APPENDIX A

Notice of Preparation and Scoping

1872

Notice of Preparation of an Environmental Impact Report and Scoping Meeting

Date:	August 15, 2017
To:	State Clearinghouse, Responsible and Trustee Agencies, Other Interested Parties
Project Sponsor and Lead Agency:	City of Antioch
Staff Contact:	Scott Buenting Project Manager City of Antioch 200 H Street Antioch, California 94509 (925) 779 – 7050 SBuenting@ci.antioch.ca.us
Project Title:	City of Antioch Brackish Water Desalination Project
Location:	The project site is located within the fenceline of the existing Antioch Water Treatment Plant (APN 071-140-010, 401 Putnam Street, Antioch, CA 94509), at the San Joaquin River Water Intake facility (near McElheny Road and Fulton Shipyard Road), Delta Diablo Wastewater Treatment Plant (APNs 074-040-037, 073-230-046, 073-230-041, 2500 Pittsburg-Antioch Highway, Antioch), and along roadway right-of-ways (ROW) in the Cities of Antioch and Pittsburg, California.
General Plan Designation:	The Antioch General Plan designates the proposed desalination project site as Open Space, Neighborhood Commercial, Medium Low Density Residential. The raw water pipeline and brine disposal pipeline will be constructed in roadway ROWs within medium/low density residential, public/ institutional, and business park designated areas.
Public Review Period:	August 15, 2017 through September 14, 2017

This Notice of Preparation (NOP) has been prepared to notify agencies and interested parties that the City of Antioch (City) as the Lead Agency will prepare an Environmental Impact Report (EIR) pursuant to the California Environmental Quality Act (CEQA) for the proposed Brackish Water Desalination Project (Project), described below. If you work for a responsible or trustee State agency, we need to know the views of your agency regarding the scope and content of the environmental information that is germane to your agency's statutory responsibilities in connection with the proposed project. The EIR may be used by your agency when considering subsequent permits or approvals necessary for this project.

Pursuant to Section 15082 of the State CEQA Guidelines, this NOP will be circulated for a 30-day review period. CEQA requires that your response be submitted to the City at the earliest possible date, but not later than **5:00 p.m. on Thursday, September 14, 2017**. Please include your name, address, and phone number with your response. Responses may be submitted by hand, mailed, or sent by e-mail.

The NOP and file for the proposed project are available for review Monday through Friday between the hours of 8:00 a.m. and 11:30 a.m., and between the hours of 1:00 p.m. and 5:00 p.m. by appointment only, at the City of Antioch City Hall, Community Development Department, 3rd and H Street, Antioch CA, except on specified holidays.

Scoping Meeting

Pursuant to the State of California Public Resources Code Section 21083.9 and CEQA Guidelines Section 15206, a public scoping meeting will be held to receive comments concerning the scope of the EIR. Public agencies, community groups and interested members of the public are invited to attend the meeting and present oral or written comments on the proposed project. The meeting will be held on Tuesday, September 5, 2017, from 6:00 to 7:30 p.m. at the City of Antioch Maintenance Service Center located at 1201 West 4th Street, Antioch, CA. Meeting location access and restrooms are compliant with the Americans with Disabilities Act. To request a language interpreter or to accommodate persons with disabilities at the scoping meeting, please contact the staff contact listed above at least 72 hours in advance of the meeting.

Background and Project Description

Currently, the City's primary sources of untreated water are the San Joaquin River (River) and water purchased from the Contra Costa Water District (CCWD) via the Contra Costa Canal. The City currently pumps River water to the City's municipal reservoir then to the water treatment plant (WTP) located at 401 Putnam Street, Antioch (see **Figure 1**). Because the Antioch WTP does not reduce chloride concentrations (i.e., total dissolved solids [TDS], salinity), the City stops pumping River water when the chloride concentration in the municipal reservoir approached levels that are too high for public consumption, typically around 75 milligrams per liter (mg/l). The City purchases water from CCWD when it is unable to utilize River water. Generally, the City is able to use River water from January to July, and relies on water from CCWD for the remainder of the year.

The City proposes to construct, operate, and maintain the Project which includes a desalination facility within the City's existing WTP. The goals of the Project are to improve water supply reliability and water quality for its customers, especially during droughts and future changes in Delta water management, and to provide operational flexibility for the City. The Project meets these goals by constructing facilities that allows the City to withdraw water from the River year-round under its pre-1914 water rights, even when the chloride concentration is above the 75 mg/l limit normally treated at the WTP.

The components that comprise the Project shown in **Figures 1 and 2** are as follows:

- **Desalination Facility** – The desalination facility would produce up to 6 million gallons per day (mgd) of finished water and would be constructed south and east of 'Plant A' within the fenceline of the existing WTP. Salinity would be removed from water pumped from the River using a treatment system called reverse osmosis (RO). The RO treatment system would be housed in a new building located at the site. In addition to the RO treatment system, the desalination facility includes storage tanks, pumps, an electrical substation, and associated piping, equipment and appurtenances to support the RO system. Locating the desalination facility at the WTP would allow 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. A new pipeline would be constructed to allow filtered water from Plant A to flow to the new desalination facility. Permeate from the RO system would undergo post-treatment before entering Plant A's existing clearwell for distribution. The proposed desalination facility would only be operated during times of year when the salinity of River water is too high for public consumption. These poor water quality conditions have historically been limited to summer and fall months but may extend to longer periods in the future due to changes in Delta water management and frequency of droughts.

- **Intake Pump Station Replacement and Raw Water Pipeline Connection** – The Project would require a direct connection to the City's existing River water intake. The existing intake pump station would be demolished and a new pump station will be constructed. The new pump station would be equipped with a fish screen to protect sensitive aquatic habitat in the Delta. Water would be conveyed from the new pump station through the City's existing raw water pipeline for the majority of the distance between the pump station and the WTP. A new pipeline branch (up to approximately 3,000 feet long) from the existing pipeline underneath Long Tree Way to the WTP would allow a direct connection to maximize use of existing infrastructure.

- **Brine Disposal Pipeline** – An approximately 4-mile long brine disposal pipeline from the desalination facility to the existing Delta Diablo (formerly DDSD) Wastewater Treatment Plant (WWTP) outfall would be constructed. River intake pumping at 8 mgd would produce 6 mgd of finished water and approximately 2 mgd of brine flows from the RO system. The brine disposal pipeline would be constructed within existing public road right-of-ways and use existing underground pipelines to the extent possible to minimize cost and public disruption. In addition to the brine disposal pipeline, storage facilities for the brine may be provided to allow discharges to be timed to minimize any potential impacts to receiving waters and habitat. The brine would be discharged with the WWTP effluent through the existing Delta Diablo outfall to New York Slough.

The Notice of Preparation is available on the City's website at www.antioch.ca.us.

Probable Environmental Effects

The EIR will identify, describe, and evaluate the significance of the potential environmental impacts associated with implementation of the Project as described. The EIR will address direct, indirect, and cumulative effects in all issue areas. The EIR will include feasible mitigation measures to reduce significant or potentially significant environmental impacts, where appropriate. Each of the following CEQA environmental issue areas will be addressed in the EIR:

- Aesthetics
- Agriculture and Forestry Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Geology and Soils
- Greenhouse Gases
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation/Traffic
- Tribal Cultural Resources
- Utilities, Energy and Service Systems

CEQA Guideline Section 15126.6(a) requires that an EIR describe a range of reasonable and potentially feasible alternatives to the proposed project. The alternatives must feasibly attain most of the objectives of the proposed project while also avoiding or substantially lessening at least one of the significant environmental effects of the proposed project. The EIR will identify alternatives to the project, in part, by public comment received during the NOP comment period. To ensure that the full range of issues and alternatives related to the proposed project are identified, comments and suggestions are invited from all interested parties. The EIR will evaluate alternative project site locations and the required “No-Project” Alternative.

Required Discretionary City Approvals
Approvals from the City for the proposed project include but are not limited to: certification of the EIR, approval of the project, grading and encroachment permits.

Other Agency Review and Approvals
Other local, regional, and statewide agencies that may require review of permits for the proposed project include:

- City of Pittsburg encroachment permit
- Regional Water Quality Control Board – San Francisco Bay
- California Department of Fish and Wildlife
- California Department of Transportation
- California Department of Water Resources
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- U.S. National Marine Fisheries Service (NOAA Fisheries)

Attached Figures

- Figure 1 – Vicinity Map and Facilities Location
- Figure 2 – Proposed Desalination Facility Site Plan

N

0 1,000 2,000

Scale in Feet

FIGURE 1 - VICINITY MAP AND FACILITIES LOCATION

CITY OF ANTIOCH

BRACKISH WATER DESALINATION PROJECT

carollo

CITY OF ANTIOCH 1872 CALIFORNIA

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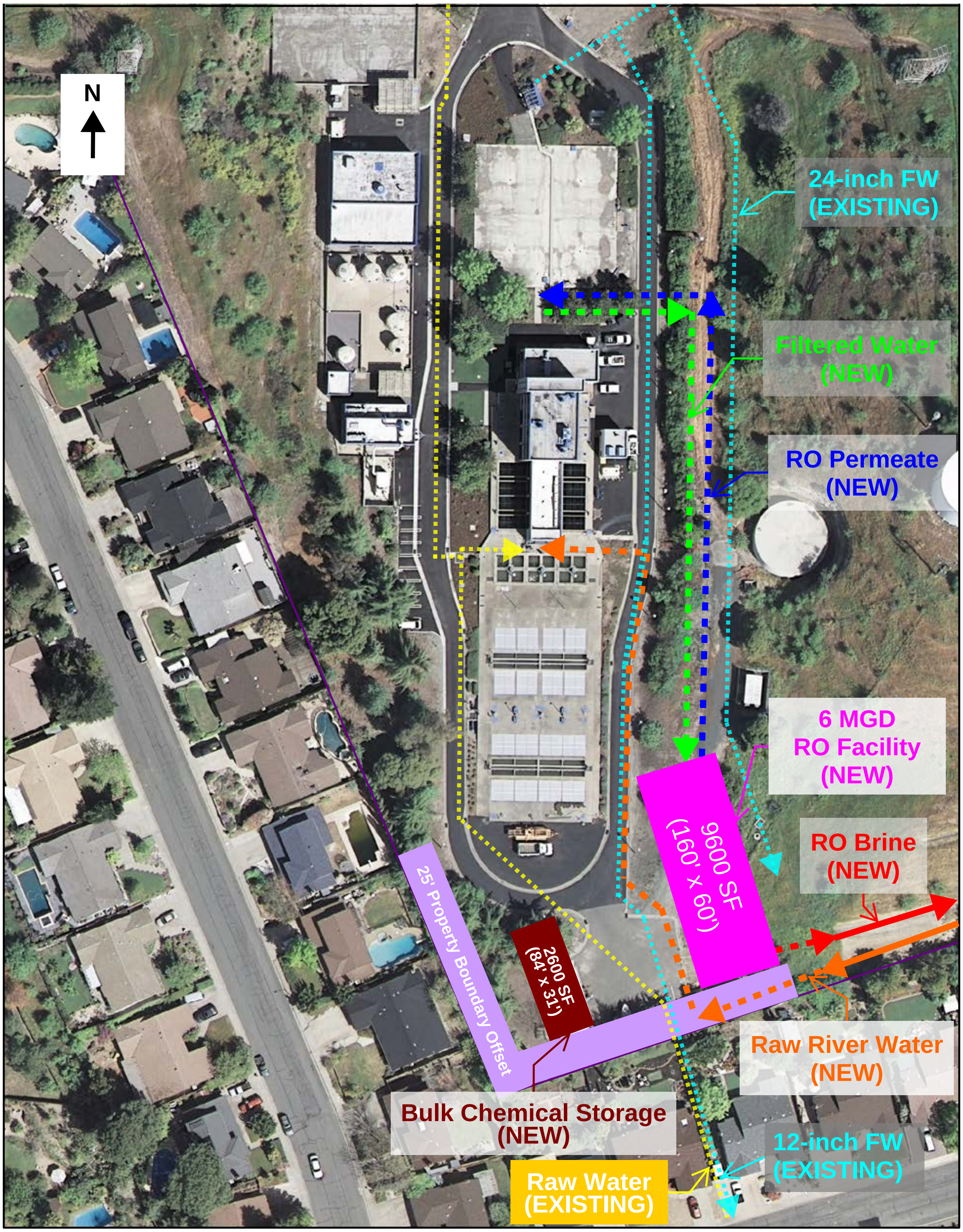
FIGURE 2 - PROPOSED DESALINATION FACILITY SITE PLAN



STATE OF CALIFORNIA
Governor's Office of Planning and Research
State Clearinghouse and Planning Unit

Edmund G. Brown Jr.
Governor

Ken Alex
Director

Notice of Preparation

RECEIVED
AUG 21 2017
CITY OF ANTIOCH
CAPITAL IMPROVEMENTS

August 15, 2017

To: Reviewing Agencies

Re: Brackish Water Desalination Project
SCH# 2017082044

Attached for your review and comment is the Notice of Preparation (NOP) for the Brackish Water Desalination Project draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Scott Buenting
City of Antioch
200 H Street
Antioch, CA 94509

with a copy to the State Clearinghouse in the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan
Director, State Clearinghouse

Attachments
cc: Lead Agency

Document Details Report
State Clearinghouse Data Base

SCH# **2017082044**
Project Title Brackish Water Desalination Project
Lead Agency Antioch, City of

Type **NOP** Notice of Preparation

Description Currently, the City's primary sources of untreated water are the San Joaquin River (River) and water purchased from the Contra Costa Water District (CCWD) via the Contra Costa Canal. The City currently pumps River water to the City's municipal reservoir then to the water treatment plant (WTP) located at 401 Putnam Street, Antioch. Because the Antioch WTP does not reduce chloride concentrations, the City stops pumping River water when the chloride concentration in the municipal reservoir approached levels that are too high for public consumption, typically around 75 milligrams per liter (mg/l). The City purchases water from CCWD when it is unable to utilize River water. Generally, the City is able to use River water from January to July, and relies on water from CCWD for the Remainder of the year. The City proposes to construct, operate, and maintain the Project which includes a 6 million gallons per day (mgd) desalination facility within the City's existing WTP. The goals of the project are to improve water supply reliability and water quality for its customers, especially during droughts and future changes in Delta water management, and to provide operational flexibility for the City. The project meets these goals by constructing facilities that allows the City to withdraw water from the River year-round under its pre-1914 water rights, even when the chloride concentration is above the 75 mg/l limit normally treated at the WTP.

Lead Agency Contact

Name Scott Buenting
Agency City of Antioch
Phone (925) 779-7050 **Fax**
email
Address 200 H Street
City Antioch **State** CA **Zip** 94509

Project Location

County Contra Costa
City Antioch, Pittsburg
Region
Cross Streets Putnam Street between D Street, G Street, McElheny Road, Fulton Shipyard Road,Pittsburg-Antioch
Lat / Long
Parcel No. Varies
Township 2N **Range** 1E **Section** 25 **Base** MDB&M

Proximity to:

Highways 4
Airports No
Railways Amtrak
Waterways San Joaquin River
Schools Multiple
Land Use Open Space, Neighborhood Commercial, Medium Low Density Residential

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Project Issues Aesthetic/Visual; Agricultural Land; Air Quality; Archaeologic-Historic; Biological Resources; Drainage/Absorption; Flood Plain/Flooding; Forest Land/Fire Hazard; Geologic/Seismic; Minerals; Noise; Population/Housing Balance; Public Services; Recreation/Parks; Schools/Universities; Soil Erosion/Compaction/Grading; Solid Waste; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Water Supply; Growth Inducing; Landuse; Cumulative Effects

Note: Blanks in data fields result from insufficient information provided by lead agency.

(*Project Description continued*) The Project meets these goals by constructing facilities that allows the City to withdraw water from the River year-round under its pre-1914 water rights, even when the chloride concentration is above the 75 mg/l limit normally treated at the WTP.

Reviewing Agencies Checklist

Lead Agencies may recommend State Clearinghouse distribution by marking agencies below with and "X".
If you have already sent your document to the agency please denote that with an "S".

X Air Resources Board
X Boating & Waterways, Department of
X California Emergency Management Agency
____ California Highway Patrol
X Caltrans District # 4
____ Caltrans Division of Aeronautics
____ Caltrans Planning
____ Central Valley Flood Protection Board
____ Coachella Valley Mountains Conservancy
____ Coastal Commission
____ Colorado River Board
____ Conservation, Department of
____ Corrections, Department of
X Delta Protection Commission
____ Education, Department of
____ Energy Commission
X Fish & Wildlife Region # 3
____ Food & Agriculture, Department of
____ Forestry and Fire Protection, Department of
____ General Services, Department of
____ Health Services, Department of
____ Housing & Community Development
X Native American Heritage Commission

X Office of Historic Preservation
____ Office of Public School Construction
X Parks & Recreation, Department of
____ Pesticide Regulation, Department of
____ Public Utilities Commission
X Regional WQCB # 5
X Resources Agency
____ Resources Recycling and Recovery, Department of
____ S.F. Bay Conservation & Development Commission
____ San Gabriel & Lower L.A. Rivers and Mtns Conservancy
____ San Joaquin River Conservancy
____ Santa Monica Mountains Conservancy
____ State Lands Commission
X SWRCB: Clean Water Grants
X SWRCB: Water Quality
X SWRCB: Water Rights
____ Tahoe Regional Planning Agency
____ Toxic Substances Control, Department of
X Water Resources, Department of

X Other SWRCB Division of Drinking Water
S Other USFWS
S Other NOAA
S Other U.S. Army Corps

Local Public Review Period (to be filled in by lead agency)

Starting Date August 15, 2017
Ending Date September 14, 2017

Lead Agency (Complete if applicable):

Consulting Firm: ESA
Address: 550 Kearny Street, Suite 800
City/State/Zip: San Francisco, CA 94108
Contact: Susan Yogi
Phone: 415.896.5900

Applicant: Scott Buenting
Address: 200 H Street
City/State/Zip: Antioch, CA 94509
Phone: 925.779.7050

Signature of Lead Agency Representative: **Date:** August 14, 2017

Authority cited: Section 21083, Public Resources Code. Reference: Section 21161, Public Resources Code.

NOP Distribution List

County: Contra Costa

SCH# 2017082044

Resources Agency

■ **Resources Agency**
Nadell Gayou

☐ **Dept. of Boating & Waterways**
Denise Peterson

☐ **California Coastal Commission**
Allyson Hitt

☐ **Colorado River Board**
Lisa Johansen

☐ **Dept. of Conservation**
Crina Chan

☐ **Cal Fire**
Dan Foster

■ **Central Valley Flood Protection Board**
James Herota

☐ **Office of Historic Preservation**
Ron Parsons

■ **Dept of Parks & Recreation**
Environmental Stewardship Section

☐ **S.F. Bay Conservation & Dev't. Comm.**
Steve Goldbeck

■ **Dept. of Water Resources**
Resources Agency
Nadell Gayou

Fish and Game

☐ **Depart. of Fish & Wildlife**
Scott Flint
Environmental Services Division

☐ **Fish & Wildlife Region 1**
Curt Babcock

☐ **Fish & Wildlife Region 1E**
Laurie Harnsberger

☐ **Fish & Wildlife Region 2**
Jeff Drongesen

■ **Fish & Wildlife Region 3**
Craig Weightman

☐ **Fish & Wildlife Region 4**
Julie Vance

☐ **Fish & Wildlife Region 5**
Leslie Newton-Reed
Habitat Conservation Program

☐ **Fish & Wildlife Region 6**
Tiffany Ellis
Habitat Conservation Program

☐ **Fish & Wildlife Region 6 I/M**
Heidi Calvert
Inyo/Mono, Habitat Conservation Program

☐ **Dept. of Fish & Wildlife M**
William Paznokas
Marine Region

Other Departments

☐ **California Department of Education**
Lesley Taylor

☐ **OES (Office of Emergency Services)**
Monique Wilber

☐ **Food & Agriculture**
Sandra Schubert
Dept. of Food and Agriculture

☐ **Dept. of General Services**
Cathy Buck
Environmental Services Section

☐ **Housing & Comm. Dev.**
CEQA Coordinator
Housing Policy Division

Independent Commissions,Boards

■ **Delta Protection Commission**
Erik Vink

■ **Delta Stewardship Council**
Kevan Samsam

☐ **California Energy Commission**
Eric Knight

■ **Native American Heritage Comm.**
Debbie Treadway

■ **Public Utilities Commission**
Supervisor

☐ **Santa Monica Bay Restoration**
Guangyu Wang

■ **State Lands Commission**
Jennifer Deleong

☐ **Tahoe Regional Planning Agency (TRPA)**
Cherry Jacques

Cal State Transportation Agency CalSTA

☐ **Caltrans - Division of Aeronautics**
Philip Crimmins

☐ **Caltrans – Planning HQ LD-IGR**
Christian Bushong

■ **California Highway Patrol**
Suzann Ikeuchi
Office of Special Projects

Dept. of Transportation

☐ **Caltrans, District 1**
Rex Jackman

☐ **Caltrans, District 2**
Marcelino Gonzalez

☐ **Caltrans, District 3**
Eric Federicks – South
Susan Zanchi - North

■ **Caltrans, District 4**
Patricia Maurice

☐ **Caltrans, District 5**
Larry Newland

☐ **Caltrans, District 6**
Michael Navarro

☐ **Caltrans, District 7**
Dianna Watson

☐ **Caltrans, District 8**
Mark Roberts

☐ **Caltrans, District 9**
Gayle Rosander

☐ **Caltrans, District 10**
Tom Dumas

☐ **Caltrans, District 11**
Jacob Armstrong

☐ **Caltrans, District 12**
Maureen El Harake

Cal EPA

Air Resources Board

☐ **Airport & Freight**
Jack Wursten

☐ **Transportation Projects**
Nesamani Kalandiyur

☐ **Industrial/Energy Projects**
Mike Tollstrup

☐ **California Department of Resources, Recycling & Recovery**
Sue O'Leary

■ **State Water Resources Control Board**
Regional Programs Unit
Division of Financial Assistance

