacity and then purchase water from CCWD if needed)
- River salinity between 100mg/L and 250 mg/L: blend river and CCWD water to meet City demand (meet 50 percent of demand from river and remainder purchased from CCWD)
- River salinity greater than 250 mg/L: meet all demand using purchased CCWD water.

For the with project simulations, the operating criteria were modified in anticipation of future operating conditions:

- River salinity below 75 mg/L: meet City demand using the river intake (up to 16 mgd pump station capacity and then purchase additional water from CCWD if needed)
- River salinity greater than 75 mg/L: use desalination plant and meet any remaining demand with combination of river and CCWD water to achieve 75 mg/L delivered water quality goal.

The outputs of the model include the amount water diverted at the river intake and from the CCWD canal, the amount of "finished" water produced by the City's treatment plants. For the with project condition, model output also included the amount and quality of brine produced. Model outputs were used in combination with the other modeling tools to evaluate project effects.

Visual Plumes

The Visual Plumes UM3 model was used to calculate the near-field dilution[3] of the DDSD discharge. Visual Plumes is a widely used mixing-zone computer model developed in a joint effort led by USEPA and used to simulate single and multi-port submerged discharges using receiving water characteristics specified by the user. The Visual Plumes model was used to compute plume dilution, trajectory, and the dimensions of the plume at the edge of the zone of initial dilution (ZID). The ZID is defined as the area where mixing is driven primarily by the buoyancy and/or initial momentum of the discharge; beyond the ZID, mixing results mainly from ambient turbulence.

Brine Discharge Simulation: Near-Field Effects

Near-field effects of the brine discharge were evaluated using the Visual Plumes model. A number of modeling scenarios were identified to evaluate a range of future Delta Diablo effluent discharge volumes and seasonal and water year-type variations in receiving water conditions. Each model run was conducted over a full tidal cycle. The only difference between with and without project runs for each modeling scenario was the addition of 2 mgd of desalination brine.

The modeling analyses including a number of additive conservative assumptions. For example, the desalination brine was assumed to have a constant TDS concentration of 32,000 mg/L, corresponding to a river TDS of 8,000 mg/L (i.e., the brine is four times as concentrated as the source water); a river TDS concentration of 8,000 mg/L is near the peak salinity simulated to occur at the City's intake in the existing condition DSM2 simulations over the 16-year period (see **Figure 3-11.4**). Under actual operating conditions, the brine concentration will vary with the source water quality. The use of the peak brine concentration of 32,000 mg/L is a conservative assumption that will result in lower simulated dilution than using the brine TDS concentration calculated from the river (source) water for a given tidal cycle.

Analyses conducted by Exponent indicated that the lowest near-field dilution occurred during the fall season, indicating greatest potential for the project to alter conditions during this period *(Final Near-Field Modeling Study of Potential Future Discharge from the Delta Diablo*

3 Dilution was calculated as the ratio of ambient water to diffuser effluent. For example, a 10:1 dilution means that 1 part of effluent is mixed with 10 parts of ambient water.

Sanitation District Outfall, 2018). Scenarios 1 and 3, which modeled receiving water conditions during fall months in dry-year and critically dry year types, represent the "worst case" scenario relative to receiving water quality. These scenarios were used to assess potential water quality impacts related to project implementation. A summary of all modeled scenarios is provided in **Table 3.11-3**, and the Exponent Modeling Study is included in **Appendix D.**

TABLE 3.11-3
MODELING SCENARIOS APPLIED FOR THE NEAR-FIELD ANALYSIS

Scenario[1]		Year Type	Season and Year	Flow (mgd) Desal Brine	Flow (mgd) Blowdown and Dow Brine	Flow (mgd) Waste-water Effluent
1 Dry Year/ Max Recycled	a) Without-project (Min DDSD)	Dry	Fall 2013	a) 0	2013 Seasonal Avg.	0
	b) Project (Min DDSD)			b) 2		
2 Dry Year/ Min Recycled	a) Without-project (Typical DDSD)	Dry	Fall 2013	a) 0	2013 Seasonal Avg.	12
	b) Project (Typical DDSD)			b) 2		
3 Critical Dry Year/ Max Recycled	a) Without-project (Min DDSD)	Critical	Fall 2015	a) 0	2015 Seasonal Avg.	0
	b) Project (Min DDSD)			b) 2		
4 Critical Dry Year/ Min Recycled	a) Without-project (Typical DDSD)	Critical	Fall 2015	a) 0	2015 Seasonal Avg.	12
	b) Project (Typical DDSD)			b) 2		
5 Critical Dry Year Max Recycled-Spring	a) Without-project (Typical DDSD)	Critical	Spring 2015	a) 0	2015 Seasonal Avg.	12
	b) Project (Typical DDSD)			b) 2		
6 Dry Year ADWF Baseline	a) Without-project (16 mgd)	Dry	Winter 2013	a) 0	2013 Seasonal Avg.	16
	b) Project (16 mgd)			b) 2		
7 Dry Year Max Flow Winter	a) Without-project (32 mgd)	Dry	Winter 2013	a) 0	2013 Seasonal Avg.	32
	b) Project (32 mgd)			b) 2		

Source: Exponent, 2018 (Appendix D)

NOTES:
1. Scenarios 1 to 4 review receiving water conditions in fall months during Dry and Critically Dry Years. Scenario 5 evaluates the spring receiving water quality, relevant to fisheries. Scenarios 6 and 7 evaluated winter water receiving conditions.

The near-field effects analysis considers the extent to which the project could degrade water quality such that beneficial uses of receiving waters would be affected. Note that effects on fisheries as a beneficial use are discussed separately in Section 3.3, *Aquatic Biological Resources*.

Far-Field Effects

As explained in the project description, the amount of water delivered to City of Antioch customers would be the same with and without the proposed project. However, the proposed project would change the timing and amount of City diversions from its river intake and reduce the amount of Delta water purchased from CCWD. When the desalination project is operating, the City would divert 8 mgd from the river intake for desalination to produce 6 mgd of finished water and return 2 mgd as brackish desalination brine at DD's diffuser.

The project would result in an incremental net increase in water diversions from the Delta, and the amount shifted from diversion at CCWD intakes to be diverted by City of Antioch is very small relative to western Delta flows, representing less than 0.05 percent of total river flow (calculated from information in Exponent, 2018).

As such, it was deemed unnecessary to use the Delta hydrologic/operations model CALSIM 2.0. Rather, the potential for Delta operational change resulting from the proposed project was analyzed using DSM2 to simulate potential water quality changes at key Delta regulatory compliance locations. The DSM2 analysis was also used to evaluate potential for degradation of beneficial uses and water quality at specific intake locations across the Delta, and for further comparison to future scenarios that include cumulative conditions.

For this analysis, two California WaterFix scenarios produced by the California Department of Water Resources (DWR) were used as basis for the existing and future condition analyses. DWR's EBC2 scenario was used to represent existing conditions, and the Boundary 1 scenario was used to represent future conditions. The Boundary 1 scenario has been described by DWR as the model scenario that may result in the highest salinity in the western Delta resulting from adaptive management of the WaterFix project. Discharge from the Delta Diablo diffuser and the diversion of water at the City's intake were simulated for the EBC2 and Boundary 1 scenarios for project and without-project scenarios.

DSM2 model output describing hourly water quality at Antioch's drinking water intake was used, together with the Antioch operations model, to generate City diversions and brine discharge flow rates and salinity. Intake and brine discharge flow rates from the operations model were then used in DSM2 simulations by Exponent to evaluate salinity at several locations in the western Delta, including Antioch's intake location, Contra Costa Canal at Pumping Plant #1, the CCWD intakes on Old River and Middle River, Emmaton, and Jersey Point. Exponent simulated both with and without project scenarios for the full 16-year DSM2 simulation period (1976-1991) for the EBC2 and Boundary 1 scenarios and computed hourly salinity at the six Delta locations.

3.11.4 Impacts and Mitigation Measures

TABLE 3.11-4
SUMMARY OF IMPACTS – DELTA HYDROLOGY AND WATER QUALITY

Impacts	Significance Determinations
Impact 3.11-1: Changes in the location and timing of water diversion from the Delta, when combined with proposed discharges, could alter threshold concentrations established by the Regional Water Quality Control Board, or otherwise violate waste discharge or water quality standards.	LS
Impact 3.11-2: The proposed project could exceed applicable NPDES permit discharge standards.	LS
Impact 3.11-C-1: Implementation of the proposed project, in combination with other cumulative development, could contribute to cumulative degradation of water quality in the Delta	LS

NOTES:
LS = Less than Significant

Impact 3.11-1: Changes in the location and timing of water diversion from the Delta, when combined with proposed discharges, could alter threshold concentrations established by the Regional Water Quality Control Board, or otherwise violate waste discharge or water quality standards. ***(Less than Significant)***

Delta Flows

The City has pre-1914 appropriative water rights to divert water from the San Joaquin River along with the tributary flow from the Sacramento River. Under existing conditions, the City's operations utilize river water as much as possible given water quality and the existing pump station's 16 MGD fixed speed capacity constraints. When salinity at the City's intakes becomes too high, the City ceases diversions and meets all demands with purchased water from CCWD. Consistent with current City operations and the City of Antioch's pre-1914 water right, project implementation would include City diversion of up to 8 mgd of water to produce 6 mgd of desalinated water. Modeled City diversions by month for typical wet year and dry year conditions are shown in **Figures 2-13a and 2-14a**, Chapter 2.0, *Project Description*, and modeling was conducted over a 16-year period, with the average increase in annual diversions by the City of about 6,000 afy. In comparison to San Joaquin River flows in the vicinity of the proposed intake, this diverted volume represents less than 0.05 percent of total river flow (calculated from Exponent, 2018). Potential water quality effects associated with the discharge of concentrate from the RO process via the DD diffuser were examined using the Visual Plumes model and are identified in the "near-field" analysis discussion. Potential water quality impacts outside of the near-field were evaluated using the DSM2 model to review potential water quality changes at specific locations, and are described in the "far-field" impacts discussion.

Project implementation would likely result in a reduction in City of Antioch water purchases from CCWD, depending upon hydrologic year. The City's operational modeling over the 16-year period indicates that the reduction in CCWD water purchased would range from 0 afy to 6,900 afy, with an average reduction of 4,200 afy compared to existing conditions. It is beyond the scope of this analysis to review potential CCWD operational changes, if any, that may result from reduced purchases by the City of Antioch. CCWD operations are governed by several biological documents and water rights, none of which would be affected by reduced purchase of stored water, or as demonstrated in the analysis below, by project implementation. Additionally, DSM2 modeling for the far-field analyses includes CCWD diversions (with existing City of Antioch demands), and City of Antioch proposed diversions, and would therefore be considered conservative relative to potential effects to Delta operations, water quality, and beneficial uses.

Near-Field Impacts

The reverse osmosis desalination process would generate approximately 2 mgd of brine waste. Brine from the reverse osmosis system would be conveyed through an approximately 4.3-mile long, 12-inch-diameter dedicated pipeline (see Section 2.6.3, Brine Disposal for details). The diffuser pipe is 400 feet long and 42 inches in diameter, with three-inch diameter ports spaced eight feet on center and offset side to side, for a total of 50 ports discharging brine waste.

Extensive modeling of hydrologic and water quality conditions was performed using mixing and dispersion models to provide a quantitative basis from which to assess potential operational effects of the project alternatives associated with brine waste discharge on fisheries resources and aquatic habitats (see **Appendix D**). Dilution of brine water discharge was evaluated using the Visual Plumes UM3 model. The model evaluated dilution achieved by the Delta Diablo Sanitation District (DDSD) diffuser at the edge of the ZID[4] for the base (without-project) scenario and for project scenarios that assumed continuous operation of the proposed desalination facility.

As noted above, the simulated brine concentration of 32,000 mg/L is a conservatively high estimate for the salinity of the brine water discharge. This estimate relies on peak potential brine concentration for all modeled scenarios, and therefore will result in model output that has lower simulated dilution than typical / average conditions.

Table 3.11-5 provides numerical results for the modeled output, for each of the seven scenarios considered. Modeling of brine water discharge across different operation scenarios showed relatively minor increases in salinities in the effluent plume under the proposed project versus existing conditions (see also **Appendix D**, Table 8 of the Near-Field modeling results). As shown, the greatest hourly increase in TDS concentration at the ZID under the project would occur under Scenario 1 (fall 2013, dry conditions, 0 mgd wastewater discharge), where the project would cause TDS concentrations at the ZID to increase from 246 mg/L (without project) to 948 mg/L (with project), equivalent to an increase of 702 mg/L (values shaded in gray in table). The highest modeled concentration observed would occur under Scenario 3 (fall 2015, critical water year conditions, 0 mgd wastewater discharge), when peak TDS concentrations at the ZID under

4 The ZID is defined as the area where mixing is driven primarily by the buoyancy and/or initial momentum of the discharge, and defines area where the process of initial dilution is completed. Therefore, the cumulative ZID across the 50 ports was used to determine the potential area of influence of brine discharge on aquatic species.

the project are estimated to reach 1062 mg/L (project) compared to 532 mg/L (without-project) (values shaded in gray in table). Both of these scenarios, when TDS concentrations were the highest, occurred under the combined effects of dry or critical water year conditions plus zero wastewater discharge (where wastewater discharge would otherwise act to dilute the brine), as well as under low hourly ambient water current conditions.

Scenarios 2, 4, 5, 6, and 7, which included wastewater discharge, exhibited substantially lower with-project TDS concentrations at the edge of the ZID. Based on the minimum dilution results, Scenarios 1 and 3 have the greatest potential for increase in TDS concentrations and are reviewed in additional detail.

During periods of minimum dilution, when TDS concentrations at the edge of the ZID are highest, the size of the ZID (plume size) is relatively small. Reductions in plume size under the project scenarios in comparison to without-project scenarios reflect a denser plume due to elevated TDS concentrations in the effluent. This reduces the length of the ZID (the distance traveled by the plume perpendicular to the diffuser), as the discharged effluent sinks more quickly relative to comparable without-project scenarios. Further, as described above, where TDS concentrations at the edge of the ZID are highest when dilution is lowest. Scenarios 1 and 3, identified above as having the greatest effect on TDS concentrations during periods of low ambient current, have an estimated distance to the ZID of only 2 feet and 3 feet, respectively when effluent is discharged into an ambient current of 0.55 feet per second (ft/s) and -0.54 ft/s, respectively. Therefore, during the peak hourly TDS concentrations at the edge of the ZID, only a very small area is affected.

During periods of high ambient current, the length to the edge of the ZID is also substantially smaller under the project scenarios, again reflecting an effluent with increased density. The hourly maximum distance to the edge of the ZID for Scenarios 1 and 3 occurs during discharge into an ambient current of 2.45 ft/s, and result in ZID lengths of 28 feet (project) versus 85 feet (without project) for Scenario 1, and 35 feet (project) versus 98 feet (without project) for Scenario 3. Therefore, results of the modeled analysis indicate that plumes become more concentrated under the project, but are also smaller in size, and therefore, have the potential to affect a smaller parcel of water during initial mixing.

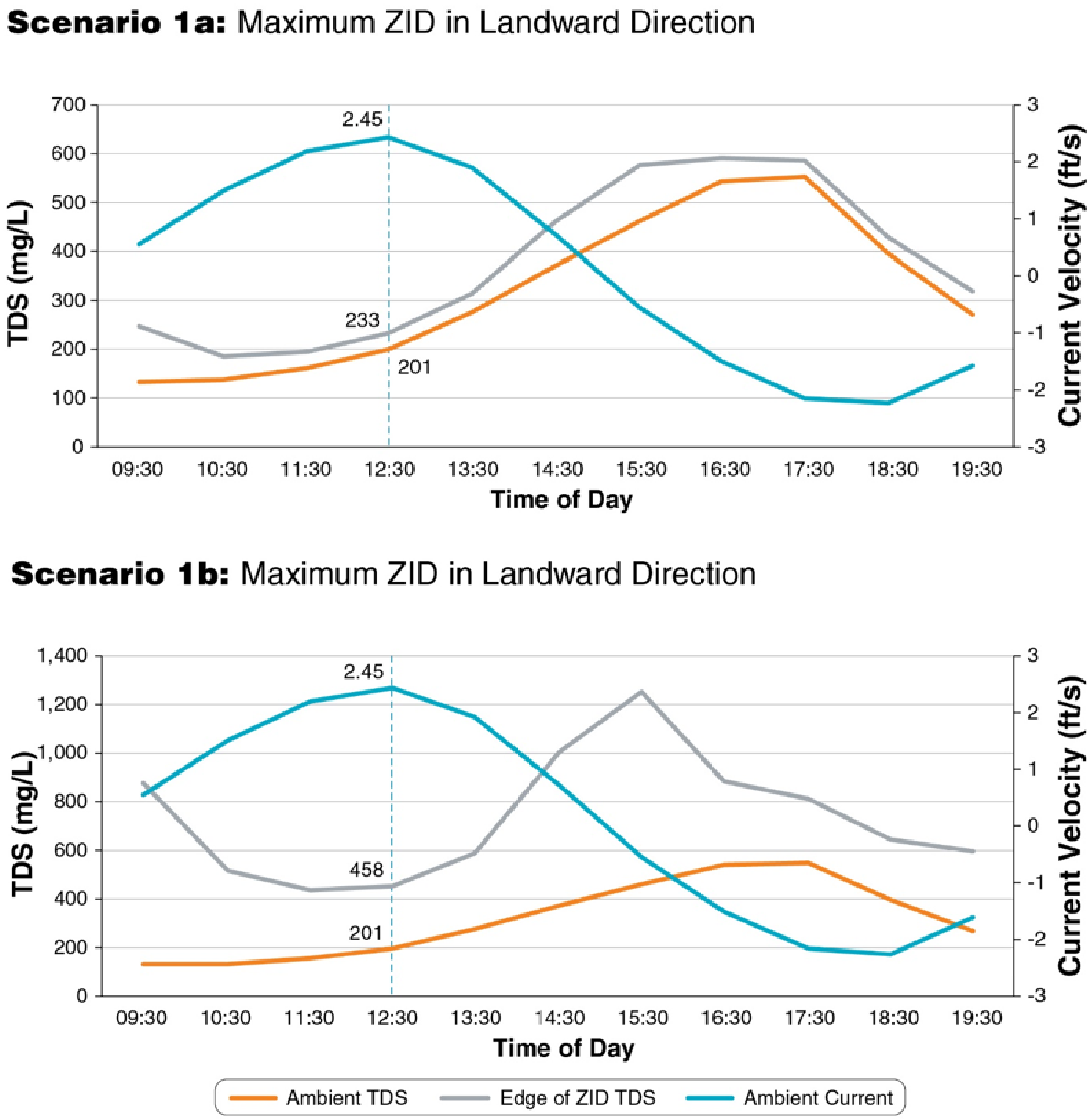
As noted above, Scenarios 1 and 3 show the greatest potential for salinity increase in the discharge plume; therefore, the following review of scenario-specific plume properties focuses on those two scenarios. **Figures 3.11-6** and **3.11-7** summarize results from the modeled analysis over an entire tidal cycle, for Scenario 1. The blue line in the figures represents current velocity, while ambient and discharge TDS are shown by the orange and grey lines, respectively. Comparing the without project and with project model results in **Figure 3.11-6**, which reveals generally higher TDS concentrations of the project in comparison to existing conditions. Nonetheless, ambient TDS is less than 8,500 mg/L at least 99.99 percent of the time based on the model scenario used for direct impacts (i.e., scenario EBC2, hourly data).

TABLE 3.11-5
NEAR-FIELD MODELED DILUTION RESULTS

Scenario		Total Flow (mgd)	Effluent TDS (mg/L)	Minimum Dilution and Plume Properties					Maximum ZID and Plume Properties				
				Minimum Dilution	Ambient TDS (mg/L)	TDS at ZID (mg/L)	Plume diameter (ft)[1]	Distance to edge of ZID (ft)[2]	Dilution	Ambient TDS (mg/L)	TDS at ZID (mg/L)	Plume diameter (ft)	Distance to edge of ZID (ft)[2]
1 Dry Year Max Recycled	a) Without-project (Min DDSD)	1.2	6346	55	135	**246**	**2**	**10**	191	201	233	2	85
	b) Project (Min DDSD)	3.2	22543	27	135	**948**	**3**	**3**	86	201	458	2	28
2 Dry Year Min Recycled	a) Without-project (Typical DDSD)	13.2	1285	55	464	479	17	21	599	201	203	24	1129
	b) Project (Typical DDSD)	15.2	5335	24	464	660	9	5	128	201	241	6	159
3 Critical Dry Year Max Recycled	a) Without-project (Min DDSD)	2.9	4835	63	464	**532**	**4**	**14**	167	201	228	3	98
	b) Project (Min DDSD)	4.9	15820	25	464	**1062**	**3**	**5**	99	201	357	3	35
4 Critical Dry Year Min Recycled	a) Without-project (Typical DDSD)	14.9	1611	34	135	177	12	10	337	201	205	16	559
	b) Project (Typical DDSD)	16.9	5198	24	135	341	9	5	133	201	238	7	170
5 Critical Dry Year Max Recycled-Spring	a) Without-project (Typical DDSD)	13.3	1257	45	464	481	14	16	325	201	204	13	663
	b) Project (Typical DDSD)	15.3	5288	23	464	662	8	5	119	201	243	6	126
6. Dry Year ADWF Baseline	a) Without-project (16 mgd)	18.2	1387	38	374	400	13	12	303	201	205	18	753
	b) Project (16 mgd)	20.2	4417	26	374	526	9	6	131	201	233	9	222
7 Dry Year PWWF Flow Winter	a) Without-project (32 mgd)	34.2	1127	33	374	396	16	10	223	201	205	26	348
	b) Project (32 mgd)	36.2	2832	34	374	444	16	12	218	201	213	27	512

NOTES:

1. For a plume diameter of 8 feet or less, plumes from individual ports do not merge. For plume diameters of more than 8 feet, individual plumes merge.
2. The distance from the diffuser to the edge of the ZID in one direction.
SOURCE: Exponent, 2018.



Note: The ambient current resulting in the maximum distance to the edge of the ZID is indicated by the vertical dashed line.
Source: Exponent, 2018.

Figure 3.11-6
Summary of TDS in ambient water and at the edge of ZID during a tidal cycle for Scenario 1 Without Project (TOP) and With Project (BOTTOM)

In general, the project results in a smaller plume and higher TDS concentrations at the edge of the ZID. The plume size and concentration varies over the tidal cycle, such that the effects of the project are greatest during slack tide and least when the ambient current is strongest. This situation is illustrated in **Figures 3.11-6**, which shows that the difference between ambient and edge of ZID TDS is largest following slack tide (zero ambient current). The difference between ambient and edge of ZID TDS narrows as soon as tidal flows begin to move again, and a similar cycle repeats during the next slack tide period. Model output illustrates similar results for the other scenarios. Therefore, while the project would increase TDS concentrations in effluent discharged through the diffuser, the increase in concentrations would be relatively small, the plumes would remain small relative to the width of the channel in New York Slough, and peak TDS concentrations would persist for a relatively short period of time. Additionally, modeled increases in TDS are well within the range of existing variability observed in the vicinity of the project (i.e., up to approximately 8,500 mg/L, as shown in **Figure 3.11-4**) up to at least 99.99% of the time. Therefore, project-related changes are not expected to noticeably alter or interfere with any beneficial use in the project area or its vicinity, and near-field impacts are considered **less than significant**.

Far-Field Impacts

For long-term or continuous discharges, concentrations of TDS from discharged effluent will reach a pseudo-steady state within the Delta over time, reflecting the balance between supply from the discharge location and the removal of discharged effluent from the Delta via advection and tidal flushing. The potential effects of the project on Delta water quality and beneficial uses at several locations in the western Delta beyond the edge of the ZID (i.e., in the far-field, away from the near-field zone at the point of discharge) were evaluated using DSM2. DSM2 model output describing water quality for the EBC2 and Boundary 1 scenarios (generated by DWR) were used as input to the Antioch operations model (described in Section 3.1.4) to compute City diversions and brine flow rates and salinity with and without the project over the 16-yr simulation period.[5] The discharge of brine by the City via the DDSD diffuser was included in DSM2 simulations for the existing condition (EBC2) and future with-project (Boundary 1) scenarios by Exponent to evaluate far-field salinity impacts at several locations in the western Delta, including Antioch's intake location, Contra Costa Canal at Pumping Plant #1, the CCWD intakes on Old River and Middle River, Emmaton, and Jersey Point. Hourly salinity over the 16-yr modeled period at the six Delta locations from the project DSM2 simulations was compared to salinity from the without-project DSM2 simulations to determine potential impacts (Exponent, 2018).

[5] In the near-field dilution evaluations, the salinity of the brine was assumed to be a constant 32,000 mg/L. In contrast, for the far-field model evaluations, the brine salinity was calculated for each hourly time step as a function of the ambient salinity (i.e., the salinity at the City's intake)."

Figures 3.11-7 to 3.11-10 summarize results from the far-field analysis for all modeled scenarios at the Delta compliance locations noted previously. These box-and-whisker plots show modeled median concentration (black bar), 75th percentile (top box), 25th percentile (bottom box), maximum (top whisker), and minimum (bottom whisker).[6] As shown, in all cases, changes in electrical conductivity[7] associated with the project would be nearly indistinguishable when summarized by water year type. Specifically, project related increases in electrical conductivity would be less than 17 micro-Siemens per centimeter (µS/cm) under the project during all water year types (see also **Tables 3.11-6** and **3.11-7**). These changes are equivalent to less than a 0.25 percent increase in comparison to baseline / without project conditions, including for median, 75th and 25th percentile, minimum, and maximum measured values. Additionally, as shown in **Figures 3.11-7 to 3.11-10**, these results hold for each of the modeled locations, including during all water years including those classified as critical, dry, normal, and wet years.

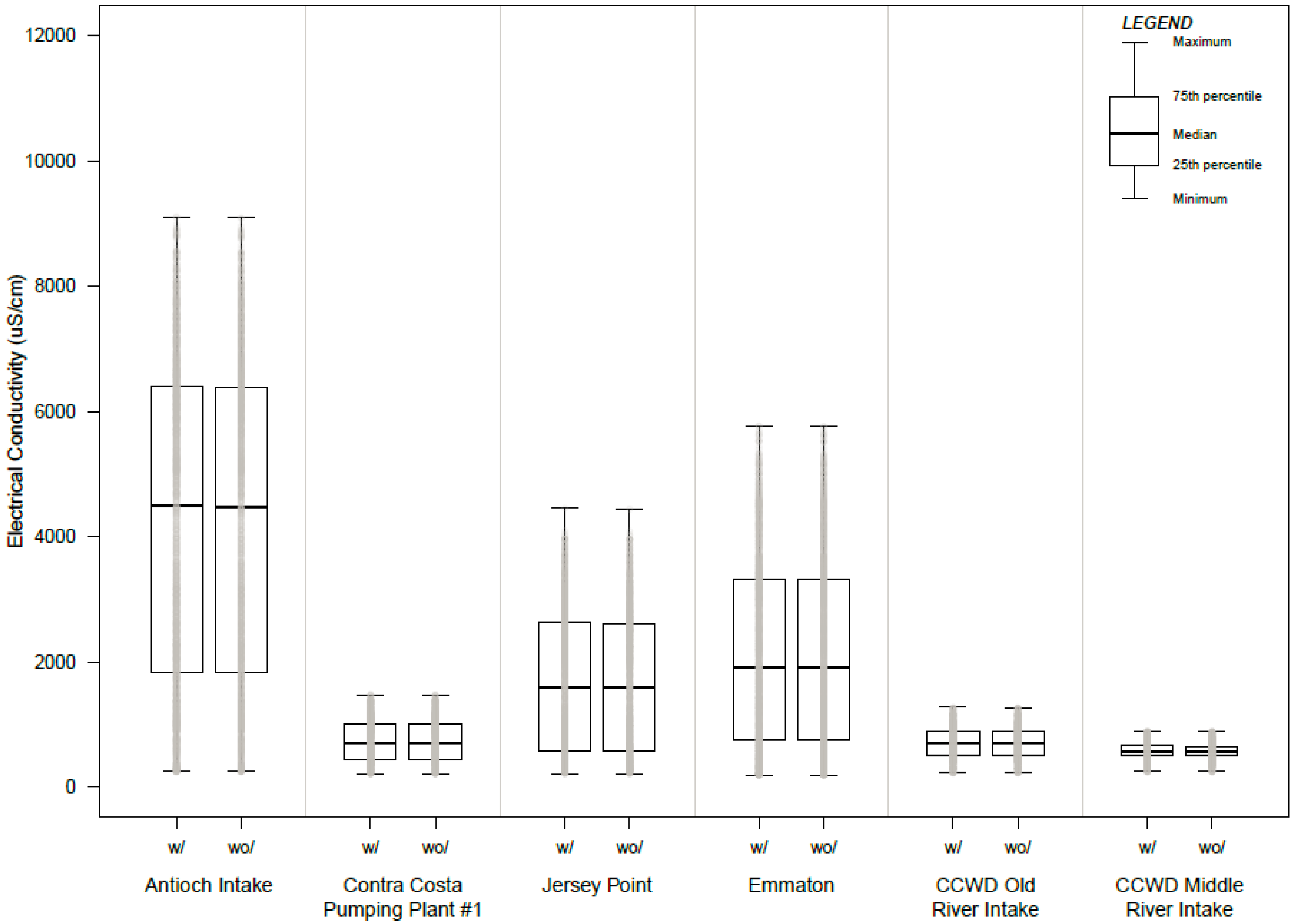
Table 3.11-6 summarizes modeled outcomes for without project and with project conditions, at each compliance location, and during each water year category, including median, 75th percentile, and maximum values for each. Net change associated with the project is shown in the *Difference* column. As shown, the greatest change in electrical conductivity was observed at the Antioch Intake site during normal water years, for the maximum value category, with an increase of 17 µS/cm (or 0.19%), when modeled conductivity increased from 9,011 under baseline conditions to 9,028 µS/cm with implementation of the project. Modeled results also showed a net increase of 16 µS/cm for the maximum value category during critical water years at the Antioch Intake, 14 µS/cm during dry years, and 15 µS/cm during wet years, all with background conductivities of at least 9,000 µS/cm and resulting in a change of 0.19% or less. Modeled results at all other compliance points indicated a difference of 10 µS/cm or less, including at CCWD's existing intakes and pumping plants. These changes are smaller than existing fluctuations in ambient water quality that occur over the course of a typical tidal cycle.

Table 3.11-7 provides additional detail of the far-field model analysis, including monthly average percent contribution of project discharges to electrical conductivity over the 16-year simulation period. As shown, the project contributed less than 0.15 percent of total conductivity, on average, during all months and water year types. During wet years, the project would contribute less than 0.1 percent of total conductivity during all months and at all identified locations. Project contributions range from 0.1 to 0.15 percent during September through January of Normal water years, during August through February in Dry water years, and during June through February of Critical water years. Outside of these months, project contributions to conductivity at CCWD's intakes would be less than 0.1 percent.

6 The percentiles, median, minimum, and maximum values were selected in order to provide a standardized and comparable summary of modeled results completed in support of the project. 25th and 75th percentiles collectively encompass the middle 50% of the data, and therefore summarizes the spread of electrical conductivity modeled results across the overall results distribution.

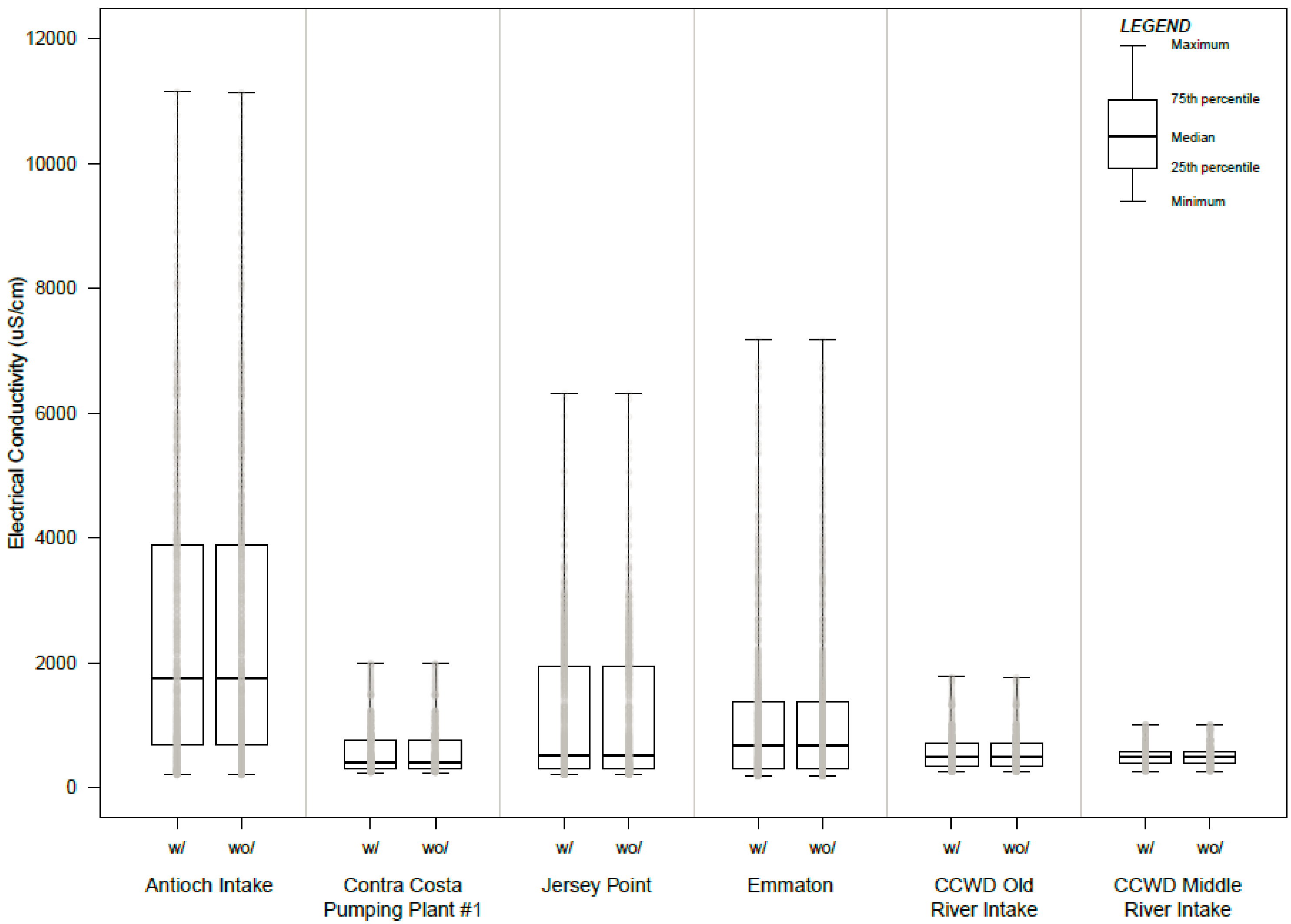
7 Results are reported as electrical conductivity rather than as TDS concentration because the conversion to TDS concentration varies spatially across the Delta; because DSM2 model output for salinity is provided as electrical conductivity, leaving far-field results as electrical conductivity facilitates intercomparison between compliance points.

These changes are identifiable within these modeled scenarios; however, under far-field conditions, these changes are smaller than existing fluctuations in ambient water quality that occur over the course of a typical tidal cycle, and would be difficult to measure. Additionally, none of the modeled scenarios would result in an increase in electrical conductivity that would prevent or impede withdrawal of Delta water by other users for municipal, agricultural, or industrial supply. Furthermore, these changes are not expected to be noticeable or interfere with other beneficial uses relevant to the Delta, and would likely be impossible to detect in most cases. Therefore, the potential changes in electrical conductivity (and therefore in TDS) associated with the project would be **less than significant**.