■ **State Water Resources Control Board**
Cindy Forbes – Asst Deputy
Division of Drinking Water

■ **State Water Resources Control Board**
Div. Drinking Water # 4

☐ **State Water Resources Control Board**
Student Intern, 401 Water Quality Certification Unit
Division of Water Quality

☐ **State Water Resouces Control Board**
Phil Crader
Division of Water Rights

☐ **Dept. of Toxic Substances Control**
CEQA Tracking Center

☐ **Department of Pesticide Regulation**
CEQA Coordinator

Regional Water Quality Control Board (RWQCB)

☐ **RWQCB 1**
Cathleen Hudson
North Coast Region (1)

☐ **RWQCB 2**
Environmental Document Coordinator
San Francisco Bay Region (2)

☐ **RWQCB 3**
Central Coast Region (3)

☐ **RWQCB 4**
Teresa Rodgers
Los Angeles Region (4)

■ **RWQCB 5S**
Central Valley Region (5)

☐ **RWQCB 5F**
Central Valley Region (5)
Fresno Branch Office

☐ **RWQCB 5R**
Central Valley Region (5)
Redding Branch Office

☐ **RWQCB 6**
Lahontan Region (6)

☐ **RWQCB 6V**
Lahontan Region (6)
Victorville Branch Office

☐ **RWQCB 7**
Colorado River Basin Region (7)

☐ **RWQCB 8**
Santa Ana Region (8)

☐ **RWQCB 9**
San Diego Region (9)

☐ **Other** ____________
____
____

☐ ____________
Conservancy

Last Updated 8/3/17

CITY OF ANTIOCH

BRACKISH WATER DESALINATION PROJECT EIR

SCOPING COMMENTS SUMMARY

Letter Number	Commenter	Summary of Comment	Coverage in the EIR
	State Agency		
1	Sharaya Souza, Native American Heritage Commission (NAHC), August 23, 2017 Letter	Indicates that AB52 applies to the proposed project and recommends consultation with applicable California Native American tribes in order to avoid potential tribal resources impacts.	Section 3.18, Tribal Cultural Resources
		Recommends 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.	Section 3.18, Cultural and Tribal Resources
2	Andrea Buckley, Central Valley Flood Protection Board (CVFPB), August 30, 2017 Letter	Indicates that the proposed project is within the San Joaquin river, a regulated stream under CVFPB jurisdiction, and may require a CVFPB permit prior to construction, pursuant to Title 23, Section 6.	Chapter 2, Project Description
3	Stephanie Tadlock, Central Valley Regional Water Quality Control Board (CVRWQCB), September 6, 2017 Letter	Describes the Basin Plan in the context of the regulatory setting.	Section 3.10, Hydrology and Water Quality
		Indicates that proposed wastewater discharges must comply with the Antidegradation Policy and Antidegradation Implementation Policy contained in the Basin Plan, and that the environmental review document should evaluate potential impacts to both surface and groundwater quality.	Section 3.11, Brine Disposal
		Describes the permitting requirements of the Construction Storm Water General Permit, the Phase I and II Municipal Separate Storm Sewer System Permits, the Industrial Storm Water General Permit, the Clean Water Act Section 404 Permit, the Clean Water Act Section 401 Permit, Waste Discharge Requirements, Dewatering Permit, Low or Limited Threat General NPDES Permit, and the NPDES Permit,	Chapter 2, Project Description Section 3.10, Hydrology and Water Quality
4	Patricia Maurice, California Department of Transportation (Caltrans), September 22, 2017 Letter	Indicates that the City of Antioch is responsible for all mitigation, including any needed improvements to the State Transportation Network.	Section 3.17, Traffic and Circulation
		Indicates that any work or traffic control that encroaches onto the state right of way requires an encroachment permit issued by Caltrans, and that traffic-related mitigation measures should be incorporated into the construction plans during the encroachment permit process.	Chapter 2, Project Description Section 3.17, Traffic and Circulation
5	Cassandra Enos-Nobriga, Delta Stewardship Council (Council), September 13, 2017 Letter	Indicates that the proposed project is most likely a covered action under the Delta Plan, and encourages the City of Antioch to engage in early consultation with Council staff to help with the determination process.	Comment noted.
		Indicates that the Delta Plan policies and recommendations should be acknowledged in the regulatory setting for each applicable resource section, and the EIR should discuss any inconsistencies between the proposed project and the Delta Plan. Specifically, the EIR may need to	Section 3.12, Land Use and Planning

Letter Number	Commenter	Summary of Comment	Coverage in the EIR
		address consistency with Delta Plan Policies regarding Best Available Science Adaptive Management (G P1), Land Use Conflicts (DP P1; DP P2), and Hydrology (RR P3).	
		Indicates that mitigation measures must be consistent with those identified in the Delta Plan EIR, or substitute mitigation measures that are equally or more effective.	Environmental Setting, Impacts, and Mitigation Measures sections of applicable resource areas
		Indicates that the Council will be interested in reviewing the impact analysis for the direct, indirect, and cumulative effects of the project on the ecosystem related to the additional withdrawals of water from the system.	Section 3.10, Hydrology and Water Quality
		Indicates that the Council will be interested in reviewing the impact analysis for the proposed disposal of brine, including its impacts to the aquatic and terrestrial environment, and any proposed mitigation of potentially significant impacts.	Section 3.11, Brine Disposal
		Indicates that the Council is interested in how potential reductions in water purchased from the CCWD due to this project would affect the ecosystem and regional water supply reliability.	Section 3.10, Hydrology and Water Quality
	Local or Regional Agency		
6	Jeff Quimby, Contra Costa Water District (CCWD), September 13, 2017 Letter	Indicates that evaluation of the potential Delta water quality impacts from the project requires modeling of statewide water operations both with and without the project, and use of the results of that modeling as inputs to Delta hydrodynamics and water quality models.	Section 3.11, Brine Disposal
		Describes the water quality parameters that should be included in the proposed project's EIR to allow a determination whether the project will cause water quality impacts to CCWD.	Section 3.11, Brine Disposal
7	Kristin Pollot, City of Pittsburg, September 8, 2017 Letter	Requests that the EIR include consideration of the following potential impacts of the intake and discharge processes of the plant: • impingement and entrainment of aquatic organisms; • effects on native habitat by brine discharge; • location of disposal of waste from treatment process; • impacts of discharge to receiving waters; and, • rate of discharge to receiving waters.	Chapter 2, Project Description Section 3.3, Aquatic Biological Resources Section 3.11, Brine Disposal
		Indicates that an encroachment permit is required for work within the City of Pittsburg right-of-way.	Chapter 2, Project Description
		Indicates that design drawings are required for proper review, approval, and permitting.	Comment noted.
		Indicates that the City of Antioch will need to acquire an easement across the City of Pittsburg right-of-way.	Chapter 2, Project Description

Letter Number	Commenter	Summary of Comment	Coverage in the EIR
		Indicates that the disposal pipeline is proposed to cross an existing storm drain pipe at Arcy Lane, and that the pipe requires an integrity evaluation by the City of Antioch. Depending upon the results, the pipe may require replacement or protection.	Section 3.15, Utilities and Public Services
		Requests that the EIR include a description of the location and type of storage facilities for the brine.	No brine storage facilities are proposed.
		Requests that the EIR include a description for the method of construction that would be used to install the brine disposal pipeline within the City of Pittsburg right-of-way.	Chapter 2, Project Description
		Requests that the EIR provide pipeline material specification and service life for the specific fluid type that it would be transporting.	Chapter 2, Project Description
8	Phil Govea, Delta Diablo Sanitation District (District), September 14, 2017 Letter	Requests that the City of Antioch and consultant team remain engaged with Delta Diablo as outlined in the August 21, 2017 response letter to the City Manager, Ron Bernal.	Comment noted.
		Notes that Delta Diablo is interested in working with the City of Antioch to understand the potential impacts on the District's NPDES permit since the brine described in the NOP is a higher flow and greater TDS concentration than previously discussed with the District.	Section 3.11, Brine Disposal
		Notes that the NPDES permit for the WWTP needs to specifically identify the brine discharge waste stream in order to authorize the bypass of secondary treatment processes, and that the City of Antioch may need to be included as a co-permittee on the NPDES permit.	Section 3.11, Brine Disposal
		Requests the complete characterization of the brine to use in a Reasonable Potential Analysis to determine compliance issues in accepting the brine, and the associated mitigation measures that would allow compliance with the combined discharge.	Section 3.11, Brine Disposal
		Notes concern for the District's dilution credit and potential regulatory compliance issues with regard to the density of the combined discharge, and requests that the dilution be re-evaluated as part of the project since TDS levels and flow rates are greater than previously discussed.	Section 3.11, Brine Disposal
		Requests that the impacts to toxicity testing be discussed with the appropriate procedural modifications identified prior to the District considering accepting the brine.	Section 3.11, Brine Disposal
		Notes that acceptance of brine may result in more stringent or new effluent limits for the discharge through the outfall, and that allocating reduced or new limits to the existing dischargers will require, at least, a formal agreement.	Section 3.11, Brine Disposal
	Organizations and Individuals		
9	Mike Oliphant, Chevron Environmental Management Company (Chevron), August 31, 2017	Indicates that portions of the former Old Valley Pipeline (OVP) and Tidewater Associated Oil Company (TAOC) pipelines existed in the vicinity of the proposed project area and could be	Section 3.9, Hazards and Hazardous Materials

Letter Number	Commenter	Summary of Comment	Coverage in the EIR
	Letter	encountered during subsurface construction activities.	Section 3.15, Public Services and Utilities
		Includes a map of the location of the OVP and TAOC pipelines, in relation to proposed project components since these pipelines may not be readily identified as underground utilities through the Underground Service Alert North System or utility surveys.	Section 3.9, Hazards and Hazardous Materials Section 3.15, Public Services and Utilities
		Provides risk assessment results from soil testing, and direction for acceptable backfill procedures if soil affected by the OVP and TAOC pipelines are encountered during construction.	Section 3.9, Hazards and Hazardous Materials Section 3.15, Public Services and Utilities
10	Tim Bouslog, Home Owner Scoping Meeting Comment Card	Requests that the EIR provides information regarding the type of construction processes necessary for the raw water pipeline near Terranova Drive.	Chapter 2, Project Description
		Requests information regarding the frequency of desalination plant operations.	Chapter 2, Project Description
		Notes concern for noise and odor impacts.	Section 3.2, Air Quality Section 3.13, Noise and Vibration

STATE OF CALIFORNIA Edmund G. Brown Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION
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West Sacramento, CA 95691
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AUG 28 2017
CITY OF ANTIOCH
CAPITAL IMPROVEMENTS

August 23, 2017

Scott Buenting
City of Antioch
200 H Street
Antioch, CA 95409

RE: SCH# 2017082044, Brackish Water Desalination Project, Contra Costa County

Dear Mr. Buenting:

The Native American Heritage Commission has received the Notice of Preparation (NOP) for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code § 21000 et seq.), specifically Public Resources Code section 21084.1, states that a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, § 15064.5 (b) (CEQA Guidelines Section 15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an environmental impact report (EIR) shall be prepared. (Pub. Resources Code § 21080 (d); Cal. Code Regs., tit. 14, § 15064 subd.(a)(1) (CEQA Guidelines § 15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources with the area of project effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code § 21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code § 21084.3 (a)). **AB 52 applies to any project for which a notice of preparation or a notice of negative declaration or mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements**. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. § 800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments. **Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws**.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or

tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:

   a. A brief description of the project.
   b. The lead agency contact information.
   c. Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code § 21080.3.1 (d)).
   d. A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code § 21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code § 21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or environmental impact report. (Pub. Resources Code § 21080.3.1(b)).
   a. For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code § 65352.4 (SB 18). (Pub. Resources Code § 21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:
   a. Alternatives to the project.
   b. Recommended mitigation measures.
   c. Significant effects. (Pub. Resources Code § 21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:
   a. Type of environmental review necessary.
   b. Significance of the tribal cultural resources.
   c. Significance of the project's impacts on tribal cultural resources.
   d. If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code § 21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code sections 6254 (r) and 6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code § 21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:
   a. Whether the proposed project has a significant impact on an identified tribal cultural resource.
   b. Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code section 21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code § 21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:
   a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or
   b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code § 21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code section 21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code section 21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code § 21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code section 21084.3 (b). (Pub. Resources Code § 21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:
    a. Avoidance and preservation of the resources in place, including, but not limited to:
        i. Planning and construction to avoid the resources and protect the cultural and natural context.
        ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
    b. 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:
        i. Protecting the cultural character and integrity of the resource.
        ii. Protecting the traditional use of the resource.
        iii. Protecting the confidentiality of the resource.
    c. 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.
    d. Protecting the resource. (Pub. Resource Code § 21084.3 (b)).
    e. Please note that a federally recognized California Native American tribe or a nonfederally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code § 815.3 (c)).
    f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code § 5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An environmental impact report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:
    a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code sections 21080.3.1 and 21080.3.2 and concluded pursuant to Public Resources Code section 21080.3.2.
    b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.
    c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code section 21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code § 21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code § 65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at:
https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code § 65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code section 65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code sections 5097.9 and 5097.993 that are within the city's or county's jurisdiction. (Gov. Code § 65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
   - **a.** The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
   - **b.** Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/

NAHC Recommendations for Cultural Resources Assessments

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 NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
   - **a.** If part or all of the APE has been previously surveyed for cultural resources.
   - **b.** If any known cultural resources have been already been recorded on or adjacent to the APE.
   - **c.** If the probability is low, moderate, or high that cultural resources are located in the APE.
   - **d.** If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
   - **a.** The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
   - **b.** The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:
   - **a.** A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.

    b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
    a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, section 15064.5(f) (CEQA Guidelines section 15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
    b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
    c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code section 7050.5, Public Resources Code section 5097.98, and Cal. Code Regs., tit. 14, section 15064.5, subdivisions (d) and (e) (CEQA Guidelines section 15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions, please contact me at my email address: sharaya.souza@nahc.ca.gov.

Sincerely,

Sharaya Souza
Staff Services Analyst
cc: State Clearinghouse

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY **EDMUND G. BROWN JR.,** GOVERNOR

CENTRAL VALLEY FLOOD PROTECTION BOARD
3310 El Camino Ave., Ste. 170
SACRAMENTO, CA 95821
(916) 574-0609 FAX: (916) 574-0682

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CITY OF ANTIOCH
CAPITAL IMPROVEMENTS

August 30, 2017

Mr. Scott Buenting
City of Antioch
200 H Street
Antioch, California 94509

Subject: Brackish Water Desalination Project, Notice of Preparation, SCH Number: 2017082044

Location: Contra Costa County

Dear Mr. Buenting,

Central Valley Flood Protection Board (Board) staff has reviewed the subject document and provides the following comments:

The proposed project is within the San Joaquin River, a regulated stream under Board jurisdiction, and may require a Board permit prior to construction.

The Board's jurisdiction covers the entire Central Valley including all tributaries and distributaries of the Sacramento and San Joaquin Rivers, and the Tulare and Buena Vista basins south of the San Joaquin River.

Under authorities granted by California Water Code and Public Resources Code statutes, the Board enforces its Title 23, California Code of Regulations (Title 23) for the construction, maintenance, and protection of adopted plans of flood control, including the federal-State facilities of the State Plan of Flood Control, regulated streams, and designated floodways.

Pursuant to Title 23, Section 6 a Board permit is required prior to working within the Board's jurisdiction for the placement, construction, reconstruction, removal, or abandonment of any landscaping, culvert, bridge, conduit, fence, projection, fill, embankment, building, structure, obstruction, encroachment, excavation, the planting, or removal of vegetation, and any repair or maintenance that involves cutting into the levee.

Permits may also be required to bring existing works that predate permitting into compliance with Title 23, or where it is necessary to establish the conditions normally imposed by permitting. The circumstances include those where responsibility for the works has not been clearly established or ownership and use have been revised.

Other federal (including U.S. Army Corps of Engineers Section 10 and 404 regulatory permits), State and local agency permits may be required and are the applicant's responsibility to obtain.

Board permit applications and Title 23 regulations are available on our website at http://www.cvfpb.ca.gov/. Maps of the Board's jurisdiction are also available from the California Department of Water Resources website at http://gis.bam.water.ca.gov/bam/.

Please contact James Herota at (916) 574-0651, or via email at James.Herota@CVFlood.ca.gov if you have any questions.

Sincerely,

Andrea Buckley

Andrea Buckley
Environmental Services and Land Management Branch Chief

cc: Governor's Office of Planning and Research
State Clearinghouse
1400 Tenth Street, Room 121
Sacramento, California 95814

CALIFORNIA
Water Boards

Edmund G. Brown Jr.
Governor

Matthew Rodriquez
Secretary for Environmental Protection

Central Valley Regional Water Quality Control Board

6 September 2017

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Scott Buenting
City of Antioch
200 H Street
Antioch, CA 94509

CERTIFIED MAIL
91 7199 9991 7035 8360 3896

COMMENTS TO REQUEST FOR REVIEW FOR THE NOTICE OF PREPARATION FOR THE DRAFT ENVIRONMENTAL IMPACT REPORT, BRACKISH WATER DESALINATION PROJECT, SCH# 2017082044, CONTRA COSTA COUNTY

Pursuant to the State Clearinghouse's 15 August 2017 request, the Central Valley Regional Water Quality Control Board (Central Valley Water Board) has reviewed the *Request for Review for the Notice of Preparation for the Draft Environment Impact Report* for the Brackish Water Desalination Project, located in Contra Costa County.

Our agency is delegated with the responsibility of protecting the quality of surface and groundwaters of the state; therefore our comments will address concerns surrounding those issues.

I. Regulatory Setting

Basin Plan

The Central Valley Water Board is required to formulate and adopt Basin Plans for all areas within the Central Valley region under Section 13240 of the Porter-Cologne Water Quality Control Act. Each Basin Plan must contain water quality objectives to ensure the reasonable protection of beneficial uses, as well as a program of implementation for achieving water quality objectives with the Basin Plans. Federal regulations require each state to adopt water quality standards to protect the public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act. In California, the beneficial uses, water quality objectives, and the Antidegradation Policy are the State's water quality standards. Water quality standards are also contained in the National Toxics Rule, 40 CFR Section 131.36, and the California Toxics Rule, 40 CFR Section 131.38.

The Basin Plan is subject to modification as necessary, considering applicable laws, policies, technologies, water quality conditions and priorities. The original Basin Plans were adopted in 1975, and have been updated and revised periodically as required, using Basin Plan amendments. Once the Central Valley Water Board has adopted a Basin Plan amendment in noticed public hearings, it must be approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law (OAL) and in some cases,

Karl E. Longley ScD, P.E., chair | Pamela C. Creedon P.E., BCEE, executive officer

11020 Sun Center Drive #200, Rancho Cordova, CA 95670 | www.waterboards.ca.gov/centralvalley

the United States Environmental Protection Agency (USEPA). Basin Plan amendments only become effective after they have been approved by the OAL and in some cases, the USEPA. Every three (3) years, a review of the Basin Plan is completed that assesses the appropriateness of existing standards and evaluates and prioritizes Basin Planning issues.

For more information on the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins*, please visit our website: http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/.

Antidegradation Considerations

All wastewater discharges must comply with the Antidegradation Policy (State Water Board Resolution 68-16) and the Antidegradation Implementation Policy contained in the Basin Plan. The Antidegradation Policy is available on page IV-15.01 at: http://www.waterboards.ca.gov/centralvalleywater_issues/basin_plans/sacsjr.pdf

In part it states:

> *Any discharge of waste to high quality waters must apply best practicable treatment or control not only to prevent a condition of pollution or nuisance from occurring, but also to maintain the highest water quality possible consistent with the maximum benefit to the people of the State.*
>
> *This information must be presented as an analysis of the impacts and potential impacts of the discharge on water quality, as measured by background concentrations and applicable water quality objectives.*

The antidegradation analysis is a mandatory element in the National Pollutant Discharge Elimination System and land discharge Waste Discharge Requirements (WDRs) permitting processes. The environmental review document should evaluate potential impacts to both surface and groundwater quality.

II. Permitting Requirements

Construction Storm Water General Permit

Dischargers whose project disturb 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 or more acres, are required to obtain coverage under the General Permit for Storm Water Discharges Associated with Construction Activities (Construction General Permit), Construction General Permit Order No. 2009-009-DWQ. Construction activity subject to this permit includes clearing, grading, grubbing, disturbances to the ground, such as stockpiling, or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan

(SWPPP).

For more information on the Construction General Permit, visit the State Water Resources Control Board website at:
http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml.

Phase I and II Municipal Separate Storm Sewer System (MS4) Permits[1]

The Phase I and II MS4 permits require the Permittees reduce pollutants and runoff flows from new development and redevelopment using Best Management Practices (BMPs) to the maximum extent practicable (MEP). MS4 Permittees have their own development standards, also known as Low Impact Development (LID)/post-construction standards that include a hydromodification component. The MS4 permits also require 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.

For more information on which Phase I MS4 Permit this project applies to, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/water_issues/storm_water/municipal_permits/.

For more information on the Caltrans Phase I MS4 Permit, visit the State Water Resources Control Board at:
http://www.waterboards.ca.gov/water_issues/programs/stormwater/caltrans.shtml.

For more information on the Phase II MS4 permit and who it applies to, visit the State Water Resources Control Board at:
http://www.waterboards.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml

Industrial Storm Water General Permit

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.

For more information on the Industrial Storm Water General Permit, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/water_issues/storm_water/industrial_general_permits/index.shtml.

Clean Water Act Section 404 Permit

If the project will involve the discharge of dredged or fill material in navigable waters or wetlands, a permit pursuant to Section 404 of the Clean Water Act may be needed from the

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[1] Municipal Permits = The Phase I Municipal Separate Storm Water System (MS4) Permit covers medium sized Municipalities (serving between 100,000 and 250,000 people) and large sized municipalities (serving over 250,000 people). The Phase II MS4 provides coverage for small municipalities, including non-traditional Small MS4s, which include military bases, public campuses, prisons and hospitals.

United States Army Corps of Engineers (USACOE). If a Section 404 permit is required by the USACOE, the Central Valley Water Board will review the permit application to ensure that discharge will not violate water quality standards. If the project requires surface water drainage realignment, the applicant is advised to contact the Department of Fish and Game for information on Streambed Alteration Permit requirements.

If you have any questions regarding the Clean Water Act Section 404 permits, please contact the Regulatory Division of the Sacramento District of USACOE at (916) 557-5250.

Clean Water Act Section 401 Permit – Water Quality Certification

If an USACOE permit (e.g., Non-Reporting Nationwide Permit, Nationwide Permit, Letter of Permission, Individual Permit, Regional General Permit, Programmatic General Permit), or any other federal permit (e.g., Section 10 of the Rivers and Harbors Act or Section 9 from the United States Coast Guard), is required for this project due to the disturbance (i.e., discharge of dredge or fill material) of waters of the United States (such as streams and wetlands), then a Water Quality Certification must be obtained from the Central Valley Water Board prior to initiation of project activities. There are no waivers for 401 Water Quality Certifications.

Waste Discharge Requirements (WDRs)

Discharges to Waters of the State

If USACOE determines that only non-jurisdictional waters of the State (i.e., "non-federal" waters of the State) are present in the proposed project area, the proposed project may require a Waste Discharge Requirement (WDR) permit to be issued by Central Valley Water Board. Under the California Porter-Cologne Water Quality Control Act, discharges to all waters of the State, including all wetlands and other waters of the State including, but not limited to, isolated wetlands, are subject to State regulation.

Land Disposal of Dredge Material

If the project will involve dredging, Water Quality Certification for the dredging activity and Waste Discharge Requirements for the land disposal may be needed.

Local Agency Oversite

Pursuant to the State Water Board's Onsite Wastewater Treatment Systems Policy (OWTS Policy), the regulation of septic tank and leach field systems may be regulated under the local agency's management program in lieu of WDRs. A county environmental health department may permit septic tank and leach field systems designed for less than 10,000 gpd. For more information on septic system regulations, visit the Central Valley Water Board's website at:
http://www.waterboards.ca.gov/centralvalley/water_issues/owts/sb_owts_policy.pdf

For more information on the Water Quality Certification and WDR processes, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/help/business_help/permit2.shtml.

Dewatering Permit

If the proposed project includes construction or groundwater dewatering to be discharged to land, the proponent may apply for coverage under State Water Board General Water Quality Order (Low Risk General Order) 2003-0003 or the Central Valley Water Board's Waiver of Report of Waste Discharge and Waste Discharge Requirements (Low Risk Waiver) R5-2013-0145. Small temporary construction dewatering projects are projects that discharge groundwater to land from excavation activities or dewatering of underground utility vaults. Dischargers seeking coverage under the General Order or Waiver must file a Notice of Intent with the Central Valley Water Board prior to beginning discharge.

For more information regarding the Low Risk General Order and the application process, visit the Central Valley Water Board website at:

http://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2003/wqo/wqo2003-0003.pdf

For more information regarding the Low Risk Waiver and the application process, visit the Central Valley Water Board website at:

http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/waivers/r5-2013-0145_res.pdf

Regulatory Compliance for Commercially Irrigated Agriculture

If the property will be used for commercial irrigated agricultural, the discharger will be required to obtain regulatory coverage under the Irrigated Lands Regulatory Program. There are two options to comply:

1. **Obtain Coverage Under a Coalition Group.** Join the local Coalition Group that supports land owners with the implementation of the Irrigated Lands Regulatory Program. The Coalition Group conducts water quality monitoring and reporting to the Central Valley Water Board on behalf of its growers. The Coalition Groups charge an annual membership fee, which varies by Coalition Group. To find the Coalition Group in your area, visit the Central Valley Water Board's website at: http://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/app_approval/index.shtml; or contact water board staff at (916) 464-4611 or via email at IrrLands@waterboards.ca.gov.

2. **Obtain Coverage Under the General Waste Discharge Requirements for Individual Growers, General Order R5-2013-0100**. Dischargers not participating in a third-party group (Coalition) are regulated individually. Depending on the specific site conditions, growers may be required to monitor runoff from their property, install monitoring wells, and submit a notice of intent, farm plan, and other action plans regarding their actions to comply with their General Order. Yearly costs would include State administrative fees (for example, annual fees for farm sizes from 10-100 acres are currently $1,084 + $6.70/Acre); the cost to prepare annual monitoring reports; and water quality monitoring costs. To enroll as an Individual Discharger under the Irrigated Lands Regulatory Program, call the

Central Valley Water Board phone line at (916) 464-4611 or e-mail board staff at IrrLands@waterboards.ca.gov.

Low or Limited Threat General NPDES Permit

If the proposed project includes construction dewatering and it is necessary to discharge the groundwater to waters of the United States, the proposed project will require coverage under a National Pollutant Discharge Elimination System (NPDES) permit. Dewatering discharges are typically considered a low or limited threat to water quality and may be covered under the General Order for *Dewatering and Other Low Threat Discharges to Surface Waters* (Low Threat General Order) or the General Order for *Limited Threat Discharges of Treated/Untreated Groundwater from Cleanup Sites, Wastewater from Superchlorination Projects, and Other Limited Threat Wastewaters to Surface Water* (Limited Threat General Order). A complete application must be submitted to the Central Valley Water Board to obtain coverage under these General NPDES permits.

For more information regarding the Low Threat General Order and the application process, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2013-0074.pdf

For more information regarding the Limited Threat General Order and the application process, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2013-0073.pdf

NPDES Permit

If the proposed project discharges waste that could affect the quality of the waters of the State, other than into a community sewer system, the proposed project will require coverage under a National Pollutant Discharge Elimination System (NPDES) permit. A complete Report of Waste Discharge must be submitted with the Central Valley Water Board to obtain a NPDES Permit.

For more information regarding the NPDES Permit and the application process, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/help/business_help/permit3.shtml

If you have questions regarding these comments, please contact me at (916) 464-4644 or Stephanie.Tadlock@waterboards.ca.gov.

Elizabeth M. Lee

for Stephanie Tadlock
Environmental Scientist

cc: State Clearinghouse unit, Governor's Office of Planning and Research, Sacramento

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY EDMUND G. BROWN Jr., Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 4
OFFICE OF TRANSIT AND COMMUNITY PLANNING
P.O. BOX 23660, MS-10D
OAKLAND, CA 94623-0660
PHONE (510) 286-5528
FAX (510) 286-5559
TTY 711
www.dot.ca.gov

Making Conservation
a California Way of Life

September 22, 2017

\# 04-CC-2017-00139
SCH # 2017082044
GTS ID 7476

Scott Buenting
Capital Improvements Division
City of Antioch
200 H Street
Antioch, CA 94531-5007

Brackish Water Desalination Project – Notice of Preparation

Dear Mr. Buenting:

Thank you for including the California Department of Transportation (Caltrans) in the review process for the above referenced project. In tandem with the Metropolitan Transportation Commission's (MTC) Sustainable Communities Strategy (SCS), the Caltrans *Strategic Management Plan 2015-2020* includes targets to reduce Vehicle Miles Travelled (VMT), in part, by tripling bicycle and doubling both pedestrian and transit travel by 2020. Our comments on the Notice of Preparation are based on these initiatives and goals.

Lead Agency
As the Lead Agency, the City of Antioch is responsible for all project mitigation, including any needed improvements to the State Transportation Network (STN). The project's fair share contribution, financing, scheduling, implementation responsibilities and lead agency monitoring should be fully discussed for all proposed mitigation measures.

Project Understanding
The city proposes to construct, operate, and maintain the project which includes a desalination facility within the city's existing water treatment plan (WTP). The goals of the project are to improve water supply reliability and water quality for its customers, especially during droughts and future changes in Delta water management, and to provide operational flexibility for the city. The project meets these goals by constructing facilities that allows the city to withdraw water from the River year-round under its pre-1914 water rights, even when the chloride concentration is above the 75 mg/l limit normally treated at the WTP. The project footprint straddles state route 4 and is located throughout the entire city.

The project has four components. The first site consists of a new desalination facility within the fenceline of the existing Antioch Water Treatment Plant (APN 071-140-010, 401 Putnam Street, Antioch, CA 94509). The second site is a water intake pump station at the San Joaquin River Water Intake Facility (near McElheny Road and Fulton Shipyard Road), The third site is a brine

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

disposal at the Delta Diablo Wastewater Treatment Plant (APNs 074-040-037, 073-230-046, 073-230-041, 2500 Pittsburg-Antioch Highway, Antioch). The fourth project site has a disposal pipeline along roads in the Cities of Antioch and Pittsburg, California. The pipelines from both the water intake pump station and the brine disposal encroach upon Caltrans' roads on state route 4.

Encroachment Permit

Please be advised that any work or traffic control that encroaches onto the state ROW requires an encroachment permit that is issued by the Department. To apply, a completed encroachment permit application, environmental documentation, and five (5) sets of plans clearly indicating state ROW must be submitted to: Office of Permits, California DOT, District 4, P.O. Box 23660, Oakland, CA 94623-0660. Traffic-related mitigation measures should be incorporated into the construction plans during the encroachment permit process. See the website link below for more information. http://www.dot.ca.gov/hq/traffops/developserv/permits/

Thank you again for including Caltrans in the environmental review process. Should you have any questions regarding this letter, please contact Jerry Cheung at 510-286-5562 or jerry.cheung@dot.ca.gov.

Sincerely

Pati

PATRICIA MAURICE
District Branch Chief
Local Development - Intergovernmental Review

"Caltrans improves mobility across California"

DELTA STEWARDSHIP COUNCIL
A California State Agency

980 NINTH STREET, SUITE 1500
SACRAMENTO, CALIFORNIA 95814
HTTP://DELTACOUNCIL.CA.GOV
(916) 445-5511

September 13, 2017

Scott Buenting, Project Manager
City of Antioch
200 H Street
Antioch, CA 94509

Via email: SBuenting@ci.antioch.ca.us

RE: Comments on Notice of Preparation of an Environmental Impact Report and Scoping Meeting for the Proposed City of Antioch Brackish Water Desalination Project, SCH# 2017082044

Dear Mr. Buenting:

Thank you for the opportunity to review and comment on the City of Antioch Brackish Water Desalination Project Notice of Preparation of an Environmental Impact Report (NOP). The Delta Stewardship Council (Council) applauds City of Antioch's (City) goal to improve water supply reliability and water quality for its customers, especially during droughts and future changes in Delta water management, and to provide operational flexibility for the City.

As you may know, the 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.

State and local agencies are required to certify their projects' consistency with the Council's 14 regulatory policies if their proposed activity is a "covered action" under the Delta Plan, which includes plans, programs, or projects (as defined in section 21065 of the Public Resources Code) that would occur, in whole or in part, within the Delta or Suisun Marsh.

Based on the NOP description, Council staff believes your project meets the definition of a covered action. According to the Delta Reform Act, it is the state or local agency approving, funding, or carrying out the project that ultimately must determine if that project is a covered

"Coequal goals" means the two goals of providing a 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."

action and, if so, file a certification of consistency with the Delta Plan. As the City proceeds with design, development, and environmental impact analysis of the project, we strongly encourage you to engage in early consultation with Council staff to help you with the covered action determination process. Council staff, including staff from the Delta Science Program, can provide assistance in the use of best available science and adaptive management during this early consultation. State or local agencies may call or email to schedule a consultation with Council staff. More information on covered actions and the certification process can be found on the Council website, http://deltacouncil.ca.gov/covered-actions.

For the purposes of compliance with both the Delta Reform Act and CEQA, we offer comments below for your consideration in preparation of the Environmental Impact Report (EIR).

Comments on the Notice of Preparation

Regulatory Setting: Council staff suggests that the Delta Plan, including its policies and recommendations, be acknowledged in the EIR's description of the regulatory setting for each applicable resource section.

Inconsistencies with the Delta Plan: The EIR should discuss any inconsistencies between the proposed project and the Delta Plan, as required by 15125(d) of CEQA Guidelines. Please note that the CEQA Guidelines' Appendix G states that a project that is inconsistent with any applicable land use plan, policy, or regulation may result in a finding of significant impact on biological resources.

Mitigations Measures: Delta Plan Policy **G P1** (23 Cal. Code Regs. section 5002) requires that actions not exempt from CEQA and subject to Delta Plan regulations must include applicable feasible mitigation measures consistent with those identified in the Delta Plan Program EIR or substitute mitigation measures that are equally or more effective. Mitigation measures in the Delta Plan's Mitigation and Monitoring Report Program are available at: http://deltacouncil.ca.gov/sites/default/files/documents/files/Agenda%20Item%206a_attach%202.pdf

The NOP states that the EIR will address direct, indirect, and cumulative effects in each of the following CEQA environmental issue areas:

- Aesthetics
- Agriculture and Forestry Resources
- Air Quality
- Biological Resources
- Greenhouse Gases
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Population and Housing
- Public Services
- Recreation
- Transportation/Traffic

- Cultural Resources
- Geology and Soils
- Mineral Resources
- Noise
- Tribal Cultural Resources
- Utilities, Energy and Service Systems

Available information suggests the proposed project will enable diversions to be made year-round and those diversions could be larger than those historically made at the intake location. The Council will be interested in reviewing the impact analysis for not only the direct, but also the indirect and cumulative effects of the project on the ecosystem related to the additional withdrawals of water from the system.

Another point of interest is the impacts of brine disposal on water quality (including salinity, temperature, and contaminants such as pesticides) downstream of the Delta Diablo outfall at New York Slough. The Council will be interested in reviewing the impact analysis for the proposed disposal of the brine, including its impacts to the aquatic and terrestrial environment, and any proposed mitigation of potentially significant impacts.

The Council also is interested in how potential reductions in water purchased from the Contra Costa Water District due to this project would affect the ecosystem as well as regional water supply reliability.

Comments regarding Applicable Delta Plan Policies

The following is a list of Delta Plan policies that may be applicable to your project based on the available information.

Best Available Science and Adaptive Management: Delta Plan Policy **G P1** states that actions subject to Delta Plan regulations must document use of best available science as relevant to the purpose and nature of the project. The regulatory definition of "best available science" is provided in Appendix 1A of the Delta Plan (http://deltacouncil.ca.gov/sites/default/files/2015/09/Appendix%201A.pdf)

Delta Plan Policy **G P1** also requires that ecosystem restoration and water management covered actions include adequate provisions for continued implementation of adaptive management, appropriate to the scope of the action. This requirement is satisfied through A) the development of an adaptive management plan that is consistent with the framework described in Appendix 1 B of the Delta Plan (http://deltacouncil.ca.gov/sites/default/files/2015/09/Appendix%201B.pdf), and B) documentation of adequate resources to implement the proposed adaptive management plan.

Land Use Conflicts: Policies related to locating new urban development wisely, and respecting local land use when siting water or flood facilities or restoring habitats. Delta Plan Policy **DP P1** (23 Cal. Code Regs. section 5010) states that new residential, commercial, or industrial development is permitted outside the urban boundaries only if it is consistent with the land use designated in the relevant county general plan. It is intended to strengthen existing Delta communities while protecting farmland and open space, providing land for ecosystem restoration needs, and reducing flood risk. You may want to consider if this applies due to the project's location near Park Middle School. Delta Plan Policy **DP P2** (23 Cal Code Regs. section 5011) states that plans for ecosystem restoration must be sited to avoid or reduce conflicts with existing uses when feasible. This policy may be relevant if you propose any ecosystem restoration mitigation measure(s).

Hydrology: Please consider Delta Plan Policy **RR P3** (23 Cal. Code Regs. section 5014) which restricts encroachment in floodway. Policy **RR P3** states that "no encroachment shall be allowed or constructed in a floodway unless it can be demonstrated by appropriate analysis that the encroachment will not unduly impede the free flow of water in the floodway or jeopardize public safety". Please consider if this applies to any proposed new facilities.

Closing Comments

The Council would like to work with you to ensure the consistency of the Brackish Water Desalination Project with the Delta Plan and we look forward to continued coordination to further our related efforts. We are available to continue discussions about how to ensure that your project is consistent with the Delta Plan as you proceed in the next stages of your project approval process. The Delta Science Program's Adaptive Management Liaisons are available to provide further consultation and guidance to help the City with the appropriate application of best available science and adaptive management. Please contact Marina Brand of our Delta Science Program at (916) 445-5031 or marina.brand@deltacouncil.ca.gov for any questions about adaptive management. I encourage you to contact my staff member Anthony Navasero (Anthony.Navasero@deltacouncil.ca.gov) with any other questions, comments, or concerns.

Sincerely,

Cassandra Enos-Nobriga
Deputy Executive Officer
Delta Stewardship Council

CONTRA COSTA
WATER DISTRICT

September 13, 2017

Mr. Scott Buenting
City of Antioch
200 H Street
Antioch, CA 94509

Subject: Notice of Preparation for City of Antioch Brackish Water Desalination Project

Dear Mr. Buenting:

The Contra Costa Water District (CCWD) appreciates the opportunity to comment on the Notice of Preparation for the Environmental Impact Report (EIR) for the City of Antioch Brackish Water Desalination Project (Project). CCWD obtains its water supply from four intakes in the Sacramento-San Joaquin Delta and provides water to approximately 500,000 people in Contra Costa County, including the City. Water quality in the Delta is subject to large seasonal and inter-annual variations, and is a key concern for CCWD. Evaluation of the potential Delta water quality impacts from the Project requires modeling of statewide water operations both with and without the Project, and use of the results of that modeling as inputs to Delta hydrodynamics and water quality models. Please see the attached list of water quality parameters that should be included in the Project's EIR to allow a determination whether the Project will cause water quality impacts to CCWD. The EIR should also include any changes in the City's utilization or reliance on usage of water supplies from CCWD.

CCWD is the primary water service provider for the City and the region. We would like to continue to work with the City to ensure that the EIR considers the potential impacts of the Project and to offer any assistance in evaluating alternatives to meeting the City's water supply and water quality objectives at the lowest cost possible. We would be happy to meet with you to discuss appropriate considerations for the Project in more detail.

Thank you for your consideration of these comments. Please call me at (925) 688-8310 if you have any questions.

Sincerely,

Jeff Quimby

Jeff Quimby
Director of Planning

JQ/kh

Attachment: Delta Flow and Water Quality Impacts for Consideration

Attachment

Delta Flow and Water Quality Impacts for Consideration in the Environmental Impact Report for the City of Antioch Brackish Water Desalination Project

An appropriate suite of modeling tools, such as CALSIM II for California water operations and the Delta Simulation Model 2 for hydrodynamics and water quality, should be used to model the potential hydrodynamic and water quality changes in the Delta caused by the City of Antioch Brackish Water Desalination Project (Project) on a daily timestep. The results from that modeling should be interpreted within the context of existing regulations and water supply operations to fully understand the potential effects. Specifically, the analysis of the impacts of the proposed Project should consider and disclose any potential changes in the following conditions:

- changes in the actions required to achieve compliance with Bay Delta water quality objectives as required by the State Water Resources Control Board's Decision 1641;

- daily changes in the location of the 2 parts per thousand isohaline on the Sacramento River (the "X2 position");

- changes in upstream reservoir releases needed to meet Bay Delta water quality objectives;

- daily changes in salinity at all drinking water intakes in the Delta, including increases in salinity that could "otherwise substantially degrade water quality" in the absence of standards violations (Environmental Checklist Form, California Code of Regulations, Title 14, Division 6, Chapter 3, Article 20, Appendix G, § IX f)); and

- daily changes in salinity that could violate federal and state anti-degradation regulations.