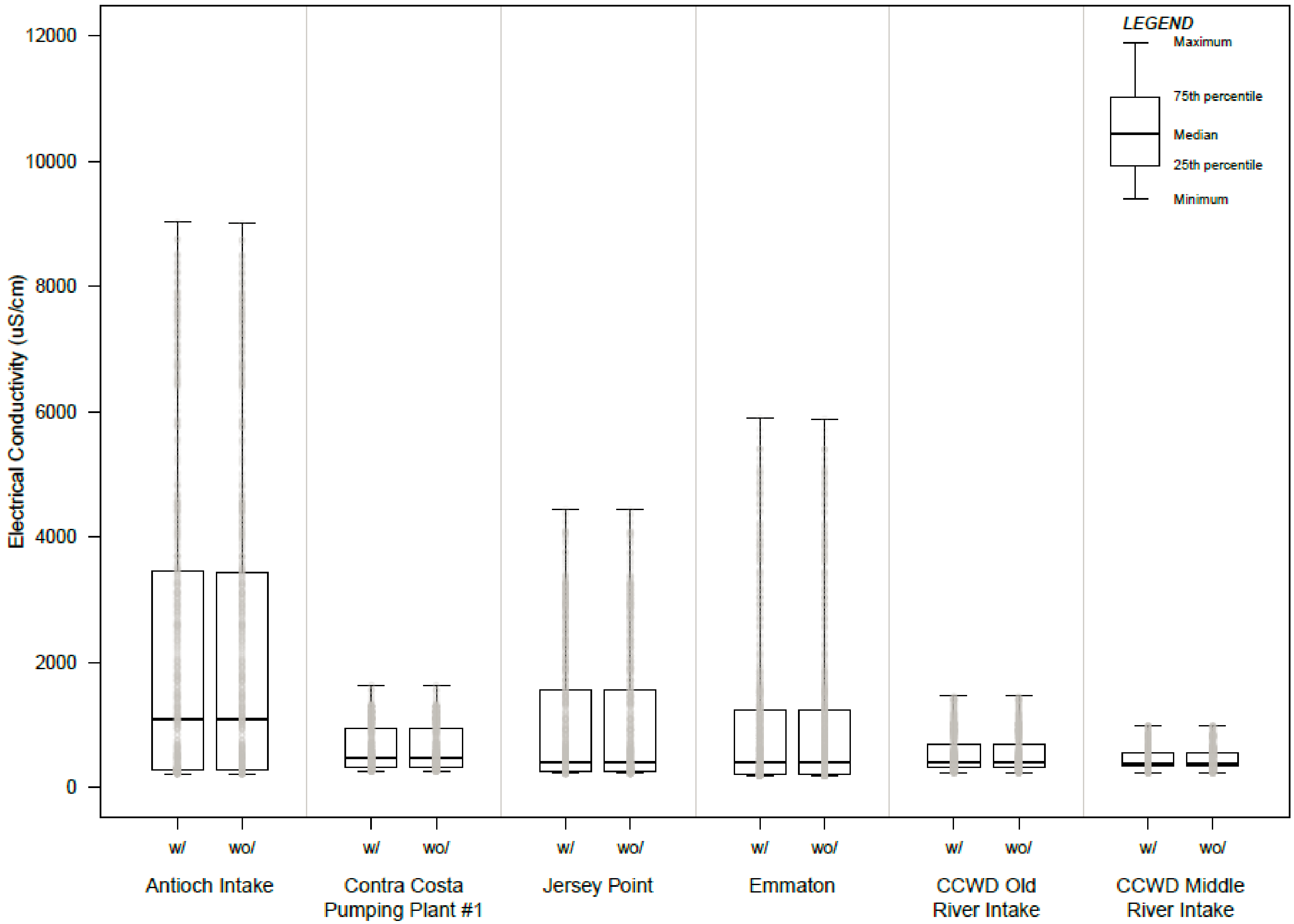
Source: Exponent, 2018

Figure 3.11-7
Project and Without Project Electrical Conductivity During Critical Water Years



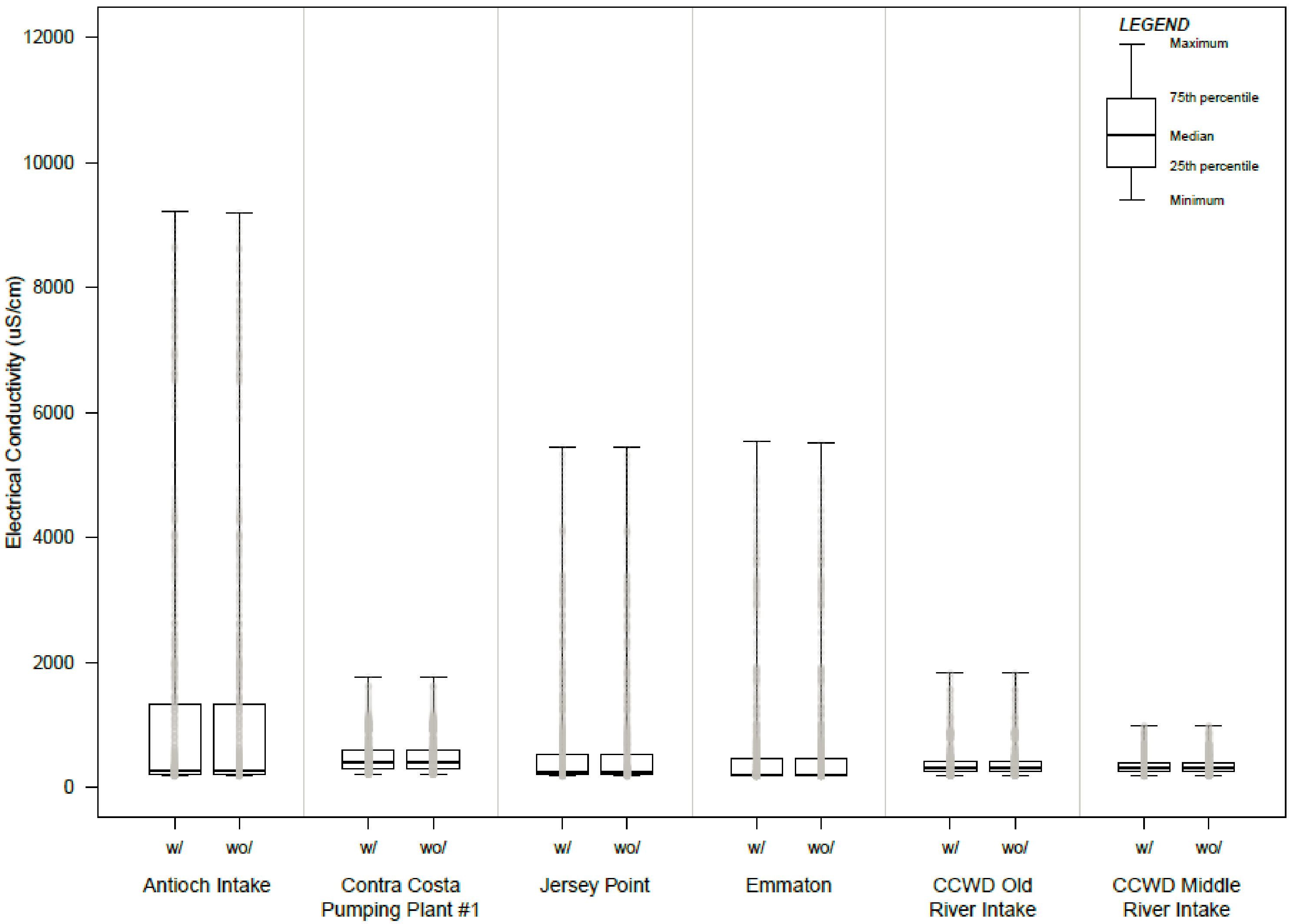
Source: Exponent, 2018

Figure 3.11-8
Project and Without Project Electrical Conductivity During Dry Water Years



Source: Exponent, 2018

Figure 3.11-9
Project and Without Project Electrical Conductivity During Normal Water Years



Source: Exponent, 2018

Figure 3.11-10
Project and Without Project Electrical Conductivity During Wet Water Years

TABLE 3.11-6
FAR-FIELD MODEL RESULTS SUMMARY, ELECTRICAL CONDUCTIVITY (μS/CM)

Location	Station	Median			75th Percentile			Maximum		
		Project	No Project	Difference	Project	No Project	Difference	Project	No Project	Difference
Normal Water Years										
Antioch Intake	RSAN007	1,094	1,092	1.3	3,442	3,434	7.9	9,028	9,011	17
Contra Costa Pumping Plant #1	CHCCC006	475	475	0.3	933	932	1.5	1,635	1,632	2.9
Jersey Point	RSAN018	390	389	0.52	1,551	1,548	2.9	4,446	4,436	9.4
Emmaton	RSAC092	395	395	0.095	1,228	1,226	2.4	5,897	5,887	10
CCWD Old River Intake	ROLD034	391	391	0.054	684	683	0.48	1,460	1,457	2.8
CCWD Middle River Intake	CHVCT000	385	385	0.064	555	555	0.48	984	983	1.4
Critical Water Years										
Antioch Intake	RSAN007	4,487	4,476	11	6,403	6,389	14	9,108	9,092	16
Contra Costa Pumping Plant #1	CHCCC006	702	702	0.99	1,014	1,013	1.7	1,471	1,468	2.7
Jersey Point	RSAN018	1,594	1,591	2.9	2,620	2,614	6.1	4,449	4,439	10
Emmaton	RSAC092	1,914	1,911	3.6	3,315	3,309	6.2	5,773	5,763	9.3
CCWD Old River Intake	ROLD034	706	706	0.51	897	895	1.4	1,270	1,268	2.3
CCWD Middle River Intake	CHVCT000	554	553	0.42	653	652	0.79	887	885	1.4
Dry Water Years										
Antioch Intake	RSAN007	1,757	1,754	3.8	3,898	3,889	8.1	11,155	11,141	14
Contra Costa Pumping Plant #1	CHCCC006	390	390	0.23	765	764	1.2	1,989	1,986	3.4
Jersey Point	RSAN018	512	511	0.81	1,944	1,940	4.2	6,318	6,307	11
Emmaton	RSAC092	677	676	1.2	1,369	1,367	2.3	7,183	7,172	11
CCWD Old River Intake	ROLD034	494	494	0.2	706	705	1.1	1,773	1,770	3
CCWD Middle River Intake	CHVCT000	489	489	0.43	574	574	0.0012	1,011	1,010	1.3
Wet Water Years										
Antioch Intake	RSAN007	265	265	-0.00012	1,323	1,321	2.2	9,217	9,202	15.4
Contra Costa Pumping Plant #1	CHCCC006	396	395	0.073	590	590	0.0011	1,765	1,761	3.4
Jersey Point	RSAN018	245	245	0.0014	531	531	0.71	5,445	5,434	11
Emmaton	RSAC092	193	193	0.000031	453	453	0.17	5,530	5,521	9.2
CCWD Old River Intake	ROLD034	300	300	0.000091	406	405	0.28	1,828	1,825	3.6
CCWD Middle River Intake	CHVCT000	306	306	0.092	400	399	0.33	990	989	1.5

TABLE 3.11-7
FAR-FIELD MODEL RESULTS, DETAIL BY WATER YEAR TYPE: AVERAGE PERCENT CONTRIBUTION OF THE PROJECT TO ELECTRICAL CONDUCTIVITY, BY SITE (PERCENT)

Water Year Type / Station	Location	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Critical													
RSAN007	Antioch Intake	0.130	0.130	0.128	0.136	0.107	0.094	0.073	0.083	0.106	0.123	0.143	0.147
CHCCC006	CCWD Pump Plant #1	0.095	0.087	0.084	0.091	0.072	0.044	0.023	0.014	0.026	0.067	0.106	0.106
RSAN018	Jersey Point	0.128	0.122	0.132	0.125	0.094	0.065	0.041	0.059	0.089	0.135	0.148	0.147
RSAC092	Emmaton	0.100	0.100	0.099	0.091	0.072	0.052	0.044	0.056	0.078	0.098	0.114	0.117
ROLD034	CCWD Old River	0.087	0.078	0.084	0.086	0.062	0.038	0.020	0.011	0.022	0.076	0.106	0.104
CHVCT000	CCWD Middle River	0.047	0.039	0.050	0.061	0.042	0.024	0.014	0.008	0.009	0.048	0.082	0.072
Dry													
RSAN007	Antioch Intake	0.079	0.096	0.082	0.117	0.093	0.046	0.017	0.047	0.073	0.096	0.117	0.130
CHCCC006	CCWD Pump Plant #1	0.044	0.036	0.037	0.045	0.053	0.024	0.005	0.001	0.005	0.050	0.091	0.101
RSAN018	Jersey Point	0.064	0.071	0.084	0.106	0.073	0.025	0.005	0.015	0.051	0.113	0.138	0.137
RSAC092	Emmaton	0.055	0.059	0.056	0.075	0.048	0.016	0.007	0.022	0.046	0.074	0.093	0.102
ROLD034	CCWD Old River	0.038	0.034	0.045	0.061	0.044	0.019	0.005	0.002	0.004	0.056	0.098	0.099
CHVCT000	CCWD Middle River	0.019	0.016	0.027	0.040	0.027	0.011	0.003	0.001	0.001	0.030	0.071	0.068
Normal													
RSAN007	Antioch Intake	0.129	0.136	0.120	0.095	0.020	0.000	0.000	0.000	0.016	0.068	0.097	0.129
CHCCC006	CCWD Pump Plant #1	0.077	0.079	0.086	0.077	0.044	0.014	0.001	0.000	0.000	0.008	0.044	0.066
RSAN018	Jersey Point	0.124	0.122	0.131	0.069	0.009	0.000	0.000	0.000	0.003	0.055	0.103	0.105
RSAC092	Emmaton	0.098	0.103	0.090	0.031	0.005	0.000	0.000	0.000	0.006	0.038	0.067	0.087
ROLD034	CCWD Old River	0.074	0.077	0.093	0.067	0.008	0.001	0.000	0.000	0.000	0.011	0.043	0.060
CHVCT000	CCWD Middle River	0.035	0.040	0.066	0.045	0.002	0.000	0.000	0.000	0.000	0.003	0.017	0.029
Wet													
RSAN007	Antioch Intake	0.074	0.078	0.051	0.033	0.003	0.000	0.000	0.000	0.015	0.049	0.070	0.094
CHCCC006	CCWD Pump Plant #1	0.056	0.053	0.047	0.027	0.005	0.003	0.001	0.000	0.000	0.008	0.029	0.044
RSAN018	Jersey Point	0.075	0.078	0.051	0.025	0.002	0.000	0.000	0.000	0.005	0.047	0.075	0.063
RSAC092	Emmaton	0.057	0.053	0.029	0.016	0.000	0.000	0.000	0.000	0.008	0.029	0.049	0.046
ROLD034	CCWD Old River	0.052	0.058	0.048	0.025	0.004	0.000	0.000	0.000	0.000	0.009	0.029	0.035
CHVCT000	CCWD Middle River	0.026	0.034	0.036	0.018	0.002	0.000	0.000	0.000	0.000	0.002	0.010	0.015

Source: Exponent, 2018.

Potential release of pollutants associated with construction of the proposed facilities is addressed in Section 3.10, *Local Hydrology and Water Quality*. The project would not result in other operational sources of water quality contamination or pollution. Specifically, the reverse osmosis system would not result in the dosing or addition of other water quality pollutants or other chemicals into the brine stream. Therefore, the project would not release or contribute to the release of new or increased loads of water quality pollutants that could degrade receiving water quality. Refer to Impact 3.11-2 for a discussion of relevant toxicity parameters.

Finally, as shown in **Table 3.11-8**, the project would be consistent with applicable policies included in the Delta Plan.

TABLE 3.11-8
APPLICABLE PLANS AND POLICIES

Policies	Consistency
Delta Plan	
WQ R1 Water quality in the Delta should be maintained at a level that supports, enhances, and protects beneficial uses identified in the applicable State Water Resources Control Board or regional water quality control board water quality control plans.	**No Conflict.** As discussed previously, the project would not result in the deterioration of water quality in the Delta, such that beneficial uses would be affected. Potential water quality degradation would be limited in extent, would be within the existing range of water quality levels, with peak levels limited to short periods of time during slack tide. As such, the project would not degrade or cause the degradation of water quality in the Delta such that beneficial uses would be affected, and the project is consistent with WQ R1 of the Delta Plan.
WQ R2 Covered actions should identify any significant impacts to water quality.	**No Conflict.** The present analysis contained in this section reviews potential for the project to cause or create significant impacts to water quality. No significant or potentially significant impacts were identified. The project is consistent with WQ R2 of the Delta Plan.

In summary, the project would generate effluent that would contain higher concentrations of dissolved solids (salts) in comparison to Delta Diablo's existing discharge. These changes would alter the density of the discharge plume, such that the plume would be smaller and more concentrated in comparison to existing conditions. Nonetheless, these changes would be limited temporally and spatially. Additionally, the near-field model analysis relied on highly conservative assumptions, including that the project would produce a brine with a constant concentration of 32,000 mg/L, equivalent to consistently drawing water with a TDS concentration of 8,000 mg/L (i.e., brine have a salinity four times that of the intake water). This is a considerable overestimate. Actual intake TDS concentrations would be below 7,000 mg/L at least 95 percent of the time, and below 3,000 mg/L at least 60 percent of the time (**Figure 3.11-4**). As such, brine concentrations would be comparatively lower than 32,000 mg/L (assumes fourfold concentration) in all but a handful of cases, as TDS is less than 8000 mg/L 99.99 percent of the time for EBC2 and 99.95 percent of the time for Boundary 1. As a result, discharges from the project are not expected to substantially affect beneficial uses.

Outside of the immediate dilution zone, DSM2 model analysis estimated changes in electrical conductivity (as a proxy for TDS) at six key locations across the Delta during critical, dry, normal, and wet water years. Changes in electrical conductivity were 17 μS/cm or less, equivalent to a change of 0.15 percent or less. Most modeled changes in electrical conductivity were even smaller, including at all CCWD facilities. These changes are not likely detectable using industry standard field measurement equipment. Finally, the project would not conflict with relevant stipulations of the Delta Plan, and would not introduce other sources of water quality pollutants during operation. Therefore, potential impacts related to Delta water quality, operations, or beneficial uses are considered **less than significant**.

Mitigation Measure:

None required.

Impact 3.11-2: The proposed project could exceed applicable NPDES permit discharge standards. ***(Less than Significant)***

As shown in **Table 3.11-2**, Delta Diablo's existing NPDES permit includes water quality effluent limitations for the following constituents: BOD, TSS, Oil and Grease, pH, Total Residual Chlorine, Copper (total recoverable), Cyanide (total), Dioxin-TEQ, and Total Ammonia (as N). The brine produced by the project would not add a new category of water quality pollutants to Delta Diablo's effluent stream. However, existing water quality pollutants in Delta waters would remain in the brine produced by the project. From a mass load perspective, the project would not alter the total mass of any such constituent in Delta waters: all constituents in the Delta source water taken into the proposed system would be released back into the Delta. However, the proposed RO system would concentrate these constituents by up to a factor of 4, which would be diluted both by other flows prior to discharge (e.g., treated wastewater, cooling water flows from generating stations) and by ambient flows in the Delta just beyond the point of discharge. To assess potential for conflict with Delta Diablo's NPDES permit, existing water quality impairments within the Western Delta, and the project's potential to contribute to water quality degradation for each of the constituents regulated under the permit was evaluated.

Biochemical Oxygen Demand (BOD). Levels of BOD in project effluent could be caused by very high concentrations of dissolved or particulate organic matter. Delta waters contain dissolved and particulate organic matter. However, the increase in BOD caused by the project would be small relative to background concentrations of BOD in the Delta, and therefore would not meaningfully contribute to BOD values in effluent, in comparison to baseline conditions.

Total Suspended Solids (TSS) concentrations in the Delta can vary widely, from as low as 1 to 2 mg/L to very high values that occasionally exceed 1,000 mg/L. However, suspended solids would be screened out of the proposed system during pre-treatment and disposed of separately, upstream of the reverse osmosis units, in order to prevent fouling of the membranes. This removal process would ensure that residual TSS, even when concentrated during the reverse osmosis process, would be minimal, and would not contribute to elevated TSS concentrations in project effluent.

Oil and Grease. Oil and grease are typically introduced through mechanical equipment or runoff from roadways or industrial facilities. Delta waters do not contain significant levels of oil and grease. Additionally, project equipment would not include mechanical equipment where oil or grease could come into contact with water. Therefore, the project would not contribute to elevated oil and grease concentrations in effluent.

pH. As shown in **Table 3.11-1**, the Western Delta does not have an existing impairment for pH, which is expected to be near neutral both at intake and in the brine following reverse osmosis. Therefore, the project would not meaningfully contribute to elevated or reduced pH levels in project effluent.

Total Residual Chlorine. Chlorine is a disinfectant used at the existing Delta Diablo facility to minimize bacteriological and viral constituents in discharged wastewater. Chlorine is not utilized in the reverse osmosis process. Therefore, the project would not contribute to elevated levels of chlorine in project effluent.

Copper, Total Recoverable. Copper can be a substantial concern in industrial facilities where very soft water (i.e., with low TDS) and/or water with low pH is in contact with copper plumbing and other copper fixtures. In contrast, water produced by the proposed reverse osmosis system would have high TDS concentrations and near neutral pH. The Western Delta is not identified as water quality limited for copper. As such, the project is not expected to contribute elevated copper levels to project effluent. Water quality data from the Regional Monitoring Program (RMP) for Sacramento/San Joaquin River indicate source water copper levels have an average concentration of 2.5 µg/L. Assuming the RO process results in a 4 times concentration of constituents, copper concentrations in brine generated by the RO process would average approximately 10 ug/L. Recent Delta Diablo effluent copper concentrations are approximately 5.5 ug/L,[8] and Delta Diablo's NPDES effluent limit for copper is 35 ug/L. Using the Delta Diablo effluent flow scenarios previously identified [0 mgd (maximum recycled water use) and 12 mgd (typical operations)], corresponding copper concentrations would be 10 ug/L (0 mgd) and 6.14 ug/L,(12 mgd), both of which would comply with the effluent limit established to be protective of aquatic life beneficial uses.

Dioxin. Dioxin is highly toxic and generated during the incomplete combustion of various substrates. The project would not operate any equipment or support any activities that would generate or release dioxin. Additionally, the Western Delta is not identified as water quality limited for dioxin. Therefore, the project is not expected to contribute elevated dioxin levels to project effluent.

Total Ammonia. Ammonia is a commonly regulated constituent from municipal wastewater treatment discharges. However, the proposed reverse osmosis system would not include any elements or components that could release ammonia. Additionally, the Western Delta is not listed as water quality limited for ammonia. As such, the project is not expected to contribute elevated ammonia levels to project effluent. Water quality data from the Regional Monitoring Program

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8 SWB CIWQS database. Available copper data from June 2011 – December 2017. Arithmetic average with two outlier values of 16 and 49 ug/L excluded.

(RMP) for Sacramento/San Joaquin River indicate source water ammonia (NH_3) levels have an average concentration of 0.07 mg/L.[9] Assuming the RO process results in a 4 times concentration of constituents, ammonia concentrations in brine generated by the process would average approximately 0.28 ug/L. Recent Delta Diablo effluent ammonia concentrations are approximately 45 mg/L. Delta Diablo's NPDES effluent limit for ammonia is 170 mg/L. Using the Delta Diablo effluent flow scenarios previously identified of 0 mgd (maximum recycled water use) and 12 mgd (typical operations), corresponding ammonia concentrations would be 0.28 ug/L (0 mgd) and 38.6 ug/L,(12 mgd), both of which would comply with the effluent limit established to be protective of aquatic life beneficial uses.

As discussed above, the project is not expected to generate or result in elevated levels of constituents identified in Delta Diablo's current NPDES Permit. Project implementation would include, through agreement between the City of Antioch and Delta Diablo, integration of brine disposal into Delta Diablo's NPDES permit reissuance as part of the regular NPDES permit review cycle, which is scheduled for 2019. The NPDES Permit incorporates the water quality objectives from the Basin Plan that are protective of beneficial uses of the receiving waters. Project implementation would be required to comply with Delta Diablo's NPDES permit requirements, and is not anticipated to result exceedance of effluent limitations. Therefore, potential impacts are considered less than significant.

<u>Mitigation Measure:</u>

None required.

Cumulative Impacts

Impact 3.11-C-1: Implementation of the proposed project, in combination with other cumulative development, could contribute to cumulative degradation of water quality in the Delta. ***(Less than Significant)***

This cumulative impacts analysis focuses on the far-field effects of the proposed project, which considers the effects of the proposed system across the Western and Western-Central Delta. The modeled cumulative far-field scenario includes implementation of WaterFix, as well as other relevant cumulative scenario projects listed in Chapter 2.0, Project Description. As discussed for direct impacts, for long-term or continuous discharges, the concentrations of TDS from discharged effluent would reach a long-term, pseudo-steady state within the Delta over time and represent the balance between supply from the discharge location and the removal of discharge discharged effluent from the Delta via flushing. Far-field changes therefore represent the potential for the project, in consideration of other cumulative scenario projects, to generate water quality impacts that could develop over time, and that could affect locations within the Delta.

Analogous to the direct impact analysis, **Figures 3.11-11 to 3.11-14** summarize results from the cumulative scenario far-field analysis, for all modeled scenarios, at the following Delta locations:

[9] SFEI RMP database. Average of BG20 (Sacramento River) and BG30 (San Joaquin River) stations. Available ammonia data from June 2011 – December 2017.

the Antioch Intake, Contra Costa Pumping Plant No. 1, Jersey Point, Emmaton, CCWD's Old River Intake, and CCWD's Middle River Intake. As shown, in all cases, changes in electrical conductivity associated with the project would be less than 17 µS/cm under the project during all water year types. Specifically, changes in maximum conductivity of 14 or 15 µS/cm were identified during normal and critical water years when electrical conductivity exceeded 11,000 µS/cm or 10,000 µS/cm under the cumulative without project scenario, and during normal, critical, and dry years for 75th percentile electrical conductivity, when values exceeded 6,200 µS/cm even without the project. Therefore, similar to direct impacts, these changes are equivalent to a 0.23-percent-or-less increase in comparison to baseline / without project conditions, including for median, 75th and 25th percentile, minimum, and maximum measured values. Additionally, these results hold for each of the modeled locations, including during all water years including those classified as critical, dry, normal, and wet years.

The largest changes in electrical conductivity are anticipated to occur at the Antioch Intake site. Modeled results at all other compliance points indicated a difference of 9.4 µS/cm or less, including at CCWD's existing intakes and pumping plants. These changes are computed by DSM2 for the modeled scenarios; however, under cumulative scenario far-field conditions, these changes would be difficult or impossible to detect based on the accuracy of industry standard instrumentation. Additionally, neither of the modeled cumulative scenarios would result in an increase in electrical conductivity that would prevent or impede withdrawal of Delta water by other users for municipal, agricultural, or industrial supply. Furthermore, these changes would not interfere with other beneficial uses in the Delta, and would be impossible to detect in most cases.

Other cumulative scenario projects are not expected to include discharge of brine from reverse osmosis. Instead, cumulative scenario projects focus primarily on changes to water supply management within the Delta. Although WaterFix has the potential to change EC within the Delta, as demonstrated above, the project's potential contribution to EC change is incidental. Therefore, the project's contribution to incremental increases in EC would not affect Delta beneficial uses, and would not be cumulatively considerable. Therefore, this impact is considered **less than significant**.

Finally, with respect to NPDES permit discharge standards at Delta Diablo's existing wastewater outfall, no other cumulative scenario projects would be expected to alter or worsen the quality of discharge from Delta Diablo's diffuser. Therefore, **no cumulative impact** would occur related to exceedance of applicable NPDES permitted discharges.

<u>Mitigation Measure:</u>

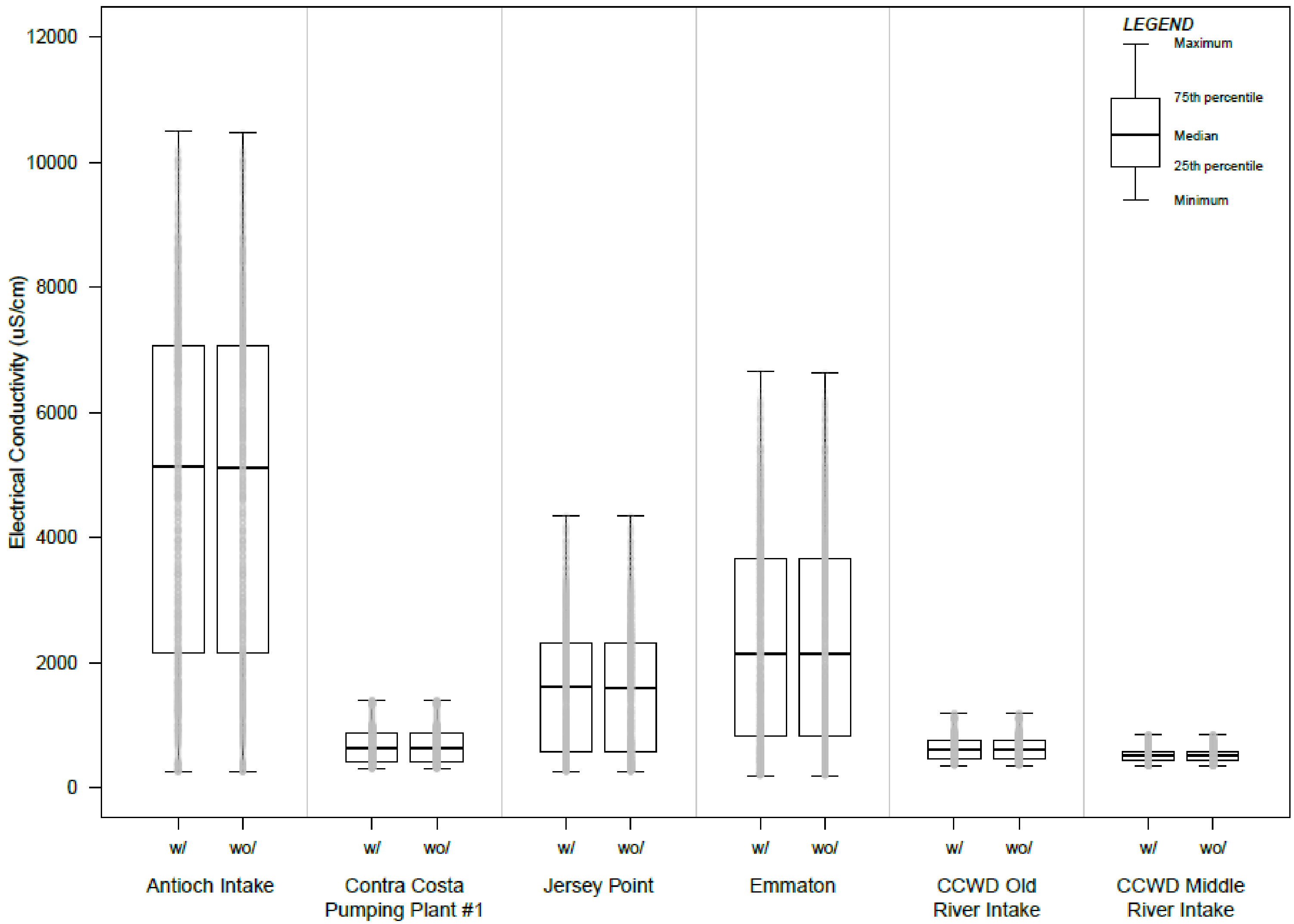
None required.

Impact 3.11-C-2: Implementation of the proposed project, in combination with other cumulative development, could potentially affect the timing of outfall capacity limitations associated with development identified under the Delta Diablo Master Plan. *(Less than Significant)*

The Delta Diablo outfall capacity is expected to provide adequate capacity to accommodate growth within the Delta Diablo service area; however, outfall capacity constraints were identified in the Master Plan. Replacement or modification of the outfall is identified in the Delta Diablo Master Plan as a potential future improvement. Project implementation would contribute 2 mgd of brine downstream of treatment plant processes when the desalination plant is operating. Depending upon development rates within the Delta Diablo service area, the project's increment of brine, in combination with effluent generated within the service area, could alter the timeframe at which capacity of the outfall is reached. However, the project's contribution would be primarily during summer and fall months, when peak wet weather flows would not be anticipated, and recycling would be highest, thereby reducing the amount of effluent discharged via the outfall. As such, the project's increment would not be cumulatively considerable, and would only be considered a contribution when and if planned development in the Delta Diablo service area occurs such that outfall capacity is reached. Therefore, the City's contribution is considered **less than cumulatively considerable**.

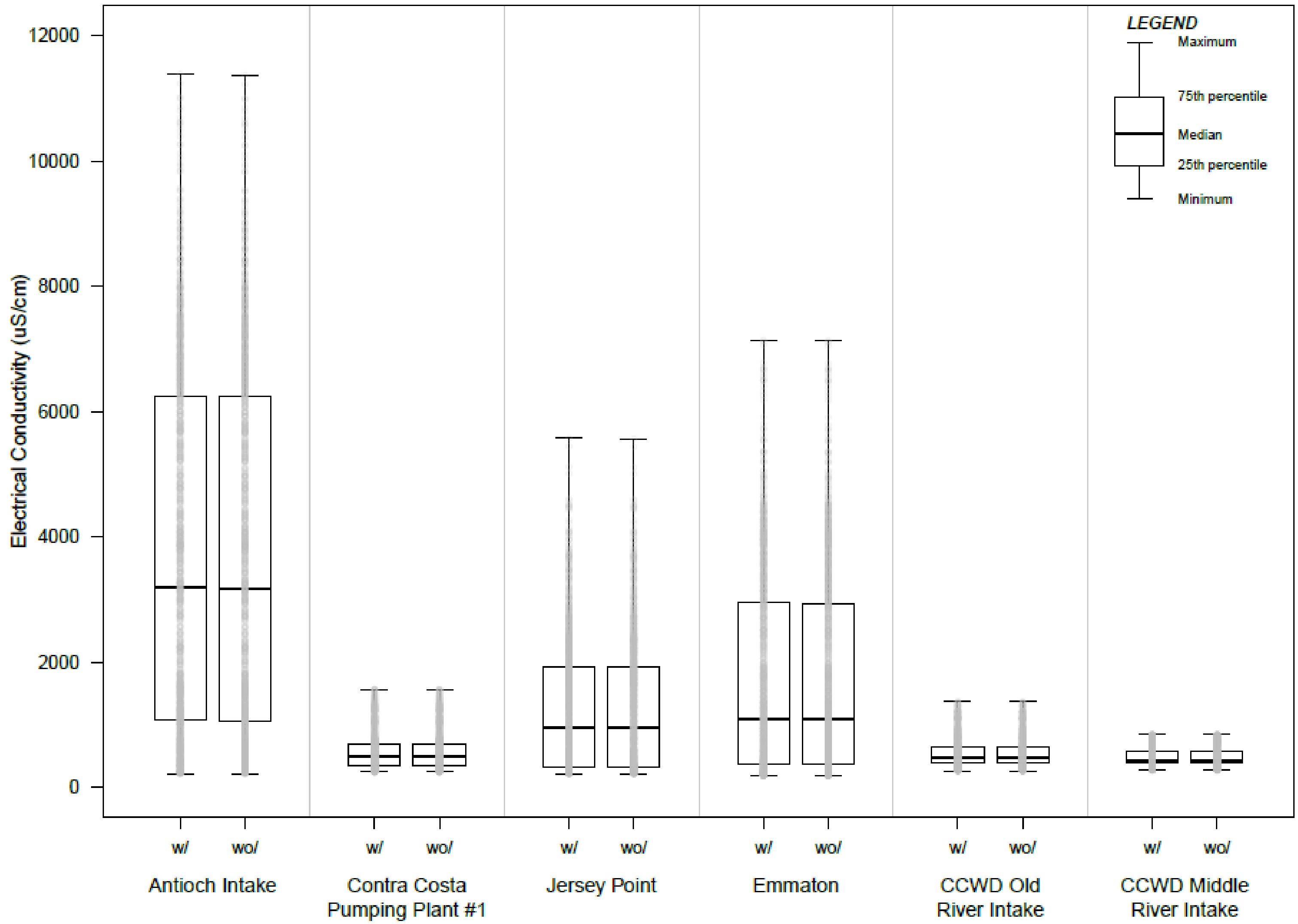
Mitigation Measure:

None required.



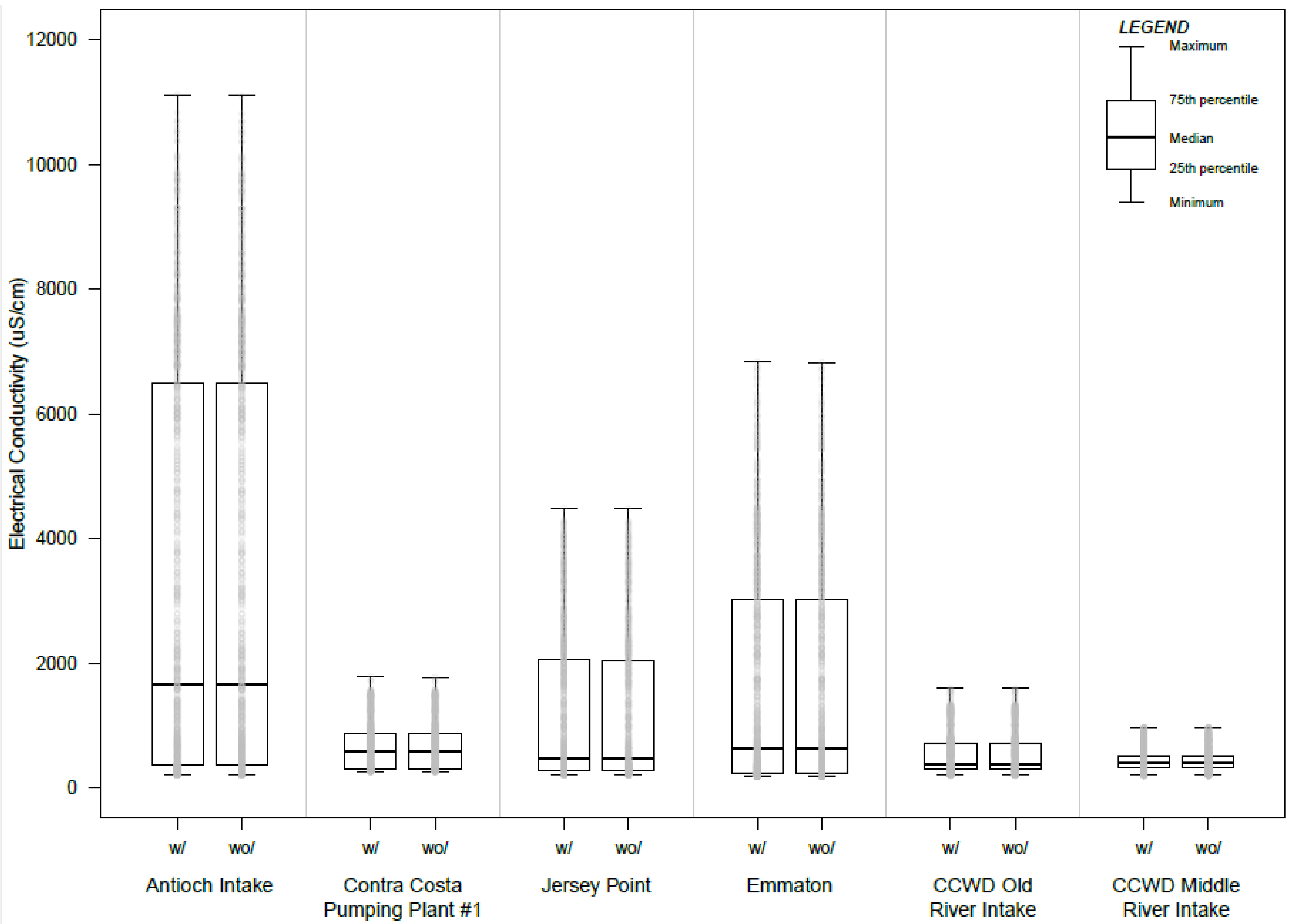
Source: Exponent, 2018

Figure 3.11-11
Cumulative Scenario With and Without Project: Electrical Conductivity During Critical Water Years



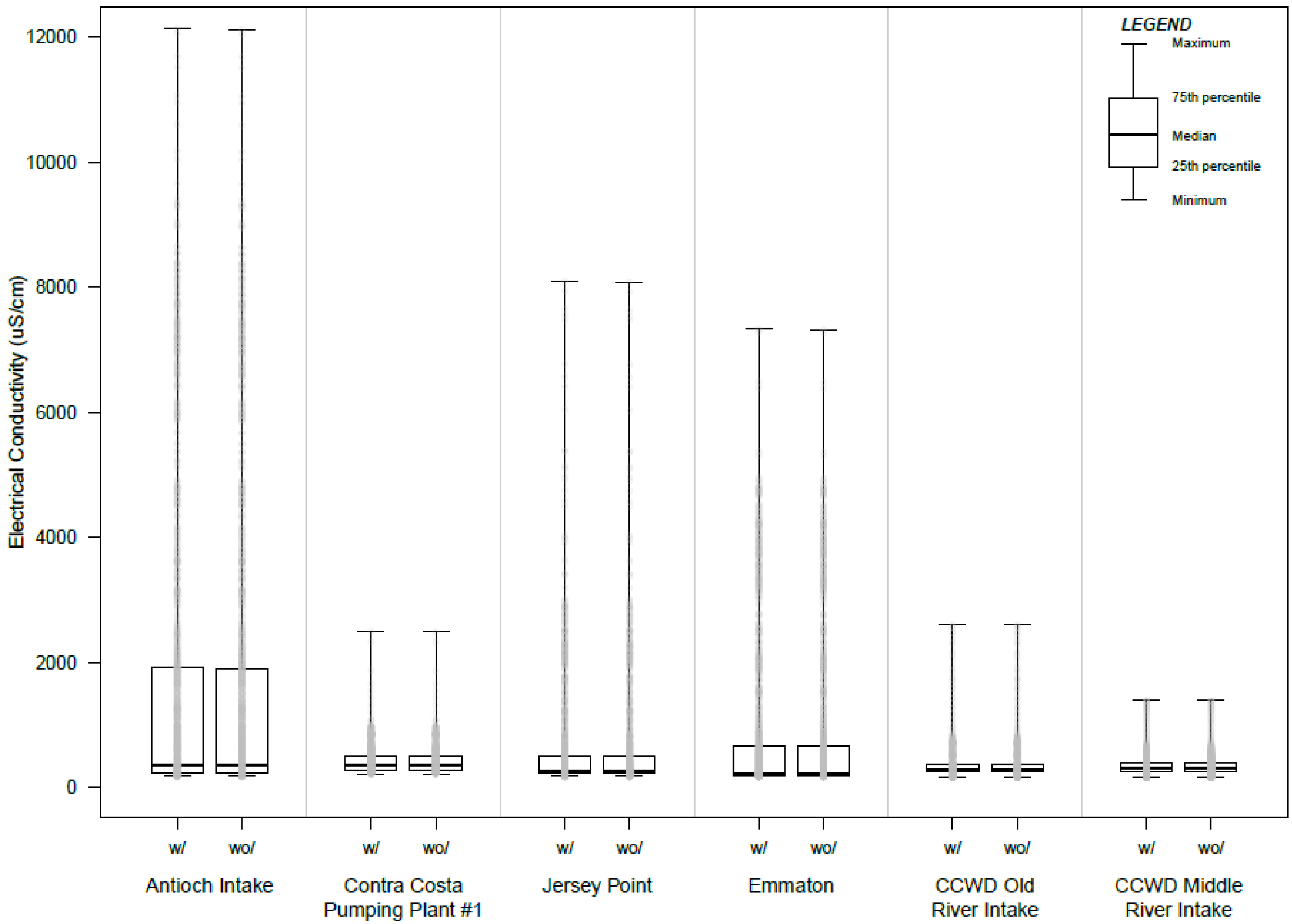
Source: Exponent, 2018

Figure 3.11-12
Project and Without Project Electrical Conductivity During Dry Water Years



Source: Exponent, 2018

Figure 3.11-13
Project and Without Project Electrical Conductivity During Normal Water Years



Source: Exponent, 2018

Figure 3.11-14
Project and Without Project Electrical Conductivity During Wet Water Years

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3.12 Land Use and Planning

Sections	Tables

This section describes existing land uses in the vicinity of the project components which are located in the City of Antioch and a portion of the City of Pittsburg. This section analyzes the potential for the proposed project to affect established land uses, and evaluates project consistency with applicable plans, policies, and ordinances governing land use in the project area.

Comments received on the NOP related to Land Use and Planning concern consistency with the Delta Plan land use policies. The proposed project's consistency with these policies are discussed in Section 3.12.2, *Regulatory Framework*.

3.12.1 Environmental Setting

City of Antioch

Project components would primarily be located within the city of Antioch, while a small portion of a proposed pipeline would be located in the city of Pittsburg. The city of Antioch is located in eastern Contra Costa County at the western edge of the San Joaquin-Sacramento Delta. The city encompasses approximately 50 square miles and is bordered by the city of Pittsburg to the west, San Joaquin River to the north, cities of Oakley and Brentwood to the east, and unincorporated Contra Costa County to the south. Open space uses, including agriculture, open water, recreational lands, and vacant lands account for approximately half the land within the city (City of Antioch, 2003a). Within the developed portion of the city, single-family residential uses cover the largest area (approximately 23 percent). Industrial areas account for approximately 3 percent of the land and generally concentrated in the northern portion of the city. Commercial areas account for nearly 3 percent of land and are generally concentrated along major roadway corridors.

City of Pittsburg

The city of Pittsburg encompasses approximately 12 square miles and is bordered by Bay Point to the northeast, Contra Costa County to the south, and Antioch to the west. Residential development covers the largest area (approximately 32 percent). Industrial areas account for approximately 12 percent of the land area and are generally located along the waterfront. Commercial areas account for 5 percent of the land area and are generally located along the City's major transportation corridors (City of Pittsburg, 2001).

River Intake Pump Station Site Land Use and Vicinity

The existing river intake pump station is located approximately 200 feet offshore in a 1-acre parking lot site owned by the City. The parking lot site is at the terminus of Fulton Shipyard Road. The General Plan designates the site as Public/Institutional. The site is bordered by the San Joaquin River to the north, industrial/manufacturing uses to the east, a diner/restaurant and lot used for staging construction material, and a fenced grassy open space area to the west.

Water Treatment Plant Site Land Use and Vicinity

The proposed desalination facility would be located within the fenceline of the existing 25-acre WTP at 401 Putnam Street. Land uses surrounding the WTP site include a public school (Park Middle School) to the northwest and undeveloped open space areas to the northwest and east. The nearest private residences are directly west along View Drive, south along Terranova Drive, and northeast along Elizabeth Lane. The WTP site is closed to the public and includes several structures and facilities associated with water treatment. Land cover is predominantly paved surfaces and structures. There are no sensitive habitats in the vicinity of the WTP, and the site is not within any habitat or natural communities' conservation plans.