City of Pittsburg
Community Development Department – Planning Division
65 Civic Avenue, Pittsburg, CA 94565 | Tel: (925) 252-4920 | Fax: (925) 252-4814

RECEIVED
SEP 13 2017
CITY OF ANTIOCH
CAPITAL IMPROVEMENTS

September 8, 2017

Mr. Scott Buenting
Project Manager
City of Antioch
200 H Street
Antioch, California 94509

RE: City of Antioch Brackish Water Desalination Project: Preparation of an Environmental Impact Report

Dear Mr. Buenting:

Thank you for the opportunity to include the City of Pittsburg in the environmental scoping preparation process for the proposed City of Antioch Brackish Water Desalination Project. The following comments are items the City of Pittsburg requests to be included in the preparation of the Environmental Impact report (EIR):

- The analysis should include considerations for the intake and discharge processes of the plant.
    - How will the process address impingement and entrainment of aquatic organisms?
    - How will the native habitat be affected by the concentration of brine discharge?
    - Where will wastes from the treatment process be disposed?
    - What is the impact of the discharge to the receiving waters?
    - What is the rate of discharge to the receiving waters? The discharges are to be regulated by an Industrial Discharge Permit issued by the State Water Resources Control Board to establish the allowable effluent limits for salinity and the mitigation measures required to achieve these levels.
- An encroachment permit is required when the project involves work in the City of Pittsburg right-of-way. The City of Pittsburg will not issue an encroachment permit until our concerns are adequately addressed.
- Design drawings will be required to be submitted for proper review, approval, and permitting. The Lead Agency will need to acquire an easement across the City of Pittsburg right-of-way.
- The disposal pipeline is proposed to cross an existing storm drain pipe at Arcy Lane on the north side Pittsburg-Antioch Highway. The pipe requires integrity

evaluation by the Lead Agency and depending on the results, the pipe may require replacement or protection.

- Describe location and type of storage facilities for the brine to allow discharges to receiving waters.
- Describe the method of construction (open trench or horizontal directional boring) to install brine disposal pipeline within the City of Pittsburg right-of-way.
- Provide pipeline material specification and service life for the specific fluid type that it would be transporting.

Thank you for your consideration of these comments and we look forward to working with you on this project.

Sincerely,

Kristin Pollot, AICP
Planning Manager
City of Pittsburg

Delta
Diablo

A CALIFORNIA
SPECIAL DISTRICT

September 14, 2017

Mr. Scott Buenting, Project Manager
City of Antioch
200 H Street
Antioch, CA 94509

SUBJECT: COMMENTS ON THE NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT AND SCOPING MEETING FOR THE CITY OF ANTIOCH BRACKISH WATER DESALINATION PROJECT

Dear Mr. Buenting:

Thank you for soliciting comments on the scope and content of the environmental information to be included in the upcoming Environmental Impact Report (EIR) for the City of Antioch (City) Brackish Water Desalination Project as requested in the Notice of Preparation (NOP) dated August 15, 2017. As a potential disposal option for the reverse osmosis (RO) concentrate waste stream (brine) generated by the project, Delta Diablo (District) is very interested in the characterization of the brine and potential impacts to receiving water quality, as well as wastewater treatment plant (WWTP) operations and regulatory compliance. The NOP provides additional detail to the initial project description provided in the August 14, 2017 letter the City sent to the District officially requesting the use of the WWTP outfall for disposal of the brine discharge produced by the planned RO facility. As the process moves forward, we continue to encourage City staff and its consultant team to remain engaged with Delta Diablo as outlined in our August 21, 2017 response letter to the City Manager, Ron Bernal. The District is supportive of the City's efforts to offset potable water demands, especially during future drought conditions.

The project, as described in the NOP, proposes to send upwards of 2 million gallons per day (MGD) of brine at approximately 35,000 to 45,000 mg/L of total dissolved solids (TDS) to the District for disposal through an existing outfall. In addition to the analysis of the receiving water quality and habitat impacts of the brine disposal, the District is interested in working with the City to fully understand potential impacts on the District's National Pollutant Discharge Elimination System (NPDES) permit issued by the San Francisco Bay Regional Water Quality Control Board (Water Board). While the District has conducted some preliminary analyses of brine impacts in the past, the brine described in the NOP is a higher flow and greater TDS concentration than previously discussed with the District. Further work is needed (either in the EIR or separately) in the areas described in the following sections:

Permitting Options: As the brine discharge would be sent directly to the outfall, it bypasses most of the secondary treatment process. The NPDES permit for the WWTP needs to specifically identify this waste stream from the City for the bypass to be authorized. In addition, including the City as a co-permittee on the NPDES permit may be the most straightforward means of addressing requirements for discharge for all parties, where the flow, concentration, and load requirements for the brine could be stipulated in the permit.

Reasonable Potential/Effluent Limitations: As the desalination process concentrates all constituents present in the source water, the brine would be expected to contain elevated levels of many additional chemicals of concern in addition to TDS. The NPDES permit for the WWTP contains both concentration- and mass-based effluent limitations, with which the District currently complies. The District would require the complete characterization of the brine to use in a Reasonable Potential Analysis to determine compliance issues in accepting the brine, and the associated mitigation measures that would allow compliance with the combined discharge.

Dilution Credit: Several effluent limitations are based in part on the available dilution from the outfall. If the density of the combined discharge is appreciably altered, especially in relation to the ambient water density, dilution conditions would be affected. Decreasing the dilution would require more stringent effluent limits for all associated constituents for which dilution credit is granted and may result in regulatory compliance issues for the District. Near and long-term compliance with the NPDES permit depends on sufficient dilution. As the density is greatly affected by the TDS levels and flows, and the NOP specifies TDS levels and flow rates greater than previously discussed, the dilution should be re-evaluated as part of the project.

Toxicity Testing: As the District is an estuarine discharger, the NPDES requirement is to run toxicity testing on the most sensitive species, whether it is marine or freshwater. We currently run acute bioassay tests on freshwater species and use salt as the reference toxicant. We will need to better understand the impact of increased TDS with the addition of brine on the ability to run toxicity testing. In the event the increased TDS disallows the use of the freshwater species for toxicity testing, the review and approval of the Water Board would be necessary to switch species. Presumably, the freshwater species would be run if the brine was not being discharged, and marine species would be run otherwise. Prior to accepting the brine discharge, there would need to be agreement on what it would mean for a failed toxicity test. As the test is generally run on the whole effluent being discharged, the assignment of cause of failure would be difficult without additional testing. Potentially, each waste stream could be sampled and combined in the lab on a flow-proportion basis for the toxicity testing and, in the event of a failure, each stream could be tested individually; however, the WWTP discharge would need to be tested with freshwater species and the higher TDS discharges may require marine species. Impacts to toxicity testing need to be discussed with appropriate procedural modifications identified prior to the District considering accepting the brine.

Compliance options: Currently, the District accepts blowdown water for discharge through the outfall and there are complexities for determining compliance with the NPDES permit. Accepting the brine may result in more stringent or new effluent limits for the discharge. Allocating reduced or new limits to the existing dischargers will require a formal agreement at minimum. The most straightforward approach would be to assign specific limits to each discharger and individually determining compliance. However, the approach would require individually sampling each waste stream, increasing the operational cost for the individual discharger. Incorporating the City as a co-permittee to the NPDES permit with the specific compliance option detailed in the permit, would provide each party, dischargers and regulators, with the clarity likely necessary for the project to proceed successfully.

Working with the City and considering the full characterization of the RO concentrate will be essential to determine the level of RO concentrate management alternatives that may be necessary for a successful project. Please feel free to give me a call at (925) 756-1928 or email me at philg@deltadiablo.org to begin discussions regarding the issues cited above in advance of anticipated project coordination meetings. It is our goal to find mutually agreeable solutions to make the project successful for all agencies.

Sincerely,

Phil Govea

Phil Govea, P.E.
Engineering Services Director / District Engineer

AR/PG:db

cc: District File No. CORP.03.05-CORRES
Chron File

Mike N. Oliphant
Project Manager
Mining and Specialty
Portfolio

Chevron Environmental
Management Company
P.O. Box 6012
San Ramon, CA 94583
Tel (925) 842 9922
mike.oliphant@chevron.com

August 31, 2017

Stakeholder Communication – City of Antioch

Mr. Scott Buenting
Project Manager
City of Antioch
200 H Street
Antioch, California 94509

Subject: **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

Dear Ms. Buenting:

On behalf of Chevron Environmental Management Company (CEMC), Leidos, Inc. (Leidos; CEMC contract consultant) recently became aware of the Notice of Preparation of an Environmental Impact Report for the City of Antioch Brackish Water Desalination Project. The information contained in this letter may help you to understand something about Chevron's former pipeline operations in the City of Antioch, as residual weathered crude oil, abandoned pipeline, and asbestos-containing materials (ACM) could potentially be encountered during subsurface construction activities in the vicinity of these former pipeline locations within the existing former pipeline rights of way (ROW).

Portions of the former Old Valley Pipeline (OVP) and Tidewater Associated Oil Company (TAOC) pipelines existed within the vicinity of the proposed project area. These formerly active pipelines were constructed in the early 1900s and carried crude oil from the southern San Joaquin Valley to the San Francisco Bay Area. Pipeline operations for the OVP ceased in the 1940s, and in the 1970s for the TAOC pipelines. When pipeline operations ceased, the pipelines were taken out of commission. 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 of pipelines having been removed, they are not readily identified as underground utilities through the Underground Service Alert North System or utility surveys. Figure 1 illustrates the location of the former OVP and TAOC ROWs with respect to the proposed project areas in the City of Antioch. The location of the pipelines shown on Figure 1 is based on historical as-built drawings and the approximated positional accuracy of the alignments is generally +/- 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 ACM.

Working under the direction of State regulatory agencies, CEMC conducted risk assessments at numerous locations with known historical crude-oil release points along the former OVP and TAOC pipelines. Analytical results from these risk assessments indicated that the crude-contaminated soil was non-hazardous. Accordingly, it is likely that if soil affected by the historical release of crude oil from these former pipelines is encountered during construction activities it may be reused as backfill on site. Properly abandoned crude-oil pipeline may be left in the ground. Parties conducting construction activities in the vicinity of these former pipeline ROWs may wish to use the information provided in this letter to help prepare for the possibility of encountering abandoned pipelines and pipeline-related ACM during the course of their work.

For more information regarding these historic pipelines, please visit http://www.hppinfo.com/. If you would like additional information, or would like to request more detailed maps, please contact Leidos consultants Mike Hurd (michael.t.hurd@leidos.com) at (510) 466-7161 or Tan Hoang (tan.t.hoang@leidos.com) at (916) 979-3742.

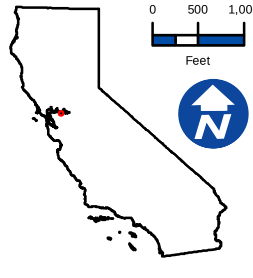
Sincerely,

Mike Oliphant

MO/klg

Enclosure:
Figure 1. Historical Pipeline Rights of Way – Vicinity Map and Facilities Location

cc: Mr. Mike Hurd – Leidos
475 14th Street, Suite 610, Oakland, California 94612



CALIFORNIA LOCATION MAP

HISTORICAL PIPELINE RIGHTS OF WAY

VICINITY MAP AND
FACILITIES LOCATION
Antioch, California

DATE: 8/25/2017 | ANALYST: HOANGTA | FIGURE:

1

leidos

FILE: Q:\HPPBTRMANAGEMENTSTRATEGY\POTENTIAL PROJECTS\CONTRA COSTA\BRACKISHWATERDESALINATION\PROJECTS\FIGURE 1\PSEP FIG1 BRACKISHDESAL 2017 08.MXD

Speaker Card

Antioch Brackish Water Desalination Project
Public Scoping Meeting
September 4, 2017 at 6:00 P.M.

Tim Bouslog
Name (Print)

Home Owner
Agency or Organization (if applicable)

3206 View Dr. Antioch CA 94509
Address City Zip Code

925-757-5113
Phone Number

Email

Brackish Water Desalination Project
EIR Public Scoping Meeting, September 5, 2017
Comments

pull up the slide
Resource topic Analysis

I have the following comments on the scope of the *Brackish Water Desalination Project EIR*.

"Environmental Review"

What safety Feature to be Assured Delta Diablo does not contaminate the plant

Line parellel to Terranova Dr.
Whats the process for trenching/backfill
Concrete culvert

Whats the Frequency of the desalination plant being on Line

What is the 9600 SF
Roadway Repair 160' x60'
compaction paint purple marking
Noise
smell underground
Why not sink the Bulk chemical storage
whats the ROI compared to capturing Canal water

At the meeting:

Place this comment sheet into the comment box

After the meeting:

Mail or Email comments to:
Scott Buenting, Project Manager
200 H Street
Antioch, CA 94509
SBuenting@ci.antioch.ca.us

Comments must be received at the earliest possible date, but no later than 5:00 PM on September 14, 2017.

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY EDMUND G. BROWN Jr., Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 4
OFFICE OF TRANSIT AND COMMUNITY PLANNING
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Making Conservation
a California Way of Life

October 6, 2017

04-CC-2017-00139
GTS ID 7476

Scott Buenting
Community Development Department
City of Antioch
200 H Street
Antioch, CA 94509-1285

Brackish Water Desalination – Notice of Preparation

Dear Mr. Buenting:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the above referenced project. In tandem with the Metropolitan Transportation Commission's (MTC) Sustainable Communities Strategy (SCS), Caltrans' mission signals a modernization of our approach to evaluate and mitigate impacts to the State Transportation Network (STN). Caltrans' Strategic Management Plan 2015-2020 aims to reduce Vehicle Miles Traveled (VMT) by tripling bicycle and doubling both pedestrian and transit travel by 2020. Our comments are based on the notice of preparation.

Project Understanding
The city of Antioch is attempting to increase its water treatment capabilities by creating additional facilities. The project proposes: (1) a new desalination facility at existing Antioch water treatment plant site, (2) a new section of a raw water conveyance pipeline , (3) a new brine disposal pipeline and (4) a new river water intake pump station.

Lead Agency
As the Lead Agency, the City of Antioch is responsible for all project mitigation, including any needed improvements to the STN. The project's fair share contribution, financing, scheduling, implementation responsibilities and lead agency monitoring should be fully discussed for all proposed mitigation measures.

Encroachment Permit
Please be advised that any work or traffic control that encroaches onto the state ROW requires an encroachment permit that is issued by the Department. To apply, a completed encroachment permit application, environmental documentation, and five (5) sets of plans clearly indicating state ROW must be submitted to: Office of Permits, California DOT, District 4, P.O. Box 23660, Oakland, CA 94623-0660. Traffic-related mitigation measures should be incorporated into the

incorporated into the construction plans during the encroachment permit process. For more information: http://www.dot.ca.gov/hq/traffops/developserv/permits/

Thank you again for including Caltrans in the environmental review process. Should you have any questions regarding this letter, please contact Jerry Cheung at 510-286-5562 or jerry.cheung@dot.ca.gov.

Sincerely,

PATRICIA MAURICE
District Branch Chief
Local Development - Intergovernmental Review

CITY OF ANTIOCH

BRACKISH WATER DESALINATION PLANT

September, 5, 2017

ANTIOCH MAINTENENANCE SERVICE CENTER

1201 WEST 4TH STREET

ANTIOCH, CALIFORNIA

6:00 P.M.

Reported by:
Peter Petty

APPEARANCES

PRESENTERS

Scott Buenting, Project Manager, City of Antioch

Susan Yogi, Environmental Science Associates

Jim O'Toole, Environmental Science Associates

Scott Weddle, Carollo Engineers

PUBLIC COMMENT

Tim Bouslog

Alex Lukash

Kenneth Cowan

PROCEEDINGS

6:00 P.M.

MR. BUENTING: Just for everybody’s knowledge, restroom is just down the hallway. Go past the water fountain. It’s just to your right. And the doors are open. If anybody else is expected to come, they’ll still be able to get in here.

My name is Scott Buenting. I’m a Project Manager of the City of Antioch. This is one of my projects within the Capital Improvements Department here. I’ll start off the presentation, and will be followed up by both Susan Yogi and Jim O’Toole with ESA, who are our environmental consultants. Scott Weddle is also here with Carollo Engineers. And they are helping with the pre-design work that we’re doing so far for this project.

We’ll go through a number of slides here, give you a brief overview. We’ll talk about the background, why it is that the city is looking to do this project. I’ll give you a description of kind of what the proposed project looks like. We’ll move into some environmental review process, so that you guys have a better understanding of where that’s going to end up going. And then how you guys can participate in the process, some of the next steps.

And at the end there will be an opportunity for some public comments.

This is really meant to kind of just present the project to you guys, not so much like a back-and-forth Q&A at this point. We'd just like to give you a description of what is that we've been working on, kind of the proposed project at this point.

Some background. The city currently has two sources of drinking water. We intake water from our river pump located down off of Fulton Shipyard, or receive water from the Contra Costa Canal. Water from the river goes into our reservoir or, yeah, the municipal reservoir. Water from the canal can either go into the reservoir or directly to the water treatment plant.

Some of the challenges that the city currently faces, we have some limited flexibility, both in the reliability -- or flexibility limitations, reliability of source during drought. We've seen over the past, through some of these drought years, there's been some restrictions on water. The city really doesn't have any place to go to, once the river ends up going a little salty. Like I said, we can either pull from the county through the canal; we also do have a connection with a multipurpose pipeline, which is treated water.

The diversification of our water supply is rather limited right now. Like I said, if the river isn't available to us, our only option, really, is to go to the canal.

River quality has been going up and down consistently. The drought season or the drought years tend to make the river saltier for a longer period of time. The salt concentrations rise in the river. The city has no way to treat that with our current conventional plan, which leads us to the city's current, you know, reliance on Contra Costa Water District for our drinking water when the river isn't available.

Our objective from this project, we'd like to improve the water supply and reliability, as well as water quality, giving us another water source in there, especially during drought season or drought times. That there is diversification of our water supply is important, to have another place to go rather than just Contra Costa Water District when the river becomes something that's no longer treatable by us.

Flexibility for the city, very important. And this will give, like I say, a more -- more options for our water sources, and basically, to maximize the use of our existing infrastructure. The project will utilize a portion of one of the plants, the water treatment plant, for pre-treatment. We do have Pre-1914 Water Rights that allow us to pull water from the river. By having a project like this will allow us to utilize those rights more efficiently and more often.

Overview of the project. A couple things are going on. We talked about the existing river pump, down off Fulton. Part of this project will be replacing that, upgrading that facility, putting in a new fish screen out there. We're hoping to have some pretty good environmental benefits with upgrading that portion of the project. Currently, we're looking at a 6 million gallon per day, that's finished water, desalination plant. That would be located within the footprint of our existing water treatment plant. It will utilize a portion of that plant, as I said, to do the pre-treatment. So, basically, this is just adding on another layer of treatment within the existing plant.

We would be looking to install a new raw water pipeline that would bring water directly to the plant from the river. As I said, currently the water comes from the pump station into the reservoir. Part of this project would be diverting the water, which goes along Lone Tree Way, into the water treatment plant. And that way, you know, it could be treated more efficiently, rather than going back and forth, and allow this project to use more salty water. Rather than the water goes into the reservoir at that point, you know, you have some issues with possible contamination of that water source.

Also, the project does produce brine. As you’re desalting water, it does have a by product that’s called brine. That brine would be discharged from the water treatment plant through a new pipeline currently anticipated to go out to Delta Diablo and be mixed with their outfall, and that’s how the brine would be disposed of.

Conceptually, how the plant is set up, everybody’s probably seen this within the NOP that was given to you, the new facilities are located on this other side of the plant. You have two buildings out there. One would be where the chemicals for the reverse osmosis system would be stored. The other will house the reverse osmosis system itself. And then additional pipelines would need to be constructed in there in order for water to get around the new facility, back into the water treatment plant, as well utilizing the pre-treatment process of Plant A, and then getting that into our reverse osmosis system.

Currently, both the brine and the new raw water intake or intake pipeline would be coming in between the homes that are on Terra Nova and the business park that's just to the north, right there. That would be where the new pipelines in and out of the city -- or in and out of the plant are currently proposed to go, as well as -- a lot of the other stuff that you see on here is all internal. It's just moving the water around within the plant to get through the system.

A brief process here. Off to the left is our intake. You have intake from the river. You have intake from Contra Costa Water District's canal. That water then goes to our reservoir, or straight from the canal to the plant. It will go through one of our plant's pre-treatment system. That will be kind of the first phase of the treatment. After it gets out of that plant, then it goes into this new reverse osmosis/desalinization portion of it. After going through that process, then it's reintroduced into our system, using the same distribution pipelines as we currently use in our conventional plant.

I'd like to talk a little bit about the CEQA process. But for that, I'd like Susan to give you some expertise.

MS. YOGI: Can you hear me?

MR. BUENTING: I think it's been turned off.

MS. YOGI: I think it's on. Can you hear me?

MR. BUENTING: Yeah. Yeah.

MS. YOGI: Oh.

MR. BUENTING: Yeah, it's on.

MS. YOGI: Okay.

MR. BUENTING: It's on.

MS. YOGI: Great. Okay. I'd like to introduce myself. My name is Susan Yogi, and I'm with Environmental Science Associates, ESA. I'm the Project Manager for the EIR. And we also have Jim O'Toole here. He is the Project Director.

A couple things. I think all of you have already signed in, so thank you for doing that. And we also have a court reporter here to transcribe the meeting, and the transcript will be part of the record for this project.

What I’m going to do is a give you a brief overview of the environmental review process, what CEQA is, and why we’re here today.

CEQA is state law. And it requires that a project undergo environmental review before it’s considered for approval, and it has several objectives. And one is to provide an informed decision-making process. And it also encourages public participation and agency coordination. And it also discloses the environmental impacts of a project to the public and the decision makers.

So what we’re going to do is prepare an Environmental Impact Report, or an EIR. You’ll hear that term a lot. It’s an informational document, and it’s a detailed study that will look at the potential effects of the project to the environment. And it will also identify ways to mitigate or avoid these significant impacts with mitigation measures or project alternatives.

There will be several opportunities for public participation during the environmental review process, which is why we’re here today. And the purpose of today’s meeting is to really hear from you, the public, take comments early in the process about the scope and the focus of the EIR, what you want to see addressed in the document. And this is your opportunity to help the city by providing your comments and sharing information that you may know that might help us in preparing the EIR.

And this is the general schedule for the EIR. It extends through 2018. And as you can see, we’re still in the very first part of this process, and here doing the scoping meeting. And after this 30-day period closes, we’ll take your comments and consider them in our document, and also prepare the draft EIR over the next couple months. So we’ll be releasing a draft EIR in early 2018 sometime, and there will be a 45-day public review period. You will have another opportunity at that time for public participation. And we will hold at least one scoping meeting during that time.

Once the 45-day period closes, we take all the comments that we’ve received and review them, and prepare a Response to Comments document as part of the final EIR. And the final EIR will go before the City Council for them to consider and certify. And following that, approval or disapproval of the project, is a separate action by the City Council.

So with that, I’m going to let Jim talk about, more in depth, about the resources that we’ll be looking at in the document.

MR. O'TOOLE: Thanks Susan.

Can you guys here me okay? I'm going to go without the microphone.

So this slide provides a summary of the resource topics that we'll be analyzing as part of the EIR process. And again, part of our reason here tonight is to allow the public to comment on the scope of analysis in the EIR. CEQA is a public process, and so this is part of the public engagement around individual projects.

So this is the full list of the environmental topic areas that are required under CEQA, and I'm going to talk just a little bit about a couple of them. I kind of perceive that folks here tonight are mostly living in the vicinity of the treatment plant; is that correct? So our analysis really will include kind of two sets of impacts for each of these issue areas. One relates to a short-term impact associated with construction of propose facilities, so we usually think of those as short-term construction-related impacts. And then there are some long-term operational impacts related to operating the facility over the long term.

So short-term impacts typically relate to, as I said, construction, both for the pipelines themselves, and at the treatment plant itself. And those are the issue areas like noise, impacts to transportation, impacts to air quality related to dust generation, impacts to the aesthetics of the facility, or just construction.

As you're going down a street and installing a pipe, you know, it gets a little messy as you're moving through individual neighborhoods. But most of those impacts from a CEQA perspective are short term in that they are not permanent. So they occur over a time period and, in the case of the pipeline, really move, usually, at a rate of 200 to 500 feet per day, kind of through an area.

And for the treatment plant there will a be construction schedule that's articulated in the EIR for how long that construction period would happen. And for the short-term types of impacts, we're usually able to establish mitigation measures or what we like to call best management practices to really minimize those effects to the degree that we can. So things like limitations on construction hours, dust control measures, swift control measures for erosion, kind of standard mitigation practices can be applied to those construction-related effects to really minimize them to the best that we can.

So the longer-term issues relate to hydrology and water quality, and to biological resources. As we were talking about earlier, there's going to be improvements at the city's intakes to more effectively provide for biological resource protection at that facility, and so we think that's going to be an enhancement.

And then we will be analyzing from hydrology and water quality aspect, both the increased intake of river water and kind of a longer duration or seasonal change in when water is taken from the river, so we'll be looking at the from a biological resource perspective, and then we'll be analyzing the concentrate management strategy, as we were talking about earlier. Treatment with the reverse osmosis process takes river water and creates a concentrate that's kind of a highly salined concentrate that will then be transported to Delta Diablo San District and comingled with their effluent that's currently discharged. So we'll be looking at and actually modeling and reviewing whether or not there are any environmental effects with that concentrate discharge.

And then some of these other issue areas, like population and housing, utilities and service systems, we want to make sure that the project as proposed is kind of consistent with the city’s planning around population and housing and provision of water supply. As we were talking about earlier, there’s lots of operational benefits for the city to be able to have the desalinization plant in operation.

So this would be the full range of analysis areas that we look at in the EIR.

So tonight what, well, we’d like to hear from folks in the room, and as part of our Notice of Preparation process, are comments on the scope of the analysis and the EIR. What are the range of environmental topics that you guys are interested? Are there specific issues that concern you? You can comment on the approach to the technical analysis, maybe what some project alternatives might be, and other environmental considerations, so just in the context of I request that the EIR consider these things.

So there’s the opportunity to comment tonight as part of this meeting, but not everybody likes to get up and make a statement in front of people or stand in front of these great microphones that have been provided this evening, so you can provide comments in writing. We've provided comment cards. You can submit those to the city, to Scott. We have a 30-day public review process under CEQA. And so the close of that comment period is September 14th, so it's about ten days. And then we would then review those comments as it relates to our scope of work for the CEQA analysis.

So then following the close of the public review period for the Notice of Preparation, we will consider those comments that are relative to our scope of work. We then move forward into completing the EIR process. Susan had a schedule laid out earlier. We'll be working with the city and their design engineers to kind of finish out some of the details relative to the proposed design, and then bring you that after another public review period, 45-day public review period, we'll be bringing that to City Council for public review.

There are other regulatory permits that we need to obtain in order to implement the project, and then moving forward to construction.

So with that, I think we'd like to just open it up for public comment. We have public comment cards. If you folks, if you're interested in speaking, if you could fill those out, just so we have your name and address for the record. And as Peter was telling me, I think these microphones are capable of kind of picking up comments. So if you want to just raise your hand, we can just go in order and you can speak from your chair. Does that make sense?

(Colloquy)

MR. BOUSLOG: Tim Bouslog. I live on View Drive.

Can you go back to the slide?

MR. O'TOOLE: Yeah. I was going to ask if that would be helpful.

MR. BOUSLOG: Yeah, the resource topic.

MR. O'TOOLE: This one?

MR. BOUSLOG: Yeah, there you go.

MR. O'TOOLE: Okay.

MR. BOUSLOG: So the aesthetic side of it, have you guys looked at sinking the tank versus the 84-foot out of the ground? I mean, can you not sink it underground? I'm not looking for an answer, but it's an option.

MR. O'TOOLE: Yeah. Well, maybe lay it --

MR. BOUSLOG: I'm sure they're concerned

over here.

MR. O’TOOLE: Well, maybe lay it on its side?

MR. BOUSLOG: They’re concerned over there. It’s going to be right in my backyard, very visible. So if it’s 84 feet, give or take, it’s going to be aesthetically going back to the first.

MR. O’TOOLE: Uh-huh.

MR. BOUSLOG: So I would propose you sink the tank where it’s not visible, it’s underground. It’s doable.

So the air quality side of it, what’s the noise? Because typically, desalination plants are not run all the time. It’s really for when it’s needed, so it should be a lower percentage of the time. What’s the idea for when is it’s running? Have you guys figured out what the percentage is based on what the plant is running today? It should be a very low percentage.

MR. O’TOOLE: It’s going to run when the river water quality is too salty --

MR. BOUSLOG: Right.

MR. O’TOOLE: -- so typically, August, September, through let’s say February, January and February.

MR. BOUSLOG: Right.

MR. O'TOOLE: And during that period, ideally we'd pretty much run the plant consistently.

MR. BOUSLOG: Right. Now what's the noise driven off the plant? Because right now it's pretty quiet. You know, when it's dead outside, you can hear it. But I live on View Drive, so, again, it's not in my backyard, but the noise would be a concern.

MR. O'TOOLE: Yeah. All the main pumps and equipment would be housed inside the building.

I don't know if you want to go to the site plan there?

MR. BOUSLOG: So on a decimal, you know, on a decimal side, right, I think, you know, there's definitely a noise in the back that I think somebody should --

MR. O'TOOLE: Oh, we'll -- yeah.

MR. BOUSLOG: -- do some research.

MR. O'TOOLE: Yeah. No. We'll --

MR. BOUSLOG: Because I don't want something humming in the middle of the night when I'm trying to enjoy the outside; right?

MR. O'TOOLE: Yeah. No. There's --

MR. BOUSLOG: Right.

MR. O'TOOLE: It won't be anything above what's currently --

MR. BOUSLOG: So even if you -- so here's the tank that you guys proposed right here; right? Right in through here you just have a 9,600 --

MR. O'TOOLE: That's --

MR. BOUSLOG: -- square foot tank.

MR. O'TOOLE: No.

MR. BOUSLOG: I can't see it too well.

MR. BUENTING: I know. I was trying to dim the lights because it's a little -- if we can do that a little. I think you might be a little confused.

MR. O'TOOLE: Yeah.

MR. BOUSLOG: Number 26, I'm sorry.

MR. BUENTING: Right. What we have, this right here, that's a building.

MR. BOUSLOG: Okay.

MR. BUENTING: It's not -- both of these would be buildings.

MR. BOUSLOG: Okay. And then the bulk chemical storage tank, which is new --

MR. BUENTING: Bulk chemical storage --

MR. BOUSLOG: There you go.

MR. BUENTING: -- is a building --

MR. BOUSLOG: You should know your project.

MR. BUENTING: -- (indiscernible).

MR. BOUSLOG: It's right here.

MR. BUENTING: Yeah.

MR. BOUSLOG: It's right here; right?

MR. BUENTING: It's a building.

MR. BOUSLOG: Bulk chemical storage, that's a building?

MR. BUENTING: It's a building.

MR. BOUSLOG: It's not a tank?

MR. BUENTING: No.

MR. O'TOOLE: No. I'm sorry.

MR. BOUSLOG: Okay.

MR. BUENTING: Yeah. Both these new facilities are buildings.

MR. BOUSLOG: Right.

MR. BUENTING: The actual reverse osmosis system would be housed within a structure. And this would just be where the chemicals are kept.

MR. BOUSLOG: Okay.

MR. BUENTING: It's not like what we have down here where the caustic and the fluoride and --

MR. BOUSLOG: Right.

MR. BUENTING: -- you know, and the bleach and all that stuff will be.

MR. BOUSLOG: So there's chemical? You have it contained? You have a plan to contain the chemicals, obviously?

MR. BUENTING: Yeah. And there's --

MR. BOUSLOG: I would still look at sinking that building, though. Again, these folks over here, they're going to be looking right at it.

So the square footage on the building that's there presently, do you know what that --

MR. BUENTING: How big is it?

MR. BOUSLOG: -- the top of the -- the height of that? Because, again, if you knew what the height of that building was, compared to this is going to replace that building then --

MR. WEDDLE: Yeah. Good point. Yeah, the maintenance shed that's out there currently?

MR. BOUSLOG: Right. Right. Yeah.

MR. WEDDLE: It won't be much taller than that. It --

MR. BOUSLOG: Right. Right. But still taller; right?

MR. WEDDLE: We haven't laid it out completely yet. But it's envisioned to be about, what's that, maybe 12, maybe 15?

MR. BUENTING: Yeah. It's 12, 15. It's a

normal size building. This isn’t a multi-storey building.

MR. BOUSLOG: If it’s going to go taller, right now, again, if they’re used to it, I’d see if you can’t lower it a little bit --

MR. BUENTING: Sure.

MR. BOUSLOG: -- drop it a little bit. Because there’s no water table there, so what the heck; right? I mean, it’s not like you’re going to -- it’s going to flood. You’re going to put floor drains anyway, so --

MR. BUENTING: It’s rock. (Indiscernible).

MR. BOUSLOG: Yeah, it is.

MR. BUENTING: (Indiscernible.)

MR. BOUSLOG: So the other question that I have is, again, I’m not looking for answers, I’m just saying is you guys may want to look into it. So if your feed or the feeds go in your -- salt is going to be generated, your brine is going to be generated back to Delta Diablo, what’s the safety feature, so we’re not going to get any contamination to this plant itself; right? Because, again, you guys can have a shutdown and there could be a back feed. So it’s a 360 osmosis; right? Does the Delta Diablo back then have the potential for contamination?

MR. WEDDLE: No. There will be what they call the shut valves that --

MR. BOUSLOG: Perfect. Okay. So then you're going to have --

MR. WEDDLE: -- to prevent any back --

MR. BOUSLOG: I mean, you see where I'm going with this?

MR. WEDDLE: Oh, yeah. They'll be --

MR. BOUSLOG: Because that could be a catastrophe.

MR. WEDDLE: There will be backflow direction.

MR. BOUSLOG: So the line that's parallel to Terra Nova, which is running, let me think here, which is running through here, so you're going to be doing more home aligned from Lone Tree across the hill on Terra Nova, you have a drainage ditch up there, so the ditch sits back a little bit. Is that going to be impacted? If it is, obviously, you'll replace it.

MR. WEDDLE: Right.

MR. BOUSLOG: And then what kind of machinery are you going to be using up there to ditch? How wide? How deep?

MR. WEDDLE: Actually, what we're thinking is, as far as coming from the building --

MR. BOUSLOG: Out to Lone Tree?

MR. WEDDLE: -- well, for the majority of that run we're looking at -installing it above ground --

MR. BOUSLOG: Oh, forget about it.

MR. WEDDLE: -- just because --

MR. BOUSLOG: These folks here are going to be looking right at that. You just killed their value of their homes.

MR. WEDDLE: Oh, well, I'm talking the pipeline.

MR. BOUSLOG: That's what I'm saying.

MR. WEDDLE: Okay. When I say above ground, I mean --

MR. BOUSLOG: Yeah, I get you. They're going to be looking right at it.

MR. WEDDLE: Okay.

MR. BOUSLOG: So my proposal would be is, and I would expect it as a homeowner of Antioch, is that line, too, is something --

MR. WEDDLE: Be buried?

MR. BOUSLOG: Absolutely.

MR. WEDDLE: Okay.

MR. BOUSLOG: Come on; right? It makes sense.

MR. WEDDLE: Okay.

MR. BOUSLOG: Because, again, these folks are -- at retirement age, don't you want them to be able to retire and sell their home at some point? They'll lose the value of their property.

MR. WEDDLE: Sure.

MR. BOUSLOG: I mean, that would be my recommendation.

MR. WEDDLE: Yeah. No. The intent was not to build something high. But if it's (indiscernible) --

MR. BOUSLOG: Yeah. But that should have been in the plan too. That should have been pre-identified --

MR. WEDDLE: Okay.

MR. BOUSLOG: -- so people know exactly what they're going to be chewing off. So my recommendation would be to sink it --

MR. WEDDLE: Okay.

MR. BOUSLOG: -- and that's very doable. You're doing it down Lone Tree, so why not keep the path of travel going.

MR. WEDDLE: Uh-huh. Sure.

MR. BOUSLOG: Can you go back to the other slide please, the resource slide?

MR. WEDDLE: Sure. Okay.

MR. BOUSLOG: I’m going to jump around here a little bit. So on the roadway -- on the roadway repair from the river, so are you guys just going to be taking where you’re digging, trenching that new line and just doing the backfill and just repairing that particular little area, or are you going to be fixing the entire roadway; right? I mean, you see that happen too much in the City of Antioch, so let’s clean the road up while we have the opportunity. It’s not that much more money in the grand scheme of things. It’s going to deteriorate over time, you know that. You know, it’s going to sag, you’re going to get -- I mean, so, again, my recommendation is look at, if you’re going to take, you know, whether it’s the fast lane or the slow lane, just fix both of them; right? I mean, that’s an easy fix. You’re going to grind it down a little bit and resurface it and be done. We’re going to improve Antioch.

MR. O’TOOLE: Do you guys have an ordinance for pipeline installation or --

MR. BUENTING: We do have a trench cut

detail. But a lot of this, it’s all specific to the project and it’s something that we can look into.

MR. BOUSLOG: Yeah, I would. Because, again, it’s going to sink, it’s going to sag. It’s just the nature of the beast.

So again, noise.

Any smell from the plant at all?

MR. O’TOOLE: No, it’s all enclosed.

I was going to say, for noise, we didn’t really go back to that question. So we’ll be analyzing any changes in the noise environment --

MR. BOUSLOG: Okay.

MR. O’TOOLE: -- for this type of facility. I would imagine it’s going to be pretty consistent with what’s out there right now.

MR. BOUSLOG: Yeah.

MR. O’TOOLE: So these are -- this is an electrical, enclosed treatment facility.

MR. BOUSLOG: So it should be pretty quiet?

MR. O’TOOLE: Yeah. So things like blowers or generators --

UNIDENTIFIED FEMALE 1: Can I interrupt you for a minute. Can you talk a little bit louder please?

MR. O’TOOLE: I’m sorry. I’m sorry.

UNIDENTIFIED FEMALE 1: Thank you.

MR. O'TOOLE: You know, I --

UNIDENTIFIED FEMALE 1: I can't hear real well.

MR. O'TOOLE: I was saying, on the noise issue, that he had asked earlier about whether there would be changes in the noise environment. And we would anticipate it will be pretty consistent with what you experience out there now. That's an enclosed, electrically-based treatment plant. So typical noise sources, like blowers or generators that run, we wouldn't anticipate those types of facilities here. So we would -- we're pretty confident that the noise environment is going to be very similar to what is out there now.

MR. LUKASH: I had a question regarding the noise during construction, during the expansion of the water treatment plant. Between the constant diesel engines running --

MR. O'TOOLE: Uh-huh.

MR. LUKASH: -- 12 hours a day, smelling up the yard, the constant beeping of all the equipment going through there --

MR. O'TOOLE: At the reverse, yeah, at the reverse, yeah --

MR. LUKASH: -- noise that's created, the City of Antioch didn't really do a very good job with that, as far as I'm concerned. And I would like to think that during the construction, maybe they would improve on what was happening during the addition of the water treatment plant.

MR. O'TOOLE: Can I get you just to state your name for us?

MR. LUKASH: Yes. My name is Alex Lukash, and live at 36 Terra Nova Drive. And there was an entire summer where I couldn't go out in my yard because of the diesel fumes.

MR. O'TOOLE: Thank you, Alex.

MR. BOUSLOG: So we covered the aesthetics.

You know, again, I do a lot of walking. So if I'm walking down from, let's say, Lone Tree to the convalescent home that parallels Camby (phonetic), you know, again, you have those above-ground lines that people are tagging and what have you. It's going to happen; right? I mean, people are going to tag it. People are going to painting on them over time, whether it's 10 years or 15 or 20 years, it's going to be tagged. It's going to look like crud.

And so, again, I'll fight it tooth and nail to (indiscernible) above ground. I’ll push the envelope and say it has to be underground, you know, that’s just a must. Because people are -- you know, it’s just going to be an eyesore. You’re going to get kids up there and painting on it and whatever you. Hey, we were all kids; right? It’s going to happen.

MR. O’TOOLE: Yeah. Understood.

MR. BOUSLOG: You know, again, as the gentleman over here said, is the dust, the noise while construction is going on, is definitely a must have.

You also mentioned the EIP (phonetic). I do have a concern. I’ve walked the property. I’ve stared at the property parallel to View Drive. That yard is a mess right now. My concern, if the yard is a mess today -- and you guys have surveyed the property, it’s a fire hazard. You guys have got paint cans sitting out. There’s a lot of debris out there that can -- that’s pretty bad right now.

So again, if we’re expected to keep our property up, I would expect the City of Antioch to keep their property up. It’s a mess out there. I mean, there must be --

MR. O’TOOLE: Oh, these are the pictures?

MR. BOUSLOG: Yeah.

MR. O'TOOLE: Okay. Okay.

MR. BOUSLOG: And also, either it looks like there's person vehicles, trailers, there could be city vehicles that's being parked up there right now.

MR. O'TOOLE: Uh-huh.

MR. BOUSLOG: I wish my employer would allow me to park my own personal trailer. But if you're a city employee, you shouldn't get any more perks than what I get; right?

So here's the line that I'm talking about. It's nice and clean.

MR. O'TOOLE: Oh, yeah.

MR. BUENTING: Uh-huh.

MR. BOUSLOG: So now you top onto that --

MR. O'TOOLE: This is the drain --

MR. BOUSLOG: -- you've got --

MR. O'TOOLE: This is the drain?

MR. BOUSLOG: You have -- well, that's where you're proposing that line goes through --

MR. O'TOOLE: Uh-huh.

MR. BOUSLOG: -- right? So now you put the concrete pillars in for support, it's going to raise it. These folks through here are going to look up at this. And again, like I say, aesthetically, it's going to be tacky. It's nice and clean right now, probably because these neighbors keep it clean.

MR. O'TOOLE: Uh-huh.

MR. BOUSLOG: It's not because of anything the city does or doesn't do. So if you raise it, if you look at the backyards here, this is what these folks would be looking at from their backyard.

MR. O'TOOLE: Uh-huh.

MR. BOUSLOG: It's literally, you know, you get to a certain age, you're spending a lot of time out back.

MR. O'TOOLE: Is that -- that fence line is all across -- along the back of all the properties?

MR. BOUSLOG: Yeah.

MR. O'TOOLE: A chain-link fence? Okay.

MR. BOUSLOG: No. No. This is just 24 Terra Nova.

MR. O'TOOLE: Okay.

MR. BOUSLOG: And so here's some additional pictures.

MR. O'TOOLE: I totally appreciate that. Thank you.

MR. BOUSLOG: But this concerns me. I mean, that's a little disturbing, to be honest with you.

MR. O’TOOLE: Does the city mow that easement or does somebody else? These guys are mowing? Yeah.

MR. BOUSLOG: There are folks that are taking care of it.

(Colloquy)

UNIDENTIFIED FEMALE 1: I have a PG&E easement on mine, you know?

MR. O’TOOLE: Does the city keep it up?

UNIDENTIFIED FEMALE 1: I have all those big towers in the back --

MR. BOUSLOG: Yeah. Yeah. Yeah.

UNIDENTIFIED FEMALE 1: -- and now I’m going to have this across the street.

MR. BOUSLOG: And I said, no.

MR. O’TOOLE: Oh.

UNIDENTIFIED FEMALE 1: How is that going to affect my property value? Do I have to disclose it?

MR. O’TOOLE: No, you wouldn’t. You wouldn’t have to disclose it.

MR. COWAN: I’m -- go ahead. I’m Kenneth Cowan at 24 Terra Nova.