Land Uses in the Vicinity of the Pipelines

The new raw water pipeline would be located in the city of Antioch and would follow one of two routes. From the connection with the existing raw water pipeline, the proposed route would head west along Putnam Street, then south along D Street before entering the WTP site; the optional route would head south along Lone Tree Way, and then west across the WTP's southern property line. In the vicinity of the WTP, portions of the new brine disposal pipeline would be co-located with the new raw water pipeline. The proposed brine disposal pipeline route would head north across the WTP property and cross Putnam Street; the optional alignment would head east across the WTP's southern property line, north along Lone Tree Way, and then west along Putnam Street. Lands uses adjacent to the raw water pipeline and brine disposal pipeline routes are generally residential and commercial.

To reach the connection with the Delta Diablo WWTP in the city of Pittsburg, the majority of the new brine disposal pipeline would continue along rights-of-way through the city of Antioch, with a minor portion crossing into city of Pittsburg rights-of-way. Land uses adjacent to the pipeline would be residential, public/institutional, and commercial.

Delta Diablo WWTP Land Use

The Delta Diablo WWTP is located at 2500 Pittsburg-Antioch Highway and the site located within both the cities of Antioch and Pittsburg. This is an industrial facility that provides secondary treatment of wastewater, consisting of screening, grit removal, primary and secondary clarification, biological treatment by trickling towers and/or aeration basins, chlorination, and de-chlorination. The WWTP has an average dry weather design capacity to provide secondary level treatment for 19.5 mgd. Treated wastewater is discharged through a deep-water outfall to New York Slough.

3.12.2 Regulatory Framework

Federal

There are no applicable federal regulations related to land use.

State

California State Lands Commission

The California State Lands Commission (SLC) has jurisdiction and management authority over all ungranted tidelands, submerged lands, and the beds of navigable lakes and waterways. The State Lands Commission also has certain residual and review authority for tidelands and submerged lands legislatively granted in trust to local jurisdictions. All tidelands and submerged lands, granted and ungranted, as well and navigable lakes and waterways, are subject to the protections of the Common Law Public Trust. Generally, the SLC has jurisdiction over land below mean high tide. Public and private entities may apply to the SLC for land leases or permits on State lands for purposes, such as dredging and placement of new submarine infrastructure. California Government Code (CGC) Section 65940 specifies the requirements of a surface land lease application.

For this project, it is noted that the SLC granted the City of Antioch sovereign tide and submerged lands in trust in 1955. In 1989, the original grant and its amendments were repealed and replaced with a new granting statute and to convey certain tidelands and submerged lands to the City (California State Lands Commission, 1989).

California Government Code

California Government Code Section 53091(d) states that "building ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment, or transmission of water, wastewater, or electrical energy by a local agency". Additionally, California Government Code Section 53091(e) establishes that "zoning ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment, or transmission of water…." The proposed facilities evaluated in this EIR all relate exclusively to the production, generation, treatment, and transmission of water and are, therefore, legally exempt from Cities of Antioch and Pittsburg building and zoning ordinances, including their respective General Plans.

Delta Stewardship Council – Delta Plan

The Delta Stewardship Council is a State agency created through the Delta Reform Act of 2009 to develop and implement a legally enforceable long-term management plan for the Delta and Suisun Marsh. The Delta Plan applies a common sense approach based on the best available science to achieve the coequal goals of protecting and enhancing the Delta ecosystem and providing for a more reliable water supply for California, while protecting and enhancing the unique cultural, recreational, and agricultural values of the Delta as an evolving place.

The city of Antioch is within the Delta Secondary Zone, as shown in Appendix 6 of the Delta Plan; therefore, Delta Plan policies need to be evaluated to determine whether the proposed project would conflict with the Delta Plan.

The following policies from the Delta Plan are relevant to land use and planning:

DP P1 (a) New residential, commercial, and industrial development must be limited to the following areas, as shown in Appendix 6 and Appendix 7:

(1) Areas that city or county general plans as of May 16, 2013, designate for residential, commercial, and industrial development in cities or their spheres of influence;

DP P2 (a) Water management facilities, ecosystem restoration, and flood management infrastructure must be sited to avoid or reduce conflicts with existing uses or those uses described or depicted in city and county general plans for their jurisdictions or spheres of influence when feasible, considering comments from local agencies and the Delta Protection Commission. Plans for ecosystem restoration must consider sites on existing public lands, when feasible and consistent with a project's purpose, before privately owned sites are purchased. Measures to mitigate conflicts with adjacent uses may include, but are not limited to, buffers to prevent adverse effects on adjacent farmland.

(b) For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, this policy covers proposed actions that involve the siting of water management facilities, ecosystem restoration, and flood management infrastructure.

Local

City of Antioch General Plan

The Antioch General Plan (City of Antioch, 2003b) encompasses a comprehensive strategy for managing the community's future. The General Plan is the community's statement of what is in its interest, and is the City's most important statement regarding its ultimate physical, economic, and cultural development through 2028. The General Plan is a legally binding policy document to be used by City officials, the development community, citizens, and others to guide decisions regarding the future development and management of community resources, including land, the natural environment, and public services and facilities.

The Antioch General Plan designates the existing WTP site as Open Space, Neighborhood Commercial, and Medium Low Density Residential. Proposed pipelines would be constructed within road rights-of-way adjacent to areas designated as medium/low density residential, public/institutional, and business park. The river intake pump station site is designated Public/Institutional.

The following objectives and policies from the General Plan are relevant to land use and planning:

8.4.1 Water Facilities Objective: Ensure a water system capable of providing high quality water to existing and future residences, businesses, institutions, recreational facilities, and other uses within the City of Antioch during peak use conditions, with sufficient water in storage reservoirs for emergency and fire protection needs.

> ***Policy 8.4.2.a*:** As part of the design of water systems, provide adequate pumping and storage capacity for both drought and emergency conditions, as well as the ability to provide fire flows required by the Contra Costa County Fire Protection District.
>
> ***Policy 8.4.2.d*:** Maintain existing levels of water service by protecting and improving infrastructure, replacing water mains and pumping facilities as necessary, and improving the efficiency of water transmission facilities.

City of Antioch Zoning Ordinance

The new River Intake Pump Station site is zone Urban Waterfront District (WF). Section 9-5.3803 of the City of Antioch Municipal Code states that utility substations are permitted in the WF district.

The WTP property is zoned Open/Space/Public Use District (OS) and Single-Family Low Density Residential District: 4-6 du/acre (R-6). Section 9-5.3803 of the City of Antioch Municipal Code states that utility substations are allowed with a Use Permit in R-6 and OS districts.

City of Pittsburg General Plan

The Pittsburg General Plan (City of Pittsburg, 2001) addresses issues related to physical development, growth, and conservation of resources in the City's Planning Area. The portion of the brine discharge pipeline that would be constructed within the road rights-of-way in Pittsburg is designated as Industrial in the General Plan.

City of Pittsburg Municipal Code

The Delta Diablo WWTP is located in an area zoned for General Industrial (IG). Chapter 18.54 of the City of Pittsburg Zoning Code specifies that IG districts are to provide sites for intense industrial uses on large parcels occupied by or directly adjacent to existing heavy industrial uses, as well as on small parcels in the vicinity of heavy industrial uses. Areas are established for heavy industrial uses in order to protect them, to the extent feasible, from disruption and competition for space from unrelated retail and commercial uses that are more appropriately located elsewhere in the city. Major utilities are permitted with a Use Permit from the Planning Commission on such lands.

3.12.3 Analysis, Impacts and Mitigation

Significance Criteria

Based on Appendix G of the CEQA *Guidelines*, the project would have a significant impact on land use and planning if it would:

- Physically divide an established community;
- Conflict with any 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.

Methodology and Assumptions

Construction and Operational

The following section provides an impact analysis for the proposed project and discusses the thresholds listed above to determine the impact significance. The impacts analysis discusses the significance of the changes from the existing conditions as a result of the project. Impacts of the project would be considered significant if the project would divide an established community; conflict with any applicable land use plan, policy, or regulation; or conflict with any applicable habitat conservation plan or natural community conservation plan.

Issues Not Discussed in Impacts

Due to the nature of the project, there would be no impact related to the following topics for reasons described below:

- ***Physically divide an established community.*** The raw water connection pipeline and brine disposal pipelines would be located underground in roadway rights-of-way, and the overlying areas would be restored after construction. Although the project would add a desalination facility at the WTP and intensify uses at the site, it would be located inside the property line of the WTP. The new river intake pump station would be located within an existing City-owned parking lot, and would replace the function of an existing pump station. The aboveground structures would not divide an established community or established land uses. Therefore, the criterion related to the division of an established community is not applicable to the proposed project and is not discussed further.
- ***Conflict with any applicable HCP or NCCP.*** There are no habitat conservation plans or natural community conservation plans for the project area. The project would therefore have no impact on HCP or NCCP. This criterion is not discussed further.

Impacts and Mitigation Measures

Table 3.12-1 summarizes the proposed project's impacts and significance determinations related to land use.

TABLE 3.12-1
SUMMARY OF IMPACTS – LAND USE AND PLANNING

Impacts	Significance Determinations
Impact 3.12-1: The proposed project would not conflict with an applicable land use policy included in a general plan or zoning ordinance adopted for the purpose of avoiding or mitigating an environmental effect.	LS
Impact 3.12-C-1: Cumulative impacts related to land use.	LS

NOTES:
LS = Less than Significant

Impact 3.11-1: The proposed project would not conflict with an applicable land use policy included in a general plan or zoning ordinance adopted for the purpose of avoiding or mitigating an environmental effect. *(Less than Significant)*

Section 15125(d) of the CEQA *Guidelines* requires analysis of potential "conflict with any 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." There are numerous plans, policies, and regulations that either are implicated by relevant significance criteria or were adopted for environmental purposes and thus are evaluated under the appropriate topical sections of this EIR. As an example, Section 3.2, *Air Quality*, evaluates whether the project would conflict with or obstruct implementation of an applicable air quality plan. Accordingly, potential conflicts with air quality plans are discussed in Section 4.2.

This section evaluates the proposed project's potential to conflict with applicable plans, policies, and regulations pertaining to land use. The applicable plans, policies, and regulations related to these topics are presented in Section 3.12.2, *Regulatory Framework*, and discussed further in the following paragraphs.

Table 3.12-2 identifies applicable plans, policies, and objectives related to land use and applicable to the proposed project. The table includes an analysis of the project's potential to conflict with these provisions.

As noted in Section 3.12.2, *Regulatory Framework,* pursuant to California Government Code Section 53091(d) and (e), facilities for the production, generation, storage, treatment, and transmission of water supplies are exempt from local land use policies and zoning ordinances. Therefore, in accordance with Sections 53091(d) and 53091(e) of the California Government Code, the proposed desalination facility, intake pump station, and pipelines are exempt from the provisions of the City of Antioch and City of Pittsburg General Plan Land Use Plans and Zoning Ordinances.

For the reasons set forth in **Table 3.12-2,** the project would not conflict with plans, policies, and regulations pertaining to land use. The impact would be **less than significant**. The physical environmental effects of the proposed project's construction and operation are discussed in their respective sections in this EIR.

<u>Mitigation Measure:</u>

None required.

TABLE 3.12-2
APPLICABLE PLANS AND POLICIES

Policies	Consistency
Delta Plan	
DP P1 (a) New residential, commercial, and industrial development must be limited to the following areas, as shown in Appendix 6 and Appendix 7: (1) Areas that city or county general plans as of May 16, 2013, designate for residential, commercial, and industrial development in cities or their spheres of influence.	**No Conflict.** The new river intake pump station would be located in a parking lot designated as public/institutional. The proposed project is sponsored by the City, and would provide a public water source; therefore, the intake and pump station would be consistent with this designation. The lands surrounding the WTP site are designated as open space, commercial, and residential. Since the proposed desalination facilities would be located within the fenceline of the existing WTP, the proposed desalination facilities would not conflict with this policy. The pipelines would be installed in road rights-of-way and would not conflict with this policy.
DP P2 (a) Water management facilities, ecosystem restoration, and flood management infrastructure must be sited to avoid or reduce conflicts with existing uses or those uses described or depicted in city and county general plans for their jurisdictions or spheres of influence when feasible, considering comments from local agencies and the Delta Protection Commission. Plans for ecosystem restoration must consider sites on existing public lands, when feasible and consistent with a project's purpose, before privately owned sites are purchased. Measures to mitigate conflicts with adjacent uses may include, but are not limited to, buffers to prevent adverse effects on adjacent farmland. (b) For purposes of Water Code section 85057.5(a)(3) and section 5001(j)(1)(E) of this Chapter, this policy covers proposed actions that involve the siting of water management facilities, ecosystem restoration, and flood management infrastructure.	**No Conflict.** The proposed project could be characterized as a "water management facility", and would be sited to avoid conflicts with existing uses described in the City of Antioch General Plan. There are no plans for ecosystem restoration on public lands in the proposed project.
City of Antioch General Plan	
8.4.1 Water Facilities Objective: Ensure a water system capable of providing high quality water to existing and future residences, businesses, institutions, recreational facilities, and other uses within the City of Antioch during peak use conditions, with sufficient water in storage reservoirs for emergency and fire protection needs. 8.4.2.a: As part of the design of water systems, provide adequate pumping and storage capacity for both drought and emergency conditions, as well as the ability to provide fire flows required by the Contra Costa County Fire Protection District. 8.4.2.d: Maintain existing levels of water service by protecting and improving infrastructure, replacing water mains and pumping facilities as necessary, and improving the efficiency of water transmission facilities.	**No Conflict.** The purpose of the project is to diversify the City's water supply portfolio, provide operational flexibility, and reduce dependence on imported water supply. The project would not result in an increase in capacity of the water system. The project would provide a supplemental source of high quality water to the City of Antioch's service district during peak use conditions, and would ensure that sufficient water is stored in reservoirs for drought, emergency, and fire protection needs. The project would replace the existing intake pump station, provide adequate pumping capacity, and would improve the efficiency of water transmission facilities.

Cumulative Impacts

Impact 3.11-C-1: Implementation of the proposed project, in combination with past, present, and reasonably foreseeable future development would not result in a cumulatively significant impact related to land use. *(Less than Significant)*

As described in Section 3.12.3, the project would not divide an established community and would have no impact; therefore, it would not cause or contribute to any cumulative impact related to this issue. The proposed project is not within a HCP or NCCP area, and would have no impact; therefore, it would not cause or contribute to any cumulative impact related to this issue.

The geographic context for the cumulative land use impacts encompass the project components sites and immediate vicinities. A cumulative land use impact would occur if the proposed project in combination with the cumulative projects identified in **Table 3-1** would result in a change in land use that would divide an existing community or cause a conflict with applicable land use policies, plans, or regulations adopted for the purpose of avoiding or mitigating an environmental effect. As discussed in Impact 3.11-1, the proposed project is not expected to conflict with any land use plans, policies, or regulations adopted for the purpose of avoiding or mitigating an environmental effect. The cumulative projects in the immediate vicinity of the project components sites include project numbers 1 (Almond Knolls), 2 (Water Treatment Plant Disinfection Improvements Project), 10 (Mt. Diablo Resource Recovery Park Service), 15 (East County Bioenergy Project), and 14 (Dow Modernization Project). The project in combination with past, present and reasonably foreseeable projects identified in Table 3.1-1 would intensify uses in the project vicinity. The cumulative projects would be required to be comply with the Cities' General Plans and applicable land use plans and regulations and would not substantially change the mix of land uses in the project vicinity. It is therefore expected that, the proposed project, in combination with cumulative projects would not result in significant cumulative impacts related to land use. On the basis of this discussion, cumulative land use impacts are considered **less than significant**.

References – Land Use and Planning

City of Antioch, 2003a. *Draft General Plan Update Environmental Impact Report, City of Antioch, Contra Costa County, California,* July 2003. Prepared by LSA.

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City of Pittsburg, 2017. Pittsburg Municipal Code, Section 18.54. Available at www.codepublishing.com/CA/Pittsburg/html/Pittsburg18/Pittsburg1854.html#18.54. Accessed on December 28, 2017.

Delta Stewardship Council, 2014. Regulations. November 14, 2014. Amended November 22, 2016. Available at deltacouncil.ca.gov/delta-plan-regulations. Accessed December 27, 2017.

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3.13 Noise and Vibration

Sections	Figures	Tables
3.13.1 Environmental Setting 3.13.2 Regulatory Framework 3.13.3 Analysis, Impacts, and Mitigation	3.13-1 Noise Monitoring Locations 3.4-2 Critical Habitat in the Vicinity of the Project Area	3.13-1 Typical Sound Levels Measured in the Environment 3.13-2 Measured Short-Term Noise Levels on the Project Site 3.13-3 Construction Vibration Damage Criteria 3.13-4 Ground-Borne Vibration Impact Criteria for General Assessment 3.13-5 Summary of Impacts – Noise and Vibration 3.13-6 Typical Noise Levels from Construction Equipment 3.13-7 Vibration Velocities for Construction Equipment

This section evaluates the potential noise and vibration impacts associated with construction and operation of the proposed project and associated pipelines. This section describes the existing noise environment and identifies nearby sensitive receptors, presents relevant local noise ordinances and standards, and evaluates the potential for the proposed project to result in noise and vibration impacts. This section focuses on noise and vibration impacts on humans and structures; potential noise and vibration effects on marine and terrestrial wildlife are addressed in Sections 3.3, *Aquatic Biological Resources*, and 3.4, *Terrestrial Biological Resources*, respectively.

Public comments received during the scoping period that relate to noise and vibration generally concerned noise impacts to surrounding residents in general. These concerns are addressed in Section 3.13.3 below.

Data used to prepare this analysis were obtained from the General Plans for the Cities of Antioch and Pittsburg, the Municipal Codes for the Cities of Antioch and Pittsburg, a publication of Transit Noise and Vibration Impact Assessment developed by the Federal Transit Administration, Caltrans' Technical Noise Supplement to the Traffic Noise Analysis Protocol and by measuring and modeling existing and future noise levels at the Project site and the surrounding land uses. Information contained in Section 3.16, *Transportation and Circulation,* was used in the modeling of vehicle and truck traffic noise exposure.

3.13.1 Environmental Setting

General Background on Noise and Vibration Analysis

Overview

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise is defined as unwanted sound. The sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. Sound pressure level is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain. Because sound pressure can vary greatly within the range of human hearing, a logarithmic loudness scale is used to keep sound intensity numbers at a convenient and manageable level.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). When all the audible frequencies of a sound are measured, a sound spectrum is plotted consisting of a range of frequency spanning 20 to 20,000 Hz.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. When assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA).[1] Frequency A-weighting is typically applied to community noise measurements. **Table 3.13-1** shows some representative noise sources and their corresponding noise levels in dBA.

TABLE 3.13-1
TYPICAL SOUND LEVELS MEASURED IN THE ENVIRONMENT

Examples of Common, Easily Recognized Sounds	Decibels (dBA) at 50 feet	Subjective Evaluations
Near Jet Engine	140	Deafening
Threshold of Pain (Discomfort)	130	
Threshold of Feeling – Hard Rock Band	120	
Accelerating Motorcycle (at a few feet away)	110	
Loud Horn (at 10 feet away)	100	Very Loud
Noisy Urban Street	90	
Noisy Factory	85	
School Cafeteria with Untreated Surfaces	80	Loud
Near Freeway Auto Traffic	60	Moderate
Average Office	50	
Soft Radio Music in Apartment	40	Faint
Average Residence Without Stereo Playing	30	
Average Whisper	20	Very Faint
Rustle of Leaves in Wind	10	
Human Breathing	5	
Threshold of Audibility	0	

NOTE: Continuous exposure above 85 dBA is likely to degrade the hearing of most people. Range of speech is 50 to 70 dBA.

SOURCE: United States Department of Housing and Urban Development, *The Noise Guidebook*, 1985.

1 All noise levels reported herein reflect A-weighted decibels unless otherwise stated.

Noise Exposure and Community Noise

Noise exposure is a measure of the noise experienced by the individual over a period of time. A noise level is a measure of noise at a given instant in time. However, noise levels rarely persist consistently over a long period of time. Rather, community noise varies continuously with time with respect to the contributing sound sources in the environment. Community noise is primarily the product of many distinct noise sources that constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic and changes in atmospheric conditions. What makes community noise constantly variable throughout a day, besides the slowly changing background noise, is the addition of short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual. Community noise is commonly described in terms of the "ambient" noise level, which is defined as the all-encompassing noise level associated with a given noise environment.

These successive additions of sound to the community noise environment make the community noise level variable from instant to instant, requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

L_{eq}: The equivalent sound level is used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The L_{eq} is the constant sound level, which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).

L_{max}: The instantaneous maximum noise level measured during the measurement period of interest.

L_x: The sound level that is equaled or exceeded x percent of a specified time period. The L_{50} represents the median sound level.

DNL: The day-night average noise level (DNL; also referred to as L_{dn}) or energy average of the A-weighted sound levels occurring during a 24-hour period, and which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises). Noise between 10:00 PM and 7:00 AM is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noises.

CNEL: Similar to the DNL, the Community Noise Equivalent Level (CNEL) adds a 5-dBA "penalty" for the evening hours between 7:00 PM and 10:00 PM in addition to a 10-dBA penalty between the hours of 10:00 PM and 7:00 AM.

Effects of Noise on People

The effects of noise on people can be placed into three categories:

- Subjective effects of annoyance, nuisance, dissatisfaction;
- Interference with activities such as speech, sleep, learning; and
- Physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants generally experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide variation exists in the individual thresholds of annoyance, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so called "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference;
- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10-dBA change is subjectively heard as approximately a doubling in loudness and can cause adverse response.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion; hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, but instead combine logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Health Effects of Environmental Noise

The World Health Organization (WHO) is an important source of current knowledge regarding the health effects of noise impacts because European nations have continued to study noise and its health effects. Potential health effects of daytime noise identified by WHO include decreased performance for complex cognitive tasks, such as reading, attention span, problem solving, and memorization; physiological effects such as hypertension and heart disease (after many years of constant exposure, often by workers, to high noise levels); and hearing impairment (again, generally after long-term occupational exposure, although shorter-term exposure to very high noise levels, for example, exposure several times a year to concert noise at 100 dBA, can also damage hearing). Finally, noise can cause annoyance and can trigger emotional reactions like anger, depression, and anxiety. WHO reports that, during daytime hours, few people are seriously annoyed by activities with noise levels below 55 dBA or moderately annoyed with noise levels below 50 dBA.

Vehicle traffic and continuous sources of machinery and mechanical noise contribute to ambient noise levels. Short-term noise sources, such as truck backup beepers, the crashing of material being loaded or unloaded, car doors slamming, and engines revving outside a nightclub, contribute very little to 24-hour noise level metrics but are capable of causing sleep disturbance and annoyance.

Noise Attenuation

Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate, or lessen, at a rate of 6 to 7.5 dBA per doubling of distance from the source, depending on the topography of the area and environmental conditions (i.e., atmospheric conditions and noise barriers, either vegetative or manufactured, etc.). Widely distributed noise, such as a large industrial facility spread over many acres or a street with moving vehicles, would typically attenuate at a lower rate, approximately 3 to 4.5 dBA per doubling of distance from the source.

Vibration

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Several different methods can be used to quantify vibration including the peak particle velocity (PPV), and the root mean square (RMS). The PPV is defined as the maximum instantaneous peak of the vibration signal and is discussed in terms of inches per second. The PPV is most frequently used to describe vibration impacts to buildings. The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body. The RMS amplitude is the average of the squared amplitude of the signal. Typically, ground-borne vibration generated by man-made activities (e.g., pile driving, vibratory rollers, and drill rigs) attenuates rapidly with distance from the source of the vibration [Federal Transit Administration (FTA), 2006].

Existing Noise and Vibration in the Project Vicinity

Noise Environment

Transportation sources, such as automobiles, trucks, trains, and aircraft, are the principal sources of noise in most urban environments. Along major transportation corridors, noise levels can reach 80 DNL, while along arterial streets noise levels typically range from 65 to 70 DNL. The noise environment surrounding the proposed desalination facility is influenced primarily by existing operations of the existing WTP and traffic noise on View Drive and Terranova Drive. The proposed pipeline alignments are located in areas that are predominantly developed and urban, characterized by residential, commercial, and industrial development where roadway traffic noise is the predominant noise source.

Short-term (15-minute) noise monitoring was conducted in January 2018 at noise-sensitive land uses adjacent to the proposed RO facility and bulk chemical storage area. Additionally, a noise measurement was collected at the existing intake pumps station location. The locations of these noise measurements and associated results can be found in **Figure 3.13-1**. Noise monitoring data for these locations are presented in **Table 3.13-2**. These data indicate the typically suburban conditions around the project site which are generally between 47 and 50 dBA (hourly Leq) during daytime hours.

TABLE 3.13-2
MEASURED SHORT-TERM NOISE LEVELS ON THE PROJECT SITE

Site No.	Measurement Location	Noise Level in dBA[a]
ST-1	Property site boundary adjacent to proposed RO facility	47
ST-2	Property site boundary adjacent to bulk chemical storage area	50
ST-3	Intake Pump Station at end of pier	52

NOTES:
[a] dBA = A-weighted decibels.

Sensitive Noise Receptors

Some land uses are considered more sensitive to ambient noise levels than others because of the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved for those uses. Residences, schools, rest homes, hospitals, and churches are generally more sensitive to noise than commercial and industrial land uses. The proposed desalination facility would be located at the existing water treatment plant where the rear yards of single-family residential uses on Terranova and View Drive would be separated from the proposed RO facility and chemical storage area by a 25-foot setback. Sensitive receptors along the proposed brine disposal pipeline consist of Park Middle School, March Elementary School, Antioch High School and single-family residences along D Street, Tregallas Road, G Street, 18th Street, L Street, and 10th Street. Noise-sensitive land uses are located to the east within 500 feet the existing intake pump station and 125 feet of the proposed pump station location.

Vibration Environment

Sources of substantial vibration in the project vicinity are minimal, and are generally restricted to vibration and shaking caused by the occasional passing of heavy vehicles on major roadways with discontinuity in the pavement. There are no sources of substantial vibration on the project site itself. The brine disposal pipeline would cross the Union Pacific Railroad tracks which are subject to vibration from locomotive operations.

150433.02

SOURCE: ESA, 2018; Bases Google Earth, 2018

Brackish Water Desalination Facility

Figure 3.13-1
Noise Monitoring Locations

ESA

3.13.2 Regulatory Framework

Federal

There are no applicable federal standards that would apply to the project with respect to noise. For vibration, the Federal Transit Administration (FTA) has adopted vibration standards that are used to evaluate potential building damage impacts related to construction activities. While the FTA's criteria were primarily developed to assess construction vibration impacts from transit operations (e.g., bus, commuter rail, etc.), the criteria are broadly applicable to all types of construction activities that could generate vibration. The vibration damage criteria adopted by the FTA are shown in **Table 3.13-3**.

TABLE 3.13-3
CONSTRUCTION VIBRATION DAMAGE CRITERIA

Building Category	PPV (in/sec)
I. Reinforced-concrete, steel, or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12

SOURCE: FTA, 2006.

In addition, the FTA has also adopted standards associated with human annoyance for ground-borne vibration impacts for the following three land-use categories: Vibration Category 1 – High Sensitivity, Vibration Category 2 – Residential, and Vibration Category 3 – Institutional. The FTA defines Category 1 as buildings where vibration would interfere with operations within the building, including vibration-sensitive research and manufacturing facilities, hospitals with vibration-sensitive equipment, and university research operations. Vibration-sensitive equipment includes, but is not limited to, electron microscopes, high-resolution lithographic equipment, and normal optical microscopes. Category 2 refers to all residential land uses and any buildings where people sleep, such as hotels and hospitals. Category 3 refers to institutional land uses such as schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment but still have the potential for activity interference. The vibration thresholds associated with human annoyance for these three land-use categories are shown in **Table 3.13-4**. No thresholds have been identified or recommended specific to commercial and office uses, although Category 3 standards may be applied as they are defined as land uses with primarily daytime and evening use. Because the project-induced vibration would be from impact pile driving activities, as discussed later in this section, the impact thresholds for the proposed project would be based on the "Frequent Events" criteria shown in **Table 3.13-4**.

TABLE 3.13-4
GROUND-BORNE VIBRATION IMPACT CRITERIA FOR GENERAL ASSESSMENT

Land Use Category	Frequent Events[a]	Occasional Events[b]	Infrequent Events[c]
Category 1: Buildings where vibration would interfere with interior operations	65 VdB[d]	65 VdB[d]	65 VdB[d]
Category 2: Residences and buildings where people normally sleep	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use	75 VdB	78 VdB	83 VdB

NOTES:
[a] Frequent Events" is defined as more than 70 vibration events of the same source per day.
[b] Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.
[c] Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day.
[d] This criterion is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes.

SOURCE: FTA, 2006.

State

The State of California does not have statewide standards for environmental noise, but the California Department of Health Services (DHS) has established guidelines for evaluating the compatibility of various land uses as a function of community noise exposure. The purpose of these guidelines is to maintain acceptable noise levels in a community setting for different land use types. Noise compatibility by different land uses types is categorized into four general levels: "normally acceptable," "conditionally acceptable," "normally unacceptable," and "clearly unacceptable." For instance, a noise environment ranging from 50 dBA CNEL to 65 dBA CNEL is considered to be "normally acceptable" for multi-family residential uses, while a noise environment of 75 dBA CNEL or above for multi-family residential uses is considered to be "clearly unacceptable." In addition, Section 65302(f) of the California Government Code requires each county and city in the state to prepare and adopt a comprehensive long-range General Plan for its physical development, with Section 65302(g) requiring a Noise Element to be included in the General Plan. The Noise Element must: (1) identify and appraise noise problems in the community; (2) recognize Office of Noise Control guidelines; and (3) analyze and quantify current and projected noise levels.

The California Noise Act of 1973 (Health and Safety Code Sections 46000–46002) sets forth a resource network to assist local agencies with legal and technical expertise regarding noise issues. The objective of the act is to encourage the establishment and enforcement of local noise ordinances.

The State has also established noise insulation standards for new multi-family residential units, hotels, and motels that would be subject to relatively high levels of transportation-related noise. These requirements are collectively known as the California Noise Insulation Standards (Title 24, California Code of Regulations). The noise insulation standards set forth an interior standard of DNL 45 dBA in any habitable room. They require an acoustical analysis demonstrating how dwelling units have been designed to meet this interior standard where such units are proposed in areas subject to noise levels greater than DNL 60 dBA. Title 24 standards are typically enforced by local jurisdictions through the building permit application process.

Local

City of Antioch General Plan

The Noise Objective for the City of Antioch General Plan (Section 11.6.1) calls for achieving and maintaining a 60 CNEL for single- and multi-family residential uses and 70 dBA[2] CNEL at the front setback for commercial/industrial uses. Other noise policies pertaining to the proposed project are as follows:

> ***Policy 11.6.2(e)*** requires the implementation of appropriate noise mitigation when the proposed project will cause new exceedances of General Plan noise objectives, or an audible (3.0 dBA) increase in noise in areas where General Plan noise objectives are already exceeded as the result of existing development.
>
> ***Policy 11.6.2(g)*** allows the use of noise barriers (walls, berms, or a combination thereof) to reduce significant noise impacts.
>
> ***Policy 11.6.2(j)*** requires proposed development adjacent to occupied noise sensitive land uses to implement a construction-related noise mitigation plan during construction.
>
> ***Policy 11.6.2(k)*** requires all construction equipment to utilize noise reduction features that are no less effective than those originally installed by the manufacturer.

City of Antioch Municipal Code

Sections 5-17.04 and 5-17.05 of the Antioch Municipal Code prohibits the use of heavy construction equipment used in grading and earth moving, (including diesel engine equipped machines over one ton); the starting, warming-up, and idling of heavy construction equipment engines or motors; and construction activity on weekdays prior to 7 a.m. and after 6 p.m.; on weekdays within 300 feet of an occupied dwelling space prior to 8 a.m. and after 5 p.m.; and on weekends and holidays prior to 9 a.m. and after 5 p.m. The City addresses noise from stationary noise sources through enforcement of its non-quantitative ordinance for Disturbing the Peace in Section 5-17.02 of the Antioch Municipal Code.

City of Pittsburg General Plan

These goals are to be implemented through policies of the General Plan Noise Element, the following of which may apply to elements of the proposed Project within the City of Pittsburg:

> ***Policy 12-P-1*****:** As part of development review, use Figure 12-3 to determine acceptable uses and installation requirements in noise-impacted areas. Figure 12-3 is based on land use and noise exposure compatibility levels in Appendix A of the State of California General Plan Guidelines. The table is consistent with the provision of State law that requires special noise

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[2] The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ears decreased sensitivity to low and extremely high frequencies instead of the frequency mid-range. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA).

insulation for new multi-family housing units within 60 dB Ldn noise exposure contours. The table's land use categories do not correspond to the land use classifications on the General Plan Land Use Diagram, but to actual uses in development projects.

***Policy 12-P-7*:** Require the control of noise at the source through site design, building design, landscaping, hours of operation, and other techniques, for new development deemed to be noise generators.

***Policy 12-P-8*:** Develop noise attenuation programs for mitigation of noise adjacent to existing residential areas, including such measures as wider setbacks, intense landscaping, double-pane windows, and building orientation muffling the noise source.

***Policy 12-P-9*:** Limit generation of loud noises on construction sites adjacent to existing development to normal business hours between 8:00 AM and 5:00 PM.

***Policy 12-P-10*:** Reduce the impact of truck traffic noise on residential areas by limiting such traffic to appropriate truck routes. Consider methods to restrict truck travel times in sensitive areas.

City of Pittsburg Municipal Code

Chapter 9-44 of the Pittsburg Municipal Code prohibits any person to make, continue or cause to be made or continued any noise which either unreasonably annoys, disturbs, injures or endangers the comfort, repose, health, peace or safety of others, within the limits of the city. The Code identifies horns and signaling devices, radios, television sets and mechanical devices, loudspeakers and amplifiers for advertising, yelling, shouting, steam whistles, engine exhaust, blowers or motor vehicle acceleration as examples of noise sources which may result in a violation of the Code.

The Code also prohibits the use of pile drivers, or other impact hammers between the hours of 10:00 p.m. and 7:00 a.m. except in case of emergencies. The Code further specifies that excessive noise on any street adjacent to any school, institution of learning, church or court while the same is in use, or adjacent to any hospital, which unreasonably interferes with the workings of such institution is prohibited. The Code does not establish any quantitative noise level standards.

- Protecting public health and welfare by eliminating or minimizing the effects of existing noise problems, and by preventing increased noise levels in the future;
- Encouraging criteria such as building design and orientation, wider setbacks, and intense landscaping in lieu of sound walls to mitigate traffic noise along all major corridors, except along State Route 4; and
- Continuing efforts to incorporate noise considerations into land use planning decisions, and guide the location and design of transportation facilities to minimize the effects of noise on adjacent land uses.

3.13.3 Analysis, Impacts, and Mitigation

Significance Criteria

Based on Appendix G of the CEQA *Guidelines*, the project would have a significant impact with respect to noise and/or ground-borne vibration if it would result in:

- Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies;
- 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 people residing or working in the area around the project site to excessive noise levels (for a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport);
- Exposure of people residing or working in the area around the project site to excessive noise levels (for a project within the vicinity of a private airstrip); or
- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.

Methodology and Assumptions

For the purpose of this analysis, the proposed project is considered to result in significant impacts on the environment if it would generate noise or vibration levels in excess of the following thresholds:

- **Construction Noise in Excess of Standards.** The project would result in a significant construction impact if construction activity would occur outside of the allowable daytime hours specified by the City of Antioch or (where applicable) City of Pittsburg noise ordinance. Additionally, the project would result in a significant construction impact if construction contractors would not implement a construction-related noise mitigation plan during construction adjacent to occupied noise-sensitive land uses in the City of Antioch or operate construction equipment that utilize noise reduction features no less effective than those originally installed by the manufacturer.
- **Construction Vibration.** Since the City does not have any regulations pertaining to vibration, the FTA criteria are applied to the project. The project would result in a significant vibration impact if buildings would be exposed to the FTA vibration threshold level of 0.2 PPV for building damage, or if sensitive individuals would be exposed to the FTA vibration threshold level of 72 VdB for human annoyance outside of the allowable daytime hours specified by the City noise ordinance.
- **Substantial Periodic or Temporary Increases in Noise over Existing Levels.** A "substantial" noise increase is defined as one that would interfere with human activities during the day and/or night (as opposed to an absolute, numerical increase over ambient noise levels). This evaluation uses speech interference as an indicator that construction noise could cause a substantial adverse impact on daytime and evening activities, and sleep interference

as an indicator that construction noise could cause a substantial adverse impact on nighttime activities. The speech and sleep interference criteria are based on objective research of speech and sleep interference (as opposed to subjective surveys of annoyance) and can be used to evaluate a project's noise impacts. The speech and sleep interference criteria used in this EIR are defined below.

- **Speech Interference.** A speech interference threshold, in the context of impact duration and time of day, is used to identify substantial increases in noise from temporary construction activities. This analysis assumes noise peaks generated by construction equipment could result in speech interference in adjacent buildings if the noise level in the interior of the buildings exceeds 45 dBA. A typical building can reduce noise levels by approximately 25 dBA with the windows closed (USEPA, 1974). This noise reduction could be maintained only on a temporary basis in some cases, since it assumes windows must remain closed at all times. Assuming a 25 dBA reduction with the windows closed, an exterior noise level of 70 dBA L_{eq} would maintain an acceptable interior noise environment of 45 dBA during the day and evening hours. Noise levels would vary depending on the phase of construction and the types of construction equipment being used.

  In addition to the decibel level of noise, the duration of exposure at any given noise-sensitive receptor is an important factor in determining an impact's significance. Generally, temporary construction noise that occurs during the day for a relatively short period of time would not be significant because most people of average sensitivity who live in suburban environments are accustomed to a certain amount of construction activity or heavy equipment noise from time to time. The loudest construction-related noise levels would be sporadic rather than continuous because different types of construction equipment would be used throughout the construction process. Therefore, an exterior noise level that exceeds 70 dBA Leq during the daytime is used as the threshold for substantial construction noise where the duration of construction noise exceeds two weeks.

- **Sleep Interference.** Based on available sleep data, an interior nighttime level of 35 dBA is considered acceptable for sleeping (USEPA, 1974). Assuming a 25 dBA reduction with the windows closed, an exterior noise level of 60 dBA would maintain an acceptable interior noise environment of 35 dBA at night. Therefore, a significant impact would occur if the proposed project were to generate exterior noise levels above the 60 dBA L_{eq} sleep interference threshold for one or more nights.

- **Operational Noise in Excess of Standards.** The project would result in a significant operational noise impact if project elements would exceed the Noise Objective for the City of Antioch General Plan (Section 11.6.1), which calls for achieving and maintaining a 60 CNEL for single- and multi-family residential uses and 70 dBA CNEL at the front setback for commercial/industrial uses. Consistent with Policy 11.6.2(e) of the General Plan Noise Element, if a receptor already experiences noise levels in excess of these standards, an increase of up to 3 dBA is allowed before noise control measures are required.

- **Substantial Permanent Increases in Ambient Noise over Existing Levels.** For the analysis of long-term operational impacts on the existing ambient noise environment, impacts are considered significant if operation of the project facilities would result in a substantial increase in noise levels in the project area. This evaluation uses a 5-dBA increase in noise exposure, which Caltrans identifies as a readily perceptible noise increase (Caltrans, 2013), to assess the significance of operational noise increases on ambient noise levels in the project vicinity for receptors where the existing noise environment is below the Noise Objective for the City of Antioch General Plan, discussed above.

Issues Not Discussed in Impacts

Due to the nature of the project, there would be no impact related to the following topics for the reasons described below:

- ***Be located within an airport land use plan area or within 2 miles of a public airport or public use airport and expose people to excessive noise levels.*** The closest public airport to the project area is Buchannan Field in Concord, which is approximately 13 miles west of the project site. No project components would be within 2 miles of a public airport. Additionally, none of the project facilities would result in direct increases in aircraft operations, nor would they constitute noise-sensitive land uses (i.e., the proposed project does not include the construction of new housing or other noise-sensitive receptors that would be subject to aviation noise). As a result, there would be no impacts related to this significance criterion and is not discussed further.

- ***Be located in the vicinity of a private airstrip and expose people to excessive noise levels.*** The closest private air strips to the project area are Funny Farm Airport which is approximately 9 miles east of the project area and Las Serpientes Airport, which is approximately 11 miles east of the project site. No project components would be within two miles of a private airstrip. Additionally, none of the project facilities would result in direct increases in aircraft operations, nor would they constitute noise-sensitive land uses (i.e., the proposed project does not include the construction of new housing or other noise-sensitive receptors that would be subject to aviation noise). As a result, there would be no impacts related to this significance criterion and is not discussed.

Impacts and Mitigation Measures

Table 3.13-5 summarizes the proposed project's impacts and significance determinations related to noise and vibration.

TABLE 3.13-5
SUMMARY OF IMPACTS – NOISE AND VIBRATION

Impacts	Significance Determinations
Impact 3.13-1: Construction of facilities under the proposed project could generate noise levels that exceed the applicable county or city noise standards or result in a substantial temporary increase in ambient noise levels at nearby sensitive receptors.	LSM
Impact 3.13-2: Construction of facilities under the proposed project would not expose persons to or generate excessive ground-borne vibration or ground-borne noise levels	LS
Impact 3.13-3: Operation of the project would generate traffic, stationary source, and area source noise similar to existing noise levels and would not exceed City noise requirements	LSM
Impact 3.13-C-1: Cumulative impacts related to noise and vibration	LSM

NOTES:
LS = Less than Significant
LSM = Less than Significant with Mitigation

Impact 3.13-1: Construction of facilities under the proposed project could generate noise levels that exceed the applicable county or city noise standards or result in a substantial temporary increase in ambient noise levels at nearby sensitive receptors. ***(Less than Significant with Mitigation)***

Construction noise levels at and near the construction areas would fluctuate depending on the particular type, number, and duration of use of various pieces of construction equipment. Construction-related material haul trips would raise ambient noise levels along haul routes, depending on the number of haul trips and types of vehicles used. In addition, certain types of construction equipment and construction activities generate impulsive noises (such as pile driving), which can be particularly annoying. **Table 3.13-6** shows typical noise levels produced by various types of construction equipment.

TABLE 3.13-6
TYPICAL NOISE LEVELS FROM CONSTRUCTION EQUIPMENT

Construction Equipment	Noise Level (dBA, Leq at 50 Feet)
Dump truck	80
Portable air compressor	78
Crane	81
Concrete mixer (truck)	79
Pile driver (impact or vibratory)	101
Excavator	81
Dozer	82
Generator	81
Backhoe	78
Graders	85
Rollers	80
Pavers	77

SOURCE: FHWA, 2006.

Noise from construction activities generally attenuates at a rate of 6 to 7.5 dBA per doubling of distance; therefore, other sensitive receptors in the study area would be exposed to construction noise at incrementally lower levels than the noise levels expected at the closest residences. Noise levels are analyzed below with an assumed attenuation rate of 7.5 dBA because construction activities would attenuate at a rate similar to a point source over an absorptive ground surface.

River Intake Pump Station

Construction activities for the proposed intake pump station would involve excavation, pouring concrete footing for foundations; assembling and installing piping, pumps, and electrical equipment; building concrete enclosures and roofs; and performing finish work such as paving, and fencing the perimeter of the pump station site on City property over a 12-month period.

Equipment used for construction of the pump station would include excavator, backhoe, air compressor, small crane, generator, paving equipment, rollers, and welders.

Additionally, a cofferdam may be temporarily installed in the river by the construction contractor to minimize turbulence and sediment disturbance during construction for the installation of pipelines and fish screens. The cofferdam would consist of interlocking sheet piles forming a watertight corridor approximately 50 feet wide that would extend into the River approximately 200 feet from the shore. Sheet piles are typically installed using vibratory pile driving methods. Sheet pile installation for the cofferdam is expected to take approximately two weeks.

The nearest sensitive land use to the intake pump station would be residential uses, approximately 125 feet to the east of the proposed pump station site and approximately 320 feet southeast of the proposed coffer dam where sheet pile driving would occur. At a distance of 320 feet pile driving noise would be attenuated to 85 dBA which would be above the speech interference threshold of 70 dBA for the approximately 2 weeks of coffer dam installation. Construction activity involving non-impact equipment such as excavators, cranes and generators would generate noise levels of 73 dBA at a distance of 125 feet which would also be above the speech interference threshold. However, with implementation of **Mitigation Measure 3.13-1 (General Noise Controls for Construction Equipment and Activities)**, temporary increases in noise levels resulting from project construction would be reduced to a less-than-significant level.

All construction activity would occur on weekdays between 7 a.m. and 6 p.m. and would be consistent with the restrictions of the City of Antioch Noise Ordinance. Therefore, construction noise impacts associated with the intake pump station would be **less than significant**.

Pipeline Installation

A total of approximately 4.8 miles of pipelines would be installed for the raw water pipeline connection to the WTP, the new filtered water and RO permeate pipelines at the WTP site, and the brine disposal pipeline. The raw water pipeline connection would be up to 3,000-feet-long and connect the River's pump station and the WTP either across Putnam Street, and south along D Street before entering the WTP site, or west across the southern property line.

The WTP pipelines would be approximately 1,200 feet in total length, and would run between the existing WTP and the proposed desalination plant. The brine disposal pipeline would be approximately 4.3 miles long. It would be constructed within roadway right-of-ways in the cities of Antioch and Pittsburg along Elizabeth Lane/D Street, Tregallas Road, G Street, 18th Street, L Street, and 10th Street and would connect to the Delta Diablo WWTP. As alternative alignments for crossing the highway/railroad and entering the WTP, G Street, East 18th Street, Putnam Street, Lone Tree Way, and private easement may be used. The majority of the pipelines would be installed in existing roadways using conventional cut and cover construction techniques and installing the pipe in open trenches.

The raw water pipeline connection and brine disposal pipeline construction may be completed simultaneously with other project components. Although construction of these pipelines would occur over a 10-month period, installation could occur at any time throughout the entire 14-month project construction period. The WTP pipelines would be installed during the desalination facility construction period, as described below. Raw water and brine disposal pipeline installation would be sequenced to minimize land use disturbance and traffic disruption to the extent possible.

Typical construction equipment for pipeline installation would include flatbed trucks, backhoes, excavators, pipe cutting and welding equipment, haul trucks for spoils transport and materials delivery, compaction equipment, arc welders, generators, air compressors, cranes, drill rigs, and skip loaders.

Sensitive receptors along the proposed brine disposal pipeline consist of Park Middle School, March Elementary School, Antioch High School and single-family residences along D Street, Tregallas Road, G Street, 18th Street, L Street, and 10th Street. The setback of some of these residential receptors would be as close as 50 feet from the proposed alignment and occasional noise levels exceeding 80 dBA could be expected to occur, as indicated in **Table 3.13-6**. Open-trench construction would generally proceed at a rate of about 200 feet per day. Consequently, any given receptor along a pipeline alignment would experience construction noise for approximately four days as construction approaches and then recedes. While pipeline construction activities could exceed the 70 dBA speech interference threshold at times, the brief duration of the noise exposure from pipeline installation would be relatively brief and would not be considered a significant noise impact. All construction activity would occur on weekdays between 7 a.m. and 6 p.m. and would hence be consistent with the restrictions of the City of Antioch Noise Ordinance. Therefore, construction noise impacts associated with pipeline installation activities would be **less than significant**.

Desalination Facility Construction

Construction activities for the desalination facility would include excavation, grading, pouring concrete footings for foundations, tanks, and other support equipment; building walls and roofs; assembling and installing major desalination process components; installing piping, pumps, storage tanks, and electrical equipment; testing and commissioning facilities; and finish work such as paving and landscaping of the site. Construction equipment would include excavators, backhoes, graders, pavers, rollers, bulldozers, concrete trucks, flatbed trucks, boom trucks, cranes, forklifts, welding equipment, dump trucks, air compressors, and generators. A total of approximately one quarter acre of the roughly 25 acre WTP site would be disturbed during construction. Construction activities at the desalination plant site are expected to occur over 14 months. All construction activity would occur on weekdays between 7 a.m. and 6 p.m. and would hence be consistent with the restrictions of the City of Antioch Noise Ordinance.

The proposed desalination facility would be located at the existing WTP where the rear yards of single-family residential uses on Terranova and View Drive would be separated from the proposed reverse osmosis facility and chemical storage areas by a 25-foot setback. Potential construction noise levels at sensitive receptors nearest the desalination plant assuming the two noisiest pieces of equipment operating simultaneously,[3] were calculated using the Highway Noise Construction Model assuming a 25-foot property boundary offset as indicated in **Figure 3.13-1** and an additional 15 feet to the setback of the residential structure. Existing fences between the project site and these adjacent receptors have substantial gaps in places and the analysis conservatively assumed no attenuation due to their presence. Average Leq noise levels of 89 dBA at the property line and 85 dBA at the residential setback could be expected during peak activity. While construction activity closest to the property line would not occur over the entirety of the 14-month construction period, given the overall duration of construction activities within 100 feet of these adjacent residences and resultant noise levels exceeding the 70 dBA speech interference threshold, construction activity associated with the desalination plant would be considered to result in a **significant impact** with respect to temporary noise increases in ambient noise levels and mitigation is warranted.

<u>Mitigation Measure:</u>

Mitigation Measure 3.13-1: General Noise Controls for Construction Equipment and Activities

a) The construction contractor(s) shall assure that construction equipment with internal combustion engines have sound control devices at least as effective as those provided by the original equipment manufacturer. No equipment shall be permitted to have an unmuffled exhaust.

b) To reduce potential daytime construction noise impacts to residential uses immediately south of the desalination facility contractors shall employ temporary noise curtains or barriers along the southern and western property boundary of the WTP to shield daytime construction noise impacts to residential uses to the south and west. To reduce potential daytime construction noise impacts to residential uses immediately east of the proposed new pump station, contractors shall employ temporary noise curtains or barriers along the eastern property boundary of the pump station worksite to shield daytime construction noise impacts to residential uses to the east. Implementation of this measure will ensure that daytime construction activities do not exceed noise criteria for daytime construction at residential uses (70 dBA L_{eq}). These barriers shall be installed prior to the start of construction.

c) Impact tools (i.e., jack hammers, pavement breakers, and rock drills) used for project construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler shall be placed on the compressed air exhaust to lower noise levels by up to approximately 10 dBA. External jackets shall be used on impact tools, where feasible, in order to achieve a further reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever feasible.

Significance after Mitigation: Moveable sound barrier curtains can provide 15 dBA of sound attenuation (INC, 2014). Static sound barrier curtains can provide sound transmission loss of 16 to 40 dBA, depending on the frequency of the noise source (ENC,

3 This is consistent with the *General Assessment* methodology of the Federal Transit Administration for assessing construction noise impacts (FTA, 2006).

2014). Given that the predicted noise levels would exceed daytime thresholds by 15 to 19 dBA, implementation of **Mitigation Measure 3.13-1** would reduce noise levels to a **less-than-significant** level.

Impact 3.13-2: Construction of facilities under the proposed project would not expose persons to or generate excessive ground-borne vibration or ground-borne noise levels. ***(Less than Significant)***

Some types of construction equipment can produce vibration levels that can cause architectural damage to structures and be annoying to nearby sensitive receptors. Vibration levels generated during construction of the proposed project would vary during the construction period, depending upon the construction activity and the types of construction equipment used. Typical vibration levels for the construction equipment types that would generally result in the highest vibration levels (e.g., drill rig, large bulldozers) are presented in **Table 3.13-7**.

TABLE 3.13-7
VIBRATION VELOCITIES FOR CONSTRUCTION EQUIPMENT

Equipment Activity	PPV at 25 Feet (inches/second)[a]	RMS at 25 Feet (VDB)[b]
Large Bulldozer	0.089	87
Bulldozers	0.089	87
Loaded Trucks	0.076	86
Jackhammer	0.035	79
Pile driver (vibratory)	0.65	104
Vibratory Roller	0.21	94

NOTES:
[a] Buildings can be exposed to ground-borne vibration levels of 0.2 PPV without experiencing structural damage.
[b] The human annoyance response level is 80 RMS.

SOURCE: FTA, 2006, Caltrans, 2013.

River Intake Pump Station

Construction activities for the intake pump station would involve excavation, pouring concrete footing for foundations; assembling and installing piping, pumps, and electrical equipment; building concrete enclosures and roofs; and performing finish work such as paving, and fencing the perimeter of the pump station site on City property. Equipment prone to vibration generation that may be used for pump station installation would include rollers.

Additionally, a cofferdam may be temporarily installed in the River by the construction contractor to minimize turbulence and sediment disturbance during construction. The cofferdam would consist of interlocking sheet piles which are typically installed using vibratory pile driving methods.

Sheet pile installation for the coffer dam would be the activity with the greatest potential for vibration generation as indicated in **Table 3.13-7**. The cofferdam would be approximately 180 feet from the nearest structure. At this distance vibration levels would be attenuated to a vibration level of 0.074 PPV which would be below the 0.2 PPV threshold for building damage. Vibration levels from all other equipment would be substantially less than this and the impact of vibration from construction of the intake pump station with respect to building damage would be less than significant.

The cofferdam would be approximately 320 feet from the nearest residential structure. At this distance vibration levels would be attenuated to a vibration level of 71 VdB which would be below the 72 VdB criteria for frequent events at residences and buildings where people normally sleep. Additionally, sheet pile driving would be restricted to daytime hours and therefore would not be expected to result in sleep disturbance. Therefore, construction vibration impacts of the intake pump station would be **less than significant**.

Pipeline Installation

Typical construction equipment for pipeline installation would include flatbed trucks, backhoes, excavators, pipe cutting and welding equipment, haul trucks for spoils transport and materials delivery, compaction equipment, arc welders, generators, air compressors, cranes, drill rigs, and skip loaders.

Sensitive receptors along the proposed brine disposal pipeline consist of Park Middle School, March Elementary School, Antioch High School and single-family residences along D Street, Tregallas Road, G Street, 18th Street, L Street, and 10th Street. The setback of some of these residential receptors would be as close as 50 feet from the proposed alignment.

Vibration inducing equipment used in pipeline construction would be drill rigs and vibratory rollers. Drill rigs would generate approximately 0.089 PPV and 87 root mean square (RMS) amplitude at 25 feet. The nearest sensitive receptors to any of the proposed pipelines would be approximately 50 feet from heavy equipment activity and could experience vibration levels of 0.042 PPV and 78 RMS from drill rig operation. At 50 feet, vibration levels from vibratory roller operations would be attenuated to 0.10 in/sec PPV, which is below the building damage threshold, resulting in a less-than-significant impact.

Vibration levels at these receptors would not exceed the potential building damage threshold of 0.2 PPV or the annoyance threshold of 72 RMS during nighttime hours. Other sensitive receptors in the project vicinity would be exposed to vibration levels at incrementally lower levels than those calculated for the nearest receptors.

Desalination Facility Construction

Construction equipment for the desalination plant would include excavators, backhoes, graders, pavers, rollers, bulldozers, concrete trucks, flatbed trucks, boom trucks, cranes, forklifts, welding equipment, dump trucks, air compressors, and generators. Construction activities at the desalination plant site are expected to occur over 14 months. All construction activity would occur on weekdays between 7 a.m. and 6 p.m.

The proposed desalination facility would be located at the existing water treatment plant where the setback of the residential structures on Terranova Drive and View Drive would be separated from the proposed reverse osmosis facility and chemical storage areas by a 25-foot property boundary offset and an additional 10 feet of building setback.

Vibration inducing equipment used in the desalination facility construction would be bulldozers and vibratory rollers. Bulldozers would generate approximately 0.089 PPV and 87 RMS amplitude at 25 feet. The nearest sensitive receptors to any of the proposed pipelines would be approximately 40 feet from heavy equipment activity and could experience vibration levels of 0.053 PPV and 81 RMS from bulldozer operation. Additionally, construction activity would be restricted to daytime hours and therefore would not be expected to result in sleep disturbance.

At 40 feet, vibration levels from vibratory roller operations would be attenuated to 0.13 in/sec PPV, which is below the building damage threshold, resulting in a less-than-significant impact.

Vibration levels at these receptors would not exceed the potential building damage threshold of 0.2 PPV or the annoyance threshold of 72 RMS during nighttime hours. Other sensitive receptors in the project vicinity would be exposed to vibration levels at incrementally lower levels than those calculated for the nearest receptors.

<u>Mitigation Measure:</u>

None required.

Impact 3.13.3: Operation of the project would generate traffic, stationary source, and area source noise similar to existing noise levels and would not exceed City noise requirements. ***(Less than Significant with Mitigation)***

Traffic Noise

Operation of the proposed desalination facility would add up to 7 new employees, whose trips would be distributed between two day shifts and one night shift. This would generate approximately 14 new one-way trips per day or about 4 trips per peak hour. While portions of the proposed pump stations and pipelines would be located near residences, periodic inspection and maintenance of these facilities would not generate significant noise as these inspections would be infrequent. No significant traffic-related noise impacts would occur.

Operational Equipment Noise

River Pump Station. Noise generated by the new intake pump station would result from pumping operations. The pump station building would be approximately 23-feet-tall and would house the mechanical and electrical equipment. Equipment would include three vertical variable speed turbine pumps (8 mgd and 600 hp each). Two of the pumps would be active and one on standby.

Pump operations currently occur adjacent to this location where noise levels were monitored to be 52 dBA (see **Table 3.13-2)**. The ambient noise environment was dominated by marine engine activity from vessels in the San Joaquin River and using the pier, and by railroad operations to the south. The proposed relocated pumps would be enclosed within a structure and noise impacts from pump operations would be **less than significant**.

Desalination Plant. Noise generated by the new desalination plant would result from pump operations: four RO feed pumps (2 mgd and 250 hp each), four RO booster pumps (1 mgd and 100 hp each), chemical dosing pumps, and clean-in-place (CIP) recirculation pump (1000 gpm and 25 hp. All of these pumps would be housed in an approximately 18-foot-tall, 10,700 square-foot membrane process building which would serve to contain pump noise and reduce the impact to adjacent residential uses. At the current stage of project development noise generation specification of the proposed pumps are not available and quantitative estimate of noise generation of pump operation and the attenuation offered by the proposed RO building cannot be estimated. As a result, the impact is considered **significant**. However, implementation of **Mitigation Measure 3.13-3 (Stationary-Source Noise Controls)** would reduce impacts to a less-than-significant-level.

Mitigation Measure:

Mitigation Measure 3.13-3: Stationary-Source Noise Controls

The City shall retain an acoustical professional to design stationary-source noise controls and ensure the applicable noise standards are met. At a minimum, all stationary noise sources (e.g., RO pumps) shall be located within enclosed structures and with adequate noise screening, as needed, to maintain noise levels to no greater than 5 dBA above the existing monitored ambient values and 60 CNEL, at the property lines of nearby residences. Once the stationary noise sources have been installed, the contractor(s) shall monitor noise levels to ensure compliance with local noise standards.

Significance after Mitigation: Implementation of **Mitigation Measure 3.13-3** would reduce stationary noise levels to a **less-than-significant** level.

Cumulative Impacts

This section presents an analysis of the cumulative effects of the proposed project in combination with other past, present, and reasonably foreseeable future projects that could cause cumulatively considerable impacts. As discussed above, the proposed project would have no impact with respect to a being located in the vicinity of a public or private airport. Accordingly, the proposed project could not contribute to cumulative impacts related to these topics and are not discussed further.

Impact 3.13-C-1: Implementation of the proposed project, in combination with other cumulative development could result in a significant noise impact for which the proposed project would make a considerable contribution. ***(Less than Significant with Mitigation)***

Noise is a localized occurrence and attenuates with distance. Therefore, only other projects or activities in relatively close proximity (about 1,000 feet or less) to the intake pump station or the desalination facility sites would have the potential to add to anticipated project-generated noise and create cumulative noise effects. Pipeline installation would progress at a rate of 200 feet per day and would only occur in the presence of a given receptor for three to four days, thus avoiding cumulative noise impacts during construction.

For the intake pump station, the nearest cumulative project would be project number 6 (Rocketship Elementary School) on **Figure 3-1**, which would be over 4,000 feet to the south and would be sufficiently distant to preclude any localized cumulative noise impacts. For the desalination facility, the nearest off-site cumulative projects would be project number 1 (Almond Knolls) on **Figure 3-1** which would be over 1,500 feet away and be sufficiently distant to preclude any localized cumulative noise impacts.

Significant cumulative construction-related noise increases would occur if any nearby cumulative projects are constructed at the same time as the proposed project and affect the same sensitive receptors as the proposed project. Project number 2 (Water Treatment Plant Disinfection Improvements Project) on **Figure 3-1** is also located at the WTP. The Initial Study prepared for this cumulative project identified less than significant construction-related and operational noise impacts (CDM Smith, 2017). If construction of both the proposed project and the Water Treatment Plant Disinfection Improvements Project coincide, the combined effect could result in higher construction noise exposure to sensitive receptors. However, implementation of **Mitigation Measure 3.13-1 (General Noise Controls for Construction Equipment and Activities)** would require the incorporation of sufficient noise control measures. Therefore, with implementation of Mitigation Measure 3.13-1, the proposed project's contribution to cumulative impacts would not be considerable, and the impact would be **less than significant with mitigation**.

References – Noise and Vibration

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Industrial Noise Control (INC), 2014. Product Specification Sheet, INC Portable Noise Screen, 2014.

3.14 Population and Housing

Sections	Tables
3.14.1 Environmental Setting 3.14.2 Regulatory Framework 3.14.3 Analysis, Impacts, and Mitigation	3.14-1 Summary of Impacts – Population and Housing

This section describes existing population, housing, and employment characteristics and trends in the City of Antioch and the potential for implementation of the project to result in direct or indirect impacts on population and housing, or displace housing or residents in the project vicinity or citywide.

The analysis in this section is based on project-specific construction and operational features, and data provided in the Antioch General Plan, U.S. Census Bureau's American Fact Finder, the California Employment Development Department, and the California Department of Finance.

3.14.1 Environmental Setting

Regional and Local Setting

The City of Antioch is the primary area that would be affected directly by potential project-related population and housing effects, and by employment effects that could result in demand for additional housing. Because project construction could draw on the regional labor pool, this section also describes employment trends in Contra Costa County.

Population and Housing

In 2010, there were 102,372 people living in the City of Antioch, a 13 percent increase in the city's population compared to 2000 (U.S. Census Bureau, 2000, 2010). The California Department of Finance, which provides population estimates and tracks changes in housing and vacancy rates for years between the decennial census counts, estimates that the city's population in 2016 was 113,495, an 11 percent increase since 2010 (DOF, 2017).

The City of Antioch experienced housing growth between 2000 and 2010. About 4,733 housing units were added over this period, a 16 percent increase, for a total of 34,849 housing units in 2010; the estimated vacancy rate in 2010 was 7.5 percent (U.S. Census Bureau, 2010; 2000). The number of households (occupied housing units) increased over this period from 29,338 in 2000 to 32,252 in 2010, a 10 percent increase (U.S. Census Bureau, 2010; 2000). The California Department of Finance estimates that about 973 housing units were added in Antioch between 2010 and 2016 (a 3 percent increase during this time period) while about 2,578 households (occupied housing units) were added, (an 8 percent increase), and that the vacancy rate as of January 1, 2016 was 2.8 percent (DOF, 2017).

Employment

According to the California Employment Development Department data, approximately 364,200 people worked in Contra Costa County in 2016, an increase of 12,400 jobs since 2015[1] (CEDD, 2017). This estimate measures workers by place of work and includes full-time and part-time wage and salary employment; it does not include self-employed people, unpaid family workers, or private household employees. From 2010 to 2016, approximately 45,100 jobs were added in Contra Costa County (CEDD, 2017). The unemployment rate in Contra Costa County is estimated to be 3.1 percent (CEDD, 2018).

Employment in Contra Costa County, as in the Bay Area region as a whole, has fluctuated substantially since the mid-1990s. Both Contra Costa County and the Bay Area economies experienced strong job growth through 2000, fueled by the “dot-com” boom in the high technology and internet sectors; 47,000 jobs were added between 1994 and 2000 for a total of almost 339,000 workers in Contra Costa County in 2000 (CEDD, 2017). Following the dot-com crash, Contra Costa County gained only 2,000 jobs between 2000 and 2004. The county gained almost 3,600 jobs between 2004 and 2008 and lost about 26,500 jobs between 2008 and 2010 during the global recession (CEDD, 2017).

Construction employment in Contra Costa County has generally not recovered from the high point in 2005 (when there were 30,500 construction jobs) to 2016 (when there were 25,400 construction jobs). Construction jobs during that period reached the lowest point in 2011, when there were 17,800 construction jobs (CEDD, 2017). The employment data indicates that construction job growth has continued, and between 2011 and 2016, 7,600 jobs were added in Contra Costa County.

Antioch WTP and River Intake Pump Station

The existing WTP property contains no active uses other than water treatment facilities, which has about 11 employees. The existing river intake pump station is maintained by the existing WTP employees.

3.14.2 Regulatory Framework

Federal

There are no applicable federal regulations related to population, housing, or employment.

State

There are no applicable state regulations related to population, housing, or employment.

[1] These estimates of employment by place of work count part-time and full-time jobs equally. People who hold more than one job may be counted more than once.

Local

City of Antioch General Plan

The following goals and policies from the Antioch General Plan are relevant to population and housing.

> **Objective 3.8.1:** Achievement of a balance between housing and employment opportunities within Antioch, providing the opportunity for households of all income levels to both live and work in Antioch.
>
> ***Policy 3.8.2.a:*** Maintain an inventory of employment-generating lands, providing for a variety of office-based, industrial, and commercial (retail and service) employment opportunities.

City of Pittsburg General Plan

The following goal from the Pittsburg General Plan is relevant to population and housing.

> **Goal 3-G-1:** Manage the City's growth to balance development of housing options and job opportunities, protection of open space and habitat areas, construction of transportation improvements, and preservation of high quality public facilities.

3.14.3 Analysis, Impacts, and Mitigation

Significance Criteria

Based on Appendix G of the *CEQA Guidelines*, the project would have a significant impact on population and housing if it would:

- Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure);
- Displace substantial numbers of existing housing units or create demand for additional housing, necessitating the construction of replacement housing; or
- Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

Methodology and Assumptions

Construction and Operational Impacts

The evaluation of the potential for project construction and operations to induce substantial population growth or creating demand for additional housing compares the number of project-related jobs to current and recent population, housing, and employment levels in the City of Antioch and Contra Costa County.

Issues Not Discussed in Impacts

Due to the nature of the project, there would be no impact related to the following topics for the reasons described below:

- ***Displace substantial numbers of existing housing units, necessitating construction of replacement housing.*** The project component sites contain no housing; consequently, there is no on-site population. The proposed project would not displace any housing that would necessitate construction of replacement housing. Therefore, the criterion related to housing displacement does not apply and is not addressed further in this section.

- ***Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.*** The project component sites contain no housing; consequently, there is no on-site population. The project would not displace any people and therefore would not necessitate construction of any replacement housing elsewhere. Therefore, the criterion related to displacement of people does not apply and is not addressed further in this section.

Impacts and Mitigation Measures

Table 3.14-1 summarizes the proposed project's impacts and significance determinations related to population and housing.

TABLE 3.14-1
SUMMARY OF IMPACTS – POPULATION AND HOUSING

Impacts	Significance Determinations
Impact 3.14-1: The proposed project would not directly or indirectly induce substantial population growth in the area or create demand for additional housing.	LS
Impact 3.14-C-1: Cumulative impacts related to geology and soils.	LS

NOTES:
LS = Less than Significant

Impact 3.14-1: The proposed project would not directly or indirectly induce substantial population growth in the area or create demand for additional housing. ***(Less than Significant)***

Construction

Project construction would take approximately 14 months, with an average of 6 to 8 construction workers for each component (refer to **Table 2-5** in Chapter 2, *Project Description).* During the construction period, a total of up to 38 construction workers would be employed. The 38 jobs provided during the construction period represents less than 1 percent of Contra Costa County construction jobs in 2016.

It is expected that construction workers would be drawn primarily from the regional construction employment pool, given that the project's construction jobs would represent a minor percentage of current regional construction employment levels. Project construction workers who do not live in Contra Costa County would likely commute from elsewhere in the Bay Area rather than relocate from more distant towns and cities. While it is possible that some workers might temporarily relocate from other areas, the small increase potentially attributable to project construction would not result in a substantial increase in the local population and not create an increase demand for services in the area. Consequently, construction of the project would not induce population growth by attracting a substantial numbers of workers from outside the region to relocate to the area and would not create demand for additional housing or other facilities and services associated with growth; therefore, the growth-inducing impact of the construction of the proposed project would be **less than significant**.

Operational Impacts

Operation of the proposed project would result in the addition of 7 new permanent jobs at the WTP. Given that the city had a housing vacancy rate of 2.8 percent in 2016, meaning that 1,003 housing units were unoccupied (DOF, 2016), housing would be available to meet the need of any new workers. It is likely that new employees would be drawn from the existing local or regional labor pool; however, conservatively assuming that the regional labor force could not meet the operational workforce requirement, up to 7 new employees relocating to the area would represent a 0.001 percent increase in workers residing in Contra Costa County (i.e., 0.001 percent of the labor force) in 2016. This incremental increase would not constitute substantial population growth in the region. The proposed project would not involve construction of new homes that would directly induce population growth, or, with the exception of the WTP, new places of employment in the area.

Therefore, operation of the proposed project would not directly induce a substantial increase in the local population as it would not require a substantial increase in the local workforce to support project operations, and the direct growth-inducing impact of the proposed project would be **less than significant**.

<u>Mitigation Measure:</u>

None required.

Cumulative Impacts

As discussed in Section 3.14.3, the project would not displace any existing housing or people, or result in the need for replacement housing. Thus, there would be no cumulative impact associated with displacement of housing or people. The cumulative analysis focuses on the project's contribution to direct cumulative growth effects resulting from construction and operational labor force needs.

Impact 3.14-C-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects in the vicinity, would not contribute to a cumulative impact on population and housing. *(Less than Significant)*

The geographic scope for potential cumulative population and housing impacts encompasses Contra Costa County. The cumulative analysis takes a projections based approach, utilizing projections contained in the City's General Plan and regional estimates provided by the Association of Bay Area Governments (ABAG).

Development of the proposed project and cumulative projects would result in population, housing, and employment growth. “Substantial” growth is defined as unplanned growth, for which infrastructure, services, and housing have not been planned. So long as the cumulative project scenario generates cumulative population, housing, and employment conditions that are within the projections of the City and ABAG, there would be no significant adverse growth impact related to population, housing, or employment.

Construction

As discussed under Impact 3.14-1, project construction is expected to generate up to 38 daily construction jobs during the 14-month construction period. Because construction employment is temporary, it would not necessarily combine with past or future construction projects to contribute to a cumulative impact related to construction employment. However, project construction could be occurring concurrently with other construction activity within the Cities of Antioch and Pittsburg. Construction jobs are temporary, and construction workers in a region typically commute from their residences to temporary construction jobs elsewhere in the region, rather than relocating to the vicinity of the job site. Because of the limited duration of construction jobs and considering the size of the regional construction workforce and the substantial job losses in the region experienced by the construction industry until the last few years, the construction labor force in the county is expected to accommodate demand of the cumulative projects for construction labor. Even if cumulative construction projects were to lead to population and housing effects by attracting some workers to move to the area from outside the region, such moves, and associated effects, would likely be temporary. However, the contribution of the proposed project would not be cumulatively considerable because of the relatively small number of construction workers required and the short duration of the construction period. Therefore, the cumulative impact of project construction would not be cumulatively considerable and **less than significant**.

Operation

As discussed in Impact 3.14-1, the project would result in the addition of approximately 7 full time permanent jobs.

The City of Antioch routinely prepares growth projections to inform the planning and environmental review process; these projections are based on regional estimates provided by ABAG that reflect growth in the Bay Area as a whole. According to the City of Antioch’s 2015-2023 Housing Element, ABAG forecasts a population of 120,300 for Antioch in 2035, which would be a 13 percent increase from 2014 (City of Antioch, 2015). The number of jobs in Antioch are projected to increase from 19,090 to 23,660 between 2010 and 2030, a 24 percent increase. Household growth is expected to rise from 32,252 households to 36,600, an increase of 13.5 percent (City of Antioch, 2015). These numbers show that the jobs-housing ratio in Antioch is projected to increase from 0.59 to 0.65; therefore, a significant portion of workers will continue to work outside City boundaries. For Contra Costa County as a whole, the jobs-housing ratio is projected to be approximately 1 for the next few decades (City of Antioch, 2015).

Given the size of the regional workforce, current unemployment rate in Contra Costa County, as discussed in Section 3.14.1, the labor demand associated with cumulative projects in **Table 3-1** is expected to be accommodated by workers in the region. To the extent that new workers would move to the area from outside the region in response to employment opportunities provided by non-residential development in the region, there is no evidence to suggest that any such in-migration would be inconsistent with job growth projected and planned to occur under the City of Antioch's general plan, and housing is also planned to accommodate such new workers. A key purpose of General Plan housing elements is to demonstrate that jurisdictions have the capacity to accommodate anticipated housing needs. The contribution of the proposed project would not be cumulatively considerable because of the relatively small number of operational workers required. Therefore, the cumulative impact of project operation would not be cumulatively considerable and **less than significant**.

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3.15 Public Services and Utilities

Sections	Tables
3.15.1 Environmental Setting 3.15.2 Regulatory Framework 3.15.3 Analysis, Impacts, and Mitigation	3.15-1 Summary of Impacts - Public Services and Utilities

This section evaluates potential impacts on public services and utilities that could result from implementation of the proposed project. Public services in the project area include fire and police protection, emergency medical services, and schools. Utilities in the project area provide solid waste disposal, water, wastewater, and stormwater drainage. This section also presents mitigation measures to reduce or eliminate potential impacts, as appropriate. Potential impacts associated with hazards in the vicinity of schools in the project area are discussed in Section 3.9, *Hazards and Hazardous Materials*. In addition, the City of Antioch Recreation Department administers parks and recreation centers in the project area. Potential impacts associated with recreational facilities in the project area are discussed in Section 3.16, *Recreation*.

Public comments received during the scoping period that relate to utilities and public services generally concerned the potential for the proposed project to encounter existing pipelines and storm drains in the project area during construction, disclosure of brine discharge pipeline material and lifetime specifications, and potential impacts on the Delta Diablo Sanitation District's NPDES permit due to combined discharges with the proposed project's brine effluent.

As described in Chapter 2, *Project Description*, proposed raw water pipeline and brine disposal pipelines would be composed of ductile iron and HDPE/PVC, respectively. The remaining scoping comments are addressed in Section 3.15.3, *Analysis, Impacts, and Mitigation*, below.

The analysis included in this section was developed based on project-specific construction and operational features, applicable state and local regulations and policies, governmental and local utility websites detailing facility capacity, and technical utility documents.

3.15.1 Environmental Setting

The study area for evaluation of impacts on utilities and public service systems includes the service areas for the public services and utilities that serve the project area.

Public Services

Fire Protection and Emergency Medical Services

The Contra Costa County Fire Protection District and Emergency Medical Services Division serves the project area. The District currently operates 30 full-time Advanced Life Support engine companies (Contra Costa County Fire Protection District, 2018). Stations within the immediate project area include the following:

- Station No. 83: 315 W. 10th Street, Antioch, CA 94509
- Station No. 84: 196 Bluerock Drive, Antioch, CA 94509
- Station No. 85: 2717 Gentrytown Drive, Antioch, CA 94509

Police

The Antioch Police Department (APD) serves the project area, and the Antioch population of over 100,000. The police department is staffed with 103 sworn and 35 non-sworn employees. The department is comprised of two divisions: Support Services and Field Services. The Field Services Division includes the dispatch, patrol, community policing, and traffic bureaus. The Support Services Division consists of the administration, investigations, narcotics, records, and animal services Bureaus. The police station is located at 300 L Street (City of Antioch, 2017a).

Schools and Libraries

The Antioch Unified School District oversees the management of five high schools, four middle schools, and 13 elementary schools. Potential impacts to schools within 0.25 mile of project components is discussed in Section 3.9, *Hazards and Hazardous Materials*.

The Antioch Library at 501 West 18th Street is managed by the Contra Costa County Library system. The brine discharge pipeline would be installed within 0.25 mile of the Antioch Library.

Utilities

Solid Waste Services

Republic Services of Contra Costa County manages the City of Antioch's solid waste collection, disposal, and recycling system. All solid waste generated by construction and operation of the project that would not be recycled would be disposed of at the Keller Canyon Landfill. Keller Canyon is a 244-acre Class II facility, has a maximum permitted capacity of 75 million cubic yards and is permitted to accept 3,500 tons of solid waste per day. The landfill has a projected site life of 50 years from commencement of operations in October 1992 (CalRecycle, 2017).

Water Service

Water Supply

The City provides water to approximately 31,800 customers (connections) in the City of Antioch (City of Antioch, 2016). The City's primary sources of untreated surface water are from the San Joaquin River and the Contra Costa Canal, which can be stored in the Antioch Municipal Reservoir. The Canal water is purchased from the Contra Costa Water District (CCWD) and is pumped from the Delta and stored in the Los Vaqueros Reservoir (City of Antioch, 2016). Water is conveyed through pipelines from the Contra Costa Canal and pumped into the City's municipal reservoir or directly to the Antioch Water Treatment Plant (WTP). The WTP treats water from the Canal and municipal reservoir and distributes it through 320 miles of pipelines and water mains, and booster pumping stations to the City's residents and businesses. The City's current annual agreement with the Contra Costa Water District is for a peak demand of 36 mgd (13,140 MG per year). In 2015, the City purchased 3,915 MG of raw surface water from CCWD. CCWD water purchases are projected to increase steadily from 4,099 MG in 2020 to 5,044 MG in 2040. The CCWD is prepared to sell to the City all of the City's projected water needs through 2028.

In 2015, the City pumped 409 MG of raw surface water from the San Joaquin River Intake. Water supplies from the river intake are projected to increase to 2,460 MG per year through 2040 (City of Antioch, 2016). The existing capacity of the river water intake is 16 mgd. Increased salinity in the San Joaquin River has limited the volume that the City can pump. The Department of Water Resources and the City have an agreement in which the City is able to pump water with a chloride content less than 250 mg/L, for at least 208 days per year (City of Antioch, 2016).

The City also receives treated, recycled wastewater from the Delta Diablo Sanitation District (District) to be used for irrigation in four City parks and in the Lone Tree Golf Course. In 2015, the District supplied the City with 79 MG of recycled water. Recycled water supplies are projected to increase to 326 MG in 2020 and up to 489 MG a year through 2040 (City of Antioch, 2016).

Overall, the City's actual total water supplies were 4,600 MG in 2015. Total water supply is projected to increase from 6,885 MG in 2020 to 7,993 MG in 2040, a 73 percent increase from 2015 (City of Antioch, 2016).

Water Demand

The City's total actual water demand was 4,521 MG in 2015. Water demand is projected to increase from 6,559 MG in 2020 to 7,504 MG in 2040, a 66 percent increase from 2015 usage (City of Antioch, 2016).

Wastewater Treatment

Delta Diablo provides wastewater resource recovery services for the Cities of Antioch and Pittsburg, and the unincorporated community of Bay Point, serving a population of approximately 208,000. The City of Antioch's sanitary sewer system includes approximately 292 miles of gravity sewer mains and the majority of the collection system is transported to the District's Wastewater Treatment Plant (WWTP). The WWTP is located at 2500 Pittsburg-Antioch Highway on the border of Pittsburg and Antioch and has an average dry weather design capacity for up to 19.5 mgd. The treated wastewater is discharged about 500 feet offshore through a deep water diffuser outfall to New York Slough (Delta Diablo, 2018.).

Sanitary Sewer System

The City of Antioch operates and maintains an estimated 310 miles of sanitary sewer system and 31,000 residential and commercial sewer lateral connections. The City's sanitary sewer lines feed into Delta Diablo's collection system (City of Antioch, 2017a).

Stormwater Drainage

The City maintains a stormwater collection system consisting of catch basins, storm drains, channels, detention basins, creeks, culverts, and concrete-lined "V" ditches in open space, which handle stormwater runoff throughout the City (City of Antioch, 2017a).

3.15.2 Regulatory Framework

Federal

There are no applicable federal regulations related to utilities and public services.

State

California Integrated Waste Management Act of 1989, Assembly Bill 341, and the California Green Building Standards

In 1989 the California legislature passed the Integrated Waste Management Act of 1989, known as AB 939. The bill mandates a reduction of waste being disposed: jurisdictions were required to meet diversion goals of 25 percent by 1995 and 50 percent by the year 2000 through source reduction and recycling programs. AB 939 also established an integrated framework for program implementation, solid waste planning, and solid waste facility and landfill compliance which requires each county to adopt development program for waste reduction.

Assembly Bill 341, which amends the Integrated Waste Management Act of 1989 and was adopted by the California legislature in October 2011, directs CalRecycle to adopt a state policy that actively seeks to achieve a goal of diverting 75 percent of solid waste from landfills by 2020. The new legislation focuses largely on commercial waste generators, as this sector was identified as the most in need of improved waste management. Assembly Bill 341 does not alter the diversion mandates included in AB 939; rather, it is a policy goal to guide CalRecycle's administration of the California Integrated Waste Management Act.

The 2016 California Green Building Standards Code (Part 11 of Title 24, California Code of Regulations), effective January 1, 2017, requires construction waste reduction of 65 percent.

Utility Notification Requirements

California law (Government Code Section 4216 et seq.) requires owners and operators of underground utilities to become members of, participate in, and share the costs of a regional notification center. Government Code Section 4216 requires that persons planning to conduct any excavation contact the regional notification center. Section 4216 includes several related requirements, including requirements for excavations near "high priority subsurface installation," or high-risk facilities, which include high-pressure natural gas pipelines and other pipelines that are potentially hazardous to workers or the public if damaged or ruptured. Underground Service Alert North (USA North) is the notification center for the project area. USA North receives planned excavation reports and transmits the information to all participating members that may have underground facilities at the location of excavation. The USA North members will then mark or stake their facility, provide information about the location, or advise the excavator of clearance (USA North, 2018).

NPDES Waste Discharge Program

The National Pollution Discharge Elimination System (NPDES) waste discharge requirements and the NPDES Permit for the Delta Diablo WWTP are discussed in Sections 3.10, *Local Hydrology and Water Quality* and 3.11, *Delta Hydrology and Water Quality*.

Local

City of Antioch Municipal Code

Construction and Demolition Ordinance

Title 6, Chapter 3, Section 6-3.203 of the Antioch Municipal Code states that applicants for building, demolition, or site development permits involving any covered project shall complete and submit a waste management plan (WMP), on a WMP form approved by the city. No building, demolition, or site development permits shall be issued, nor shall any demolition, construction or renovation take place on any covered project, unless and until the WMP Compliance Official has approved the WMP.