MR. O’TOOLE: Uh-huh.

MR. COWAN: And I keep that up. That’s a city right of way through there. I’m the one that has to clean the weeds off, spray the weeds, and that's why it looks so clean. I don't see the city out there doing it.

And then I sure don't want to look at a pipeline that's out there on top of that, after I'm up there taking care of that.

MR. BOUSLOG: Let's do the right thing. It's a good project. I agree with the project. I mean, it's going on throughout the state. I mean, they're taking ocean water -- I mean, again, I think it's a good project in itself.

MR. O'TOOLE: Yeah.

MR. BOUSLOG: I think it just needs to be cleaned up a little bit.

MR. O'TOOLE: Okay. Those are really good comments.

Any other comments from folks?

MR. LUKASH: I just have one more question, and it doesn't have anything to do with the EIR, but I guess I didn't attend the City Council meeting when this came out.

What is the cost of this project?

UNIDENTIFIED FEMALE 1: That's what I was going to say.

MR. LUKASH: How is it going to affect the water rights here, compared to pulling out of Los Vaqueros and putting in the desalination plant? It has to be more expensive.

MR. O'TOOLE: Uh-huh.

MR. LUKASH: Can anybody (indiscernible)?

MR. O'TOOLE: I'll have to refer to my engineering brethren.

MR. BUENTING: Well, some of it's still -- right now we're still in pre-design stages, so you're looking at an estimate of what the project might cost. You know, we currently just put in an application for a $10 million grant from the state. Looking at a project, we've seen estimates that -- also, right now it's a 6 million gallon per day plant. We've looked at going up to 16, if for some reason one of the regional players would also want to partner with us. So I've seen $30 to $120 million. So right now you're probably looking at, with a 6 mgd, somewhere, 30 to 50. But that's kind of a real guess at this stage since you have a lot to go through. You know, we're talking about getting a project defined. That's really what we're doing right now. You're looking at conceptual things, lines on paper.

The reason why we're here is to hear your concerns to see what we could do. Projects can get bigger or smaller. If we ended up including, you know, reconstructing roads and doing other things, you never know what gets included. The costs go up and down.

So the main goal isn't for the city to spend more money. This is a project designed for us to, you know, save some money, you know, be able to get water at affordable, as well as being reliable, utilizing our water rights as best we can.

MR. LUKASH: Will it ultimately then make the end water user, make it less expensive for them?

MR. BUENTING: Again, I mean, I don't know right now. We're going into -- it's something we study all the time, with the water rates and things like that. But this is an idea to get water produced at a reasonable price. It isn't just to have the facility, but to have it be beneficial for, hopefully, a number of reasons.

So cost-wise, like I said, we'll know better once we kind of get through the EIR. At that time, you have a project that you can actually, you know, get a better idea of what kind of costs are associated with it.

MR. BOUSLOG: So will the return on

investment calculated, pulling water straight from the canal versus doing a desalination plant -- so you'll do a study based on, again, here's the desalination plant, which will probably push over $50 million, that's just the fact of it, but I calculated my numbers pretty quickly, and then you've got pulling from the canal, what's the return on investment, typically speaking? If it's not paying off within eight to ten years, it's a bad plan, just saying.

MR. COWAN: Well, and, too, say ten gallons of water, you have two gallons of waste brine out of that, is what it said, so you've got eight gallons of good. Okay. When this gets worse out here and they ship more water south, or whatever they do, and the water quality gets worse, where's the breaking point? I mean, as water gets worse, the brine -- there's more brine coming out. So at what point? You know what I'm saying?

MR. WEDDLE: Yeah. Well --

MR. COWAN: You're going to have more waste as the water gets worse.

MR. WEDDLE: Well, yes and no. I mean, as the water in the river declines, the quality of the --

MR. COWAN: Uh-huh.

MR. WEDDLE: -- river declines, our own facility could -- would run for longer duration. The amount of brine that's actually generated would stay -- the quantity would stay the same.

MR. COWAN: The same?

MR. WEDDLE: Yeah, the concentration of the brine. So the salinity will go up and down as the river salinity goes up and down. But it's -- no, we don't anticipate there being a lot more brine generated. Like I said before, it will run at a fairly consistent rate. Once it's turned on it will run for four to six months pretty consistently.

And I wanted to kind of add on to what Scott was talking about. One of the main goals of this project is to help improve the water quality of water served to the customers. And that's one of the main benefits of this project, is it does allow -- I mean, even CCWD water gets kind of salty in the --

MR. BUENTING: Yeah, it's rough.

MR. WEDDLE: -- it gets pretty -- yeah. But with this project, it will extend the period of time where the water quality is better, less salty.

And getting back to the cost, we've been looking at the cost. And we believe we can bring this project in at a lower unit cost than what the city is currently -- lower or comparable to what the city is currently paying to treat water. So better water quality at the same or lower price, that's the main goal.

MR. BOUSLOG: So is the idea to scrap the present process or use this as a backup or a primary?

MR. WEDDLE: Well, that's one of the reasons why this project, we're able to bring it in. We're actually using part of the existing plant.

MR. BOUSLOG: Right. Right.

MR. WEDDLE: So the existing plant is divided into what they call Plant A and Plant B. What we're proposing to do is use Plant B for pre-treatment to remove all the solids and any other contaminants from the river prior to going to the desalination membranes. So we're using a lot of the existing treatment infrastructures.

Oh, and the other thing is when our own system, like our reverse osmosis, when that's not in use, the existing plant goes back to treating water the way it always does. So during those months of the year where the water quality in the river is good the existing facilities are going to be reused.

UNIDENTIFIED FEMALE 1: Are the chemicals going to be stored above ground or below ground?

MR. WEDDLE: typically, I mean, we heard comments -- typically they're in the storage tanks that are at or a little bit below ground in a containment area. And there will be a canopy roof over the top.

UNIDENTIFIED FEMALE 1: Because they had a fire on that hill last year, back there, at nighttime --

MR. BOUSLOG: So if you --

UNIDENTIFIED FEMALE 1: -- a couple years ago, yeah.

MR. BOUSLOG: You say canopy. It's not going to be a metal shed, it's going to be a canopy or enclosed?

MR. WEDDLE: The building as it -- the chemical building -- so we have two buildings. We have the chemical storage building, and then we have the reverse --

MR. BOUSLOG: Yeah. Can you pull the --

MR. WEDDLE: Yeah. Maybe we can take a look at that.

MR. BOUSLOG: If you don't mind? Thanks.

MR. WEDDLE: So the smaller --

MR. BOUSLOG: The yellow?

MR. WEDDLE: Not the yellow, the rectangle.

UNIDENTIFIED FEMALE 1: The dark one.

MR. WEDDLE: The dark one.

MR. BOUSLOG: Okay.

MR. WEDDLE: That's the proposed chemical building.

MR. BOUSLOG: A bulk chemical storage?

MR. WEDDLE: Yeah, bulk.

MR. BOUSLOG: So you're saying that's going to replace the one that's presently tied in --

MR. WEDDLE: Yeah. Exactly.

MR. BOUSLOG: -- where all the trailers are --

MR. WEDDLE: Right. And --

MR. BOUSLOG: -- and the paint cans, and all that good stuff?

MR. WEDDLE: Right. We had planned on -- initial concepts were to have a canopy-style building with storage tanks under the canopy.

MR. BOUSLOG: Right. So this is 84 by 31; 2,600 feet is not that big of -- it's about the size of (indiscernible), a little size of their homes up and down Terra Nova.

What’s the height of it? I don’t have my glasses.

MR. WEDDLE: It’s 12 to 15 feet, similar to the building that --

MR. BOUSLOG: It says 31 feet, 84 by 31.

MR. WEDDLE: Well, that’s the other --

MR. BOUSLOG: That’s that one.

MR. BUENTING: Yeah. Yeah. So that’s here.

MR. WEDDLE: Yeah. This --

MR. BOUSLOG: Well, what’s that building?

MR. WEDDLE: Well, that’s the chemical building.

MR. BOUSLOG: Oh, okay. Because this says 84 by 31.

UNIDENTIFIED FEMALE 1: Where is that?

UNIDENTIFIED FEMALE 2: That’s in back of (indiscernible) house.

UNIDENTIFIED FEMALE 1: Back of who?

UNIDENTIFIED FEMALE 2: (Indiscernible.)

MR. BUENTING: Yeah. I think that’s just the dimensions.

MR. WEDDLE: Yeah. That’s what --

MR. BOUSLOG: Okay. Okay. Not the height. Okay. Got you.

MR. WEDDLE: (Indiscernible.)

MR. BOUSLOG: I just don't have my glasses on.

MR. BUENTING: Heights not identified.

MR. BOUSLOG: Heights not identified.

MR. BUENTING: But we'll include that in the --

MR. BOUSLOG: Yeah.

MR. BUENTING: -- EIR project description.

MR. O'TOOLE: I think it should be done. Again, it's --

MR. BUENTING: Fifteen feet, twenty. You know, something close to existing is what we're aiming for.

MR. BOUSLOG: Yeah. I mean, anything above that, I would have heartburn over, I'm sure. I mean, again, I'm not looking at it. I'm just looking out for this (indiscernible).

So, you know, my two concerns are as is the lines going on top of the hill above ground versus underground. And again, just driving around the city, I mean, it's a tag city, you know, and it will get tagged, that's just the nature of the beast. You know, you're going to be underground when you make the loop, Diablo from Lone Tree onto that right of way. You have to go in through Inzerillo's property. You can't go above ground through Inzerillo's; right?

MR. O'TOOLE: Right. No. That was all going to be below ground. And your point is well taken.

MR. BOUSLOG: Yeah. But you see where I'm going with it? So if you're doing what's right for Inzerillo's do what's right for the rest of the neighbors. Because, in theory, the neighbors can take their fences height back, as Inzerillo's did. They're good people. I know them personally. But again, what's good for one is good for all. So they bumped their fence out, as well as the rest of the homeowners should be able to. Then you guys have a problem.

MR. O'TOOLE: So did they -- they put their fence out onto --

MR. BOUSLOG: Absolutely. Yeah. Another 20 feet, yeah.

MR. O'TOOLE: Yeah. Yeah. Yeah. That happens --

MR. BOUSLOG: That's why you're --

MR. O'TOOLE: -- sometimes.

MR. BOUSLOG: Yeah, it happens.

MR. O'TOOLE: Yeah. Interesting. Okay.

UNIDENTIFIED FEMALE 1: Is there an estimated time of start and finish?

MR. O'TOOLE: Let's go back to our CEQA schedule. So we are here in September. And we are going to come out with a draft EIR, probably in spring of next year. And there will be a 45-day public review period, and we'll have another public meeting, just like this one, where folks can comment. And then we anticipate probably getting to the City Council, probably in summer of 2018, so summer of next year. And then the -- we would be moving forward, assuming that the City Council takes their discretionary action, we then start moving forward with design and going to construction bid, and so there's some time period there.

So I would say probably late 2018. Probably the spring of 2019 is probably more realistic. If we were going to start from today, if you laid that out, that would be probably when construction would start. But there's a lot of things that have to happen, but I think that's probably the right time frame, is 2019.

UNIDENTIFIED FEMALE 1: How tall are those buildings going to be, the storage building?

MR. O'TOOLE: Yeah. We were talking -- we were talking about that.

UNIDENTIFIED FEMALE 1: (Indiscernible.)

MR. O'TOOLE: And Tim made the comment that trying to keep that height very consistent with what's out there now is in the best interest of the neighborhood. It's estimated at about between 12 and 15 feet right now. And so we would go out there and take a look at trying to keep the visual sense of the facility very consistent with that's out there now.

MR. LUKASH: Could you improve on what's there now?

MR. O'TOOLE: Yeah. I was going to say, let's get another shed.

MR. LUKASH: Don't build another shed, just --

MR. BUENTING: Yeah. Yeah.

MR. WEDDLE: But early 2020 would be about the duration we could expect to be done.

UNIDENTIFIED FEMALE 1: About when?

MR. WEDDLE: Early 2020, so early 2019, early 2020, about a year to 18 months at the most.

UNIDENTIFIED FEMALE 1: (indiscernible.) This is one, I think. I think it is, no?

MR. BOUSLOG: Yeah, it's needed. I mean,

it’s a necessity. But again, you know, I think you guys just need to take into consideration some simple aesthetics and --

MR. O’TOOLE: Sure.

MR. BOUSLOG: -- you know, the quality of life for these folks that are going to be living and looking at that and, you know, clean up what’s there now; right? I mean, that’s a little concerning as we speak, knowing that there’s weeds that are growing up, and you all are responsible for maintaining your own property, as we are, as well, so clean up what’s there. Hopefully I see somebody out there tomorrow.

MR. O’TOOLE: Any other questions or comments that you folks would want entered into the record?

I really appreciate everybody coming out tonight. I have to say, we just did a series of public meetings in Sonoma and Marin and Napa. We had four meetings and we had one person --

UNIDENTIFIED FEMALE 1: Oh, my goodness.

MR. O’TOOLE: -- in four different locations. So I really appreciate you folks coming out tonight. Decisions get made by people who show up.

UNIDENTIFIED FEMALE 1: Yeah.

MR. O'TOOLE: So it's great to see this type of turnout.

MR. BOUSLOG: It's a good neighborhood, you know? I mean, it's --

UNIDENTIFIED FEMALE 1: Yeah, it is a good neighborhood.

MR. BOUSLOG: I'd hate to see it impacted by not doing the right thing for the neighbors, so --

UNIDENTIFIED FEMALE 1: And they've been very helpful in that I had that -- what's the tree that we had back there?

MR. COWAN: Oh, eucalyptus.

UNIDENTIFIED FEMALE 1: Eucalyptus tree. After the fire, I asked them to cut it and they cut it down.

MR. O'TOOLE: Oh, did they come out and take care of that for you?

UNIDENTIFIED FEMALE 1: And then I have a big shrub going against my fence that was breaking my fence. They cut that down for me.

MR. O'TOOLE: Good.

UNIDENTIFIED FEMALE 1: So they've been very helpful. That's why I was wondering who was --

they've been more helpful than PG&E.

MR. BUENTING: Yeah. You guys probably know (indiscernible), Duane Anderson has been the Superintendent out at the water treatment plant for a little while. Tim Coley is the Supervisor. David (indiscernible) staff up there for providing all the services that they do for the city. I'll let them know about what's going on.

Part of what's going on out there, as you guys also know, we're under construction right now. We're in the process of switching over from gas to liquid disinfection projects, or different disinfection chemicals. You've probably heard some jackhammers going off as they're trying to rough up and remove some walls. They'll be pouring some walls here, stem walls, over the next week or so, and then doing some more work out there.

So I do realize that there has been work in the area going on, it seems like continuously for quite a while, because the plant has expanded a number of times. We do our best, construction-wise, to keep a hold of the contractors. If there is an issue, like right now, if you have a problem with, say, construction noises that you might be hearing, I'm the person to call.

MR. BOUSLOG: And what's your number?

MR. BUENTING: It's on that. It's on that.

(Colloquy)

MR. BUENTING: Because those guys, they're working for me right now. I know that, you know, some people would rather just yell at them, but let me know.

UNIDENTIFIED FEMALE 1: Do you have a card? If so, give me one.

MR. BUENTING: No. I've got mine --

MR. WEDDLE: In the handout packages.

MR. BOUSLOG: Oh, in the package?

MR. WEDDLE: Yeah.

MR. BOUSLOG: Okay.

MR. WEDDLE: It's like the -- I think it's on the first page.

MR. BOUSLOG: Oh, there you go.

MR. BUENTING: Yeah. Is there a phone number there also?

MR. BOUSLOG: Yeah, it is, 7050?

MR. BUENTING: 7050 will get you to me.

MR. BOUSLOG: Yeah.

MR. BUENTING: I think I'm option number three, or something, on that.

MR. BOUSLOG: Is that a 24/7 number?

MR. BUENTING: It is, but I'll only pick it up when I get in. Leave messages.

UNIDENTIFIED FEMALE 1: When we call, you don't answer?

MR. BUENTING: Yeah. Somebody will answer, but it will be telling you to leave a message.

But like I said, I will talk to those guys about what they're seeing, you know, what we've talked about, the south site over there, to clean it up. I know there is a construction trailer that's out there right now for -- it's Anderson Pacific is the company that's doing this disinfection equipment, so they do have a trailer out there. But then the rest of the area, Duane typically likes to keep a pretty clean shop up there. So I'll let him know that --

MR. BOUSLOG: Yeah. The paint cans are a little concerning. And then the weed abatement, too, you know, I just hate to see that, you know?

MR. BUENTING: Right. I'll let him --

MR. BOUSLOG: When you're trying to do a good project and I walk up there and I go, come on; right?

MR. BUENTING: Well, I'll be up there tomorrow and I'll talk to those guys and just let them know.

MR. BOUSLOG: Okay.

MR. BUENTING: I'd say typically, you know, they want to keep it --

MR. BOUSLOG: Make sure they don't throw it away in regular waste.

MR. BUENTING: Or throw it over the fence; right?

MR. BOUSLOG: Yeah. That okay. I don't live there.

MR. BUENTING: No. But like Jim was saying, we do appreciate you guys coming out. You do have my number and my email address, my mailing address. If you guys want to, you know, give me a call, send me an email. If you forgot to ask a question that you really want answered, send it to us, we'll get you back something, but we did like the feedback that you have.

The reason why we have these meetings is to try to catch this stuff as early as possible, so we can build it into the EIR. If nothing comes up until that meeting in the process, now we, as a city, have to double back sometimes on design ideas. And in the grand scheme, it's going to cost us money, it's going to cost us time. And we'd like to do this as efficiently as possible and make sure you guys are, you know, involved and happy with the product.

(Colloquy)

MR. O'TOOLE: Yeah. Thanks again for everybody coming out. We'll close up shop. Really appreciate it.

(The meeting concluded at 6:52 p.m.)

REPORTER'S CERTIFICATE

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 15th day of September, 2017.

PETER PETTY
CER**D-493
Notary Public

CERTIFICATE OF TRANSCRIBER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were transcribed by me, a certified transcriber and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

I certify that the foregoing is a correct transcript, to the best of my ability, from the electronic sound recording of the proceedings in the above-entitled matter.

Martha L. Nelson

MARTHA L. NELSON, CERT**367

September 15, 2017

APPENDIX B

Air Quality, Health Risk Assessment, and Greenhouse Gas Emissions Estimates

Average Daily Construction Emissions

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
Desal 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**

Demolition/Construction of River Pump Station

Emissions	ROG	NO$_x$	CO	PM$_{10}$	PM$_{2.5}$	Mitigated Tier 4 PM$_{10}$	Mitigated Tier 4 PM$_{2.5}$
Off-road Equipment - tons 2019	0.2041	2.1088	1.2210	0.0753	0.0711	0.0064	0.0064
Off-road Equipment - tons 2020	0.0395	0.3871	0.2427	0.0139	0.0131	0.0013	0.0013
Off-road Equipment - total tons	0.2436	2.4959	1.4637	0.0892	0.0842	0.0077	0.0077
Off-road Equipment - total pounds	487.2000	4,991.8000	2,927.4000	178.4000	168.4000	15.3600	15.3600
Off-road Equipment - average daily pounds[a]	1.7400	17.8279	10.4550	0.6371	0.6014		
On-road Vehicles - tons 2019	0.0044	0.0038	0.0337	0.0001	0.0001		
On-road Vehicles - tons 2020	0.0008	0.0007	0.0062	0.0000	0.0000		
On-road Vehicles - total tons	0.0052	0.0045	0.0399	0.0001	0.0001		
On-road Vehicles - total pounds	10.4800	9.0200	79.8000	0.1400	0.1400		
On-road Vehicles - average daily pounds[a]	0.0374	0.0322	0.2850	0.0005	0.0005		

[a] There would be total of 280 construction workdays.

Raw Water/Feed Water Connection Pipeline to WTP

Emissions	ROG	NO$_x$	CO	PM$_{10}$	PM$_{2.5}$
Off-road Equipment - tons 2019	0.0167	0.1973	0.1064	0.0068	0.0063
Off-road Equipment - tons 2020					
Off-road Equipment - total tons	0.0167	0.1973	0.1064	0.0068	0.0063
Off-road Equipment - total pounds	33.4000	394.6000	212.8000	13.6200	12.5400
Off-road Equipment - average daily pounds[a]	0.1193	1.4093	0.7600	0.0486	0.0448
On-road Vehicles - tons 2019	0.0011	0.0094	0.0083	0.0000	0.0000

Total Pounds for HRA

	PM$_{10}$		PM$_{2.5}$	
	Pump Statio	Desal Plant	Pump Statio	Desal Plant
Unmitigated				
2019	150.6000	124.6000	142.2000	117.8000
2020	27.8000	30.8000	26.2000	29.2000
Total	178.4000	155.4000	168.4000	147.0000
Mitigated Tier 4				
2019	12.7400	11.1400	12.7400	11.1400
2020	2.6200	3.1000	2.6200	3.1000
Total	15.3600	14.2400	15.3600	14.2400

Total DPM	**398.7600**	
Offroad	**398.0600**	**99.8%**
Onroad	**0.7000**	**0.2%**

On-road Vehicles - tons 2020					
On-road Vehicles - total tons	0.0011	0.0094	0.0083	0.0000	0.0000
On-road Vehicles - total pounds	2.2600	18.7600	16.6800	0.0800	0.0800
On-road Vehicles - average daily pounds[a]	0.0081	0.0670	0.0596	0.0003	0.0003

[a] There would be total of 280 construction workdays.