City of Antioch General Plan

The following policies from the Antioch General Plan are relevant to utilities:

> ***Policy 8.4.2.a*****:** As part of the design of water systems, provide adequate pumping and storage capacity for both drought and emergency conditions, as well as the ability to provide fire flows required by the Contra Costa County Fire Protection District.
>
> ***Policy 8.4.2.d*****:** Maintain existing levels of water service by protecting and improving infrastructure, replacing water mains and pumping facilities as necessary, and improving the efficiency of water transmission facilities.
>
> ***Policy 8.6.2.h*****:** The City of Antioch shall follow State regulations in implementing the goals, policies, and programs in order to achieve and maintain a 50 percent reduction in solid waste disposal through source reduction, reuse, recycling, and composting.
>
> ***Policy 8.6.2.j*****:** The City shall require all development projects to coordinate with appropriate departments and/or agencies to ensure that there is adequate waste disposal capacity to meet the waste disposal requirements of the project, and the City shall recommend that all development projects incorporate measures to promote waste reduction, reuse, recycling, and composting.

The proposed project uses existing storage and pumping facilities and would continue to be able to provide adequate water supply, pressure, and capacity to meet emergency conditions; therefore, the proposed project would be consistent with Policy 8.4.2.a.

The proposed project is a water infrastructure project that would improve pumping facilities, construct new transmission pipelines, and create new desalination infrastructure; therefore, the proposed project would be consistent with Policy 8.4.2.d.

The proposed project would be required to submit a Waste Management Plan to the City of Antioch pursuant to Title 6, Chapter 3, Article II of the Antioch Municipal Code; therefore, the proposed project would be consistent with Policy 8.6.2.h.

The proposed project would be consistent with Policy 8.6.2.j. See the discussion in Impacts 3.15-2 and 3.15-3.

City of Pittsburg General Plan

The following policies from the City of Pittsburg General Plan Public Facilities element may be relevant to the proposed project (City of Pittsburg, 2001).

> ***Policy11-G-6:*** Continue reduction and recycling efforts within the City to divert increasingly larger portions of the waste stream from local landfills.
>
> ***Policy 11-G-7:*** Manage solid waste so that State diversion goals are met.

The proposed project would comply with policies in the Antioch Municipal Code and General Plan that require projects to incorporate measures to promote waste reduction, reuse, and recycling of materials to meet State regulations. Therefore, the proposed project would be consistent with Policies 11-G-6 and 11-G-7.

3.15.3 Analysis, Impacts, and Mitigation

Significance Criteria

Based on Appendix G of the CEQA *Guidelines*, the project would have a significant impact on public services and utilities if it would:

- Disrupt operations or require relocation of regional or local utilities;
- Result in 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 public services such as fire and police protection, schools, parks, or other public facilities;
- Require or result in the construction of new water treatment facilities or the 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 the expansion of existing facilities, the construction of which could cause significant environmental effects;
- Have insufficient water supply available to serve the project from existing entitlements and resources or require new or expanded water supply resources or entitlements;

- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board;
- Result in a determination by the wastewater treatment provider that it has inadequate capacity, including treatment and/or outfall capacity, to accommodate the project's projected demand;
- Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs.

Methodology and Assumptions

The analysis included in this section was developed based on project-specific construction and operational features, applicable state and local regulations and policies, governmental and local utility websites detailing facility capacity, and technical utility documents.

Issues not Discussed in Impacts

Due to the nature of the proposed project, the following criteria are not addressed in the impact analysis sections for the reasons described below:

- ***Result in the need for new or physically altered governmental facilities.*** During the approximately 14-month construction period, an average of up to eight construction workers would be employed at the various construction sites, depending on the phase of construction and the construction activities taking place. It is expected that construction workers could come from the regional labor pool. While it is possible that some workers might temporarily relocate from other areas, the proposed project would not substantially increase the local population. During project construction, incidents requiring law enforcement, fire protection, or emergency services could occur; however, any temporary increase in incidents would not exceed the capacity of local and/or regional service providers to a degree that requires new or expanded facilities. Any temporary increase in the local population during project construction would be negligible and could be accommodated by existing service providers. Therefore, construction of the proposed project would not result in impacts related to the need for new or physically altered governmental facilities, including, including fire and police protection, libraries, schools, hospitals, or other services, in order to maintain existing levels of public services, and no impacts on public services would occur.

  Operation and maintenance activities would require approximately up to seven permanent employees and would not substantially increase the demand for public services, including fire and police protection, libraries, schools, hospitals, or other services. Therefore, no impacts related to public services would occur during project operations. Because there would be no construction or operational impacts, the criterion related to the need for new or modified governmental facilities is not applicable to the project and is not discussed further. The issues of population and housing are discussed in Section 3.13, *Population and Housing*. The potential impact related to impaired emergency access during construction is addressed in Section 3.17, *Transportation and Circulation*.

- ***Require or result in the construction of new water treatment facilities or the expansion of existing facilities, the construction of which could cause significant environmental effects.*** As described in Chapter 2, *Project Description*, the proposed project would develop a new water supply for the City to offset purchased water use. The construction of water-related facilities, including the desalination facility, is the subject of this EIR. Other sections in

Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures* discuss the potential impacts and identify mitigation measures associated with these proposed facilities.

- ***Require or result in the construction of new stormwater drainage facilities or the expansion of existing facilities, the construction of which could cause significant environmental effects.*** The potential for the proposed project to change drainage patterns and increase stormwater runoff is addressed in Section 3.10, *Hydrology and Water Quality*. That analysis indicates that, due to the negligible increase in impervious surfaces associated with the proposed aboveground facilities, the proposed project would have a less than significant impact associated with potential changes in drainage patterns and the rate and amount of surface runoff. As a result, the proposed project would not require or result in the need for new or expanded stormwater drainage facilities. No impact would result and this impact is not discussed further.
- ***Have insufficient water supply available to serve the project or require new or expanded water supply resources or entitlements.*** Project implementation would generate up to seven permanent jobs in the region. The proposed project would not construct new housing, nor would it substantially increase the number of permanent workers in the area. No substantial changes in water demand or water distribution would result. Furthermore, the purpose of the proposed project is to provide a new potable water supply source to serve the City of Antioch service area and the implementation of this new water supply is the subject of this EIR. Therefore, this criterion is not applicable to the project and is not discussed further in this section.

Impacts and Mitigation Measures

Table 3.15-1 summarizes the proposed project's impacts and significance determinations related to public services and utilities.

TABLE 3.15-1
SUMMARY OF IMPACTS – PUBLIC SERVICES AND UTILITIES

Impacts	Significance Determinations
Impact 3.15-1: The proposed project could disrupt operations or require relocation of regional or local utilities.	LSM
Impact 3.15-2: The proposed project would not exceed the wastewater treatment requirements of the applicable Regional Water Quality Control Board or result in a determination by the wastewater treatment provider that it has inadequate capacity, including treatment and/or outfall capacity, to accommodate the project's projected demand.	LS
Impact 3.15-3: The proposed project would not be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs.	LS
Impact 3.15-C-1: The proposed project, in combination with other cumulative development, could disrupt operations or require relocation of regional or local utilities.	LSM
Impact 3.15-C-2: The proposed project, in combination with other cumulative development, would not exceed the wastewater treatment requirements of the applicable Regional Water Quality Control Board or result in a determination by the wastewater treatment provider that it has inadequate capacity, including treatment and/or outfall capacity, to accommodate the project's projected demand.	LS
Impact 3.15-C-3: The proposed project, in combination with other cumulative development, would not be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs.	LS

NOTES:
LS = Less than Significant
LSM = Less than Significant with Mitigation

Impact 3.15-1: The proposed project could disrupt operations or require relocation of regional or local utilities. ***(Less than Significant with Mitigation)***

Construction

Disconnection or relocation of existing utility lines would not be required for construction of the desalination facility within the WTP property. As described in Section 2.7.3, *River Intake Pump Station,* the existing pump station would remain in operation while the new pump station is constructed. Once the new pump station is operational, the existing pump station would be taken offline and demolished. Therefore, the ability of the City of Antioch to pump raw water from the river would not be disrupted. This impact would be **less than significant**.

Construction activities that involve underground utilities throughout the City of Antioch and a small portion of the City of Pittsburg may require minor relocation or disruption of existing overhead and underground utility lines such as such as natural gas, electricity, sewage, telephone, fuel, and water lines. The impact is **potentially significant**.

<u>Mitigation Measures:</u>

Mitigation Measure 3.15-1a: Locate and Confirm Utility Lines.

Before excavation begins, the City of Antioch or its contractor(s) shall locate all overhead and underground utility lines (such as natural gas, electricity, sewage, telephone, fuel, and water lines) that are reasonably expected to be encountered during excavation. When a project excavation is within the approximate location of a subsurface utility, the City of Antioch or its contractor shall determine the exact location of the underground utility by safe and acceptable means, including the use of hand tools and modern techniques. Information regarding the size, color, and location of existing utilities shall be confirmed before construction activities begin. These utilities shall be highlighted on all construction drawings.

Mitigation Measure 3.15-1b: Coordinate Final Construction Plans with Affected Utilities.

The City of Antioch or its contractor(s) shall coordinate final construction plans, schedule, and specifications with affected utilities with utility providers and affected jurisdictions (e.g., the City of Pittsburg). Arrangements shall be made with these entities regarding the appropriate protection, relocation, or temporary disconnection of services. If any interruption of service is required, the City of Antioch or its contractor(s) shall notify residents and businesses in the project corridor of any planned utility service disruption at least 2 working days and up to 14 calendar days in advance.

Mitigation Measure 3.15-1c: Safeguard Employees from Potential Accidents Related to Underground Utilities.

When any excavation is open, the construction contractor(s) shall protect, support, or remove underground utilities as necessary to safeguard employees.

The contractor(s) shall be required to provide weekly updates to the City of Antioch and construction workers regarding the planned excavations for the upcoming week, and to specify when construction will occur near a high-priority utility (i.e., pipelines carrying petroleum products, oxygen, chlorine, or toxic or flammable gases; natural gas pipelines greater than 6 inches in diameter or with normal operating pressures greater than 60 pounds per square inch gauge; and underground electric supply lines, conductors, or cables that have a potential to ground more than 300 volts that do not have effectively grounded sheaths). Construction managers shall hold regular tailgate meetings with construction staff on days when work near high-priority utilities will occur to review all safety measures regarding such excavations, including measures identified in the Mitigation Monitoring and Reporting Program and in construction specifications. The contractor shall designate a qualified Health and Safety Officer who shall specify a safe distance to work near high-priority utilities. Excavation near such utility lines shall not be authorized until the designated Health and Safety Officer confirms and documents in the construction records that: (1) the line was appropriately located in the field by the utility owner using as-built drawings and a pipeline-locating device; and (2) the location was verified by hand by the construction contractor.

Mitigation Measure 3.15-1d: Emergency Response Plan.

Before commencement of construction, the City of Antioch or its contractor(s) shall develop an emergency response plan that outlines procedures to follow in the event of a leak or explosion. The emergency response plan shall identify the names and phone numbers of staff at the potentially affected utilities that would be available 24 hours per day in the event that construction activities cause damage to or rupture of a high-risk utility. The plan shall also detail emergency response protocols, including notification, inspection, and evacuation procedures; any equipment and vendors necessary to respond to an emergency (such as an alarm system); and routine inspection guidelines.

Mitigation Measure 3.15-1e: Notify Local Fire Departments.

The City of Antioch or its contractor(s) shall notify local fire departments in advance of any time work that is to be performed in close proximity to a gas utility line, or any time damage to a gas utility line results in a leak or suspected leak, or whenever damage to any utility results in a threat to public safety.

Mitigation Measure 3.15-1f: Ensure Prompt Reconnection of Utilities.

The City of Antioch or its contractor(s) shall promptly contact utility providers to reconnect any disconnected utility lines as soon as it is safe to do so.

Significance after Mitigation: With the implementation of **Mitigation Measure 3.15-1a through f**, the impact would be reduced to a **less-than-significant** level because it requires the City of Antioch or its contractor(s) to locate and confirm utility lines, coordinate final construction plans with affected utilities, safeguard employees from potential accidents related to underground utilities, prepare an emergency response plan, notify local fire departments, and ensure prompt reconnection of utilities.

Operation

Operation of the proposed project would not disrupt operations or require relocation of regional or local utilities. There would be **no impact**.

Mitigation Measure:

None required.

Impact 3.15-2: The proposed project would not exceed the wastewater treatment requirements of the applicable Regional Water Quality Control Board or result in a determination by the wastewater treatment provider that it has inadequate capacity, including treatment and/or outfall capacity, to accommodate the project's projected demand. ***(Less than Significant)***

Construction

As described above in Section 3.15.1, *Environmental Setting*, the Delta Diablo provides wastewater resource recovery services for the Cities of Antioch and Pittsburg, and the unincorporated community of Bay Point. The City of Antioch's sanitary sewer system includes approximately 292 miles of gravity sewer mains and the majority of the collection system is transported to the WWTP at 2500 Pittsburg-Antioch Highway on the border of Pittsburg and Antioch. The treated wastewater is discharged about 500 feet offshore through a deep water diffuser outfall to New York Slough. The WWTP has an average dry weather design capacity for up to 19.5 mgd.

During the approximately 14-month construction period, an average of up to eight construction workers would be employed at each of the various construction sites, depending on the phase of construction and the construction activities taking place. While it is possible that some workers might temporarily relocate from other areas, it is expected that construction workers could come from the regional labor pool. Construction of the proposed project would not increase the local population to an extent that wastewater generated by project construction workers could exceed the wastewater treatment requirements or treatment capacity. The impact would be **less than significant**.

<u>Mitigation Measure:</u>

None required.

Operation

As described in Chapter 2, *Project Description*, brine from the RO system would be conveyed through an approximately 4.3-mile-long, 12-inch-diameter dedicated pipeline from the desalination facility to the existing Delta Diablo WWTP, which has primary, secondary, and partial tertiary treatment capabilities. The brine disposal pipeline would connect to the WWTP effluent channel at the north end of the plant. The brine would be mixed with treated wastewater from the WWTP prior to discharge through the existing WWTP outfall. As noted above, the WWTP has a permitted average dry weather effluent flow of 19.5 mgd.

As described in Chapter 2, *Project Description*, the desalination facility would operate at its full capacity with the RO process generating 2 mgd of brine. The desalination facility would operate at its full capacity anywhere between several days to every day of each month depending on the salinity of the river. Therefore, the total volume of brine discharged during the months the desalination facility is not operating every day would be lower than when the facility is operating every day. **Table 2-9** in Chapter 2, *Project Description* shows the average monthly wastewater effluent flows from the WWTP and a conservative assumption of 2 mgd of brine through the outfall and diffuser during typical non-drought and drought year scenarios. As depicted in Table 2-9 combined existing and project effluent flows would not exceed the wastewater treatment requirements or treatment capacity, and the impact would be **less than significant**.

<u>Mitigation Measure:</u>

None required.

Impact 3.15-3: The proposed project would not be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs. *(Less than Significant)*

Construction

Excavation and construction activities would generate excess soil, rock, construction material, and debris. Although suitable topsoil and subsoils excavated during construction would be used to backfill excavations and restore work areas, project construction is projected to generate excess material that would require offsite disposal and the Keller Canyon Landfill.

If any soil contaminated with hazardous materials were encountered, it would be characterized, transported and disposed of at an appropriate landfill in compliance with applicable federal, state, and local regulations. Refer to Section 3.9, *Hazards and Hazardous Materials* for a more detailed discussion of the handling of hazardous materials generated by or encountered during project construction.

As shown **Table 2-5** in Chapter 2, *Project Description*, project construction would generate approximately 36,665 cubic yards of spoils and approximately 25,665 cubic yards of fill for a total volume of approximately 62,330 cubic yards of excess spoils and construction debris over an anticipated 14-month construction period.

The Keller Canyon Landfill is permitted to accept 3,500 tons (approximately 4,725 cubic yards of soil-type waste) per day and has a maximum permitted capacity of 75 million cubic yards. The projected site life is through 2042. If all construction spoils were disposed of at the Keller Canyon Landfill, the proposed project would not cause the landfill to exceed capacity. However, the proposed project would comply with policies in the Antioch Municipal Code and General Plan that require projects to incorporate measures to promote waste reduction, reuse, and recycling of materials to meet State regulations. Therefore, the proposed project would not exceed landfill capacity or be out of compliance with regulations related to solid waste during construction. The impact would be **less than significant**.

<u>Mitigation Measure:</u>

None required.

Operation

Operation of the desalination facility would produce minimal solid waste associated with the desalination process. The "cake" solids removed from the filtration backwash during the waste washwater treatment process would be comprised of naturally occurring organic and inorganic constituents of brackish river water very similar to the existing "cake" solids generated by the WTP.. The spent clean-in-place system chemicals would be neutralized and disposed through the WTP's sanitary sewer system or be hauled to the Delta Diablo WWTP. Administrative activities associated with the desalination facility operation would not contribute significant amounts of solid waste and impacts would be negligible in this regard. Operation of the river intake pump station and pipelines would not generate excess soils or solid waste.

As noted above, the Keller Canyon Landfill is permitted to accept 3,500 tons (approximately 4,725 cubic yards of soil-type waste) per day and has a maximum permitted capacity of 75 million cubic yards. The projected site life is through 2042. Consequently, operational activities associated with the desalination facility would not exceed landfill capacity, and the impact would be **less than significant**.

<u>Mitigation Measure:</u>

None required.

Cumulative Impacts

The cumulative scenario and cumulative impacts methodology are described in Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*. **Table 3-1** lists potential cumulative projects.

Impact 3.15-C-1: The proposed project, in combination with other cumulative development, could disrupt operations or require relocation of regional or local utilities. *(Less than Significant with Mitigation)*

A cumulatively significant impact on utilities could result if the incremental impacts of the proposed project combined with those of one or more of the cumulative projects would cause utility damage, extended periods of utility service disruptions, or multiple disruptions within a short timeframe. As described in Impact 3.15-1, construction of the proposed project could require minor relocation or disruption of existing overhead and underground utility lines such as such as natural gas, electricity, sewage, telephone, fuel, and water lines.

As described in Impact 3.15-1, the proposed project's potential utility impacts would be reduced to a less-than-significant level with implementation **Mitigation Measure 3.15-1a through f**, which requires the City of Antioch or its contractor(s) to locate and confirm utility lines, coordinate final construction plans with affected utilities, safeguard employees from potential accidents related to underground utilities, prepare an emergency response plan, notify local fire departments, and ensure prompt reconnection of utilities.

Cumulative projects that could cause utility impacts similar to those described for the proposed include those identified in **Table 3-1** involving future construction. Due to the localized nature of utilities, most potential impacts would likely be limited to construction areas or utility distribution subareas, rather than affecting the entire project area or utility service area. The incremental contribution of the residual (post-mitigation) effects of the proposed project to a cumulative impact would not be substantial because most potential effects would be related to pipeline construction. Proposed project construction activities that have the potential to disrupt utility service would not occur in the vicinity of other cumulative projects for extended periods of time such that prolonged or frequent disruption of service would occur in the vicinity (or utility service subarea) of cumulative projects with potential to cause similar effects. Therefore, after implementation of mitigation measures described above, the proposed project's residual effects would be minimal and would not have a cumulatively considerable contribution to significant cumulative utility service impacts. Consequently, the cumulative impact would be **less than significant with mitigation**.

Impact 3.15-C-2: The proposed project, in combination with other cumulative development, would not exceed the wastewater treatment requirements of the applicable Regional Water Quality Control Board or result in a determination by the wastewater treatment provider that it has inadequate capacity, including treatment and/or outfall capacity, to accommodate the project's projected demand. ***(Less than Significant)***

A significant cumulative impact would occur if the effects of the proposed project combined with those of the cumulative projects would cause effluent flows to exceed the Delta Diablo WWTP capacity or exceed wastewater treatment requirements. As described in Impact 3.15-2, combined existing and project effluent flows would not exceed the wastewater treatment requirements or treatment capacity of the Delta Diablo Sanitation District WWTP.

Implementation of the proposed project, in combination with other cumulative development identified in **Table 3-1** would increase demand for wastewater treatment. The City's Wastewater Collection System Master Plan provides for a phased expansion of the WWTP as growth occurs in the City, ensuring that the WWTP has sufficient capacity to meet planned growth in the service area (City of Antioch, 2014). Any necessary changes to capacity would occur incrementally, as regional population growth demands greater treatment capacity. Because implementation of the Wastewater Collection System Master Plan is expected to ensure that capacity is available as growth occurs, the proposed project's contribution of 2 mgd to cumulative wastewater treatment demand would be less than considerable because it could be accommodated within the growth projections used in the City's Wastewater Collection System Master Plan. Therefore, the proposed project's contribution would not be considerable, and the resulting impact would be **less than significant**.

Mitigation Measure:

None required.

Impact 3.15-C-3: The proposed project, in combination with other cumulative development, would not be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs. ***(Less than Significant)***

As discussed in Impact 3.15-3, operation of the desalination facility and administrative activities associated with the desalination facility operation would not contribute significant amounts of solid waste and impacts would be negligible in this regard. Operation of the river intake pump station and pipelines would not generate excess soils or solid waste.

As noted above, the Keller Canyon Landfill is permitted to accept 3,500 tons (approximately 4,725 cubic yards of soil-type waste) per day and has a maximum permitted capacity of 75 million cubic yards. The projected site life is through 2042. Given the relatively small effect of the proposed waste disposal on daily and absolute landfill receiving capacity, and the comparatively large contribution anticipated by cumulative projects, the proposed project would not contribute considerably to a cumulatively significant landfill capacity impact. In addition, the proposed project would comply with policies in the Antioch Municipal Code and General Plan that require projects to incorporate measures to promote waste reduction, reuse, and recycling of materials to meet State regulations. Therefore, the proposed project's contribution would not be considerable, and the resulting impact would be **less than significant**.

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3.16 Recreation

Sections	Tables
3.16.1 Environmental Setting 3.16.2 Regulatory Framework 3.16.3 Analysis, Impacts, and Mitigation	3.16-1 Summary of Impacts – Recreation

This section describes publicly accessible recreational resources in the vicinity of the proposed project components. The section also presents an impact analysis on the recreational resources that would result from the proposed project.

The analysis in this section was developed based on project-specific construction and operational features, and data provided by the City of Antioch's Recreation Department, the California Division of Boating and Waterways, and the U.S. Fish and Wildlife Service's National Wildlife Refuge System.

3.16.1 Environmental Setting

Parks

The City of Antioch Recreation Department manages over 35 parks, community centers, and open spaces throughout the city that are available for public recreation (City of Antioch, 2017). There are no designated parks within or immediately adjacent to the proposed project components. Local parks in the vicinity of the project components include the following (City of Antioch, 2003; City of Antioch, 2017):

- **Chichibu Park.** This 6.3-acre area is south of Longview Road, approximately 0.2-mile south of the WTP. This park's amenities include a group picnic area, sports fields, and a youth play area.

- **Mountaire Park.** This 5.1-acre area is east of Sunset Lane, approximately 0.4 mile east of the WTP. Amenities include a group picnic area, sports fields, and a youth play area.

- **Fairview Park.** This 3-acre area is east of Crestview Drive, approximately 0.1-mile south of the proposed brine discharge pipeline. This park's amenities include a group picnic area, sports fields, and a youth play area.

Local Recreational Facilities

Public recreational facilities in the project area include the following:

- **Antioch Boat Launch Ramp.** The City owns and manages the Antioch public boat launch ramp at the foot of Fulton Shipyard Road. This boat launch ramp has capacity to launch/receive one boat up to 12-feet-wide. The parking lot at the boat launch ramp includes 24 spaces for vehicles with boat trailers only, and approximately 25 spaces for vehicles. The boat ramp and parking lot are adjacent to the existing intake pump station. The walkway and access point to the pump station is located at the northwest corner of the parking lot.

The City has several special-use facilities, of which the following is located in the immediate vicinity of the project area:

- **Contra Costa County Fairgrounds.** This 75-acre area is located at L Street and W 10th Street, where the brine disposal pipeline would be installed. This site is accessed from O Street, W 10th Street, or at the L Street/W 18th Street intersection. The fairgrounds are used for the annual Contra Costa County Fair, and is in use continually as a site of preschool classes, a roller rink, flea market, auto races, cultural and music events, and community league ballfields (City of Antioch, 2003).

Other Recreational Facilities

- **Bicycle Facilities.** Class III bikeways exist on Tregallis Road for its entirety. Class II bikeways existing on: Lone Tree Way from SR 4 to James Donlon Boulevard; on Pittsburg-Antioch Highway from L Street to Antioch's western city limits; and on Contra Loma Boulevard between SR 4 and James Donlon Boulevard. The proposed raw water connection pipeline and brine disposal pipeline alignments would occur within portions of these roadways.

- **Antioch Dunes National Wildlife Refuge.** The U.S. Fish and Wildlife Service (USFWS) manages the Antioch Dunes National Wildlife Refuge, which is approximately 0.15 mile east of the proposed River Intake Pump Station. The 55-acre refuge is not open to unsupervised use by the public due to sensitivity of the dune habitat and the presence of endangered species; however, access is available via monthly guided tours and special events (USFWS, 2017).

- **Dow Wetlands Preserve.** Dow owns and manages this 472-acre undeveloped area located approximately 0.5-mile north of W 10th Street/Pittsburg-Antioch Highway where the brine disposal pipeline would be installed. This preserve serves as an environmental buffer zone for the existing Dow Chemical Plant to the west. The wetlands contain tideland marsh areas, upland grass areas, wildlife, and native vegetation. This area is open to the public from sunrise to sunset (Dow, No Date; Dow, 2017).

3.16.2 Regulatory Framework

Federal

There are no applicable federal regulations related to recreation.

State

Delta Stewardship Council – Delta Plan

The Delta Stewardship Council is a State agency created through the Delta Reform Act of 2009 to develop and implement a legally enforceable long-term management plan for the Delta and Suisun Marsh. The Delta Plan applies a common sense approach based on the best available science to achieve the coequal goals of protecting and enhancing the Delta ecosystem and providing for a more reliable water supply for California, while protecting and enhancing the unique cultural, recreational, and agricultural values of the Delta as an evolving place.

The city of Antioch is within the Delta Secondary Zone, as shown in Appendix 6 of the Delta Plan. The following policies from the Delta Plan are relevant to recreation:

> **DP R11** Water management and ecosystem restoration agencies should provide recreation opportunities, including visitor-serving business opportunities, at new facilities and habitat areas whenever feasible; and existing recreation facilities should be protected, using California State Parks' Recreation Proposal for the Sacramento-San Joaquin Delta and Suisun Marsh and Delta Protection Commission's Economic Sustainability Plan for the Sacramento-San Joaquin Delta as guides.

Local

City of Antioch General Plan

The following goals and policies of the Antioch General Plan (City of Antioch, 2003) are relevant to recreation.

> ***Objective 8.9.1:*** Maintain a system of parks, specialized recreation facilities, and natural open spaces of sufficient size and variety and in the appropriate locations to serve the needs of Antioch residents of all ages.
>
> > *Policy 8.9.1.c:* Maintain a minimum size for neighborhood parks of five acres or more, unless there is a specific need for a smaller facility.
> >
> > *Policy 8.9.1.d:* Secure and develop a shoreline park along the San Joaquin River consisting of recreational trails, viewing areas, and natural habitat protection so as to ensure availability of the waterfront in the City for public enjoyment.

City of Pittsburg General Plan

There are no parks, open spaces, or trail systems managed by the City of Pittsburg that are in the vicinity of proposed project components.

3.16.3 Analysis, Impacts and Mitigation

Significance Criteria

Based on Appendix G of the CEQA *Guidelines*, the project would have a significant impact on 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; or
- Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.

Supplementing the above criteria, the proposed project would be considered to result in a significant impact on recreation if it would:

- Disrupt or preclude public access to existing recreational resources.

Methodology and Assumptions

The location, size, and type of recreational resources in the vicinity of the project components were identified using local planning documents and maps. Project impacts were analyzed by noting existing recreational resources and assessing potential changes in use of the resources that could result from the proposed project. The analysis addresses the potential for temporary impacts on recreation during construction. The level of the impact was determined using the significance criteria noted above.

Issues Not Discussed in Impacts

Due to the nature of the proposed project, the following criteria are not addressed in the impact analysis sections for the reasons described below:

- ***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.*** The desalination facility operating staff would include approximately 6 full-time equivalent workers. The project would not increase the number of residents in the project area such that it would result in the construction of new homes or businesses. Project construction would occur in the vicinity of recreational facilities, but would not cause permanent displacement of users from these facilities, such that other facilities experienced an increased level of use that resulted in physical impacts. Therefore, this significance criterion is not applicable to the proposed project and is not discussed further.

- ***Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.*** The proposed project is a water supply project and does not include recreational facilities or require the construction or expansion of recreational facilities. Thus, the significance criterion related to the construction or expansion of recreational facilities is not applicable to the proposed project and is not discussed further.

- ***Disrupt or preclude public access to recreational facilities during project operations.*** The proposed project does not involve any permanent aboveground facilities whose operations would affect public access to recreational facilities. The pipelines would be installed below ground and the desalination facility would be constructed within the WTP property outside of any public access areas. The new intake pump station would be a new aboveground structure in an existing City parking lot. Its operation would not disrupt or preclude public access to the boat ramp. Therefore, the significance criterion related to project operations impacts on public access to recreational facilities are not discussed further. Impact 3.16-1 below only discusses potential impacts during project construction activities.

Impacts and Mitigation Measures

Table 3.16-1 summarizes the proposed project's impacts and significance determinations related to recreation.

TABLE 3.16-1
SUMMARY OF IMPACTS – RECREATION

Impacts	Significance Determinations
Impact 3.16-1: Project construction activities could temporarily disrupt access to recreational resources in the vicinity of the project components.	LSM
Impact 3.16-C-1: Cumulative impacts related to recreation.	LS

NOTE:
LS = Less than Significant
LSM = Less than Significant with Mitigation

Impact 3.16-1: Project construction activities could temporarily disrupt access to recreational resources in the vicinity of the project components. *(Less than Significant with Mitigation)*

Construction activities associated with the new intake pump station and pipelines would overlap geographically or occur immediately adjacent to bicycle routes, the Antioch public boat launch ramp, and the Contra Costa County Fairgrounds. As described in Impact 3.17-3 in Section 3.17, *Transportation and Circulation,* project construction activities could temporarily disrupt routes in the project area, some of which include Class II and III bicycle facilities. Potential effects on bicycle routes are not analyzed here, but focused on the potential for project construction to disrupt access to recreational facilities in the vicinity of the project components. There are no recreational facilities at the Delta Diablo WWTP site; thus there are no potential effects on public access.

Construction staging associated with the new intake pump station would require approximately 3,000 square feet within the existing parking lot that serves the public boat launch ramp. Construction, staging, and demolition activities at this site would occur over a period of 12 months. As described in Chapter 2, *Project Description,* a cofferdam approximately 50 feet wide and extending 200 feet from shore may be temporarily installed in the river to facilitate installation of the pipelines and fish screens. If a cofferdam is not used, underwater construction techniques would be used. Both construction scenarios would occur in the area immediately adjacent to the boat launch ramp. Intake pipeline installation would also be required through the parking lot to connect the new pump station to the river. For safety purposes, the boat launch ramp may be temporarily closed during the construction of the new intake pump station. During the 12-month construction period, boats can access the river from the Antioch City Marina approximately 1 mile to the east. Following construction, the parking lot would be returned to its approximate pre-construction condition and public access to the boat launch ramp would continue to be provided.

The brine disposal pipeline construction activities would occur within the roadways adjacent to the Contra Costa County Fairgrounds and could impede access to the fairgrounds at O Street, W 10th Street, and L Street/W 18th Street intersection by temporary lane closures. Construction of the brine disposal pipeline would progress at a rate of approximately 200 feet per day in a linear fashion and would typically be limited to a few days at each access point. Furthermore, due to the linear construction sequencing, one access point would be impacted at a time, while the other access points would remain open to the public. Following construction, the roadways adjacent to the fairgrounds would be returned to their approximate pre-construction condition and no permanent effects on access would result.

The impacts associated with access to these recreational facilities would be short term and temporary, but potentially significant. Implementation of **Mitigation Measure 3.17-1b** for all construction activities would require the preparation and implementation of a traffic control/traffic management plan. This measure would require the City to notify affected users of the construction activities in advance, and include measures to provide continued or alternate vehicular, pedestrian, and bicyclist access.

<u>Mitigation Measure:</u>

> **Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan** (see Section 3.17, *Transportation and Circulation*)
>
> **Significance after Mitigation**: Implementation of **Mitigation Measure 3.17-1b** would reduce construction related impacts on public access to recreational facilities to a **less-than-significant** level.

Cumulative Impacts

As described in Section 3.16.3, the proposed project would not increase the use of existing neighborhood parks or other recreational facilities, include or require the construction of recreational facilities, or disrupt or preclude public access to recreational facilities (operations phase); therefore, it could not cause or contribute to any cumulative impact related to these issues.

Impact 3.16-C-1: Implementation of the proposed project, in combination with other cumulative development would not result in a cumulatively significant impact related to recreational facilities. *(Less than Significant)*

The geographic scope of potential cumulative impacts on recreation encompasses recreational facilities that would be affected by proposed project construction. The timeframe during which the proposed project could contribute to cumulative recreation effects includes the construction phase. A significant cumulative impact on recreation would result if the construction-phase effects of the project, combined with those of the cumulative projects, would impede public access to recreational facilities. As discussed in Impact 3.16-1, construction activities of the proposed project could temporarily disrupt of impede access to the public boat launch ramp and the fairground. Construction impacts from the proposed project would be less than significant with mitigation. There are no cumulative projects in **Table 3-1** whose effects could combine with those of the proposed project to further impact public access to these recreational facilities.

Therefore, no other projects could combine with the short-term construction-related effects of the project to result in a significant cumulative impact; this impact would be **less than significant**.

References - Recreation

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3.17 Transportation and Circulation

Sections	Tables

This section describes the potential for the proposed project to affect transportation and circulation. The analysis is based on review of transportation studies and maps of the project area and vicinity, including site-specific investigations conducted for each of the three components (i.e., desalination facility, intake pump station replacement and raw water pipeline connection, and brine disposal pipeline) that comprise the proposed project, the relevant regulatory ordinances, and a discussion of the methodology and thresholds used to determine whether the proposed project would result in significant impacts. This section analyzes the potential for both project-level and cumulative environmental impacts.

Public comments received during the scoping period that relate to transportation and circulation concerned the requirement for an encroachment permit (issued by the California Department of Transportation [Caltrans]) for any construction work that would encroach onto the State right-of-way, the City's responsibility for any necessary improvements to State highways, and an encroachment permit from the City of Pittsburg for any work that would occur in the City of Pittsburg's right-of-way. These concerns are addressed in Sections 3.17.2 and 3.17.3 below.

The analysis included in this section was developed based on project-specific construction and operational features, data provided by the City, maps of the project area, and the City of Antioch General Plan. Due to the limited nature of the proposed project development and minimal additional operational traffic trips that would be added to the project area, a full traffic impact analysis (traffic study) was not required for the proposed project.

3.17.1 Environmental Setting

The proposed project would include the development of a desalination facility with associated equipment and appurtenances, replacement of an existing intake pump station, and pipelines for the conveyance of source water and brine concentrate. As shown in **Figure 2-1**, Project Vicinity, in Chapter 2.0, *Project Description*, the proposed desalination facility would be located within the fenceline of the City's existing water treatment plant (WTP) at 401 Putnam Street, and the pipeline routes would generally follow roadway ROW. The study area encompassing these three project components is generally bounded to the north by the San Joaquin River, to the south by the Contra Costa Canal, to the east by Lone Tree Way and Cavallo Road, and to the west by D Street, G Street, L Street, and Arcy Lane.

The section below describes the characteristics of the existing transportation system within the study area, including the regional and local roadways, bicycle facilities, pedestrian facilities, and public transit.

Regional and Local Roadways

Regional access to the project sites is provided by State Route (SR) 4, an east-west highway that connects the San Pablo Bay to the Sierra Nevada. SR 4 is identified as a Route of Regional Significance (RRS) by the Contra Costa Transportation Authority (CCTA), which is a major roadway or freeway corridor that serves regional traffic. RRS are identified in action plans adopted by the CCTA under the countywide Measure J program. Roadways in the study area are classified per the City of Antioch General Plan Circulation Element and the Contra Costa Congestion Management Program (CMP).

Intake Pump Station Replacement and Raw Water Pipeline Connection Sites

Fulton Shipyard Road/Cavallo Road is a two-lane roadway with no posted speed limit north of Wilbur Avenue. To the south of Wilbur Avenue, Fulton Shipyard Road becomes Cavallo Road with three lanes (includes a center left-turn lane) and a posted speed limit of 35 miles per hour (mph); and two lanes with a posted speed limit of 25 mph between E 18th Street and SR 4.

Tregallas Road is a two-lane roadway with a posted speed limit of 25 mph that runs east-west between G Street and Hillcrest Avenue parallel to SR 4. Class III bicycle facilities are located on Tregallis Road for its entirety.[1]

Sunset Lane is a two-lane roadway with a posted speed limit of 25 mph that runs north-south between Tregallas Road and Lone Tree Way.

Putnam Street/Worrell Road is a two-lane roadway with a posted speed limit of 25 mph that runs east-west between Gentrytown Drive and Garrow Drive. Putnam Street becomes Worrell Road east of Lone Tree Way.

A Street/Lone Tree Way is a four-lane roadway with a posted speed limit of 35 mph in the vicinity of the project site that runs north-south between downtown Antioch and SR 4 providing direct access to the Rivertown District. South of SR 4, A Street becomes Lone Tree Way, and continues southeast into Brentwood. It is identified by CCTA as a RRS and a Primary Arterial in the General Plan. Class II bicycle facilities are provided on Lone Tree Way from SR 4 to James Donlon Boulevard.[2]

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1 Class III facilities are defined in the General Plan as bicycle routes that provide signage to alert bicyclists and motorists that a bicycle route exists.

2 Class II facilities are defined in the General Plan as designated bike lanes that provide space in the road for bicycle travel.

Desalination Facility

D Street is a two lane roadway with a posted speed limit of 25 mph in the vicinity of the project site that runs north-south between W 3rd Street and the project site, where it dead-ends at the driveway to the existing WTP site.

Elizabeth Court is a private one-way loop with no posted speed limit providing internal access to Plant A at the existing WTP site.

Brine Disposal Pipeline Alignment

Arcy Lane/Driveway is a private two lane roadway in the City of Pittsburg with no posted speed limit that runs north-south between W 10th Street/Pittsburg-Antioch Highway and the existing Delta Diablo Wastewater Treatment Plant (WWTP). This is the only roadway within the study area that is located outside of the City of Antioch.

W 10th Street/Pittsburg-Antioch Highway is a three-lane roadway (includes a center left-turn lane) with a posted speed limit of 35 mph in the vicinity of the project site that provides east-west access in downtown Antioch between Somersville Road and A Street. West of Somersville Road, W 10th Street becomes the Pittsburg-Antioch Highway, providing a regional roadway connection to the west of Antioch. It is identified by CCTA as a RRS and a Primary Arterial in the General Plan. Class II bicycle facilities are provided on Pittsburg-Antioch Highway from L Street to Antioch's western city limits.

L Street/Contra Loma Boulevard is a two-lane roadway with a posted speed limit of 35 mph in the vicinity of the project site that runs north-south in northern Antioch between SR 4 and W 10th Street. Contra Loma Boulevard runs north-south in southern Antioch between SR 4 and James Donlon Boulevard. It is identified as a Primary Arterial in the General Plan. Class II bicycle facilities are provided on Contra Loma Boulevard between SR 4 and James Donlon Boulevard.

18th Street is a two-lane roadway with a posted speed limit of 25 mph in the vicinity of the project site that is located north of SR 4 and runs parallel to SR 4. 18th Street acts as a major arterial between A Street and the SR 4/SR 160 junction. It is identified as a Primary Arterial in the General Plan. Class II bicycle facilities are provided on 18th Street between D Street and L Street.

G Street is a two-lane roadway with a posted speed limit of 25 mph in the vicinity of the project site that runs north-south between the San Joaquin River and James Donlon Boulevard.

Tregallas Road (refer to description above under *Intake Pump Station Replacement and Raw Water Pipeline Connection*)

D Street (refer to description above under *Desalination Facility*)

Existing Traffic Conditions

As stated previously, a traffic impact analysis was not required to assess specific traffic conditions on transportation facilities in the study area. However, the following background information is provided for a general understanding of current traffic conditions on regional and local roadways that serve the proposed project.

According to the latest traffic data available from Caltrans, SR 4 in the vicinity of the proposed project carried between 111,000 and 129,000 average daily traffic (ADT) (Caltrans, 2017). The most current ADT information available for the majority of the regional and local roadways described above, and their operational performance (level of service), are provided below in **Table 3.17-1**.

TABLE 3.17-1
EXISTING TRAFFIC CONDITIONS

Roadway	Classification	Level of Service (LOS)	Average Daily Traffic (ADT)
Regional Facilities			
SR 4 at A Street/Lone Tree Way	Divided Freeway	E	111,000
SR 4 at G Street	Divided Freeway	E	119,000
SR 4 at L Street/Contra Loma Boulevard	Divided Freeway	E	129,000
Local Facilities			
Cavallo Road north of 18th Street	Collector	C	5,750
Cavallo Road south of 18th Street	Collector	C	6,220
E Tregallas Road west of Garrow Drive	Local	C	5,160
Putnam Street east of G Street	Local	C	6,440
Worrell Road west of Garrow Drive	Collector	C	2,270
Lone Tree Way south of Worrell Road	Arterial	D	28,000
Pittsburg-Antioch Highway west of Somersville Road	Arterial	C	16,900
10th Street west of L Street	Arterial	C	17,300
L Street south of 10th Street	Arterial	C	6,960
18th Street east of L Street	Local	C	9,610
G Street south of 18th Street	Collector	C	6,380
W Tregallas Road east of G Street	Arterial	C	7,930

SOURCES: Caltrans, 2017; and City of Antioch, 2015 and 2003.