Desal Facility Construction

						Mitigated Tier 4	
Emissions	**ROG**	**NO$_x$**	**CO**	**PM$_{10}$**	**PM$_{2.5}$**	**PM$_{10}$**	**PM$_{2.5}$**
Off-road Equipment - tons 2019	0.1736	1.7719	0.9607	0.0623	0.0589	0.0056	0.0056
Off-road Equipment - tons 2020	0.0453	0.4367	0.2598	0.0154	0.0146	0.0016	0.0016
Off-road Equipment - total tons	0.2189	2.2086	1.2205	0.0777	0.0735	0.0071	0.0071
Off-road Equipment - total pounds	437.8000	4,417.2000	2,441.0000	155.4000	147.0000	14.2400	14.2400
Off-road Equipment - average daily pounds[a]	1.5636	15.7757	8.7179	0.5550	0.5250		
On-road Vehicles - tons 2019	0.0065	0.0060	0.0495	0.0001	0.0001		
On-road Vehicles - tons 2020	0.0017	0.0015	0.0123	0.0000	0.0000		
On-road Vehicles - total tons	0.0081	0.0075	0.0618	0.0001	0.0001		
On-road Vehicles - total pounds	16.2800	15.0800	123.6000	0.2400	0.2200		
On-road Vehicles - average daily pounds[a]	0.0581	0.0539	0.4414	0.0009	0.0008		

[a] There would be total of 280 construction workdays.

WTP Pipeline Installation

						Mitigated Tier 4	
Emissions	**ROG**	**NO$_x$**	**CO**	**PM$_{10}$**	**PM$_{2.5}$**	**PM$_{10}$**	**PM$_{2.5}$**
Off-road Equipment - tons 2019	0.0067	0.0789	0.0426	0.0027	0.0025	0.0003	0.0003
Off-road Equipment - tons 2020							
Off-road Equipment - total tons	0.0067	0.0789	0.0426	0.0027	0.0025	0.0003	0.0003
Off-road Equipment - total pounds	13.3400	157.8000	85.2000	5.4400	5.0200	0.6000	0.6000
Off-road Equipment - average daily pounds[a]	0.0476	0.5636	0.3043	0.0194	0.0179		
On-road Vehicles - tons 2019	0.0006	0.0074	0.0040	0.0000	0.0000		
On-road Vehicles - tons 2020							
On-road Vehicles - total tons	0.0006	0.0074	0.0040	0.0000	0.0000		
On-road Vehicles - total pounds	1.1200	14.8400	8.0200	0.0800	0.0600		
On-road Vehicles - average daily pounds[a]	0.0040	0.0530	0.0286	0.0003	0.0002		

[a] There would be total of 12 construction workdays.

Brine Discharge Pipeline

Emissions	**ROG**	**NO$_x$**	**CO**	**PM$_{10}$**	**PM$_{2.5}$**
Off-road Equipment - tons 2019	0.0662	0.6642	0.3643	0.0226	0.0218
Off-road Equipment - tons 2020					
Off-road Equipment - total tons	0.0662	0.6642	0.3643	0.0226	0.0218
Off-road Equipment - total pounds	132.4000	1,328.4000	728.6000	45.2000	43.6000
Off-road Equipment - average daily pounds[a]	0.4729	4.7443	2.6021	0.1614	0.1557
On-road Vehicles - tons 2019	0.0038	0.0113	0.0284	0.0001	0.0001
On-road Vehicles - tons 2020					
On-road Vehicles - total tons	0.0038	0.0113	0.0284	0.0001	0.0001
On-road Vehicles - total pounds	7.5000	22.6000	56.8000	0.1600	0.1600
On-road Vehicles - average daily pounds[a]	0.0268	0.0807	0.2029	0.0006	0.0006

[a] There would be total of 280 construction workdays.

GHG Construction Emissions

Project Component	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	1,126.58
Amortized Emissions	37.55

See CalEEMod output sheets.

Demolition/Construction of River Pump Station

Emissions Source	CO_2e
Off-road Equipment - metric tons 2019	384.9240
Off-road Equipment - metric tons 2020	78.1844
On-road Vehicles - metric tons 2019	8.7136
On-road Vehicles - metric tons 2020	1.7386
Total metric tons	473.5606

Raw Water/Feed Water Connection Pipeline to WTP

Emissions Source	CO_2e
Off-road Equipment - metric tons 2019	40.9043
Off-road Equipment - metric tons 2020	
On-road Vehicles - metric tons 2019	3.8729
On-road Vehicles - metric tons 2020	
Total metric tons	44.7772

Desal Facility Construction

Emissions Source	CO_2e
Off-road Equipment - metric tons 2019	333.5580
Off-road Equipment - metric tons 2020	91.7343
On-road Vehicles - metric tons 2019	12.8991
On-road Vehicles - metric tons 2020	3.4802
Total metric tons	441.6716

WTP Pipeline Installation

Emissions Source	CO_2e
Off-road Equipment - metric tons 2019	16.3617
Off-road Equipment - metric tons 2020	
On-road Vehicles - metric tons 2019	2.4539
On-road Vehicles - metric tons 2020	
Total metric tons	18.8156

Brine Discharge Pipeline

Emissions Source	CO_2e

Off-road Equipment - metric tons 2019	138.7620
Off-road Equipment - metric tons 2020	
On-road Vehicles - metric tons 2019	8.9931
On-road Vehicles - metric tons 2020	
Total metric tons	147.7551

Total GHG Emissions from Project Operations

Operation Emissions Source	**CO_2e (metric tons)**
Net Increase in Electricity Consumption	191.94
Waste and Water	10.6
Vehicle Trips	17.08
Total	219.62
See CalEEMod out sheets for assumptions.	

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

Pump Station Baseline Energy Usage (kWh)

2014[a]			2015[a]			2016[a and b]			2017[b]		
Date	With Duplicates	No Duplicates	Date	With Duplicates	No Duplicates	Date	With Duplicates	No Duplicates	Date	With Duplicates	No Duplicates
2-Dec	4,156	4,156	30-Dec	3,614	3,614	29-Dec	226,702	226,702	14-Sep	299,551	299,551
2-Dec	4,156		1-Dec	3,798	3,798	30-Nov	4,862	4,862	15-Aug	79,374	79,374
30-Oct	3,529	3,529	29-Oct	3,459	3,459	30-Oct	3,718	3,718	16-Jul	317,371	317,371
30-Oct	3,529		30-Sep	3,792	3,792	9-Sep	1,228	1,228	14-Jun	408,692	408,692
1-Oct	3,594	3,594	31-Aug	3,976	3,976	30-Aug	3,845	3,845	16-Apr	209,720	209,720
1-Oct	3,594		30-Jul	3,641	3,641	31-Jul	5,663	5,663	30-Mar	410,526	410,526
2-Sep	4,123	4,123	1-Jul	3,795	3,795	29-Jun	77,642	77,642	1-Mar	433,490	433,490
2-Sep	4,123		2-Sep	3,644	3,644	31-May	112,201	112,201	30-Jan	433,558	433,558
31-Jul	3,677	3,677	2-Jun	3,937	3,937	1-May	662,608	662,608			
1-Jul	3,629	3,629	3-May	3,937		30-Mar	395,458	395,458			
2-Jun	3,949	3,949	3-May	27,951	27,951	1-Mar	461,044	461,044			
1-May	88,035	88,035	1-Apr	27,951		31-Jan	144,432	144,432			
1-Apr	334,339	334,339	1-Apr	335,169	335,169						
3-Mar	29,725	29,725	3-Mar	335,169							
			3-Mar	202,569	202,569						
			1-Feb	202,569							
			1-Feb	292,311	292,311						
			1-Jan	292,311							
	494,158	478,756	1-Jan	1,753,593	891,656		2,099,403	2,099,403		2,592,282	2,592,282

4-year Annual Average	1,515,524

a . Energy Report for Water Pump (DIA/8004147) From Feb 15, 2014, to Feb 15, 2018.[Does not contain all 2016 data or any 2017 data.]

b. Energy Report for Water Pump (DIA/8004147) From Oct 1, 2016, to Sept 30, 2017. [Does not appear to contain all 2017 data.]

Water Treatment Plan Energy Usage (kWh)

2017	3,135,290
2016	3,420,536
2015	3,411,294
2014	3,833,709
Annual Average	3,450,207

Total Energy Use

Total	4,965,732
Existing	4,966
Exisitng plus project	6,413
Project increas	1,447

Construction Fuel Use

Total Fuel Use During Contruction

Fuel Type	Fuel Consumed		Gallons sold in Contra Costa County in 2016	% Project gal/County gal
	(gal/proj)	(av. gal/yr)		
Gasoline	5,267	4,515	431,000,000	0.00%
Diesel	127,581	109,355	26,000,000	0.42%

Construction Equipment Total Diesel Fuel Use

Project Component	HP	OffRoadEquipmentType	Unit Amount	Ave. Hrs/day	Workdays	Fuel Consumption	Total Hours	Diesel Fuel Consumed	
						(gal/hr)		(gal/proj)	(av. gal/yr)
Brine Disposal Pipeline	20	Air Compressors	1	1	119	0.91	119	109	93
	221	Bore/Drill Rigs	1	8	5	5.32	40	213	182
	300	Excavators	1	6	119	6.47	714	4,618	3,958
	100	Forklifts	1	2	119	2.00	238	477	409
	250	Generator Sets	1	6	119	4.69	714	3,346	2,868
	300	Off-Highway Trucks	1	2	119	7.39	238	1,759	1,508
	10	Pumps	2	6	119	0.91	1428	1,303	1,117
	300	Sweepers/Scrubbers	1	2	119	7.12	238	1,695	1,453
Desal Facility Construction	5	Air Compressors	1	1	280	0.91	280	255	219
	500	Excavators	1	6	60	6.47	360	2,328	1,996
	100	Forklifts	1	3	280	2.00	840	1,683	1,443
	250	Generator Sets	1	6	280	4.69	1680	7,872	6,747
	500	Off-Highway Trucks	1	6	280	7.39	1680	12,419	10,645
	300	Off-Highway Trucks	1	2	280	7.39	560	4,140	3,548
	10	Pumps	1	6	280	0.91	1680	1,533	1,314
	300	Tractors/Loaders/Backhoes	1	4	60	6.05	240	1,453	1,245
Pipeline to WTP	5	Air Compressors	1	1	12	0.91	12	11	9
	221	Bore/Drill Rigs	0	0	0	5.32	0	0	0
	300	Excavators	1	6	12	6.47	72	466	399
	25	Plate Compactors	1	4	12	0.77	48	37	32
	300	Tractors/Loaders/Backhoes	1	4	12	7.12	48	342	293
	300	Off-Highway Trucks	1	2	12	7.39	24	177	152
	300	Pavers	1	8	12	6.95	96	667	572
	300	Sweepers/Scrubbers	1	4	12	7.12	48	342	293
Demolition/Construction of River Pump Station	5	Air Compressors	1	4	240	0.91	960	876	751
	1	Concrete/Industrial Saws	1	1	240	0.91	240	219	188
	500	Cranes	1	2	240	5.01	480	2,405	2,061
	500	Excavators	1	4	240	6.47	960	6,209	5,322
	100	Forklifts	1	2	240	2.00	480	962	825
	250	Generator Sets	1	6	240	4.69	1440	6,747	5,784
	500	Off-Highway Trucks	1	4	240	7.39	960	7,097	6,083
	300	Off-Highway Trucks	1	2	240	7.39	480	3,548	3,041
	10	Pumps	3	6	240	0.91	4320	3,942	3,379
	300	Tractors/Loaders/Backhoes	1	4	240	6.05	960	5,810	4,980
Raw Water Pipeline	5	Air Compressors	1	1	30	0.91	30	27	23
	500	Excavators	1	6	30	6.47	180	1,164	998
	300	Off-Highway Trucks	1	2	30	7.39	60	444	380
	300	Pavers	1	8	30	6.95	240	1,667	1,429
	25	Plate Compactors	1	4	30	0.77	120	92	79
	300	Sweepers/Scrubbers	1	4	30	7.12	120	855	732
	300	Tractors/Loaders/Backhoes	1	4	30	7.12	120	855	732
						Total	23,547	90,163	77,283

Average gallons/hour 3.8

Average gallons per year is the total gallons for the 14-month project times 86% (12/14)

Construction Vehicles Total Fuel Use

Project Component	Fuel Type	Vehicle Type	Miles/trip	Trip/day	Workdays	Total Miles Travelled	rate	Total Gallons	
							(miles/gallon)	gal/proj	gal/year
Brine Disposal Pipeline	gasoline	Light Duty Truck	10.8	16	123	21,254	20.7	1,027	880
	diesel	Heavy Duty Truck	20	56	123	137,760	7.0	19,680	16,869
Desal Facility Construction	gasoline	Light Duty Truck	10.8	16	280	48,384	20.7	2,337	2,003
	diesel	Heavy Duty Truck	20	10	280	56,000	7.0	8,000	6,857
Pipeline to WTP	gasoline	Light Duty Truck	10.8	16	24	4,147	20.7	200	172
	diesel	Heavy Duty Truck	20	46	24	22,080	7.0	3,154	2,704
Demolition/ Construction of River Pump Station	gasoline	Light Duty Truck	10.8	12	240	31,104	20.7	1,503	1,288
	diesel	Heavy Duty Truck	20	4	240	19,200	7.0	2,743	2,351
Raw Water Pipeline	gasoline	Light Duty Truck	10.8	16	24	4,147	20.7	200	172
	diesel	Heavy Duty Truck	20	56	24	26,880	7.0	3,840	3,291
Total Fuel Use	gasoline	Light Duty Truck				104,890		5,267	4,515
	diesel	Heavy Duty Truck				239,840		37,417	32,072

diesel fuel economcy obtained from http://www.dieselforum.org/about-clean-diesel/trucking

Operational Fuel Use

Total Trips	Fuel Type	Vehicle Type	Total Miles Travelled per year	Ave consum. rate (miles/gallon)	Total Gallons gal/year
Total Fuel Use	gasoline	Light Duty Truck	33,633	20.7	1,625
	diesel	Heavy Duty Truck	8,408	7.0	1,201

diesel fuel economcy obtained from http://www.dieselforum.org/about-clean-diesel/trucking

Per CalEEMod output, there would be 42,041 vehicle miles travelled each each; it is assumed 80% would be LDT and 20% would be HDT.

Offroad Fuel Consumption

Calendar Year	Air Basin	Equipment Type	HP Bin	BSFC (lbs/yr)	Activity (hrs/yr)	BSFC (gal/hr)*
2019	SF	Bore/Drill Rigs	50	37060.6592	4528.109724	1.15
2019	SF	Bore/Drill Rigs	120	231201.3833	15552.8468	2.09
2019	SF	Bore/Drill Rigs	175	267714.03	9676.802445	3.90
2019	SF	Bore/Drill Rigs	250	377109.22	9982.506466	5.32
2019	SF	Bore/Drill Rigs	500	427091.8842	6708.786189	8.96
2019	SF	Cranes	50	12235.76863	2595.927637	0.66
2019	SF	Cranes	120	292033.9007	31196.23576	1.32
2019	SF	Cranes	175	770347.6477	48999.01548	2.21
2019	SF	Cranes	250	1301219.26	56605.27427	3.24
2019	SF	Cranes	500	1996049.711	56097.9441	5.01
2019	SF	Excavators	50	1492087.937	267720.4352	0.78
2019	SF	Excavators	120	1942051.7	170962.4313	1.60
2019	SF	Excavators	175	4083729.192	199454.5433	2.88
2019	SF	Excavators	250	5186371.913	169479.4579	4.31
2019	SF	Excavators	500	8622009.917	187693.2052	6.47
2019	SF	Graders	50	9866.066267	1608.933164	0.86
2019	SF	Graders	120	265475.8762	19557.49221	1.91
2019	SF	Graders	175	2454016.979	109117.0007	3.17
2019	SF	Graders	250	4282443.33	138626.7346	4.35
2019	SF	Graders	500	1223415.047	27819.1738	6.19
2019	SF	Off-Highway Trucks	50	59512.38848	13426.20712	0.62
2019	SF	Off-Highway Trucks	120	72434.561	6026.055726	1.69
2019	SF	Off-Highway Trucks	175	1402354.584	63258.24552	3.12
2019	SF	Off-Highway Trucks	250	2881650.609	97916.06281	4.14
2019	SF	Off-Highway Trucks	500	12199515.91	232353.6828	7.39
2019	SF	Other Construction Equipment	50	333813.6072	51507.20534	0.91
2019	SF	Other Construction Equipment	120	1047240.19	84278.99536	1.75
2019	SF	Other Construction Equipment	175	569798.183	24616.95258	3.26
2019	SF	Other Construction Equipment	250	730628.8989	21953.71797	4.69
2019	SF	Other Construction Equipment	500	2491192.195	45519.82311	7.71
2019	SF	Pavers	50	40910.72081	6227.724346	0.92
2019	SF	Pavers	120	396270.6914	32817.64044	1.70
2019	SF	Pavers	175	538847.4765	22312.23101	3.40
2019	SF	Pavers	250	362725.6848	11135.47761	4.59
2019	SF	Pavers	500	136739.8	2771.754284	6.95
2019	SF	Rollers	50	840114.8302	153505.2586	0.77
2019	SF	Rollers	120	1312518.746	109329.7204	1.69
2019	SF	Rollers	175	1357442.456	68577.10737	2.79
2019	SF	Rollers	250	214317.2114	7280.001445	4.14
2019	SF	Rollers	500	135644.1749	2897.016273	6.59
2019	SF	Rough Terrain Forklifts	50	42805.10628	5510.389206	1.09

2019	SF	Rough Terrain Forklifts	120	3444098.558	241960.8326	2.00
2019	SF	Rough Terrain Forklifts	175	633171.9372	33146.53981	2.69
2019	SF	Rough Terrain Forklifts	250	52014.62951	1690.593316	4.33
2019	SF	Rough Terrain Forklifts	500	22033.65307	403.8683906	7.68
2019	SF	Tractors/Loaders/Backhoes	50	1258862.542	222218.4157	0.80
2019	SF	Tractors/Loaders/Backhoes	120	20196519.46	1794561.153	1.58
2019	SF	Tractors/Loaders/Backhoes	175	3494292.721	181249.9334	2.71
2019	SF	Tractors/Loaders/Backhoes	250	2034509.797	73837.20268	3.88
2019	SF	Tractors/Loaders/Backhoes	500	2714646.84	63153.46986	6.05
2019	SF	Sweepers/Scrubbers	50	387368.3918	58500.35188	0.93
2019	SF	Sweepers/Scrubbers	120	598690.6958	45984.62704	1.83
2019	SF	Sweepers/Scrubbers	175	149337.3742	5587.970172	3.76
2019	SF	Sweepers/Scrubbers	250	79590.80131	2338.247769	4.79
2019	SF	Sweepers/Scrubbers	500	22204.7926	439.0071185	7.12

*There is 1.874 pounds/liter of diesel, and 3.79 liters/gallon.

NCC = North Central Coast Air Basin; BSFC = brake specific fuel consumption.

Antioch Desal

Contra Costa County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Heavy Industry	9.60	1000sqft	0.22	9,600.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	58
Climate Zone	4			**Operational Year**	2020
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	290	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity factor adjusted per PG&E 2015.

Land Use - Site area based on project description.

Construction Phase - Construction phase information obtained from applicant.

Off-road Equipment - Equipment inventory and use provided by applicant.

Off-road Equipment - Obtained construction equipment inventory and use from applicant.

Off-road Equipment - Equipment inventory and use estimates provided by applicant.

Off-road Equipment - Equipment inventory and use obtained from applicant.

Off-road Equipment - Equipment inventory, hp, and use obtained from applicant.

Trips and VMT - Trips per day estimates provided by applicant.

Energy Use - electricity usage obtained from the applicant.

Construction Off-road Equipment Mitigation - Scenario include implementaion of mitigation requiring use of Tier 4 equipment.