Level of service (LOS) is used to measure the perceptions of traffic conditions by motorists and passengers; it generally reflects driving conditions such as travel time and speed, freedom to maneuver, and traffic interruptions. The LOS rating is a qualitative letter grade that represents the operations of the roadway, from LOS A (minimal delay) to LOS F (excessive congestion). LOS E represents at-capacity operations. According to the General Plan, the City strives to maintain LOS D or better operations on all roadways.

Bicycle and Pedestrian Facilities

As noted above, Class II and Class III bicycle facilities are currently present on a number of study area roadways. In addition, there are a two nearby bicycle/pedestrian facilities that are not located on study area roadways. These are identified as Class I facilities in the General Plan, and are defined as bike paths that exclude motor vehicle access. Class I facilities located near the proposed project are as follows:

- Mokelumne Trail (East Bay Municipal Utility District ROW), from Buchanan Road to Hillcrest Avenue (approximately 1,200 feet south of the proposed Desalination Facility); and
- Delta De Anza Trail, from Antioch's western city limit to Hillcrest Avenue along the Contra Costa Canal (approximately 2,400 feet south of the proposed Desalination Facility).

Existing pedestrian facilities in the study area are extensive; all major roadways have sidewalks on both sides of the street. Sidewalks are *not* present on Fulton Shipyard Road, Arcy Lane, or Elizabeth Court.

Public Transit

Eastern Contra Costa Transit Authority (Tri Delta Transit) provides public transit service to the various components of the proposed project. Tri Delta Transit operates 13 local bus routes Monday through Friday, 4 local bus routes on weekends and holidays, door-to-door bus service for senior citizens and people with disabilities, and shuttle services for community events. The following Tri Delta Transit bus routes and their nearest bus stops to the three project components are as follows:

- **Route 380/392** – Service between Pittsburg/Bay Point BART Station and the Antioch Park & Ride on Hillcrest Avenue. The nearest bus stops are located approximately 0.5 miles south of the proposed Intake Pump Station Replacement facility at the corner of Wilbur Avenue and Cavallo Road, and approximately 0.5 miles east of the proposed Desalination Facility on Lone Tree Way.
- **Route 387** – Service between Pittsburg/Bay Point BART Station and the Tri Delta Transit headquarters on Wilbur Avenue. The nearest bus stop is located approximately 0.5 miles south of the proposed Intake Pump Station Replacement facility at the corner of Wilbur Avenue and Cavallo Road.
- **Route 388** – Service between Pittsburg/Bay Point BART Station and the Kaiser Medical Center on Deer Valley Road. The nearest bus stop is located approximately 0.5 miles south of the proposed Brine Storage and Disposal facility on Verne Roberts Circle.

3.17.2 Regulatory Framework

Federal

Federal Aviation Administration

All airports and navigable airspace not administered by the United States Department of Defense are under the jurisdiction of the Federal Aviation Administration (FAA). Federal Regulation Title

14 Section 77 establishes the standards and required notification for objects affecting navigable airspace. In general, projects involving features exceeding 200 feet in height above ground level or extending at a ratio greater than 50:1 (horizontal to vertical) from a public or military airport runway less than 3,200 feet long out to a horizontal distance of 20,000 feet are considered potential obstructions, and require notification to the FAA. In addition, the FAA requires a congested area plan (CAP) for operating a helicopter (with external load) near residential dwellings.

Transportation of Hazardous Materials

The U.S. Department of Transportation (USDOT) is the administering agency for the following regulations:

- Title 49 Code of Federal Regulations (CFR) Sections 171 through 177 (49 CFR 171–177), which govern the transportation of hazardous materials, the types of materials defined as hazardous, and the marking of transportation vehicles.
- Title 49 CFR 350–399 and Appendices A through G, Federal Motor Carrier Safety Regulations, which address safety considerations for the transport of goods, materials, and substances over public highways.
- Title 49 CFR 397.9, the Hazardous Materials Transportation Act of 1974, which directs USDOT to establish criteria and regulations for the safe transportation of hazardous materials.

State

California Department of Transportation (Caltrans)

Caltrans is responsible for planning and maintaining state routes, highways, and freeways. Caltrans maintains jurisdictional authority of SR 4 in the study area. Caltrans has developed the *Guide for the Preparation of Traffic Impact Studies* (December 2002) for use when assessing state facilities.

Senate Bill 743

The legislature found that with the adoption of the SB 375, the State had signaled its commitment to encourage land use and transportation planning decisions and investments that reduce vehicle miles traveled (VMT) and thereby contribute to the reduction of greenhouse gas emissions (GHG), as required by the California Global Warming Solutions Act of 2006 (AB 32).

On September 27, 2013, SB 743 was signed into law. SB 743 started a process that could fundamentally change transportation impact analysis as part of CEQA compliance. These changes will include the elimination of auto delay, LOS, and other similar measures of vehicular capacity or traffic congestion as a basis for determining significant impacts in many parts of California (if not statewide). As part of the new *CEQA Guidelines*, the new criteria “shall promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses” (Public Resources Code [PRC] Section 21099(b)(1)). The Office of Planning and Research (OPR) is in the process of developing alternative metrics and thresholds based on VMT. OPR has published the final draft of changes to the *CEQA Guidelines*, which will require certification and adoption by the California Secretary for Natural Resources before they go into effect. This may take several months depending on the input received during the review process. Once the guidelines are prepared and certified, "automobile delay, as described solely by LOS or similar measures of vehicular capacity or traffic congestion, shall not be considered a significant impact on the environment" (PRC Section 21099(b)(2)). Because OPR has not yet amended the *CEQA Guidelines* to implement this change, automobile delay is still considered a significant impact, and the City of Antioch will continue to use the established LOS criteria.

Local

City of Antioch General Plan

The City of Antioch General Plan Circulation Element promotes alternative modes of transportation, roadway improvements, and traffic improvements throughout the planning area (City of Antioch, 2003). As the General Plan focuses on the design and implementation of circulation system improvements, policies in this element do not directly relate to the proposed project.

City of Antioch Municipal Code

Title 7 (Public Works), Chapter 2 (Encroachments) of the City of Antioch Municipal Code details the City's regulations regarding the use of roads and the construction of utilities infrastructure, including encroachments. Numerous regulations are applicable to the proposed project, including regulations regarding the use of roadways, the type of vehicles and load sizes allowable on given roadways, encroachment on private property, and the construction of utilities infrastructure (City of Antioch, 2017). The municipal code applies to all roads within the City's jurisdiction, and project construction must adhere to all ministerial regulations presented in the Municipal Code.

City of Pittsburg General Plan

The City of Pittsburg General Plan Transportation Element promotes alternative modes of transportation, roadway improvements, and traffic improvements throughout the planning area (City of Pittsburg, 2001). As the General Plan focuses on the design and implementation of circulation system improvements, policies in this element do not directly relate to the proposed project.

City of Pittsburg Municipal Code

Title 15 (Buildings and Construction), Chapter 12.01 (Encroachments within Public ROWs) of the City of Pittsburg Municipal Code details the City's regulations regarding the use of roads and the construction of utilities infrastructure, including encroachments. Numerous regulations are applicable to the proposed project, including regulations regarding the use of roadways, the type of vehicles and load sizes allowable on given roadways, encroachment on private property, and the construction of utilities infrastructure (City of Pittsburg, 2017). The municipal code applies to all roads within the City's jurisdiction, and project construction must adhere to all ministerial regulations presented in the Municipal Code.

Contra Costa Countywide Bicycle and Pedestrian Plan

The Contra Costa Countywide Bicycle and Pedestrian Plan (CBPP) was prepared to help carry out the strategies identified in the Countywide Comprehensive Transportation Plan, which support pedestrian-friendly developments and encourages a connected, coordinated network of bicycle facilities (Contra Costa County, 2009). Bicycle facilities are defined in three different classifications as follows:

Class I Bikeway: A dedicated off-road bicycle and/or pedestrian path (typically multi-use path), which provides for bicycle travel on a paved right-of-way completely separated from any street or highway.

Class II Bikeway: A dedicated bike lane on a street and/or highway (not a sidewalk), with signing and pavement markings separating the bicycle lane from adjacent traffic flow.

Class III Bikeway: Dedicated bike routes that provide for shared use with pedestrian or motor vehicle traffic and are identified by signing.

Bicycle facilities in the project study area are identified above in Section 3.17.1, *Environmental Setting*.

3.17.3 Analysis, Impacts, and Mitigation

Significance Criteria

Based on Appendix G of the CEQA *Guidelines*, the project would have a significant impact on transportation and traffic 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
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Issues Not Discussed in Impacts

The proposed project would have no impact related to the following considerations identified in Appendix G of the CEQA Guidelines. Because the proposed project would not result in any direct or indirect impact related to these considerations, none could cause or contribute to any cumulative impact. Therefore, these considerations are not addressed further.

- ***Exceedance of LOS Standards Established by the County Congestion Management Agency.*** The LOS standards for roadways that are part of the Contra Costa County Congestion Management Program network are intended to regulate long-term traffic increases from operation of new development and do not apply to temporary construction projects. As noted above, the operation of proposed project facilities is anticipated to be similar to the existing traffic and circulation conditions within the project area, with the addition of a minimal increase in maintenance worker trips. Increases in traffic volumes generated by construction projects end when construction activities end. As such, the proposed project would not exceed LOS standards established by the Contra Costa County Congestion Management Agency (i.e., the Contra Costa Transportation Authority) for designated Congestion Management Program roadways. Therefore, this criterion is not discussed further.

- ***Changes in Air Traffic Patterns.*** The nearest airport, Buchanan Field Airport, is located approximately 13 miles west of the project area. The proposed project facilities would not affect air traffic patterns of nearby airports. New structures (i.e., intake pump station and desalination plant) or construction equipment would exceed height restrictions within this area. Therefore, the proposed project would not alter air traffic patterns nor result in substantial safety risks associated with airport operations. The significance criterion related to air traffic patterns are not discussed further.

- ***Increased Hazards Due to a Design Feature or Incompatible Uses.*** The proposed project would not include new design features (e.g., new facilities or obstructions within public roadways) or alterations of existing features (e.g., road realignment). In addition, traffic generated by the proposed project would be compatible with the mix of vehicle types (automobiles and trucks) currently using project area roads. Therefore, the proposed project would not result in hazards caused by a design feature or incompatible use, and this significance criterion is not discussed further.

- ***Conflicts with Adopted Policies, Plans, or Programs Supporting Alternative Transportation.*** The proposed project would not directly or indirectly eliminate alternative transportation corridors or facilities (e.g., bike paths, lanes, bus turnouts, etc.) both because of facility locations and because of the short-term nature of construction activities where potential effects could occur. In addition, the proposed project would not include changes in policies or programs that support alternative transportation. Therefore, the proposed project would not conflict with adopted policies, plans, or programs supporting alternative transportation, and this significance criterion is not discussed further.

Methodology and Assumptions

The evaluation of transportation and traffic impacts is based on the development assumptions for the proposed project, as described in Chapter 2, *Project Description*. The number of construction trips associated with the proposed project was quantified, taking into account the estimated construction schedule and the number of truck trips and worker trips assumed to occur in each construction phase.

Based on the General Plan, the City has established a screening criterion of 50 or more net new peak-hour trips at which point projects that exceed that criterion are required to be assessed based on the City's guidelines (City of Antioch, 2003). Projects that generate less than that criterion are determined to have a less-than-significant impact. Operation of the proposed project would add up to 7 new employees, whose trips would be distributed between 2 day shifts and 1 night shift, and maintenance staff. This would generate approximately 14 new one-way trips.

Given that the net new operational trips would not trigger further analysis, the impact evaluation for operational activities is predominantly qualitative in nature.

Specific construction assumptions related to transportation and circulation are outlined below for the three components that comprise the proposed project. The proposed project facilities would be would be constructed between February 2019 through March 2020. The approximate duration of construction activities would vary by proposed project component as follows: intake pump station – 12 months; desalination plant – 14 months; pipelines – over the course of 10 months. Construction work would typically occur during normal working hours; weekdays between the hours of 8 a.m. and 5 p.m.

River Intake Pump Station

Only minor clearing or grubbing is expected for the intake pump station site as it would be constructed on pre-developed areas. Construction access would be provided via existing access roads and roadways.

Pipeline Installation

The installation of new pipelines would affect traffic flow by temporarily reducing the capacity of the affected roads because of lane closures and in some cases, road closures. The raw water pipeline connection would be up to 3,000-feet-long and would tee off of the existing pipeline in Lone Tree Way and provide a direct connection between the River's pump station and the WTP through one of two options: west across Robert Street, and south along D Street before entering the WTP site, or west across the southern property line. The WTP pipelines would be approximately 1,200 feet in total length, and would run between the existing WTP and the proposed desalination facility. The brine disposal pipeline would be approximately 4.3 miles long. It would be constructed within roadway ROWs along Elizabeth Lane/D Street, Tregallas Road, G Street, 18th Street, L Street, and 10th Street and would connect to the Delta Diablo WWTP.

Desalination Plant Construction

Construction workers would access the proposed desalination plant site via the WTP site entrance at D Street and existing internal access roads.

Impacts and Mitigation Measures

Table 3.17-2 summarizes the proposed project's impacts and significance determinations related to transportation and circulation.

TABLE 3.17-2
SUMMARY OF IMPACTS – TRANSPORTATION AND CIRCULATION

Impacts	Significance Determinations
Impact 3.17-1: Construction of the proposed project would have temporary and intermittent effects on traffic and transportation conditions in the project area.	LSM
Impact 3.17-2: Construction of the proposed project would temporarily disrupt circulation patterns near sensitive land uses (schools, hospitals, fire stations, police stations, and other emergency providers).	LSM
Impact 3.17-3: Construction of the proposed project would have temporary effects on alternative transportation or alternative transportation facilities in the project area.	LSM
Impact 3.17-4: Construction of the proposed project would temporarily increase the potential for accidents on project area roadways.	LSM
Impact 3.17-5: Construction of the proposed project would increase wear-and-tear on the designated haul routes used by construction vehicles to access the project area work sites.	LSM
Impact 3.17-C-1: Cumulative impacts related to transportation and circulation.	LSM

NOTES:
LSM = Less than Significant with Mitigation

Impact 3.17-1: Construction of the proposed project would have temporary and intermittent effects on traffic and transportation conditions in the project area. ***(Less than Significant with Mitigation)***

The proposed project would not introduce any uses to the project study area that would generate noticeable long-term changes in traffic; operational traffic would be limited to infrequent trips by maintenance personnel and by vehicles delivering chemicals to the WTP facility once a month. Thus potential traffic and transportation effects would be confined to construction of the proposed facilities. Construction-generated traffic would be temporary and therefore would not result in any long-term degradation in operating conditions or level of service on any study area roadways. The primary impacts from the movement of construction trucks would include short-term and intermittent lessening of roadway capacities due to slower movements and larger turning radii of the trucks compared to passenger vehicles.

Construction activities conducted for the proposed project would result in increased traffic volumes on area roadways generated by the daily arrival and departure of constructions workers, and by trucks hauling equipment and materials to and from the construction sites. As a worst-case scenario, worker and construction trips for all project components were assumed to occur simultaneously. **Table 3.17-3** shows the total number of one-way, daily worker and truck trips that could potentially occur during the peak of construction activity. It is estimated that the proposed project would generate a maximum of 60 one-way worker trips per day, and a maximum of 82 one-way heavy truck trips per day.

TABLE 3.17-3
CONSTRUCTION WORKER AND TRUCK TRIPS

Project Component	Daily One-Way Trips	
	Workers	**Trucks**
Demolition/Construction of River Pump Station	12	4
Raw Water/Feed Water Connection Pipeline to WTP	16	70
Desalination Facility Construction	16	8
Brine Disposal Pipeline	16	0
Total	**60**	**82**

SOURCE: Carollo, 2017.

However, given the different locations of the distinct project components, increased traffic generated by construction activities associated with these overlapping (in time) construction phases generally would not use the same roadways. As such, the impact of increased traffic on traffic and transportation conditions for these project components generally would not be additive. An exception would be the potential concurrent use of SR 4, which would be used for regional access to all work sites.

Based on the existing ADT volumes shown in **Table 3.17-1** and the estimated number of construction-related project trips shown in **Table 3.17-3**, the concurrent construction activities would increase the average daily traffic volume on local and regional roadways by no more than 0.01 percent (i.e., too small of a change to be perceived by the average motorist). Traffic increases on local roads would be more noticeable, but the roadways would continue to accommodate traffic within the roadways' carrying capacity with no discernable affect to LOS. Proposed hours of construction are between 8:00 AM and 5:00 PM. Truck trips related to off hauling of excavated material from pipeline trenching and deliveries of equipment and materials would be dispersed over the course of the day, thus lessening the effect on traffic flow conditions. Construction truck traffic occurring weekdays during the hours of 7:00 to 9:00 AM and 4:00 to 6:00 PM would coincide with peak-period traffic, and therefore, would have the greatest potential to impede traffic flow. While the construction contractor for each project component would likely schedule truck trips to avoid peak traffic hours on area roadways, dispersion of the 142 construction vehicle trips (60 worker trips and 82 truck trips) over the course of the nine-hour workday would cause less than-significant impacts on traffic flow during any specific hour. Even if all 142 construction vehicle trips were to occur on a single roadway segment, that would still only amount to an average of an additional 16 hourly vehicle trips, which would not result in any discernable effect on roadway operations. The primary impacts from the movement of construction trucks would include short-term and intermittent lessening of roadway capacities due to slower movements and larger turning radii of the trucks compared to passenger vehicles. In addition, drivers could experience delays if they were traveling behind a construction truck.

Implementation of **Mitigation Measures 3.17-1a (Encroachment Permits)** and **3.17-1b (Construction Traffic Control/Traffic Management Plan)**, would require compliance with local road encroachment permit conditions, preparation of a Traffic Control Plan, identification of roadways that require special construction techniques, development of a circulation and detour plan, and consultation with local transit service providers.

Mitigation Measures:

Mitigation Measure 3.17-1a: Encroachment Permits

The construction contractor shall obtain any necessary road encroachment permits prior to constructing each project component and shall comply with the conditions of approval attached to all project permits and approval. In addition, the Construction Traffic Control/Traffic Management Plan (subject to local jurisdiction review and approval) required by Mitigation Measure 3.17-1b, would include safety measures for traffic flow and circulation during project construction.

Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan

The construction contractor shall prepare a Construction Traffic Control/Traffic Management Plan and submit it to the appropriate local jurisdiction prior to construction (i.e., City of Antioch, City of Pittsburg) for review and approval prior to construction. The plan shall include the following components:

- Identify hours of construction (between 8:00 AM and 5:00 PM; no construction shall be permitted between 10:00 PM and 7:00 AM);
- Schedule truck trips outside of peak morning and evening commute hours to minimize adverse impacts on traffic flow (i.e., if agencies with jurisdiction over the affected roads identify highly congested roadway segments during their review of the encroachment permit applications). Haul routes that minimize truck traffic on local roadways and residential streets shall be used.
- Develop circulation and detour plans to minimize impact to local street circulation. This may include the use of signing and flagging to guide vehicles, bicyclists, and pedestrians through and/or around the construction zone.
- Control and monitor construction vehicle movements by enforcing standard construction specifications through periodic onsite inspections;
- Install traffic control devices where traffic conditions warrant, as specified in the applicable jurisdiction's standards (e.g., the *California Manual of Uniform Traffic Controls for Construction and Maintenance Work Zones*);
- Perform construction that crosses on-street and off-street bikeways, sidewalks, and other walkways in a manner that allows for safe access for bicyclists and pedestrians. Alternatively, provide safe detours to reroute affected bicycle/pedestrian traffic.
- Consult with the Tri Delta Transit at least one month prior to construction to coordinate bus stop relocations (as necessary) and to reduce potential interruption of transit service;

- Comply with roadside safety protocols to reduce the risk of accidents. Provide "Road Work Ahead" warning signs and speed control (including signs informing drivers of state-legislated double fines for speed infractions in a construction zone) to achieve required speed reductions for safe traffic flow through the work zone.
- Identify all access and parking restrictions, pavement markings and signage requirements (e.g., speed limit, temporary loading zones);
- Store all equipment and materials in designated contractor staging areas;
- Encourage construction crews to park at staging areas to limit lane closures in the public ROW;
- Include a plan and implementation process for notifications and a process for communication with affected residents, businesses, and recreational users (public boat launch ramp and Contra Costa County Fairground) prior to the start of construction. Advance public notification shall include posting of notices and appropriate signage of construction activities at least one week in advance. The written notification shall include the construction schedule, the exact location and duration of activities within each street (i.e., which lanes and access point/driveways would be blocked on which days and for how long), and a toll-free telephone number for receiving questions or complaints;
- Include a plan and implementation process to coordinate all construction activities with emergency service providers in the area at least one month in advance. Emergency service providers shall be notified of the timing, location, and duration of construction activities. All roads shall remain passable to emergency service vehicles at all times;
- Include a plan and implementation process to coordinate all construction activities with the Antioch Unified School District at least two months in advance. The School District shall be notified of the timing, location, and duration of construction activities. The City shall coordinate with the School District to identify peak circulation periods at schools along the alignment(s) (i.e., the arrival and departure of students), and require their contractor to avoid construction and lane closures during those periods. The construction contractor for each project component shall be required to maintain vehicle, bicycle, pedestrian, and school bus service during construction through inclusion of such provisions in the construction contract. The assignment of temporary crossing guards at designated intersections may be needed to enhance pedestrian safety during project construction;
- Identify all roadway locations where special construction techniques (e.g., trenchless pipeline installation or night construction) will be used to minimize impacts to traffic flow. Include the requirement that all open trenches be covered with metal plates at the end of each workday to accommodate traffic and access; and
- Specify the street restoration requirements pursuant to agreements with the local jurisdictions (i.e., City of Antioch, City of Pittsburg).

Significance after Mitigation: With implementation of **Mitigation Measures 3.17-1a** and **3.17-1b**, the construction impact would be reduced to a **less-than-significant** level because the temporary reduction in roadway capacity would be managed to minimize traffic disruptions to all roadway users.

Impact 3.17-2: Construction of the proposed project would temporarily disrupt circulation patterns near sensitive land uses (schools, hospitals, fire stations, police stations, and other emergency providers). ***(Less than Significant with Mitigation)***

The proposed project would result in temporary effects on traffic flow, particularly with pipeline construction within a road right-of-way. Pipeline construction within or across streets could result in delays for emergency vehicle access, and would also obstruct pedestrian, bicycle, and vehicle access to schools. Construction along the pipeline alignments could cause delays to school buses and limit access to school bus stops.

Construction of the desalination facility and the river intake pump station would not directly interfere with circulation patterns near sensitive land uses because no schools, hospitals, fire stations, police stations, or other emergency providers are located adjacent to these proposed facilities. However, construction could indirectly disrupt circulation patterns near sensitive land uses, as haul route could pass by sensitive land uses, and traffic may divert to roadways with sensitive land uses due to construction activity.

As stated previously in the discussion of Impact 3.17-1, implementation of **Mitigation Measure 3.17-1b (Construction Traffic Control/Traffic Management Plan)** would require the City to coordinate with the Antioch Unified School District prior to construction regarding construction schedule in the vicinity of schools and school access routes during construction. Furthermore, it would require the construction contractor to establish methods for maintaining traffic flow in and along the subject roadway corridor and minimizing disruption to emergency vehicle access to land uses along the alignment. Specific requirements that may be included in the traffic control/traffic management plan regarding emergency access and access to public schools are identified under **Mitigation Measure 3.17.1b**.

<u>Mitigation Measure:</u>

Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan

See Impact 3.17-1 above, for description.

Significance after Mitigation: Implementation of **Mitigation Measure 3.17-1b** would ensure that potential construction impacts associated with temporary effects on emergency access and access to public schools would be mitigated to a **less than-significant** level.

Impact 3.17-3: Construction of the proposed project would have temporary effects on alternative transportation or alternative transportation facilities in the project area. ***(Less than Significant with Mitigation)***

The proposed project would not result in any long-term impact on demand for alternative transportation or on alternative transportation facilities (i.e., for transit and bicyclists). However, pipeline construction along project area roadways could disrupt bicycle facilities (i.e., Lone Tree Way, Tregallas Road, Pittsburg-Antioch Highway, and 18th Street) and access to bus stops and slow bus movements for bus routes provided by Tri Delta Transit; see *Public Transit* discussion in Section 3.17.1, *Environmental Setting*, above.

As stated previously in the discussion of Impact 3.17-1, implementation of **Mitigation Measure 3.17-1b (Construction Traffic Control/Traffic Management Plan)** would require the construction contractor to establish methods for minimizing construction effects on transit service. Specific requirements that may be included in the traffic control/traffic management plan are identified under **Mitigation Measure 3.17-1b**.

<u>Mitigation Measure:</u>

Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan

See Impact 3.17-1 above, for description.

Significance after Mitigation: Implementation of **Mitigation Measure 3.17-1b** would reduce construction-related temporary disruptions to transit service to a **less-than-significant** level.

Impact 3.17-4: Construction of the proposed project would temporarily increase the potential for accidents on project area roadways. ***(Less than Significant with Mitigation)***

The proposed project would not alter the permanent configuration (alignment) of area roadways, and would not introduce types of vehicles that are not already traveling on area roads. However, construction zones in the public ROW and heavy equipment operating adjacent to or within a road ROW would increase the potential for accidents. Construction-generated trucks on study area roadways would interact with other vehicles. Potential conflicts also could occur between construction traffic and alternative modes of transportation (e.g., bicyclists and buses).

As stated previously in the discussion of Impact 3.17-1, implementation of **Mitigation Measure 3.17-1b (Construction Traffic Control/Traffic Management Plan)** requires the contractor to prepare a traffic control/traffic management plan in accordance with professional engineering standards prior to construction, including compliance with roadside safety protocols, so as to reduce the risk of accidents. Specific requirements that may be included in the traffic management plan are identified under **Mitigation Measures 3.17-1b**. Thus, implementation of

Mitigation Measures 3.17-1b would ensure temporary increases in the potential for accidents would be mitigated to a **less-than-significant** level.

Mitigation Measure:

Mitigation Measure 3.17-1b: Construction Traffic Control/Traffic Management Plan

See Impact 3.17-1 above, for description.

Significance after Mitigation: Implementation of **Mitigation Measure 3.17-1b** would reduce the potential for accidents to occur on project area roadways affected by construction activities to a **less-than-significant** level.

Impact 3.17-5: Construction of the proposed project would increase wear-and-tear on the designated haul routes used by construction vehicles to access the project area work sites. ***(Less than Significant with Mitigation)***

The use of large trucks to transport equipment and material to and from the project site(s) could affect road conditions on the designated haul routes by increasing the rate of road wear. The degree to which this impact would occur depends on the design (pavement type and thickness) and existing condition of the road. Major arterials and collectors such as SR 4, Pittsburg-Antioch Highway, and Lone Tree Way are designed to accommodate a mix of vehicle types, including heavy trucks. The project impacts are expected to be negligible on those roads. Residential streets are generally not built with a pavement thickness that would withstand substantial truck traffic volumes.

Implementation of **Mitigation Measure 3.17-5 (Roadway Repairs)**, which requires the applicant to enter into an agreement prior to construction that would detail pre- and post-construction conditions on project haul routes and pipeline segments and repair damaged roads, would reduce impacts to a **less-than-significant** level.

Mitigation Measure:

Mitigation Measure 3.17-5: Roadway Repairs

The City shall repair any roads damaged by project construction to a structural condition equal to that which existed prior to construction activity. Prior to project construction, City of Antioch Public Works Department shall document road conditions for all routes that would be used by project-related vehicles. The City shall also document road conditions after project construction is completed. Roads damaged by project construction shall be repaired to a structural condition equal to that which existed prior to construction activity.

Significance after Mitigation: Implementation of **Mitigation Measure 3.17-5** would mitigate project construction wear-and-tear impacts on study area roadways to a **less-than-significant** level.

Cumulative Impacts

Section 3.1, *Approach to Cumulative Impact Analysis and Cumulative Projects*, describes the overall approach to the cumulative analysis for those topics using a list-based approach and summarizes reasonably foreseeable future projects in the vicinity of the project that could contribute to a cumulative impact; please refer to **Table 3-1** and **Figure 3-1** for a description and location of potential cumulative projects in the vicinity of the proposed project. The cumulative analysis for transportation and circulation uses a list-based approach to analyze the effects of the project in combination with other past, present, and probable future projects in the immediate vicinity.

The proposed project would result in no impact with respect to conflicts with an applicable congestion management plan, changes in air traffic patterns, permanent increases in traffic safety hazards due to a design feature or incompatible uses, or conflicts with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities. Therefore, it could not cause or contribute to any cumulative effects related to these traffic and transportation topics, and these topics are not discussed further.

Impact 3.17-C-1: Construction of the proposed project, in combination with other cumulative development, could result in cumulative effects relating to transportation and circulation conditions in the project study area. *(Less than Significant with Mitigation)*

The geographic scope for the cumulative traffic impact analysis encompasses the local and regional roadways and highways that would be used for project-related construction. Cumulative projects that could overlap with the proposed project's construction schedule include numbers 1 (Almond Knolls), 10 (Mt. Diablo Resource Recovery Park Service), 14 (Dow Modernization Project), and 15 (East County Bioenergy Project). Cumulative projects with unknown construction timelines could be constructed within the anticipated construction period for the proposed project and have similar transportation and circulation effects. Accordingly, this analysis conservatively assumes that at least some of the cumulative projects whose construction schedules remain unknown would be constructed concurrent with the proposed project.

A significant cumulative effect on transportation and circulation could occur if the incremental impacts of the project combined with those of one or more of the projects listed in **Table 3-1** that would use the same transportation network as the project during construction to substantially and adversely affect the effectiveness of the circulation system. Concurrent construction of the proposed with other projects proposed in the vicinity (see Table 3.1-1) could result in potentially significant cumulative impacts due to increases in: construction-related vehicle trips, traffic delays, potential traffic safety hazards for vehicles, bicyclists and pedestrians on public roadways, and increased wear-and-tear on routes used by construction vehicles. As discussed in Impacts 3.17-1 through 3.17-5, the proposed project's construction activities would result in temporary, short-term impacts to transportation and circulation. However, the project's impacts would be reduced to less than cumulatively considerable with implementation of **Mitigation Measures 3.17-1a** and **3.17-1b**, and **3.17-5**, which would require the preparation and implementation of a Construction Traffic Control/Traffic Management Plan. With the implementation of the mitigation measures, the proposed project's contribution to construction traffic impacts would not be cumulatively considerable. Therefore, cumulative transportation and circulation impacts are considered **less than significant with mitigation**.

References – Transportation and Circulation

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Tri Delta Transit, *System Map* and *Schedules and Maps*. Available online at: trideltatransit.com/local_bus.aspx. Accessed on December 6, 2017.

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3.18 Tribal Cultural Resources

This section presents and discusses the tribal cultural resources associated with the project construction, implementation, and operation. Also discussed are the environmental setting, regulatory framework, the significance criteria used for determining environmental impacts, and potential impacts associated with construction and operation of the project.

During scoping for this EIR, tribal cultural resource-related concerns raised by the public and responsible agencies included the Native American Heritage Commission (NAHC). The NAHC submitted a letter that indicates Assembly Bill (AB) 52 applies to the proposed project and recommends consultation with applicable California Native American tribes in order to avoid potential tribal resources impacts. The NAHC also recommended actions to adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources.

The analysis included in this section was based on the cultural resources study completed for the proposed project: *Antioch Brackish Water Desalination Project Cities of Antioch and Pittsburg, Contra Costa County Cultural Resources Survey Report* (ESA, 2017) as well as consultation efforts with local Native American tribes.

3.18.1 Environmental Setting

Section 3.5.1 in Section 3.5, *Cultural Resources* provides the natural and cultural background for the cultural resources and tribal cultural resources analysis as well as a summary of the background research, survey effort, and an evaluation of potential tribal cultural resources. Section 3.5.1 also provides a summary of the Native American consultation effort for the proposed project.

3.18.2 Regulatory Framework

Federal

There are no applicable federal regulations that specifically address tribal cultural resources.

State

Public Resources Code (PRC) Section 21074

In September 2014, the California Legislature passed AB 52, which added provisions to the PRC regarding the evaluation of impacts on tribal cultural resources under CEQA, and consultation requirements with California Native American tribes. In particular, Assembly Bill 52 now requires lead agencies to analyze project impacts on tribal cultural resources separately from archaeological resources (PRC Section 21074; 21083.09). The Bill defines tribal cultural resources in a new section of the PRC Section 21074. AB 52 also requires lead agencies to engage in additional consultation procedures with respect to California Native American tribes (PRC Section 21080.3.1, 21080.3.2, 21082.3).

Specifically, PRC Section 21084.3 states:

a) Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.

b) If the lead agency determines that a project may cause a substantial adverse change to a tribal cultural resource, and measures are not otherwise identified in the consultation process provided in Section 21080.3.2, the following are examples of mitigation measures that, if feasible, may be considered to avoid or minimize the significant adverse impacts:

   1) Avoidance and preservation of the resources in place, including, but not limited to, planning and construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

   2) Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:

      A. Protecting the cultural character and integrity of the resource.

      B. Protecting the traditional use of the resource.

      C. Protecting the confidentiality of the resource.

   3) Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

   4) Protecting the resource.

In addition, the Office of Planning and Research updated Appendix G of the CEQA *Guidelines* to provide sample questions regarding impacts on tribal cultural resources (PRC Section 21083.09).

Local

There are no applicable local regulations that specifically address tribal cultural resources.

3.18.3 Analysis, Impacts and Mitigation

Significance Criteria

Based on Appendix G of the CEQA *Guidelines*, the project would have a significant impact on tribal cultural resources if it would:

a) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or,

b. 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 Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Methodology and Assumptions

Tribal cultural resources are defined as a site feature, place, cultural landscape, sacred place or object, which is of cultural value to a tribe that is either on or eligible for the California Register or a local historic register, or the lead agency, at its discretion, chooses to treat the resource as a tribal cultural resource. Impacts on tribal cultural resources are assessed in consultation with the affiliated Native American tribe in accordance with PRC Section 21080.3. This analysis considers whether the Project would cause damaging effects to any tribal cultural resource, including archaeological resources and human remains.

Impacts and Mitigation Measures

Table 3.18-1 summarizes the proposed project's impacts and significance determinations related to tribal cultural resources.

TABLE 3.18-1
SUMMARY OF IMPACTS – TRIBAL CULTURAL RESOURCES

Impacts	Significance Determinations
Impact 3.18-1: The project could cause a substantial adverse change in the significance of a tribal cultural resource.	LSM
Impact 3.5-C-1: Cumulative impacts related to tribal cultural resources.	LSM

NOTE:
LSM = Less than Significant with Mitigation

Impact 3.18-1: The project could cause a substantial adverse change in the significance of a tribal cultural resource. (*Less than Significant with Mitigation*)

The City sent a letter to seven culturally-affiliated Native American tribes and individuals that may have interest in the proposed Project. The Ione Band of Miwok Indians responded that the tribe was requesting official consultation on the project. The City responded that they would provide the draft Cultural Resources Survey Report, which was sent to the tribe on January 17, 2018. No additional information has been received from the tribe. Based on the NWIC background research there are no tribal cultural resources in the Project area and the Project would have no impact on known tribal cultural resources. If archaeological resources or human remains are uncovered during construction activities, impacts to tribal cultural resources could be potentially significant. **Mitigation Measure 3.5-2 (Inadvertent Discovery of Archaeological Resources)** and **Mitigation Measure 3.5-3 (Inadvertent Discovery of Human Remains)**, as described in Section 3.5, *Cultural Resources* would apply to archaeological resources and human remains that are considered tribal cultural resources and would reduce impacts to a less-than-significant level.

Mitigation Measures:

Mitigation Measure 3.5-2: Inadvertent Discovery of Archaeological Resources

Mitigation Measure 3.5-3: Inadvertent Discovery of Human Remains

Significance after Mitigation: With the implementation of **Mitigation Measure 3.5-2** listed above, this impact would be reduced to a **less-than-significant** level because the resource would be either be avoided or a treatment plan would be developed by a qualified archaeologist, in consultation with the affiliated Native American tribe(s). In addition, if human remains are identified impacts to tribal cultural resources would be reduced to a **less-than-significant** level with the implementation of **Mitigation Measure 3.5-3** because the Native American Heritage Commission and the Most Likely Descendant would be contacted if the remains were found to be Native American and the provisions of PRC Section 5097.98 would be implemented.

Cumulative Impacts

Impacts related to tribal cultural resources are generally site-specific and depend on the specific localized resources and resource potential. As a result, they are not typically additive or cumulative in nature.

The geographic scope for the analysis of cumulative impacts on tribal cultural resources includes projects within or in the immediate vicinity of the project area. The project would contribute to a cumulative impact on unknown buried archaeological resources, or human remains, that are considered tribal cultural resources if the cumulative projects listed in **Table 3-1** were to adversely affect the same resources affected by the project or would affect other tribal cultural resources in the project vicinity.

Impact 3.18-C-1: Implementation of the proposed project, in combination with other cumulative development, could contribute to cumulative impacts to tribal cultural resources. *(Less than Significant with Mitigation)*

The geographic scope for cumulative effects to tribal cultural resources includes the immediate vicinity of locations where the project would cause ground disturbance. Similar to the proposed project as described under Impact 3.5-3, cumulative projects in the project vicinity listed in **Table 3-1** could have a significant impact on archaeological resources that are considered tribal cultural resources from construction-related ground disturbance. The potential impacts of the project when considered together with similar impacts from other cumulative projects in the vicinity could result in a significant cumulative impact to tribal cultural resources. The proposed project's contribution to this impact could be cumulatively considerable. However, implementation of **Mitigation Measure 3.5-2** and **Mitigation Measure 3.5-3**, which would require avoidance of the resource or if avoidance is not feasible appropriate treatment and documentation of the resource as well as implementation of legally-required appropriate treatment of human remains. Therefore, with implementation of Mitigation Measure 3.5-2 and Mitigation Measure 3.5-3, the proposed project's contribution to cumulative impacts would not be considerable, and the impact would be **less than significant with mitigation**.

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3.19 Environmental Topics Not Subjected to Detailed Analysis

Pursuant to CEQA *Guidelines* Section 15128, this subsection describes the reasons that various possible effects of a project were determined not to be significant, or to have no impact, and, therefore, were not discussed in detail in this EIR. These determinations were generally made because the identified environmental resources are not present within or around the project area or because implementation of the project would clearly have no effect with respect to the topic issue area. These issue areas are described in this section with an explanation of why they are not evaluated further in this EIR.

3.19.1 Agricultural and Forestry Resources

Appendix G of the CEQA *Guidelines* specifies that an impact to agricultural and forestry resources would occur if a project would: Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use; conflict with existing zoning for agricultural use, or a Williamson Act contract; conflict with existing zoning, or cause rezoning of, forest land or timberland; result in loss of forest land or conversion of forest land to non-forest use, or; involve other changes that could result in conversion or farmland of forest land to non-agricultural use.

The entirety of the project area, is classified as “Urban and Built-up” by the California Farmland Mapping and Monitoring Program (California Department of Conservation, 2016), which is a classification used for lands that present constraints for agricultural use. No Prime Farmland, Unique Farmland, or Farmland of Statewide Importance is designated within any portion of the project area. The river intake pump station site and Antioch WTP sites are not zoned for agricultural uses, and there are no Williamson Act contracts that affect any portion of the project. No existing agricultural or timber-harvest uses are located on or in the vicinity of the project components. Based on these considerations, development of the proposed project would result in no impacts to agricultural resources.

3.19.2 Mineral Resources

For the purposes of this analysis, mineral resources are any non-fuel mineral resource that is obtained from the ground, including sand and gravel, cement, boron, crushed stone, gold, limestone, and other important excavated resources. Appendix G of the CEQA *Guidelines* specifies that an impact to mineral resources would occur if a project would: result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; or result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

There are no known mineral resources of mineral extraction operations occurring in the project area, nor have those operations been known to occur historically. No areas containing mineral resources have been identified within the City (City of Antioch, 2003). Development of the proposed project therefore would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; and would not result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan. Development of the proposed project would have no impact on mineral resources.

References – Environmental Topics Not Subjected to Detailed Analysis

California Department of Conservation, 2016. *Contra Costa County Important Farmland. 2014*.

City of Antioch, 2003. *Draft General Plan Update Environmental Impact Report, City of Antioch, Contra Costa County, California,* July 2003. Prepared by LSA.

CHAPTER 4
Other CEQA Considerations

Consistent with CEQA *Guidelines* Section 15126.2, this chapter discusses significant and unavoidable impacts, significant irreversible environmental changes, growth-inducing impacts, and impacts found to be less than significant. Cumulative impacts are separately discussed in Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures* under each resource topic section.

4.1 Significant and Unavoidable Adverse Impacts

Potentially significant environmental impacts that would result from the proposed project are evaluated in Chapter 3.0, *Environmental Setting, Impacts, and Mitigation Measures*, of this EIR. With implementation of the project design features, standard conditions and requirements, and mitigation measures identified for each resource area significantly impacted, many of the potentially significant impacts resulting from the proposed project would be reduced to a less-than-significant level. The proposed project impacts listed below would remain significant and unavoidable even after mitigation.

4.2 Significant Irreversible Environmental Changes

Pursuant to Section 15126.2(c) of the CEQA Guidelines, an EIR must consider any significant irreversible environmental changes that would be caused by the proposed project should it be implemented. Section 15126.2(c) states:

> *"Uses of nonrenewable resources during the initial and continued phases of the project may be irreversible since a large commitment of such resources makes removal or nonuse thereafter unlikely. Primary impacts and, particularly, secondary impacts (such as highway improvement which provides access to a previously inaccessible area) generally commit future generations to similar uses. Also irreversible damage can result*

> *from environmental accidents associated with the project. Irretrievable commitments of resources should be evaluated to assure that such current consumption is justified."*

Construction and operation activities for the proposed project would require the commitment of renewable and non-renewable sources. Implementation of the project would necessitate the consumption of resources including, but not limited to: building materials, fuel and operational materials/resources, and transportation of persons and goods to and from the project site. Construction activities would specifically require the consumption of non-renewable resources and slowly renewable resources, including: lumber and other forest resources; aggregate materials used in concrete and asphalt; metals; and water. Project construction would also require the consumption of fossil fuels, including gasoline and oil, in order to provide power to construction vehicles and equipment. Also, during construction, petroleum products including, but not limited to, gasoline, diesel fuel, and lubricants may also be used to fuel, lubricate, and clean vehicles and equipment.

Refer to Section 3.6, *Energy Conservation*, for an expanded discussion of project energy consumption.

Resources that would be permanently and continually consumed by implementation of the proposed project include building materials, water, electricity, natural gas, and fossil fuels; however, the amount and rate of consumption of these resources would not result in significant environmental impacts or the unnecessary, inefficient, or wasteful use of resources. Construction activities related to the proposed project, though previously analyzed in Chapter 3.0 of this EIR, would result in the irretrievable commitment of nonrenewable energy resources, primarily in the form of fossil fuels, natural gas, and gasoline for automobiles and construction equipment. With respect to the operational activities of the proposed project, compliance with all applicable building codes, as well as EIR mitigation measures, would ensure that all natural resources are conserved to the maximum extent practicable. It is also possible that new technologies or systems would emerge, or would become more cost-effective or user-friendly, and would further reduce the project reliance upon nonrenewable energy resources.

The CEQA *Guidelines* also require a discussion of the potential for irreversible environmental damage caused by an accident associated with the proposed project. Completion of the proposed project would involve the routine use, transport, storage, or disposal of hazardous wastes other than small amounts of construction chemicals and non-acute hazardous materials by residents and other occupants of the site. As stated in Section 3.9, *Hazards and Hazardous Materials*, of this EIR, these materials are regulated through a series of federal, state, and local laws and regulations. Compliance with these existing requirements would ensure that the potential for the completed project to cause significant irreversible environmental damage from an accident or upset of hazardous materials would be less than significant.

4.3 Growth-Inducing Impacts

CEQA *Guidelines* Section 15126.2(d) requires that an EIR evaluate the growth-inducing impacts of a proposed project. Growth inducement is defined by the CEQA *Guidelines* as:

> *[T]he ways in which a proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth (a major expansion of a wastewater treatment plant might, for example, allow for more construction in service areas). Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects. Also discuss the characteristic of some projects which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.*

A project can have a direct effect on population growth if it involves construction of new housing. A project can have indirect growth inducement if it would establish substantial new permanent employment opportunities (e.g., commercial, industrial or governmental enterprises) or if it would involve a substantial construction effort with substantial short-term employment opportunities and indirectly stimulate the need for additional housing and services to support the new employment demand. A project would also have an indirect growth inducement effect if it would remove an obstacle to additional growth and development, such as removing a constraint on a required public service.

Growth induced from a project may result in adverse impacts if the growth is not consistent with the land use plans and growth management plans and policies for the area affected. Local land use plans provide for land use development patterns and growth policies that allow for the orderly expansion of urban development supported by adequate urban public services, such as water supply, roadway infrastructure, sewer service and solid waste service. The urban development may have environmental impacts, as identified in CEQA documents prepared for adoption of local land use plans. A project that would induce "disorderly" growth that is in conflict with local land use plans could indirectly cause additional adverse environmental impacts and impacts to other public services.

4.3.1 Overview

This section addresses the indirect growth inducement potential of the proposed project. Refer to Section 3.14, *Population and Housing,* for an analysis of the project's potential direct effects on growth. Assessing the growth-inducement potential of the project involves answering the question: "Would implementation of the proposed project directly or indirectly support economic expansion, population growth, or residential construction?"

This section describes the water supply that the project would provide and characterizes the proposed project's potential to foster growth within the City's service area. The section also analyzes whether the reduction in purchased CCWD water frees up (i.e., increases the amount of) potable water that would be available for urban development, thus potentially removing an obstacle to growth. To make this determination, this section studies: the current and projected water demand in the City; planned use of desalinated water as a supply source; role of the proposed project; and the extent to which the project could remove water supply limitations and supply reliability as an obstacle to growth and therefore have an indirect growth-inducement potential.

4.3.2 Improving Water Supply Reliability

As described in Chapter 2, *Project Description,* the objectives of the proposed project include improving water supply reliability and water quality for customers; develop a reliable and drought-resistant water source to reduce dependency on purchased water supplies by maximizing the use of the City's water rights; maximize the use of existing infrastructure; and providing operational flexibility to allow the City to respond to changes in source water quality, emergencies, changes in climate and Delta conditions. The proposed project would allow the City to pump water from the river year-round and produce desalinated water to offset the use of purchased CCWD water.

The proposed project would reduce dependency on purchased water supplies with desalinated water through its provision of up to 6 mgd of desalinated water to the City's service area. The project is designed to replace water that would otherwise be purchased from CCWD and therefore would not augment the city's supplies. During the 2011 (wet year) and 2013 (dry year), purchased water from CCWD comprised approximately 40 percent (2,300 MG) and 75 percent (4,500 MG) of the City's potable water supply, respectively. The City's current operations are limited by water quality in the San Joaquin River and in recent years has needed to rely increasingly on purchased water from CCWD. CCWD obtains its water exclusively from the Sacramento-San Joaquin Delta (Delta) and operates the canal system, and intakes at Rock Slough, Victoria Canal, and Old River. The water withdrawn at these intakes are either diverted to the Los Vaqueros Reservoir or directly to the canal system. In the future, water quality and reliability in the Delta may further decline due to changes in Delta management activities, the cumulative impacts of other projects and development in the San Joaquin Valley, and climate change increasing the frequency and duration of droughts. Thus, the City's reliance on a single source of supply (aside from river pumping) could expose the City's water service area to decreased water supply reliability.

4.3.3 Water Supply and Population

There is a connection between land use planning and water supply. In California, cities and counties have primary authority over land use while water suppliers, through laws and agreements, are expected – and usually required – to provide water service if water supply is available. The City of Antioch is responsible for providing water in its service area and it is also has authority related to land use planning or approvals. The City's projection for future water needs are contained in its 2015 Urban Water Management Plan. The 2015 UWMP accounts for population projections and their relationship to water demands through data provided by the Association of Bay Area Governments (ABAG) and water use targets.[1] ABAG consists of local governments from Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma counties. ABAG develops and regularly updates regional growth forecasts that incorporate relevant zoning and land use information from jurisdictional general plans.

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1 The Water Conservation Act of 2009, also known as SB X7-7, requires agencies to establish water use targets for 2015 and 2020 that would result in statewide water savings of 20 percent by 2020.

As shown in **Table 4-1, t**he City's population is expected to increase by 15 percent from 2015 to 2035, which is approximately 0.66 percent per year. The water use projections for 2020 through 2035 assume that the City will achieve it's 2020 water use target of 165 gallons per capita per day. Brackish water desalination has been identified as a potentially viable additional source of water for several Bay Area water suppliers. A brackish water desalination facility with a capacity of up to 16 mgd was included as a potentially viable additional source of water for the City in the UWMP.

TABLE 4-1
POPULATION IN THE CITY OF ANTIOCH

	2015	2020	2025	2030	2035
Population Projected	105,600	108,900	112,400	116,200	120,300

SOURCE: ABAG, 2013

Table 4-2 summarizes water supply sources for the City and **Table 4-3** summarizes projected water demands. The City's water demand is only anticipated to increase minimally (approximately two percent annually) through 2035. Water demand is expected to be approximately 7,245 MG by 2035, and available water supplies are expected to be approximately 9,769 MG.

TABLE 4-2
WATER SUPPLIES IN THE CITY OF ANTIOCH FOR URBAN USE (MG)

Water Supply	Source	2015	2020	2025	2030	2035
Purchased or Imported Water	Contra Costa Water District	3,915	4,099	4,309	4,538	4,785
Surface Water	San Joaquin River Intake	409	2,460	2,460	2,460	2,460
Recycled Water	Delta Diablo	79	326	489	489	489
Supply from Storage	Storage from City Municipal Reservoir	197	0	0	0	0
	Total	**4,600**	**6,885**	**9,283**	**9,517**	**9,769**

NOTE: Supply from Storage (Municipal Reservoir) was collected from raw water supplies in previous years and used for consumption in 2015.

SOURCE: City of Antioch, 2016

TABLE 4-3
PROJECTED WATER USE (MG)

Use Type	2015	2020	2025	2030	2035
Single Family	2,768	4,051	4,181	4,323	4,477
Multi-Family	405	593	612	633	655
Commercial	300	440	454	469	486
Industrial	85	125	129	133	138
Institutional/Governmental	178	260	269	278	287
Landscape (treated)	465	681	703	727	753
Other (firelines and hydrant meters)	12	18	18	19	20
Other (unbilled meters)	57	0	0	0	0
Losses (potable water system losses)	222	362	374	387	400
Landscape (raw water)	29	29	29	29	29
Total	**4,521**	**6,559**	**6,769**	**6,998**	**7,245**

SOURCE: City of Antioch, 2016

Depending on the year type, the proposed project would produce roughly 2,600 AFY – 5,500 AFY (800 – 1,800 MG) of desalinated water (see **Tables 2-6** and **2-7** in Chapter 2, *Project Description)*. Purchased water from CCWD shown in **Table 4-2** would be offset by commensurate reductions – resulting in approximately 13 to 22 percent less purchased water depending on the year type.

While the project would provide a new water source within the City's service area, it would replace purchased water distribution through the service area and therefore would not induce future growth. Rather, as a project to support future supply reliability by creating a new local water source, the project would meet the demand previously met by purchased water. The project would therefore not be an impediment to already planned growth.

4.3.4 General Plan Policies

The City of Antioch General Plan lists the following policies to ensure an adequate water supply is available to serve existing and future needs of the City:

> ***Policy 8.4.1:*** Water Facilities Policies
>
> a. As part of the design of water systems, provide adequate pumping and storage capacity for both drought and emergency conditions, as well as the ability to provide fire flows required by the Contra Costa County Fire Protection District.
>
> b. Ensure that adequate infrastructure is in place and operational prior to occupancy or new development, such that (1) new development will not negatively impact the performance of water facilities serving existing developed areas, and (2) the performance standards set forth in the Growth Management Element will continue to be met.

c. Maintain an up-to-date master plan of water facilities.

d. Maintain existing levels of water service by protecting and improving infrastructure, replacing water mains and pumping facilities as necessary, and improving the efficiency of water transmission facilities.

e. Permit the construction of interim facilities only when it is found that construction of such facilities will not impair the financing or timely construction of master planned facilities.

f. Periodically evaluate local water consumption patterns, the adequacy of existing facilities, and the need for new facilities, including this information in the comparison of proposed development projects to the performance standards of the Growth Management Element.

g. Incorporate expected reductions in the need for water facilities resulting from water conservation programs only after several years of experience with the implementation of such programs.

h. Provide the Contra Costa Water District with timely information on development proposals and projected levels of future growth so that it can maintain appropriate long-term master plans and refine the delivery of service and facilities to maintain the performance standards set forth in the Growth Management Element.

Policy 10.7.2: Water Resources Policies

a. As part of the implementing the City's residential growth management program and its development review process for non-residential development, ensure that adequate long-term water supplies are available to serve the development being granted new allocations, including consideration of peak drought and peak firefighting needs.

b. Require new development to be equipped with drought tolerant landscaping and water conservation devices.

c. Work with Delta Diablo Sanitation District to make reclaimed wastewater available for irrigation use. Where reclaimed wastewater can be made available at a reasonable cost, require the installation of dual water systems in development projects and public facilities, using reclaimed wastewater for irrigation.

d. Protect, where possible, groundwater recharge areas, including protection of stream sides from urban encroachment.

e. Oppose proposals with the potential to increase the salinity of the Delta and/or endanger the City's rights to divert water from the San Joaquin River.

4.3.5 Secondary Effects of Growth

Implementation of the proposed project would allow the City to provide the level of pumping capacity, treatment and conveyance for production and distribution of desalinated water. As discussed previously, the proposed project would not result in a direct increase in population or employment. However, the project would develop a supplemental water supply to the City, and assist in providing water supply that is planned under the City of Antioch General Plan. As discussed above in Section 4.3.3, the project could provide for new use and development that is projected to occur and is consistent with the General Plan. Potentially adverse secondary effects could result from development of planned land uses in the project area. Because the proposed project would not induce growth beyond that discussed in the General Plan and General Plan EIR, the secondary effects of growth would be consistent with those discussed in the General Plan and General Plan EIR.

As discussed above under Section 4.3.2, brackish water desalination as a component of the City's water supply portfolio has been evaluated in State-approved water planning documents including the City's UWMP. Because brackish water desalination is included within the water supply planning for the City, and the proposed project would be consistent with the amount of brackish water desalination identified, provision of brackish water desalination is not anticipated to affect the rate, timing, or distribution of urban growth within the City. While project implementation would not induce or alter growth trends in the City, it would, as part of the overall water supply picture, enable secondary effects associated with development under the approved General Plan to occur. Buildout under the General Plan requires several types of infrastructure, including an adequate water supply; the proposed project would contribute to the provision of adequate water supplies, within the City. The secondary impacts related to buildout under the approved General Plan are disclosed in the General Plan EIR for the City of Antioch. A summary of impacts from the General Plan EIR and mitigation measures that would reduce the impacts to less-than-significant levels are listed in the **Table 4-4** and the discussed below.

Local land use plans and specific development plans have been adopted and approved, with the City adopting a statement of overriding consideration for these significant unavoidable effects. The proposed project would not increase the nature, number or severity of significant effects associated with planned development.

TABLE 4-4
IMPACTS ASSOCIATED WITH CITY OF ANTIOCH GENERAL PLAN IMPLEMENTATION

City of Antioch
Significant But Mitigable Impacts
1) Light and glare resulting from new development associated with implementation of the proposed General Plan could adversely affect day or nighttime views of Antioch.
2) Development allowed by implementation of the proposed General Plan could cause the destruction of known archaeological resources, as defined in CEQA Guidelines, Section 15064.5.
3) Development as a result of implementation of the proposed General Plan could potentially destroy directly or indirectly a unique paleontological resource or site.
4) Future development permitted by the proposed General Plan may increase the potential for property loss, injury, or death resulting from this ground-shaking hazard.
5) Future proposed General Plan development within Antioch would increase the potential for the placement of structures and facilities in or near areas susceptible to liquefaction.
6) Implementation of the proposed General Plan could facilitate new development in areas that may become unstable and potentially result in landslides, lateral spreading, subsidence, liquefaction, or collapse.
7) Revitalization and development of Rodgers Point, including a proposed marina and a new access road, may substantially alter a portion of the San Joaquin River.
8) Build out of the City will result in a substantial increase in population and residential and non-residential structures, potentially increasing the use of and need for natural gas.
9) Build out of the City will result in a substantial increase in population and residential and non-residential structures, potentially increasing the use of and need for electricity.
10) Increases in population and employment with the proposed General Plan could result in the incremental increase of solid waste throughout Antioch. This could increase the need for solid waste disposal, requiring additional landfill capacity and related support facilities.

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Significant and Unavoidable Impacts

1) The proposed General Plan would generate NOx emissions, which would exceed the project level operations threshold established by the BAAQMD.
2) Consistency with Clean Air Plan population and VMT assumptions.
3) Future growth occurring as the result of implementing the proposed Antioch General Plan will increase area-wide traffic volumes with the potential to degrade roadway performance below applicable performance standards.

Less Than Significant Impacts

1) Would increase the development of urban uses, causing a loss of open space and change in aesthetic character. This could have a significant adverse impact on existing and future scenic vistas and scenic resources.
2) It is not anticipated that future ambient CO concentrations, with the proposed General Plan, would violate either the State or Federal CO standards.
3) The demolition, renovation or removal of asbestos-containing building materials is subject to the limitations of BAAQMD Regulation 11, Rule 2: Hazardous Materials; Asbestos Demolition, Renovation and Manufacturing. Compliance with this procedure would be considered to have a less than significant project impact.
4) The proposed General Plan would potentially result in increased stationary sources emissions from nonresidential development, new industries having the potential for emitting toxic air contaminants, and wood-burning stoves and fire places.
5) Implementation of the proposed General Plan may result in impacts to species identified as a candidate, sensitive, or special status species, as well as riparian, wetland or other sensitive natural communities.
6) Alteration or loss of habitat of listed proposed, or candidate species that inhibits or compromises recovery efforts that could otherwise lead or contribute to the delisting of the species.
7) Implementation of the proposed General Plan could interfere with the movement of wildlife species or with migratory wildlife corridors.
8) Future development adjacent to existing preserved land could impact habitat connectivity and the biological value of such preserved lands.
9) Development allowed by implementation of the proposed General Plan could cause the destruction of or loss of an historical resource, as defined in CEQA Guidelines, Section 15064.5.
10) Future proposed General Plan development within the City would increase the potential for the placement of structures and facilities in areas susceptible landslides or rockfalls.
11) Areas exposed during development activities would be prone to erosion and/or the loss of topsoil.
12) Future development within Antioch would increase the potential for the placement of structures and facilities in areas susceptible to damage resulting from expansive soils.
13) Build out of the proposed general plan may result in increased risk of upset associated with the routine use, generation, and transportation of hazardous materials, which may potentially pose a health or safety hazard.
14) Build out of the Proposed General Plan may impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.
15) Implementation of the proposed General Plan may expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas.
16) Collapse of historic coal mine tunnels could result in subsidence of lands located above the mines, potentially causing damage to foundations or other improvements.
17) Implementation of the Proposed General Plan would not contribute to the depletion of groundwater supplies or reduce the amount of water available for public water supplies.
18) Impacts associated with new development can include erosion and sedimentation associated with groundbreaking and clearing activities. Additionally, stormwater runoff from urban areas contains a variety of pollutants that may reduce the quality of groundwater resources when introduced into groundwater aquifers.
19) Due to the City's geographic location, implementation of the proposed General Plan would not expose people or property to flooding associated with seiches or tsunamis. Additionally, the hillside topography surrounding the City to the south is generally stable and is not prone to mudflows.
20) Risk of Dam Failure. The City of Antioch is located below the Contra Loma Reservoir. The overall safety classification of the dam is registered as satisfactory.
21) Increases in runoff can amplify drainage volumes and velocities causing storm drainage facilities that are at or near capacity to fail during peak events, causing localized ponding and flooding.
22) Development has the potential to increase the risk of flooding, which leads to damage to structures and risk to the health and safety of people.
23) Because the proposed General Plan provides policies reflective of the unique combination of conditions within each area of the City, implementation of the proposed General Plan will not disrupt or divide the physical arrangement of any established neighborhood.
24) Relative to adjacent land uses, this intensification of development may contribute to or create significant land use

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impacts.
25) The General Plan proposes urban development within areas that are currently outside of the County's urban limit line. Such development might not be consistent with the provisions of the Contra Costa County 65/35 Land Preservation Plan.
26) The General Plan proposes employment-generating development in excess of that which is projected by ABAG.
27) Noise levels from grading and other construction activities would potentially result in significant noise impacts to offsite sensitive receptors adjacent to the individual construction site.
28) New development, particularly residential uses along and adjacent to major transit corridors, could be exposed to excessive traffic-related noise levels.
29) New development associated with implementation of the proposed General Plan could expose existing and/or new sensitive uses to stationary noise sources, such as industrial and/or commercial uses.
30) There could be new proposed sensitive land uses along and adjacent to the railroads that would be affected by high noise levels from railroad operations.
31) Build out of the City of Antioch due to implementation of the proposed Housing Element will result in a substantial increase in population and residential and nonresidential structures, and associated infrastructure.
32) Increases in population and employment anticipated with the proposed General Plan would increase the need for police protection and police services, requiring additional emergency responses and the need for additional police personnel and related support facilities.
33) Could result in significant impacts on existing fire protection services and require expansion of fire protection services.
34) Implementation of the proposed General Plan will result in increased development and associated student population throughout the City. School districts may be unable to meet future needs resulting from projected growth.
35) Build out within the City of Antioch will result in a substantial increase in population, potentially increasing the use of existing parks and recreation facilities.
36) The population increases projected for the City of Antioch with implementation of the proposed General Plan will increase the demand for water beyond that which currently exists.
37) Implementation of the proposed General Plan will result in reliance on a higher percentage of lower quality water from the San Joaquin River and may increase the level of pollutants that occur in water reserves.
38) Implementation of the proposed General Plan would generate increases in population and housing, in addition to increases of commercial, and industrial land uses. This growth would incrementally generate wastewater, which will necessitate increased wastewater treatment capacity.

SOURCE: City of Antioch, 2003a.

Mitigation Measures

Mitigation measures proposed in the City of Antioch General Plan Update EIR (1995) are described below:

> ***Aesthetics:*** The City of Antioch shall require that sources of lighting within the General Plan area be limited to the minimum standard required to ensure safe circulation and visibility. Within rural areas the City of Antioch shall require street lighting to be limited to intersections and other locations that are needed to maintain safe access (e.g., sharp curves). The City of Antioch shall require exterior lighting for buildings to be of a low profile and intensity. The City of Antioch shall require that commercial and industrial development provide design features such as screened walls, landscaping, setbacks, and lighting restrictions between the boundaries of adjacent residential land use designations to reduce the impacts of light and glare.
>
> ***Cultural:*** The City shall modify the proposed General Plan to incorporate a policy with the following provision: If avoidance and/or preservation in the location of any cultural resources is not possible, the following measures shall be initiated for each impacted site:

a. A participant-observer from the appropriate Indian Band or Tribe shall be used during archaeological testing or excavation in the project site.

b. Prior to the issuance of a grading permit for the project, the project proponent shall develop a test level research design detailing how the cultural resource investigation shall be executed and providing specific research questions that shall be addressed through the excavation program. In particular, the testing program shall characterize the site constituents, horizontal and vertical extent, and, if possible, period of use. The testing program shall also address the California Register and National Register eligibility of the cultural resource and make recommendations as to the suitability of the resource for listing on either Register. The research design shall be submitted to the City of Antioch for review and comment. For sites determined, through the Testing Program, to be ineligible for listing on either the California or National Register, execution of the Testing Program will suffice as mitigation of project impacts to this resource.

c. After approval of the research design and prior to the issuance of a grading permit, the project proponent shall complete the excavation program as specified in the research design. The results of this excavation program shall be presented in a technical report that follows the City's outline for Archaeological Testing. The Test Level Report shall be submitted to the City for review and comment. If cultural resources that would be affected by the project are found ineligible for listing on the California or National Register, test level investigations will have depleted the scientific value of the sites and the project can proceed.

d. If the resource is identified as being potentially eligible for either the California or National Register, and project designs cannot be altered to avoid impacting the site, a Treatment Program to mitigate project effects shall be initiated. A Treatment Plan detailing the objectives of the Treatment Program shall be developed. The Treatment Plan shall contain specific, testable hypotheses relative to the sites under study and shall attempt to address the potential of the sites to address these research questions. The Treatment Plan shall be submitted to the City for review and comment.

e. After approval of the Treatment Plan, the Treatment Program for affected, eligible sites shall be initiated. Typically, a Treatment Program involves excavation of a statistically representative sample of the site to preserve those resource values that qualify the site as being eligible for the California or National Register. At the conclusion of the excavation or research program, a Treatment Report shall be developed. This data recovery report shall be submitted to the City for review and comment.

When existing information indicates that a site proposed for development may contain paleontological resources, a paleontologist shall monitor site grading activities with the authority to halt grading to collect uncovered paleontological resources, curate any resources collected with an appropriate reposition, and file a report with the Community Development Department documenting any paleontological resources found during site grading.

Geologic and Seismic Hazards: The City shall modify the proposed General Plan to incorporate a policy with the following provision: as determined by the City of Antioch Building Division, a site specific assessment shall be prepared to ascertain potential ground shaking impacts resulting from development. The site-specific ground shaking assessment shall incorporate up-to-date data from government and non-government sources and may be included as part of any site-specific geotechnical investigation. The site-specific ground shaking assessment shall include specific measures to reduce the significance of potential ground shaking hazards. This site-specific ground shaking assessment shall be prepared by a licensed geologist and shall be submitted to the City of Antioch Building Division for review and approval prior to the issuance of building permits. The policy shall apply to any structure or facility that undergoes expansion, remodeling, renovation, refurbishment or other modification.

Where development is proposed within an identified or potential liquefaction hazard area (as determined by the City), adequate and appropriate measures such as (but not limited to) design foundations in a manner that limits the effects of liquefaction, the placement of an engineered fill with low liquefaction potential, and the alternative siting of structures in areas with a lower liquefaction risk, shall be implemented to reduce potential liquefaction hazards. Any such measures shall be submitted to the City of Antioch Building Division for review prior to the approval of the building permits.

Hydrology and Water Quality: The City shall modify the proposed General Plan to incorporate a policy with the following provision: Prior to or concurrent with approvals of any development applications, a Master Plan for Rodgers Point and the Rivertown/Urban Waterfront Focus Area shall be prepared and approved by the City. The Master Plan shall provide detailed guidance for environmental review, project-related land use, provision and financing of required public services and facilities, open space preservation, community design, recreational amenities, and community improvements.

Discussion

The proposed project would create a new source of water to offset purchased supplies water distributed by CCWD. While desalination represents a new supply source, it would be offsetting use of purchased water within the City's service area. As a result, desalinated water for use in the City's service area would not create additional water for distribution that could result in a growth inducement potential. The supply would be more reliable and would not result in increasing the overall water portfolio water demand of the City, as documented in the UWMP. The UWMP accounts for this new supply source to offset purchased water, and as described above under Section 4.3.3, the City's water demand is only anticipated to increase minimally (approximately two percent annually) through 2035 so additional supplies are not required to support any increase in demand. As a project that supports future reliability by creating a new local water source, the proposed project would accommodate existing demand and annual increase in demand such that water infrastructure reliability would not be an impediment to already-planned growth. As a result, the proposed project neither supports nor encourages growth within the City's service area to a greater degree than presently estimated by the UWMP.

Although the City would purchase less water from CCWD in a given hydrologic year, it would not necessarily result in CCWD making commensurate reductions in its withdrawals from the Delta. Therefore, CCWD would have 6 mgd, or 2,600 AFY – 5,500 AFY of extra water that could be stored at the Los Vaquero Reservoir. CCWD's projections for future water needs are contained in its 2015 Urban UWMP. Based on projected supply and demand, CCWD does not anticipate supply deficits in normal years or single-dry years, but may have shortfalls up to approximately 30,000 AF during multiple-dry year (CCWD, 2016). As such, reductions in purchases by the City of Antioch, and subsequent storage in the reservoir, would have the potential to contribute to dry year and multi-dry year reliability for the region. CCWD is responsible for allocating water to jurisdictions within its boundary but does not have authority to make land use decisions or to approve growth. Once the water is allocated to the jurisdictions, each city and Contra Costa County (for the unincorporated areas) would have the responsibility and discretion to approve or deny proposed development projects for which water was available, consistent with the jurisdiction's role as the primary land use authority and applicable land use plans, policies, regulations and laws.

The water that would not be purchased by the City would be stored at the Los Vaqueros Reservoir which provides off-stream storage to improve water quality and to provide emergency storage for customers of CCWD. A large portion of the reservoir is reserved for emergency purposes, providing up to 70,000 AF of emergency supply in wet years and up to 44,000 AF in dry years (CCWD, 2016). This water would not have a growth-inducing potential because it would not be used to meet the demands of or increase overall planned supply for any particular agency or area, but rather would be made available in the event of a natural disaster or other emergency based on needs and conditions specific to the emergency. The proposed project would not remove any obstacles to growth and would not indirectly have a significant impact on growth inducement. As a result, impacts to growth inducement would be less than significant.

References – Other CEQA Considerations

Association of Bay Area Governments (ABAG), 2013. *Projections 2013*.

City of Antioch, 2003a. *City of Antioch General Plan Update Environmental Impact Report*. July 2003. Prepared by LSA.

City of Antioch, 2003b. *City of Antioch General Plan*. November 24, 2003. Prepared by LSA.

City of Antioch, 2016. *City of Antioch 2015 Urban Water Management Plan*. May 2016. Prepared by West Yost Associates.

Contra Costa Water District, 2016. *2015 Urban Water Management Plan for the Contra Costa Water District.*

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CHAPTER 5
Alternatives to the Proposed Project

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5.1 Introduction and Overview

The following section evaluates the alternatives to the proposed Brackish Water Desalination Project. The project proposed by the City of Antioch includes a desalination facility with a finished water capacity of 6 million gallons per day (mgd) of potable drinking water. The alternatives in this chapter (excluding the "No Project" Alternative) are evaluated based on their ability to accomplish most of the Project Objectives while avoiding or minimizing one or more of the project's potentially significant impacts identified in Sections 3.1 through 3.18, as well as consideration of feasibility.

5.1.1 CEQA Requirements

CEQA requires that an EIR describe and evaluate a range of reasonable alternatives to the proposed project, and evaluate the comparative merits of the alternatives (CEQA *Guidelines* Section 15126.6(a), (d)). The "range of alternatives" is governed by the "rule of reason," which requires the EIR to set forth only those alternatives necessary to foster informed decision-making and public participation (Section 15126.6(a), (f)).

The range of alternatives shall include alternatives that would feasibly attain most of the basic objectives of the project and would avoid or substantially lessen any of the significant effects of the project (CEQA *Guidelines* Section 15126.6(a)-(c)). CEQA generally defines "feasible" to mean an alternative that is capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, technological, and legal factors. In addition, the following may be taken into consideration when assessing the feasibility of alternatives: site suitability; economic viability; availability of infrastructure; general plan consistency; other plans or regulatory limitations; jurisdictional boundaries; and the ability of the proponent to attain site control (Section 15126.6(f)(1)). If the lead agency concludes that no feasible alternative locations exist, it must disclose the reasons for this conclusion, and should include the reasons in the EIR (Section 15126.6(f)(2)(B)).

The description or evaluation of alternatives does not need to be exhaustive, and an EIR need not consider alternatives for which the effects cannot be reasonably determined and for which implementation is remote or speculative. An EIR need not describe or evaluate the environmental effects of alternatives in the same level of detail as the proposed project, but must include enough information to allow meaningful evaluation, analysis, and comparison with the proposed project (CEQA *Guidelines* Section 15126.6(d)).

The "no project" alternative must be evaluated. This analysis shall discuss the existing conditions, as well as what could be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services (CEQA *Guidelines* Section 15126.6(e)(2)).

CEQA also requires that an environmentally superior alternative be selected from among the alternatives. The environmentally superior alternative is the alternative with the fewest or least severe adverse environmental impacts. When the "no project" alternative is the environmentally superior alternative, the EIR must also identify an environmentally superior alternative from among the other alternatives (CEQA *Guidelines* Section 15126.6(e)(2)).

5.2 Project Objectives and Significant Impacts

As noted in Section 5.1.1, the CEQA Guidelines call for evaluating alternatives that would attain most of the basic objectives of the project, but would avoid or substantially lessen any identified significant effects of the project. The analysis includes alternatives that would avoid or substantially lessen any of the significant environmental effects of the proposed project. Under CEQA, costs may be and are considered in the assessment of the reasonableness or feasibility of an alternative. However, the analysis in this chapter does not focus on relative economic factors of the alternatives carried through for detailed analysis. Nevertheless, the EIR indicates those considerations that may be relevant and important to decision-makers, including factors not related to environmental quality.

5.2.1 Project Objectives

As presented in Chapter 2, *Project Description*, the City's objectives for the Brackish Water Desalination Project are to:

- Improve water supply reliability and water quality for customers.

- Develop a reliable, and drought-resistant water source to reduce dependency on purchased water supplies by maximizing the use of the City's pre-1914 water rights.
- Maximize the use of existing infrastructure to maintain economic feasibility.
- Provide cost effective operational flexibility to allow the City to respond to changes in source water quality, emergencies, changes in climate and Delta conditions.
- Preserve the value of the City's pre-1914 water rights.

5.2.2 Significant Environmental Impacts

This section summarizes the impacts of the proposed project, as analyzed in Chapter 3 of this EIR, and that were considered during the alternatives identification process. CEQA *Guidelines* Section 15126.6 requires that alternatives are considered that can avoid or substantially lessen significant impacts of a project. All project impacts were determined to be less than significant with mitigation (LSM), meaning that all significant project impacts could be reduced to a less-than-significant level through the implementation of mitigation measures identified in this EIR.

Operational Impacts

Project operation would result in the following potentially significant and significant long-term impacts, all of which could be mitigated to a less-than-significant level with the implementation of mitigation measures identified in Chapter 3:

- **Noise.** The City's General Plan calls for achieving and maintaining a 60 CNEL for single- and multi-family residential uses and 70 dBA CNEL at the front setback for commercial/industrial uses. Noise generation specifications of the proposed desalination plant pumps are not available and quantitative estimate of noise generation of pump operation and the attenuation offered by the proposed RO building cannot be estimated. The noise threshold for residential uses could potentially be exceeded, and is therefore considered a potentially significant impact (Impact 3.13-3, LSM).

Construction Impacts

Project construction would result in the following significant short-term impacts, all of which could be mitigated to a less-than-significant level with the implementation of mitigation measures identified in Chapter 3:

- **Air Quality.** Project-related construction activities including trenching and earth disturbance would generate fugitive dust emissions (Impact 3.2-1, LSM). If fugitive dust emissions are not mitigated, the project could conflict with the 2017 Clean Air Plan (Impact 3.2-3, LSM).

  Project construction activities would result in the generation of toxic air contaminants, including diesel particulate matter (DPM) which could cause a cancer risk and PM2.5 emissions in excess of Bay Area Air Quality Management District (BAAQMD) thresholds. (Impact 3.2-4, LSM).

- **Aquatic Biology.** Construction work associated with the proposed intake facility could result in direct disturbance and mortality of fish from installation of cofferdams and dewatering, and short-term degradation of aquatic habitat caused by an increase in hydrostatic pressure, underwater noise, and vibrations (Impact 3.3-3 and 3.3-4, LSM). In-water construction activities would result in a loss of shallow water habitat (Impact 3.3-5, LSM).

- **Terrestrial Biology.** Project-related construction activities could be disruptive to special-status birds, migratory birds, and roosting bats, through temporary noise disturbance or removal of trees (Impact 3.4-1, LSM).

  In-water construction work associated with the river pump station and associated pipelines and screened intakes, and removal of the existing pump station would constitute a discharge of fill into waters of the U.S. and could be considered a significant impact (Impact 3.4-3, LSM).

- **Cultural Resources.** Based on the results of the background research, surface survey, and subsurface survey, there are no known archaeological resources or human remains in the project area. The inadvertent discovery of archaeological resources or human remains during construction activities of the project could result in a potentially significant impact (Impact 3.5-2 and 3.5-3, LSM).

- **Energy.** Construction and decommissioning activities could result in wasteful or inefficient use of fuel or energy if: construction and decommissioning activities equipment is not well maintained; if equipment is left to idle when not in use; or if haul trips are not planned efficiently (Impact 3.7-1, LSM).

- **Hazards and Hazardous Materials.** Construction-related activities would require the use, handling, and transport of hazardous materials, of which the accidental release or spill could adversely affect schools within 0.25 mile of project components by exposure of school children and workers to hazardous materials (Impact 3.9-2, LSM).

  Excavation activities associated with the brine disposal pipeline could encounter petroleum hydrocarbons and/or asbestos-containing materials (ACM) that could expose workers, the public, and the environment to hazardous materials (Impact 3.9-3, LSM).

  Construction activities for the raw water connection pipeline and brine disposal pipeline would occur within roadways and could require temporary road closures, which could interfere with emergency traffic on those roads (Impact 3.9-4, LSM).

- **Noise.** Construction noise levels could result in substantial periodic or temporary increases in noise over existing levels and exceed noise thresholds for speech and sleep interference. An exterior noise level that exceeds 70 dBA Leq during the daytime is used as the speech interference threshold for substantial construction noise where the duration of construction noise exceeds two weeks. Construction activities associated with the river pump station and desalination plant would produce noise levels that would exceed the speech interfere threshold (Impact 3.13-1, LSM).

- **Utilities.** Construction activities associated with underground pipeline installation could disrupt operations or require relocation of regional or local utilities (Impact 3.15-1, LSM).

- **Recreation.** Construction activities associated with the river intake pump station and pipelines would overlap or occur adjacent to bicycle routes, the Antioch public boat launch ramp, and the Contra Costa County Fairgrounds, which could temporarily disrupt recreational resources in the project area (Impact 3.16-1, LSM).

- **Transportation.** Construction of the proposed project would have temporary and intermittent effects on traffic and transportation conditions, would temporarily disrupt circulation near sensitive land uses, would have temporary effects on alternative transportation or facilities, would temporarily increase the potential for accidents on project area roadways, and would increase wear-and-tear on designated haul routes used by construction vehicles (Impacts 3.17-1 through 3.17-5, LSM).

- **Tribal Cultural Resources.** Based on the results of the background research, surface survey, and subsurface survey, there are no known archaeological resources or human remains in the project area. The inadvertent discovery of archaeological resources or human remains during construction activities of the project could result in a potentially significant impacts to tribal cultural resources (Impact 3.18-1, LSM).

5.3 Component Development and Screening Process

This alternatives analysis begins by describing and screening the key components of the desalination project. To maximize the range of components considered, this EIR separately considered the intake pump station, desalination plant and raw water pipeline connection, and brine discharge options. The screening process is guided in part, by the magnitude and severity of the impacts identified above.

All options in the screening process are sized for a desalination plant with finished water capacity of 6 mgd and a river intake pump station with a 16 mgd capacity.

In eliminating component options, this EIR considered whether the intake options could provide a sufficient and reliable source of brackish water, and methods of brine discharge. This EIR also considered site conditions, the availability of land at the City's WTP, and the use of existing infrastructure. The component options presented below came primarily from the following sources:

- Brown and Caldwell, 2018. *Revised Draft Technical Memorandum - Antioch River Pump Station Preliminary Design,* January 19, 2018.
- Carollo Engineers, 2016. *Technical Memorandum No. 1 Water Quality Basis of Design,* August 2016.
- Carollo Engineers, 2016. *Technical Memorandum No. 2 Brine Management Alternative Analysis,* October 2016.
- Carollo Engineers, 2017. *City of Antioch Brackish Water Desalination Project – Phase II, Technical Memorandum No. 3 Conceptual Design,* Draft February 2017

5.3.1 Intake Pump Station Screening Results

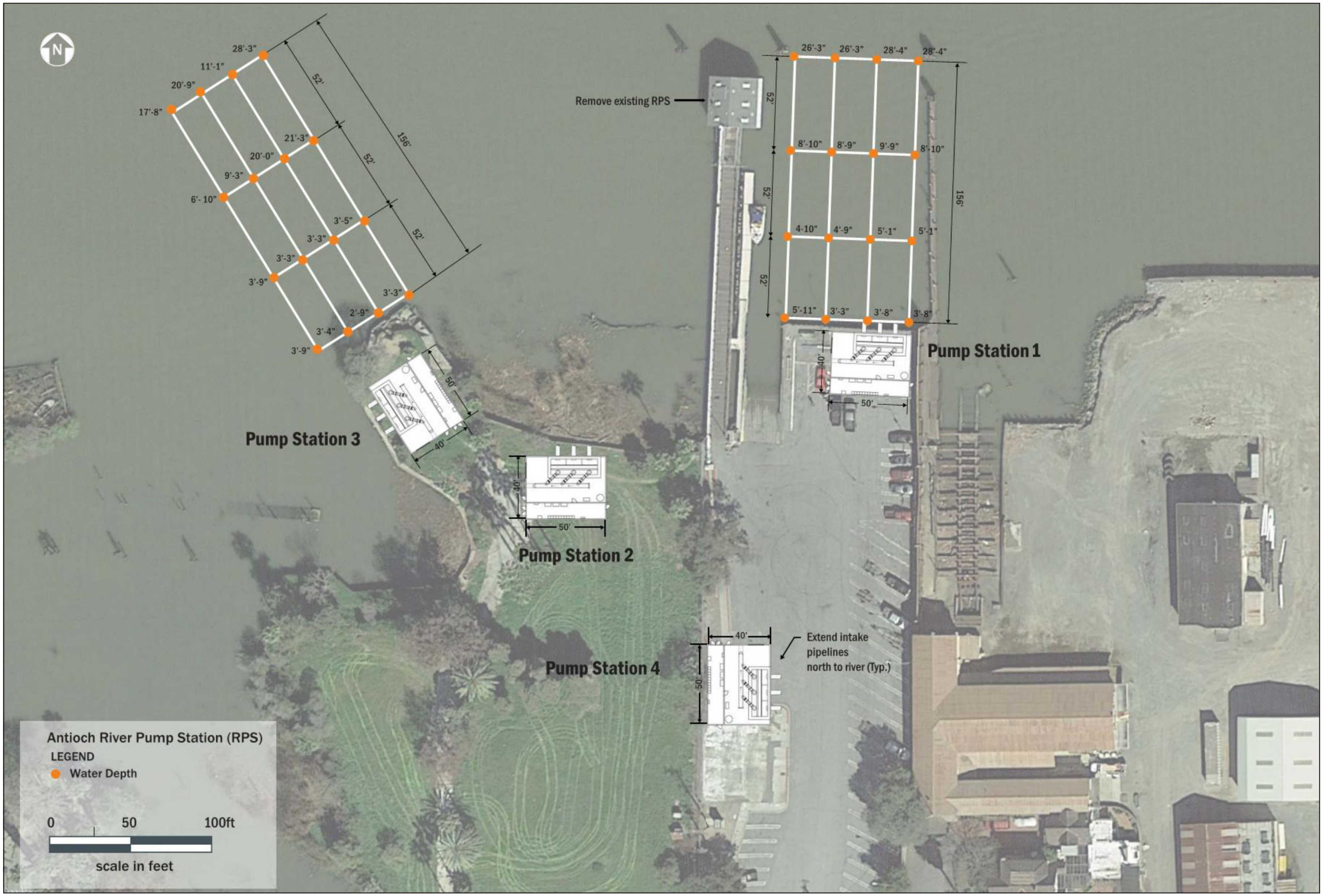
This analysis considers alternative locations or footprint configurations for the intake pump station. Four intake pump station options were identified and screened and are summarized in **Table 5-1** below and shown in **Figure 5-1**. Two of the four were not carried forward for further analysis. The primary screening criteria for the intake pump station options were:

- Proximity to the existing pump station to tie into the existing raw water pipeline at the site;
- Same intake capacity as the existing pump station (16 mgd);
- Located within City-owned property; and

- Enable the City to withdraw water from the river year-round.

TABLE 5-1
INTAKE PUMP STATION SCREENING RESULTS

Figure ID	Site	Description	Screening Results
Pump Station-1	Intake Pump Station Siting Option 1	• This option would be located east of existing pier and boat ramp at north end of parking lot. • Footprint area, three pumps (two active and one standby), and three new 36-inch diameter offshore intake pipelines would be the same as the proposed project.	*Retained for Further Analysis*
Pump Station-2	Intake Pump Station Siting Option 2	• This option would be located directly south of the area west of the existing pier. • Footprint area, three pumps (two active and one standby), and three new 36-inch diameter offshore intake pipelines would be the same as the proposed project. • This option would require the construction of a new access road.	*Not carried forward because its location offers no advantages to the pump station location under the proposed project. It would not reduce, avoid, or eliminate potential impacts of the proposed project and the location and required access roadway would be in direct conflict with plans the City may have in the future for a new park.*
Pump Station-3	Intake Pump Station Siting Option 3	• This option would be located west of the existing pier on the shore at Rogers Point. • Footprint area, three pumps (two active and one standby), and three new 36-inch diameter offshore intake pipelines would be the same as the proposed project. • This option would require the construction of a new access road.	*Not carried forward because its location offers no advantages to the pump station location under the proposed project. It would not reduce, avoid, or eliminate potential impacts of the proposed project and the location and required access roadway would be in direct conflict with plans the City may have in the future for a new park.*
Pump Station-4	Reduced Footprint Intake Pump Station	• Same location as proposed project • Two pumps (no standby) • Two new 36-inch diameter offshore intake pipelines • Footprint area would be less than the proposed project.	*Retained for Further Analysis*



SOURCE: Brown and Caldwell, 2018

Brackish Water Desalination Facility

Figure 5-1
Intake Pump Station Alternative Location Options

ESA

5.3.2 Brine Disposal Options Screening Results

This analysis considers an alternative disposal option for brine generated by the desalination plant and is summarized in **Table 5-2** below.

TABLE 5-2
BRINE DISPOSAL OPTIONS SCREENING RESULTS

Brine Disposal Option	Description	Screening Results
Surface water discharge	This option would discharge brine directly to a local or remote water body, and would require construction of an engineered solution (e.g., new outfall and diffuser).	*This option would discharge brine without dilution to local surface waters. Not carried forward because the California Ocean Plan Amendments[1] encourage co-location with a wastewater treatment plant outfall to dilute brine with wastewater effluent before it is discharged.*

Note:
1. The California Ocean Plan Amendments apply to coastal desalination plants using ocean water and are not directly applicable to the proposed desalination facility treating water from the San Joaquin River. However, these amendments are used as a guideline for this project.

The primary screening criteria for these options were:

- Technically feasible and capable of receiving the entire brine flow (2 mgd) from the brackish water desalination facility;
- Due to cost and viability for the City, the option should be a single, reliable brine management method;
- Must not require capital costs that would surpass additional revenue gained from implementation.

As described in Section 2.4, *Project Component Selection and Considerations,* a previous study for a Pilot Plant concluded that several opportunities for managing desalination concentrate would be available in the east Contra Costa region. Mixing the concentrate with wastewater effluent produced by Delta Diablo and/or the Central Contra Costa Sanitary District (CCCSD) were identified as opportunities for further consideration. Comingling with spent cooling water from the Mirant power plant, which is located east of the Mallard Slough Pump Station, or discharges into the power plant's intake itself, were also identified as potentially acceptable low cost options. The City subsequently evaluated brine disposal alternatives for their site-specific application using information from the study.

Land-based brine discharge options were not considered or evaluated in this analysis for several reasons, including: the impacts associated with the truck trips required to move 2 mgd of liquid brine to a processing facility or other disposal or treatment area; the infeasibility of developing a substantially large area that would be needed for the use of evaporation ponds; the lack of a market for the salt product in California (e.g. as a de-icing agent); the infeasibility of using the very saline brine as irrigation water or for dust control; and the infeasibility of deep well injection due to regulations requiring a 30 mile setback from known fault lines.

Based on this initial screening, no brine disposal alternative options were retained for valuation in the second step of the process.

5.3.3 Desalination Plant Site Option Screening Result

As previously discussed in Chapter 2, *Project Description*, existing facilities and assets in the vicinity of eastern Contra Costa County were reviewed for potential desalination plant site implementation by URS in 2010. The study considered plant sites at the Mallard Slough Intake Pump Station, Mirant Pittsburg Power Plant, and near Clyde or nearby locations, and included the City's WTP site. In addition, brackish water desalination has been evaluated at the planning level in the East Contra Costa County Integrated Regional Water Management Plan 2015 Update. The City has developed the proposed project in order to meet the objectives identified in Section 2.5.1, including the objective to maximize the use of existing infrastructure. Potential site options capable of meeting the project objectives is summarized in **Table 5-3** below and shown in **Figure 5-2**.

The primary screening criteria for the desalination plant were:

- Maximize use of existing infrastructure;
- Located outside of the 100-foot-wide PG&E easement that runs east-west through the WTP site; and,
- Within developable area of WTP not constrained by topography to minimize excavation.

TABLE 5-3
DESALINATION PLANT SITE OPTION SCREENING RESULT

Site	Description	Screening Results
Standalone Desalination Plant	• This option would construct a standalone desalination plant with a finished water capacity of 6 mgd at the southeast corner of the City's WTP site. • The footprint of the desalination plant would be approximately 19,000 square feet, plus approximately 3,900 square feet for chemical storage. • The desalination plant would require a 110,600-gallon Micro-Filtration filtrate tank, and an 80,000-gallon Reverse Osmosis permeate tank in the facility.	*Retained for Further Analysis*

This desalination plant option considered in this screening process would be located in the southeast corner of the City's WTP, similar to the proposed project. Unlike the proposed project, the standalone desalination plant would be capable of operating independently of Plants A and B. This facility would use microfiltration (MF) to provide pretreatment (i.e., solids removal) for the RO membranes as well as be used to address treatment requirements for pathogens and viruses. Plants A and B would not require any improvements to change their processes and would continue to operate as conventional treatment plants treating low-TDS water from the Reservoir and Canal. Filtered water produced by Plant A and/or B could be blended with RO permeate.

The footprint of a standalone desalination plant with a finished water capacity of 6 mgd would be approximately 19,000 square feet, and would require approximately 3,900 square feet for chemical storage. The standalone plant would also require a 110,600-gallon Micro-Filtration filtrate tank, and an 80,000-gallon Reverse Osmosis permeate tank in the facility.

5.3.4 Raw Water Pipeline Connection Option Screening Result

This analysis considers an alternative option for the raw water pipeline connection. This option is summarized in **Table 5-4** below and shown in **Figure 5-2**.

The primary screening criterion for the raw water pipeline connection was:

- Direct connection to the City's existing raw water pipeline to allow water to be conveyed directly from the river to the WTP.

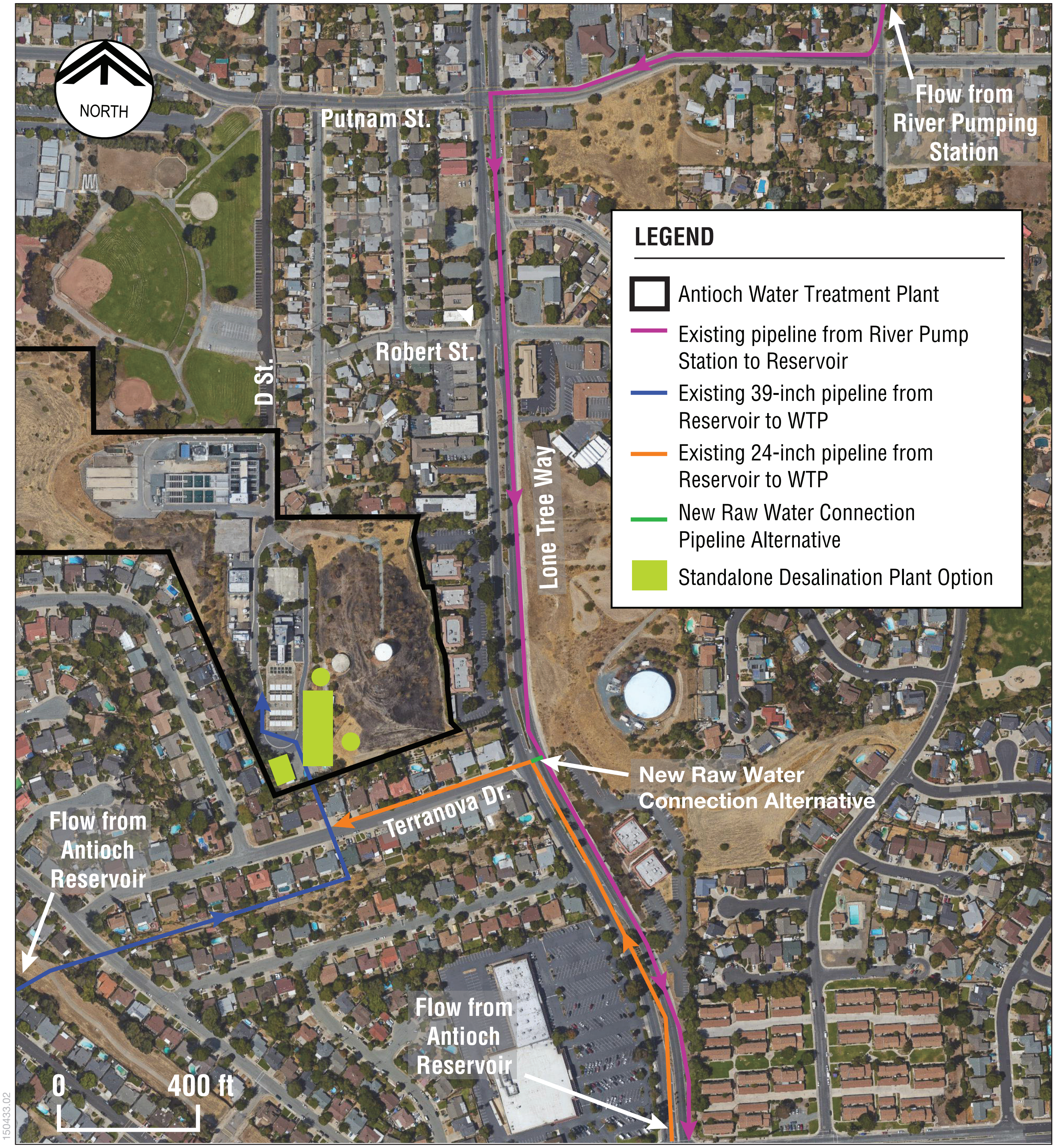
TABLE 5-4
RAW WATER PIPELINE CONNECTION OPTION

Site	Description	Screening Results
New Raw Water Pipeline Connection	• A new approximately 100-foot-long pipeline segment would tee off of the existing raw water pipeline on Lone Tree Way at Terranova Drive and connect to the existing pipeline that carries water to the WTP from the Reservoir. • Under this option, valves would be installed to allow water to flow either directly to the WTP or to the Reservoir. In-pipe blending of raw water and Reservoir water could occur, which would lower the TDS concentration of the RO feed water.	*Retained for Further Analysis*

This option would install a short section of new pipeline to connect the existing raw water pipeline from the river, to the existing 24-inch pipeline that supplies water from the Reservoir. Valves would be installed to direct the flow either to the Reservoir or the WTP.

Under this option, in-pipe blending of high-TDS river water and low-TDS Reservoir water could occur prior to the water entering the WTP. The City currently pumps river water with an elevated chloride concentration to the Reservoir whenever the Reservoir is capable of diluting the river water to an acceptable chloride concentration. Thus, the City currently has the ability to mix river and Reservoir water to control the concentration of chloride entering the WTP. This option would add another method of blending control.

This option could lower the TDS concentration of the RO feed water, which could reduce the need for RO treatment (thereby using less energy), and would lower the TDS concentration of the brine. However, under this option, because a portion of the Reservoir water used for blending would become brine, some of the Reservoir water would be wasted as the blended water undergoes RO.



SOURCE: Carollo Engineers, 2018

Brackish Water Desalination Facility

Figure 5-2
Desalination Plant Site and Raw Water Pipeline Options

ESA

5.4 Evaluation of Project Component Options

This section evaluates the relative environmental effects of the components carried forward from the prior screening step, and compared against the components of the proposed project. The components that are determined through the evaluation to avoid or reduce potential environmental impacts are used to compile whole alternatives in Section 5.4.4 that are evaluated against the proposed project in Section 5.5.

The following sub-sections present summary descriptions of the potential environmental impacts associated with the implementation of a particular component of the proposed project, as described in Chapter 3. The impacts of the component options are described comparatively using the following descriptors:

- **Similar** – impacts would be identical or would be of the same general magnitude as the proposed project component
- **Increased** – impacts would be notably greater than the proposed project component
- **Decreased** – impacts would be notably less than the proposed project component

5.4.1 Evaluation of Intake Pump Station Options

Two types of intake pump station options were compared against the proposed intake pump station.

Intake Pump Station Siting Option 1

Intake Pump Station Siting Option 1 would be constructed east of the existing pier and boat ramp at the north end of the parking lot. The footprint area, and number of pumps and pipelines would be the same as the proposed project. This option would have similar operational impacts related to Delta hydrology, impingement and entrainment when compared to the proposed project. Because this option would decrease some construction-related environmental effects, (while increasing others) compared with the proposed project, it is carried forward for development into the whole alternative (Alternative A).

Reduced Footprint Intake Pump Station

The Reduced Footprint Intake Pump Station would be in the same location as the proposed project, but would include only two pumps (no standby), and two 36-inch offshore intake pipelines with fish screens. Because this option would decrease construction-related environmental effects compared with the proposed project, it is carried forward for development into whole alternatives (Alternative B).

5.4.2 Evaluation of Standalone Desalination Plant Option

One alternative desalination plant option was compared to the proposed desalination plant at the WTP. Under the proposed project, the desalination facility would include a 10,700-square-foot membrane process building and a 2,600-square-foot chemical storage building. The standalone desalination plant would result in a larger footprint for both the RO facility and chemical storage area, at approximately 19,000 square feet and 3,900 square feet, respectively. The proposed project would use the existing conventional treatment processes at Plant A for pre-treatment of raw water prior to RO treatment, thus requiring a smaller footprint for the desalination process. The standalone desalination plant would require a microfiltration component to provide pretreatment prior to RO treatment. The microfiltration system would require larger volumes of chemicals for the pretreatment process, and would require additional pumps that would require a greater amount of energy consumption. Compared to the proposed project this option would require a larger footprint, and greater chemical and energy consumption.

The standalone desalination facility option would result in increased construction and operational impacts compared to the proposed project, and would not avoid or minimize potential environmental impacts. For this reason, the standalone desalination plant option was not carried forward in the development of the whole alternatives.

5.4.3 Evaluation of Raw Water Pipeline Connection Option

The raw water pipeline connection option would construct a new pipeline segment to connect the existing raw water pipeline from the river, to the existing pipeline that carries water to the WTP from the Reservoir. Under the proposed project, the new raw water pipeline connection to the WTP would be up to 3,000 feet in length, whereas the raw water pipeline connection option would be approximately 100 feet. Therefore, this option would result in fewer impacts associated with excavation and construction, compared to construction of the proposed project.

Because the raw water pipeline connection option would allow blending with reservoir water before reaching the desalination facility, the lower TDS concentration of the RO feed water could reduce the need for RO treatment. Therefore, the raw water connection option would consume less energy, and thus generate less greenhouse gas emissions during operation, compared to operation of the proposed project.

5.4.4 Summary of Component Option Evaluation Conclusions

Both of the intake pump station options were carried forward into the development of whole alternatives.

Based on the conclusions of the component evaluations, the various options were combined into whole alternatives for detailed consideration. Alternative A would be similar to the proposed project except the intake pump station would be located at the north end of the parking lot (Intake Pump Station Siting Option 1). Alternative B represents a reduced footprint, consisting of a smaller intake pump station and a shorter raw water connection pipeline. Both alternatives would construct a desalination facility with a finished water capacity of 6 mgd, and a brine disposal pipeline to the Delta Diablo WWTP, as under the proposed project.

5.5 Description of Alternatives Selected for Analysis

The following alternatives are analyzed in this chapter:

- **No Project Alternative**
- **Alternative A: Intake Pump Station Siting Location 1**
- **Alternative B: Reduced Footprint Alternative**

These three alternatives were determined to adequately represent the range of feasible alternatives required under CEQA for the proposed project. The No Project Alternative is included, as required by CEQA *Guidelines* Section 15126.6(e), even though it would not meet the basic project objectives. Alternative A is a potentially feasible option that could meet all of the City's objectives. Alternative B is a potentially feasible option that could meet some of the City's objectives. **Table 5-5** summarizes and compares the characteristics of the proposed project with those of the No Project Alternative, and Alternatives A and B. Detailed descriptions of each alternative are presented, below, along with an evaluation of their environmental impacts. **Table 5-6** summarizes the ability of the two alternatives to meet the project objectives.

5.5.1 Alternative A: No Project Alternative

Discussion of the No Project Alternative must examine the existing conditions and reasonably foreseeable future conditions that would exist if the project were not approved (CEQA *Guidelines* Section 15126.6(e)). The No Project Alternative is defined as a continuation of existing conditions, as well as conditions that are reasonably expected to occur in the event that the proposed project is not implemented. Under the No Project Alternative and reasonably foreseeable future conditions, current operation of the City's existing water system would continue. The existing intake pump station would continue to divert water until the river's salinity exceeds potable water supply requirements, then supplemented by purchased water from CCWD. Under the No Project Alternative, the City would not implement the proposed project to provide desalinated water to offset purchased water use.

Comparative Impact Analysis

Under the No Project Alternative, significant impacts of the proposed project associated with the construction of the river intake pump station, raw water connection pipeline, desalination plant and associated facilities, and brine disposal pipeline would not occur including: short-term increases in criteria air emissions and noise levels; disturbance or destruction of cultural resources or tribal cultural resources; potential exposure to hazardous materials; short-term disruption of traffic patterns and emergency response; short-term disruption of recreational boat use at the pump station site; and disruption of regional or local utilities. Furthermore, because no new facilities would be constructed, there would be no impacts to special-status terrestrial and aquatic species when compared to the proposed project. There would also be no change to water quality or surface water flows in the Sacramento River and Delta because the existing intake would be operated as it is under current conditions. Because no new facilities would be constructed or

TABLE 5-5
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES

Characteristic	Proposed Project	No Project	Alternative A: Intake Pump Station Siting Option 1	Alternative B: Reduced Footprint
General				
Source of Water / Yield	Up to 6 million gallons per day (mgd) of desalinated product water to offset use of purchased water.	Current water demands would continue to be met through the use of water pumped from the San Joaquin River and water purchased through CCWD.	Same as proposed project	Same as proposed project
Facilities				
Intake Pump Station	• The new pump station would be constructed within the existing parking lot, approximately 200 feet inland from the shore. • Approximately 2,400 square feet in area with three 8 mgd vertical turbine pumps (two active and one standby) for a total intake firm capacity of 16 mgd. • Three new 36-inch-diameter offshore intake pipelines to replace the existing pipeline with fish screens meeting CDFW/NOAA requirements • Electrical and instrumentation equipment	No new facilities.	Same as the proposed project except the intake pump station would be located at the north end of the parking lot.	• Same location as the proposed project, except a smaller footprint. • Two 8 mgd pumps (two active, no standby) for a total intake firm capacity of 16 mgd. • Two new 36-inch-diameter offshore intake pipelines to replace the existing pipeline with fish screens meeting CDFW/NOAA requirements • Electrical and instrumentation equipment
Raw Water Pipeline Connection	New 3,000-foot-long raw water pipeline connection to the City's existing raw water pipeline to allow water to be conveyed directly from the River to the WTP		Same as proposed project	New approximately 100-foot-long raw water connection option to connect the existing raw water pipeline with the existing pipeline that runs from the reservoir to the WTP.

TABLE 5-5 (CONTINUED)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES

Characteristic	Proposed Project	No Project	Alternative A: Intake Pump Station Siting Option 1	Alternative B: Reduced Footprint
Desalination Facilities	The existing WTP (Plant A) would provide pre-treatment of the raw water prior to RO treatment. A desalination plant with a finished water capacity of 6 mgd and related facilities, including reverse osmosis (RO); post-treatment systems; chemical feed and storage facilities; brine conveyance facilities; and other associated non-process facilities.		Same as proposed project	Same as proposed project
Brine Disposal	Approximately 4-mile-long brine disposal pipeline and connection to Delta Diablo's Wastewater Treatment Plant (WWTP) outfall		Same as proposed project	Same as proposed project
Construction				
Duration	The proposed project facilities would be built over approximately 14 months.	No construction required.	Same as proposed project	Same as proposed project, except the intake pump station and raw water pipeline connection construction would have a shorter duration.
Schedule	Monday through Friday, 8 a.m. to 5 p.m.	No construction required.	Same as proposed project	Same as proposed project
Operations				
Active Operation of Facilities	The new intake pump station could operate continuously for up to 24 hours a day.	No new operations.	Same as proposed project	Same as proposed project
Staff Requirements	Addition of 7 new permanent jobs at the WTP.	Same as existing.	Same as proposed project	Same as proposed project
Maintenance	Periodic servicing and maintenance of facilities.	No new maintenance.	Same as proposed project	Same as proposed project

TABLE 5-6
SUMMARY OF ABILITY OF ALTERNATIVES TO MEET PROJECT OBJECTIVES

Project Objective	No Project	Alternative A: Intake Pump Station Siting Option 1	Alternative B: Reduced Footprint
	Would the alternative meet this objective?		
Improve water supply reliability and water quality for customers.	No	Yes	Yes
Develop a reliable, and drought-resistant water source to reduce dependency on purchased water supplies by maximizing the use of the City’s pre-1914 water rights.	No	Yes	Yes
Maximize the use of existing infrastructure to maintain economic feasibility.	No	Yes	Yes
Provide cost effective operational flexibility to allow the City to respond to changes in source water quality, emergencies, changes in climate and Delta conditions.	No	Yes	No
Preserve the value of the City's pre-1914 water rights.	No	Yes	Yes

operated, there would be no change in energy use, operational air emissions, or noise levels. Therefore, none of the impacts identified for the construction or operation of the proposed project would occur under the No Project Alternative.

Ability to Meet Project Objectives

Implementation of the No Project Alternative would not meet any of the stated project objectives and would not address water supply or operational constraints, nor would it reduce reliance on purchased water supplies during extended drought conditions. Under the No Project Alternative, water supply reliability would not be improved. Development of a reliable and drought-resistant water source would not occur under the No Project Alternative. Under the No Project Alternative operational flexibility would not be provided to the City, and the value of the City's pre-1914 water rights would not be preserved.

5.5.2 Alternative A: Intake Pump Station Siting Option 1

Under Alternative A, the intake pump station would be located east of the existing pier and boat ramp at the north end of the parking lot. As with the proposed project, the existing intake pump station would be demolished, and a new 2,400-square-foot pump station equipped with two active and one standby pumps, and three 36-in-diameter offshore intake pipelines with fish screens would be constructed. A cofferdam consisting of interlocking sheet piles approximately 50 feet wide that would extend into the river approximately 200 feet from the shore may be installed, as proposed under the project. Because the intake pump station under this alternative would be located at the shoreline, it would not require the installation of three pipelines in the parking lot to convey river water to the pump station (as depicted in **Figure 2-5a** for the proposed project). This alternative would require the installation of one pipeline through the parking lot to convey the pumped river water to the existing raw water pipeline. As a result, the amount of temporary disturbance associated with the pipeline installation in the parking lot would be slightly reduced compared to the project and construction-related impacts would be proportionately reduced.

All other project components, including the raw water connection pipeline, desalination plant and associated facilities, and brine disposal pipeline would be the same as the proposed project. Operation and maintenance of Alternative A would be similar to those for the proposed project. Alternative A would provide up to 6 mgd of desalinated product water to offset purchased water, and the intake pump station would be able to operate continuously for up to 24 hours per day. Like the proposed project, Alternative A would be constructed over an approximately 14-month period, and would require the addition of 7 new permanent jobs at the WTP. Facility maintenance would be the same as that for the proposed project.

Comparative Impact Analysis

Impacts That Would Not Occur

Although the intake pump station would be in a different location than in the proposed project, construction and operation of Alternative A would not eliminate any impacts, when compared to the proposed project.

Impacts Identified as Being the Same or Similar to the Proposed Project

Because the only difference between Alternative A and the proposed project would be the location of the intake pump station, which would be in an already disturbed area, Alternative A would have similar impacts associated with ground disturbance as the proposed project. The alternative location of the intake pump station would not have a geographically different setting, therefore Alternative A impacts to land use, local hydrology and water quality, land use and planning, and geology, soils, and paleontological resources would be less than significant, similar to the proposed project.

Like the proposed project, construction of the intake pump station and other components in Alternative A would require excavation and could encounter hazardous materials or result in the inadvertent discovery of cultural resources. Mitigation Measures 3.9-3a through 3.9-3c would ensure that workers are provided appropriate training in the recognition and response to encountering hazardous materials, and that plans are in place that provide procedures for the testing, handling, and disposal of hazardous materials. Mitigation Measures 3.5-1 and 3.5-2 would ensure that the proper steps are taken in the event cultural resources are encountered during construction. Like the proposed project, Alternative A would require construction in the intake pump station parking lot area and would temporarily disrupt use of the boat launch ramp during construction; therefore, recreational impacts would be the same as the proposed project and Mitigation Measure 3.17-1b would be implemented to notify affected users of the construction activities in advance.

Alternative A would require installation of a cofferdam similar to the proposed project. Installation of a sheetpile cofferdam could result in direct disturbance and mortality of fish and potential short-term degradation of aquatic habitat. Mitigation Measures 3.3-3a through 3.3-3d and Mitigation Measure 3.3-4 would reduce impacts by requiring worker awareness training programs, limiting in-water construction during periods when special-status fish species are not present or least sensitive, and consulting with resource agencies and implementing additional measures, where appropriate.

Similar to the proposed project, construction disturbance from trenching, pipeline installment, building demolition, and building construction under Alternative A could impact nesting birds and special-status bats in the vicinity. Mitigation Measures 3.4-1a and 3.4-1b would reduce impacts by determining presence or absence prior to construction activities. Alternative A would have a similar amount of construction activities in waters of the U.S. through in-water fill and other in-water work. Similar to the proposed project, implementation of Mitigation Measures 3.3-5 and 3.4-3 would protect aquatic habitat and water quality during construction.

Construction activities could result in short-term impacts related to the disruption of traffic and emergency response, and increases in noise levels. Mitigation Measures 3.17-1a and 3.17-1b would require obtaining any necessary road encroachment permits and develop and implement a traffic control plan. Mitigation Measure 3.13-1 would minimize construction noise impacts at sensitive receptors. Similar to the proposed project, implementation of Mitigation Measure 3.13-3 would reduce stationary-source noise levels to a less-than-significant level.

Alternative A would require the same number of new employees as the proposed project and would have a less-than-significant impact related to population and housing.

Impacts Identified as Being Less Severe than the Proposed Project

Construction impacts associated with the Alternative A components would be similar to the proposed project for the brine disposal pipeline, raw water connection pipeline, and desalination facility. Construction impacts of the intake pump station would be slightly less severe when compared to the proposed project because less excavation in the parking lot would be required. Therefore, air quality, energy consumption and greenhouse gas emissions would be slightly reduced under Alternative A. Mitigation Measures 3.2-1 and 3.2-4 would minimize construction-related fugitive dust and DPM emissions. Mitigation Measure 3.7-1 would ensure construction activities are conducted in a fuel-efficient manner and minimize idling times for construction equipment and vehicles.

Impacts Identified as Being More Severe than the Proposed Project

The potentially higher groundwater level of the intake pump station site under Alternative A would require greater in-water work associated with dewatering and excavation, which could result in greater impacts to aquatic biology, when compared to the proposed project. The pump station location would add a 23-foot-tall structure at the shoreline. Unlike the proposed project, the alternative pump station location would be located on the shoreline of the San Joaquin River, and would be more prominent and would result in greater permanent aesthetic impacts.

Ability to Meet Project Objectives

Alternative A would meet all project objectives. The change in location in the intake pump station would not result in any significant changes to the project such that objectives could not be met.

5.5.3 Alternative B: Reduced Footprint Alternative

Under Alternative B, the intake pump station would be in the same location as for the proposed project, but would include two pumps (no standby) instead of three pumps, thereby reducing the footprint area of the pump station by approximately 30 percent. The 3,000-foot raw water pipeline connection from the existing raw water pipeline to the WTP would not be constructed, but instead an approximately 100-foot-long pipeline segment would tee off the existing raw water pipeline on Lone Tree Way at Terranova Drive and connect to the existing pipeline that carries water to the WTP from the Reservoir. As a result, the raw water connection pipeline would require about 95 percent less excavation and construction-related activities for this component. Valves would be installed to allow water to flow either directly to the WTP or to the Reservoir. In-pipe blending of raw water and Reservoir water could occur, which would lower the TDS concentration of the RO feedwater.

The other project components and construction-related activities for the desalination plant and associated facilities, and brine disposal pipeline would be the same as the proposed project. Operation and maintenance of Alternative B would be similar to those for the proposed project. Alternative B would provide up to 6 mgd of desalinated product water to offset purchased water, and the intake pump station would be able to operate continuously for up to 24 hours per day. However, because there would be no standby pump, in the event one of the pumps are out of service for maintenance, operations would be reduced to 8 mgd (versus 16 mgd under the project). Alternative B would be constructed over an approximately 14-month period, during which the various components could overlap; however, the construction duration for the intake pump station and raw water connection pipeline connection would be shorter than the proposed project. Like the proposed project, Alternative A would be constructed over an approximately 14-month period, and would require the addition of 7 new permanent jobs at the WTP. Facility maintenance would be the same as that for the proposed project.

Comparative Impact Analysis

Impacts That Would Not Occur

Although the intake pump station and raw water connection under Alternative B would have a smaller footprint, and the raw water connection would enable a lower the TDS concentration of the RO feedwater, construction and operation of Alternative B would not eliminate any impacts, when compared to the proposed project.

Impacts Identified as Being the Same or Similar to the Proposed Project

The reduced footprint area of the intake pump station and the alternative raw water connection would not have a geographically different setting, therefore Alternative B impacts to geology, soils, and paleontological resources and land use and planning would be less than significant similar to the proposed project. Alternative B would require the same number of new employees as the proposed project and would have a less-than-significant impact related to population and housing. Similar to the proposed project, implementation of Mitigation Measure 3.13-3 would reduce stationary-source noise levels to a less-than-significant level.

Like the proposed project, Alternative B would require construction in the intake pump station parking lot area and would temporarily disrupt use of the boat launch ramp during construction; therefore, recreational impacts would be the same as the proposed project and Mitigation Measure 3.17-1b would be implemented to notify affected users of the construction activities in advance.

Impacts Identified as Being Less Severe than the Proposed Project

Alternative B would require approximately 30 percent less excavation at the intake pump station location, and approximately 95 percent less excavation and trenching for the raw water connection pipeline. Because less area would be disturbed, construction-related impacts would be less than that anticipated with construction of the proposed project. Although impacts from construction disturbance would be less severe under Alternative B, there would still be short-term increases in criteria air pollutant and fugitive dust emissions, GHG emissions, energy consumption, and noise levels.

Like the proposed project, construction of the intake pump station and other components in Alternative B would require excavation and ground disturbance activities. Construction-related activities for Alternative B could therefore encounter hazardous materials, result in the inadvertent discovery of cultural resources, potential degradation of water quality, potential disturbance to terrestrial resources, potential to disrupt utilities, and short-term disruption of traffic patterns and emergency response similar to the proposed project. Mitigation measures to minimize construction phase impacts would still be implemented under Alternative B. Mitigation Measures 3.2-1 and 3.2-4 would minimize construction-related fugitive dust and DPM emissions. Mitigation Measure 3.7-1 would ensure construction activities are conducted in a fuel-efficient manner and minimize idling times for construction equipment and vehicles.

Mitigation Measures 3.9-3a through 3.9-3c would ensure that workers are provided appropriate training in the recognition and response to encountering hazardous materials, and that plans are in place that provide procedures for the testing, handling, and disposal of hazardous materials. Mitigation Measures 3.5-1 and 3.5-2 would ensure that the proper steps are taken in the event cultural resources are encountered during construction. Mitigation Measures 3.4-1a and 3.4-1b would reduce impacts by determining presence or absence prior to construction activities. Mitigation Measures 3.17-1a and 3.17-1b would require obtaining any necessary road encroachment permits and develop and implement a traffic control plan. Mitigation Measure 3.13-1 would minimize construction noise impacts at sensitive receptors. Similar to the proposed project, implementation of Mitigation Measure 3.13-3 would reduce stationary-source noise levels to a less-than-significant level.

Construction-related activities including operation of construction equipment, worker trips, and hauling trips would be reduced, result in reduced criteria air pollutant and fugitive dust emissions as compared to the proposed project. Mitigation Measures 3.2-1 and 3.2-4 would minimize construction-related fugitive dust and DPM emissions. Alternative B would still require construction activities in waters of the U.S. through in-water fill and other in-water work. However, the overall impact would be less because the in-water area disturbed associated with two intake pipelines versus the 3 intake pipelines under the proposed project would have a smaller footprint. This would result in similar but less severe impacts to water of the U.S. Similar to the proposed project, implementation of Mitigation Measures 3.3-5 and 3.4-3 would protect aquatic habitat and water quality during construction. Mitigation Measures 3.3-3a through 3.3-3d and Mitigation Measure 3.3-4 would reduce impacts by requiring worker awareness training programs, limiting in-water construction during periods when special-status fish species are not present or least sensitive, and consulting with resource agencies and implementing additional measures, where appropriate.

Like the proposed project, the smaller footprint of the intake pump station would change (but not substantially degrade) the existing visual character of the site and its surroundings, but to a lesser degree than the proposed project.

The raw water pipeline connection would allow for lower TDS concentration of the RO feed water, which would reduce the need for RO treatment, and result in lower operational energy consumption and greenhouse gas emissions, when compared to the proposed project.

Impacts Identified as Being More Severe than the Proposed Project

Construction and operation of Alternative B would not result in more severe impacts when compared to the proposed project.

Ability to Meet Project Objectives

Not all of the project objectives would be achieved under Alternative B. Because Alternative B would have two pumps and no standby pump, it would not provide the operational flexibility if one pump were to become disabled. The reduced capacity would reduce the variable diversion rate volumes and would not maximize the City's use of its pre-1914 water rights. Alternative B would reduce the City's to respond to changes in source water quality, emergencies, changes in climate and Delta conditions compared to the proposed project.

5.6 Environmentally Superior Alternative

CEQA requires identification of an environmental superior alternative; that is, the alternative that has the least significant impacts on the environment. The CEQA *Guidelines* Section 15126.6 (e)(2) that: "If the environmentally superior alternative is the "no project" alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives."

Table 5-6 presents a comparison of impacts by issue area after mitigation for the proposed project, the No Project Alternative, Alternative A, and Alternative B. While the No Project Alternative would result in no impacts when compared to the proposed project, because no components would be constructed or operated, it would not achieve any of the proposed project objectives described above. As shown in Table 5-6 and as discussed in the alternative analysis above, Alternative B would be the environmentally superior alternative because it would result in similar or less severe impacts when compared to the proposed project. However, the proposed project objectives would not be met under Alternative B since, as discussed above, the lack of a standby pump would provide less operational flexibility to deal with changes in source water quality, emergencies, or changes in climate or Delta conditions if one pump were to become disabled or taken offline for maintenance compared to the proposed project.

TABLE 5-6
COMPARISON OF ENVIRONMENTAL IMPACTS OF THE ALTERNATIVES COMPARED TO THE PROPOSED PROJECT

Issue Area	Proposed Project[1]	No Project Alternative	Alternative A	Alternative B
Environmental Impacts				
3.1 Aesthetics	LS	NI	LS (More)	LS (Less)
3.2 Air Quality	LSM	NI	LSM (Less)	LSM (Less)
3.3 Aquatic Biology	LSM	NI	LSM	LSM
3.4 Terrestrial Biological Resources	LSM	NI	LSM	LSM (Less)
3.5 Cultural Resources	LSM	NI	LSM	LSM (Less)
3.6 Geology, Soils, and Paleontological Resources	LS	NI	LS	LS
3.7 Energy	LSM	NI	LSM (Less)	LSM (Less)
3.8 Greenhouse Gas Emissions	LS	NI	LS (Less)	LS (Less)
3.9 Hazardous and Hazardous Materials	LSM	NI	LSM	LSM (Less)
3.10 Local Hydrology and Water Quality	LS	NI	LS	LS (Less)
3.11 Delta Hydrology and Water Quality	LSM	NI	LSM	LSM
3.12 Land Use and Planning	LS	NI	LS	LS
3.13 Noise and Vibration	LSM	NI	LSM	LSM (Less)
3.14 Population and Housing	LS	NI	LS	LS
3.15 Public Services and Utilities	LSM	NI	LSM	LSM (Less)
3.16 Recreation	LSM	NI	LSM	LSM
3.17 Transportation and Circulation	LSM	NI	LSM	LSM (Less)
3.18 Tribal Cultural Resources	LSM	NI	LSM	LSM (Less)

1. This finding represents the most significant finding for the issue area after mitigation

NI – No Impact
LS – Less Than Significant
LSM – Less Than Significant With Mitigation
SU – Potentially Significant
Less – Less Severe
Greater – More Severe

5.7 Project Component Alternatives Considered but Rejected from Further Evaluation

Section 15126.6 of the CEQA *Guidelines* sets forth several requirements regarding the consideration of alternatives in an EIR. This section and related case law hold that alternatives that are not reasonable or are infeasible need not be discussed at length; alternatives that do not offer substantial environmental advantages over the project can be rejected from consideration; and alternatives that do not accomplish most of the basic objectives of the project can be excluded from detailed analysis.

Off-Site Desalination Facility

As described in Section 5.3.3, an alternative off-site location for the desalination plant has not been identified because the project is location specific. One of the primary objectives of the project is to maximize the use of the City's existing infrastructure to maintain economic feasibility and viability. The primary criteria for the desalination plant included co-locating the facility at the City's WTP to maximize use of existing infrastructure for pre-treatment of the raw water. Accordingly, no off-site alternative has been carried forward for detailed analysis.

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CHAPTER 6
Report Preparers

6.1 Lead Agency

City of Antioch

Ron Bernal, City Manager
Scott Buenting, Project Manager

6.2 Consultants

Environmental Science Associates (ESA)

Project Director	Jim O'Toole
Project Manager	Susan Yogi
Deputy Project Manager	Hilary Finck
Document Coordinator	Jill Feyk-Miney
Aesthetics	Steve Smith
Air Quality	Matt Fagundes, Brian Schuster
Aquatic Biological Resources	Chris Fitzer, Paul Bergman
Terrestrial Biological Resources	Brian Pittman, Julie McNamara
Cultural Resources	Heidi Koenig, Kathy Anderson
Geology, Soils and Paleontological Resources	Michael Burns
Hazards and Hazardous Materials	Michael Burns
Local Hydrology	Michael Burns
Delta Hydrology and Water Quality	Jim O'Toole, Robert Eckard
Land Use and Planning	Hilary Finck, Susan Yogi
Noise and Vibration	Chris Sanchez
Population and Housing	Hilary Finck
Public Services and Recreation	Steve Smith
Recreation	Hilary Finck, Susan Yogi
Transportation and Circulation	Shadde Rosenblum
Tribal Cultural Resources	Heidi Koenig
Growth Inducement	Meryka Dirks
GIS	Jonathan Kemp, Eryn Pimentel
Graphics	Ron Teitel
Word Processing	Kristine Olsen, Lisa Bautista

Carollo Engineers

Scott Weddle, P.E., Associate Vice President/Project Manager

Kevin Fitzgerald, P.E., Senior Civil Engineer

Jill Shankel, P.E., Lead Engineer

Exponent

Susan Paulsen, Principal Scientist and Practice Director

Ryan Thacher, Managing Engineer

Woodard & Curran

Samantha Salvia, P.E. Senior Project Manager