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	7.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstructionPhase	NumDays	100.00	119.00

tblConstructionPhase	NumDays	100.00	280.00
tblConstructionPhase	NumDays	100.00	240.00
tblConstructionPhase	NumDays	100.00	12.00
tblConstructionPhase	NumDays	100.00	30.00
tblEnergyUse	LightingElect	3.08	0.00
tblEnergyUse	NT24E	3.70	150.69
tblEnergyUse	NT24NG	6.67	0.00
tblEnergyUse	T24E	1.48	0.00
tblEnergyUse	T24NG	19.71	0.00
tblOffRoadEquipment	HorsePower	78.00	20.00
tblOffRoadEquipment	HorsePower	158.00	300.00
tblOffRoadEquipment	HorsePower	89.00	100.00
tblOffRoadEquipment	HorsePower	84.00	250.00
tblOffRoadEquipment	HorsePower	402.00	300.00
tblOffRoadEquipment	HorsePower	84.00	10.00
tblOffRoadEquipment	HorsePower	64.00	300.00
tblOffRoadEquipment	HorsePower	78.00	5.00
tblOffRoadEquipment	HorsePower	158.00	500.00
tblOffRoadEquipment	HorsePower	89.00	100.00
tblOffRoadEquipment	HorsePower	84.00	250.00
tblOffRoadEquipment	HorsePower	402.00	500.00
tblOffRoadEquipment	HorsePower	402.00	300.00
tblOffRoadEquipment	HorsePower	84.00	10.00
tblOffRoadEquipment	HorsePower	97.00	300.00
tblOffRoadEquipment	HorsePower	78.00	5.00
tblOffRoadEquipment	HorsePower	81.00	1.00
tblOffRoadEquipment	HorsePower	231.00	500.00
tblOffRoadEquipment	HorsePower	158.00	500.00
tblOffRoadEquipment	HorsePower	89.00	100.00
tblOffRoadEquipment	HorsePower	84.00	250.00

tblOffRoadEquipment	HorsePower	402.00	500.00
tblOffRoadEquipment	HorsePower	402.00	300.00
tblOffRoadEquipment	HorsePower	84.00	10.00
tblOffRoadEquipment	HorsePower	97.00	300.00
tblOffRoadEquipment	HorsePower	78.00	5.00
tblOffRoadEquipment	HorsePower	158.00	500.00
tblOffRoadEquipment	HorsePower	402.00	300.00
tblOffRoadEquipment	HorsePower	130.00	300.00
tblOffRoadEquipment	HorsePower	8.00	25.00
tblOffRoadEquipment	HorsePower	64.00	300.00
tblOffRoadEquipment	HorsePower	97.00	300.00
tblOffRoadEquipment	HorsePower	78.00	5.00
tblOffRoadEquipment	HorsePower	158.00	500.00
tblOffRoadEquipment	HorsePower	402.00	300.00
tblOffRoadEquipment	HorsePower	130.00	300.00
tblOffRoadEquipment	HorsePower	8.00	25.00
tblOffRoadEquipment	HorsePower	64.00	300.00
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tblOffRoadEquipment	UsageHours	6.00	2.00
tblOffRoadEquipment	UsageHours	6.00	3.00
tblOffRoadEquipment	UsageHours	8.00	0.90
tblOffRoadEquipment	UsageHours	4.00	2.00
tblOffRoadEquipment	UsageHours	6.00	2.00

tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	290
tblTripsAndVMT	HaulingTripNumber	0.00	56.00
tblTripsAndVMT	HaulingTripNumber	0.00	10.00
tblTripsAndVMT	HaulingTripNumber	0.00	4.00
tblTripsAndVMT	HaulingTripNumber	0.00	46.00
tblTripsAndVMT	HaulingTripNumber	0.00	56.00
tblTripsAndVMT	VendorTripNumber	2.00	0.00
tblTripsAndVMT	VendorTripNumber	2.00	0.00
tblTripsAndVMT	VendorTripNumber	2.00	0.00
tblTripsAndVMT	VendorTripNumber	2.00	0.00
tblTripsAndVMT	VendorTripNumber	2.00	0.00
tblTripsAndVMT	WorkerTripNumber	4.00	16.00
tblTripsAndVMT	WorkerTripNumber	4.00	16.00
tblTripsAndVMT	WorkerTripNumber	4.00	12.00
tblTripsAndVMT	WorkerTripNumber	4.00	16.00
tblTripsAndVMT	WorkerTripNumber	4.00	16.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.4835	4.8592	2.8188	0.0108	0.0350	0.1701	0.2051	9.3300e-003	0.1609	0.1702	0.0000	946.7492	946.7492	0.1877	0.0000	951.4427

2020	0.0873	0.8259	0.5211	2.0200e-003	5.9200e-003	0.0293	0.0352	1.5700e-003	0.0277	0.0293	0.0000	174.2636	174.2636	0.0350	0.0000	175.1375
Maximum	**0.4835**	**4.8592**	**2.8188**	**0.0108**	**0.0350**	**0.1701**	**0.2051**	**9.3300e-003**	**0.1609**	**0.1702**	**0.0000**	**946.7492**	**946.7492**	**0.1877**	**0.0000**	**951.4427**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.1303	0.5316	4.3434	0.0108	0.0350	0.0155	0.0506	9.3300e-003	0.0155	0.0248	0.0000	946.7481	946.7481	0.1877	0.0000	951.4416
2020	0.0240	0.0953	0.8152	2.0200e-003	5.9200e-003	2.9100e-003	8.8200e-003	1.5700e-003	2.9000e-003	4.4700e-003	0.0000	174.2634	174.2634	0.0350	0.0000	175.1373
Maximum	**0.1303**	**0.5316**	**4.3434**	**0.0108**	**0.0350**	**0.0155**	**0.0506**	**9.3300e-003**	**0.0155**	**0.0248**	**0.0000**	**946.7481**	**946.7481**	**0.1877**	**0.0000**	**951.4416**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**72.98**	**88.97**	**-54.45**	**0.00**	**0.00**	**90.76**	**75.30**	**0.00**	**90.24**	**85.31**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	**Start Date**	**End Date**	**Maximum Unmitigated ROG + NOX (tons/quarter)**	**Maximum Mitigated ROG + NOX (tons/quarter)**
1	**2-4-2019**	**5-3-2019**	1.2109	0.1591
2	**5-4-2019**	**8-3-2019**	1.6940	0.2045
3	**8-4-2019**	**11-3-2019**	1.5787	0.1980
4	**11-4-2019**	**2-3-2020**	1.3009	0.1579
5	**2-4-2020**	**5-3-2020**	0.4615	0.0608
		Highest	1.6940	0.2045

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0425	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.7000e-004	1.7000e-004	0.0000	0.0000	1.8000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	190.2915	190.2915	0.0190	3.9400e-003	191.9405
Mobile	4.5700e-003	0.0217	0.0568	1.9000e-004	0.0157	1.8000e-004	0.0159	4.2100e-003	1.7000e-004	4.3900e-003	0.0000	17.0645	17.0645	6.2000e-004	0.0000	17.0801
Waste						0.0000	0.0000		0.0000	0.0000	2.4156	0.0000	2.4156	0.1428	0.0000	5.9845
Water						0.0000	0.0000		0.0000	0.0000	0.7043	1.5801	2.2844	0.0725	1.7400e-003	4.6156
Total	**0.0471**	**0.0217**	**0.0569**	**1.9000e-004**	**0.0157**	**1.8000e-004**	**0.0159**	**4.2100e-003**	**1.7000e-004**	**4.3900e-003**	**3.1199**	**208.9363**	**212.0562**	**0.2349**	**5.6800e-003**	**219.6209**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0425	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.7000e-004	1.7000e-004	0.0000	0.0000	1.8000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	190.2915	190.2915	0.0190	3.9400e-003	191.9405
Mobile	4.5700e-003	0.0217	0.0568	1.9000e-004	0.0157	1.8000e-004	0.0159	4.2100e-003	1.7000e-004	4.3900e-003	0.0000	17.0645	17.0645	6.2000e-004	0.0000	17.0801
Waste						0.0000	0.0000		0.0000	0.0000	2.4156	0.0000	2.4156	0.1428	0.0000	5.9845
Water						0.0000	0.0000		0.0000	0.0000	0.7043	1.5801	2.2844	0.0725	1.7400e-003	4.6156
Total	**0.0471**	**0.0217**	**0.0569**	**1.9000e-004**	**0.0157**	**1.8000e-004**	**0.0159**	**4.2100e-003**	**1.7000e-004**	**4.3900e-003**	**3.1199**	**208.9363**	**212.0562**	**0.2349**	**5.6800e-003**	**219.6209**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Brine Disposal Pipeline	Building Construction	2/4/2019	7/18/2019	5	119	
2	Desal Facility Construction	Building Construction	2/28/2019	3/25/2020	5	280	
3	Demolition/Construction of River Pump Station	Building Construction	3/28/2019	2/26/2020	5	240	
4	WTP Pipeline Installation	Building Construction	4/1/2019	4/16/2019	5	12	
5	Raw Water/Feed Water Connection Pipeline to WTP	Building Construction	8/29/2019	10/9/2019	5	30	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Brine Disposal Pipeline	Air Compressors	1	1.00	20	0.48
Brine Disposal Pipeline	Bore/Drill Rigs	1	0.30	221	0.50
Brine Disposal Pipeline	Excavators	1	6.00	300	0.38
Brine Disposal Pipeline	Forklifts	1	2.00	100	0.20
Brine Disposal Pipeline	Generator Sets	1	6.00	250	0.74
Brine Disposal Pipeline	Off-Highway Trucks	1	2.00	300	0.38
Brine Disposal Pipeline	Pumps	2	6.00	10	0.74
Brine Disposal Pipeline	Sweepers/Scrubbers	1	2.00	300	0.46
Desal Facility Construction	Air Compressors	1	1.00	5	0.48
Desal Facility Construction	Excavators	1	1.30	500	0.38
Desal Facility Construction	Forklifts	1	3.00	100	0.20

Desal Facility Construction	Generator Sets	1	6.00	250	0.74
Desal Facility Construction	Off-Highway Trucks	1	6.00	500	0.38
Desal Facility Construction	Off-Highway Trucks	1	2.00	300	0.38
Desal Facility Construction	Pumps	1	6.00	10	0.74
Desal Facility Construction	Tractors/Loaders/Backhoes	1	0.90	300	0.37
Demolition/Construction of River Pump Station	Air Compressors	1	4.00	5	0.48
Demolition/Construction of River Pump Station	Concrete/Industrial Saws	1	1.00	1	0.73
Demolition/Construction of River Pump Station	Cranes	1	2.00	500	0.29
Demolition/Construction of River Pump Station	Excavators	1	4.00	500	0.38
Demolition/Construction of River Pump Station	Forklifts	1	2.00	100	0.20
Demolition/Construction of River Pump Station	Generator Sets	1	6.00	250	0.74
Demolition/Construction of River Pump Station	Off-Highway Trucks	1	4.00	500	0.38
Demolition/Construction of River Pump Station	Off-Highway Trucks	1	2.00	300	0.38
Demolition/Construction of River Pump Station	Pumps	3	6.00	10	0.74
Demolition/Construction of River Pump Station	Tractors/Loaders/Backhoes	1	4.00	300	0.37
WTP Pipeline Installation	Air Compressors	1	1.00	5	0.48
WTP Pipeline Installation	Excavators	1	6.00	500	0.38
WTP Pipeline Installation	Off-Highway Trucks	1	2.00	300	0.38
WTP Pipeline Installation	Pavers	1	8.00	300	0.42
WTP Pipeline Installation	Plate Compactors	1	4.00	25	0.43
WTP Pipeline Installation	Sweepers/Scrubbers	1	4.00	300	0.46
WTP Pipeline Installation	Tractors/Loaders/Backhoes	1	4.00	300	0.37
Raw Water/Feed Water Connection Pipeline to WTP	Air Compressors	1	1.00	5	0.48
Raw Water/Feed Water Connection Pipeline to WTP	Excavators	1	6.00	500	0.38
Raw Water/Feed Water Connection Pipeline to WTP	Off-Highway Trucks	1	2.00	300	0.38
Raw Water/Feed Water Connection Pipeline to WTP	Pavers	1	8.00	300	0.42
Raw Water/Feed Water Connection Pipeline to WTP	Plate Compactors	1	4.00	25	0.43
Raw Water/Feed Water Connection Pipeline to WTP	Sweepers/Scrubbers	1	4.00	300	0.46
Raw Water/Feed Water Connection Pipeline to WTP	Tractors/Loaders/Backhoes	1	4.00	300	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Brine Disposal Pipeline	9	16.00	0.00	56.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Desal Facility Construction	8	16.00	0.00	10.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition/ Construction of River Pump Station	12	12.00	0.00	4.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
WTP Pipeline Installation	7	16.00	0.00	46.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Raw Water/Feed Water Connection Pipeline to WTP	7	16.00	0.00	56.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

3.2 Brine Disposal Pipeline - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0662	0.6642	0.3643	1.6100e-003		0.0226	0.0226		0.0218	0.0218	0.0000	138.2326	138.2326	0.0212	0.0000	138.7620
Total	**0.0662**	**0.6642**	**0.3643**	**1.6100e-003**		**0.0226**	**0.0226**		**0.0218**	**0.0218**	**0.0000**	**138.2326**	**138.2326**	**0.0212**	**0.0000**	**138.7620**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.5000e-004	8.7200e-003	1.6000e-003	2.0000e-005	4.7000e-004	3.0000e-005	5.1000e-004	1.3000e-004	3.0000e-005	1.6000e-004	0.0000	2.1445	2.1445	1.0000e-004	0.0000	2.1470
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-003	2.6200e-003	0.0268	8.0000e-005	7.5500e-003	5.0000e-005	7.6000e-003	2.0100e-003	5.0000e-005	2.0600e-003	0.0000	6.8415	6.8415	1.9000e-004	0.0000	6.8462
Total	**3.7500e-003**	**0.0113**	**0.0284**	**1.0000e-004**	**8.0200e-003**	**8.0000e-005**	**8.1100e-003**	**2.1400e-003**	**8.0000e-005**	**2.2200e-003**	**0.0000**	**8.9860**	**8.9860**	**2.9000e-004**	**0.0000**	**8.9931**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0165	0.0715	0.6125	1.6100e-003		2.2000e-003	2.2000e-003		2.2000e-003	2.2000e-003	0.0000	138.2324	138.2324	0.0212	0.0000	138.7619
Total	**0.0165**	**0.0715**	**0.6125**	**1.6100e-003**		**2.2000e-003**	**2.2000e-003**		**2.2000e-003**	**2.2000e-003**	**0.0000**	**138.2324**	**138.2324**	**0.0212**	**0.0000**	**138.7619**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Hauling	2.5000e-004	8.7200e-003	1.6000e-003	2.0000e-005	4.7000e-004	3.0000e-005	5.1000e-004	1.3000e-004	3.0000e-005	1.6000e-004	0.0000	2.1445	2.1445	1.0000e-004	0.0000	2.1470
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-003	2.6200e-003	0.0268	8.0000e-005	7.5500e-003	5.0000e-005	7.6000e-003	2.0100e-003	5.0000e-005	2.0600e-003	0.0000	6.8415	6.8415	1.9000e-004	0.0000	6.8462
Total	**3.7500e-003**	**0.0113**	**0.0284**	**1.0000e-004**	**8.0200e-003**	**8.0000e-005**	**8.1100e-003**	**2.1400e-003**	**8.0000e-005**	**2.2200e-003**	**0.0000**	**8.9860**	**8.9860**	**2.9000e-004**	**0.0000**	**8.9931**

3.3 Desal Facility Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1736	1.7719	0.9607	3.7900e-003		0.0623	0.0623		0.0589	0.0589	0.0000	331.9371	331.9371	0.0648	0.0000	333.5580
Total	**0.1736**	**1.7719**	**0.9607**	**3.7900e-003**		**0.0623**	**0.0623**		**0.0589**	**0.0589**	**0.0000**	**331.9371**	**331.9371**	**0.0648**	**0.0000**	**333.5580**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.2200e-003	2.2000e-004	0.0000	8.0000e-005	0.0000	8.0000e-005	2.0000e-005	0.0000	3.0000e-005	0.0000	0.2995	0.2995	1.0000e-005	0.0000	0.2999
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4500e-003	4.8200e-003	0.0492	1.4000e-004	0.0139	9.0000e-005	0.0140	3.7000e-003	9.0000e-005	3.7800e-003	0.0000	12.5907	12.5907	3.4000e-004	0.0000	12.5993

Total	**6.4900e-003**	**6.0400e-003**	**0.0495**	**1.4000e-004**	**0.0140**	**9.0000e-005**	**0.0141**	**3.7200e-003**	**9.0000e-005**	**3.8100e-003**	**0.0000**	**12.8902**	**12.8902**	**3.5000e-004**	**0.0000**	**12.8991**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0418	0.1811	1.5539	3.7900e-003		5.5700e-003	5.5700e-003		5.5700e-003	5.5700e-003	0.0000	331.9367	331.9367	0.0648	0.0000	333.5576
Total	**0.0418**	**0.1811**	**1.5539**	**3.7900e-003**		**5.5700e-003**	**5.5700e-003**		**5.5700e-003**	**5.5700e-003**	**0.0000**	**331.9367**	**331.9367**	**0.0648**	**0.0000**	**333.5576**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.2200e-003	2.2000e-004	0.0000	8.0000e-005	0.0000	8.0000e-005	2.0000e-005	0.0000	3.0000e-005	0.0000	0.2995	0.2995	1.0000e-005	0.0000	0.2999
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4500e-003	4.8200e-003	0.0492	1.4000e-004	0.0139	9.0000e-005	0.0140	3.7000e-003	9.0000e-005	3.7800e-003	0.0000	12.5907	12.5907	3.4000e-004	0.0000	12.5993
Total	**6.4900e-003**	**6.0400e-003**	**0.0495**	**1.4000e-004**	**0.0140**	**9.0000e-005**	**0.0141**	**3.7200e-003**	**9.0000e-005**	**3.8100e-003**	**0.0000**	**12.8902**	**12.8902**	**3.5000e-004**	**0.0000**	**12.8991**

3.3 Desal Facility Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0453	0.4367	0.2598	1.0600e-003		0.0154	0.0154		0.0146	0.0146	0.0000	91.2865	91.2865	0.0179	0.0000	91.7343
Total	**0.0453**	**0.4367**	**0.2598**	**1.0600e-003**		**0.0154**	**0.0154**		**0.0146**	**0.0146**	**0.0000**	**91.2865**	**91.2865**	**0.0179**	**0.0000**	**91.7343**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-005	3.2000e-004	6.0000e-005	0.0000	7.0000e-005	0.0000	7.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0826	0.0826	0.0000	0.0000	0.0827
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.6400e-003	1.1800e-003	0.0123	4.0000e-005	3.8700e-003	3.0000e-005	3.9000e-003	1.0300e-003	2.0000e-005	1.0500e-003	0.0000	3.3955	3.3955	8.0000e-005	0.0000	3.3976
Total	**1.6500e-003**	**1.5000e-003**	**0.0123**	**4.0000e-005**	**3.9400e-003**	**3.0000e-005**	**3.9700e-003**	**1.0500e-003**	**2.0000e-005**	**1.0700e-003**	**0.0000**	**3.4781**	**3.4781**	**8.0000e-005**	**0.0000**	**3.4802**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Off-Road	0.0116	0.0504	0.4328	1.0600e-003		1.5500e-003	1.5500e-003		1.5500e-003	1.5500e-003	0.0000	91.2864	91.2864	0.0179	0.0000	91.7342
Total	**0.0116**	**0.0504**	**0.4328**	**1.0600e-003**		**1.5500e-003**	**1.5500e-003**		**1.5500e-003**	**1.5500e-003**	**0.0000**	**91.2864**	**91.2864**	**0.0179**	**0.0000**	**91.7342**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-005	3.2000e-004	6.0000e-005	0.0000	7.0000e-005	0.0000	7.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0826	0.0826	0.0000	0.0000	0.0827
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.6400e-003	1.1800e-003	0.0123	4.0000e-005	3.8700e-003	3.0000e-005	3.9000e-003	1.0300e-003	2.0000e-005	1.0500e-003	0.0000	3.3955	3.3955	8.0000e-005	0.0000	3.3976
Total	**1.6500e-003**	**1.5000e-003**	**0.0123**	**4.0000e-005**	**3.9400e-003**	**3.0000e-005**	**3.9700e-003**	**1.0500e-003**	**2.0000e-005**	**1.0700e-003**	**0.0000**	**3.4781**	**3.4781**	**8.0000e-005**	**0.0000**	**3.4802**

3.4 Demolition/Construction of River Pump Station - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2041	2.1088	1.2210	4.3900e-003		0.0753	0.0753		0.0711	0.0711	0.0000	382.8584	382.8584	0.0826	0.0000	384.9240
Total	**0.2041**	**2.1088**	**1.2210**	**4.3900e-003**		**0.0753**	**0.0753**		**0.0711**	**0.0711**	**0.0000**	**382.8584**	**382.8584**	**0.0826**	**0.0000**	**384.9240**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	5.2000e-004	9.0000e-005	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1270	0.1270	1.0000e-005	0.0000	0.1272
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3900e-003	3.2900e-003	0.0336	9.0000e-005	9.4700e-003	6.0000e-005	9.5300e-003	2.5200e-003	6.0000e-005	2.5800e-003	0.0000	8.5806	8.5806	2.3000e-004	0.0000	8.5865
Total	**4.4100e-003**	**3.8100e-003**	**0.0337**	**9.0000e-005**	**9.5000e-003**	**6.0000e-005**	**9.5600e-003**	**2.5300e-003**	**6.0000e-005**	**2.5900e-003**	**0.0000**	**8.7076**	**8.7076**	**2.4000e-004**	**0.0000**	**8.7136**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0478	0.2072	1.7659	4.3900e-003		6.3700e-003	6.3700e-003		6.3700e-003	6.3700e-003	0.0000	382.8580	382.8580	0.0826	0.0000	384.9235
Total	**0.0478**	**0.2072**	**1.7659**	**4.3900e-003**		**6.3700e-003**	**6.3700e-003**		**6.3700e-003**	**6.3700e-003**	**0.0000**	**382.8580**	**382.8580**	**0.0826**	**0.0000**	**384.9235**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	5.2000e-004	9.0000e-005	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1270	0.1270	1.0000e-005	0.0000	0.1272
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3900e-003	3.2900e-003	0.0336	9.0000e-005	9.4700e-003	6.0000e-005	9.5300e-003	2.5200e-003	6.0000e-005	2.5800e-003	0.0000	8.5806	8.5806	2.3000e-004	0.0000	8.5865
Total	**4.4100e-003**	**3.8100e-003**	**0.0337**	**9.0000e-005**	**9.5000e-003**	**6.0000e-005**	**9.5600e-003**	**2.5300e-003**	**6.0000e-005**	**2.5900e-003**	**0.0000**	**8.7076**	**8.7076**	**2.4000e-004**	**0.0000**	**8.7136**

3.4 Demolition/Construction of River Pump Station - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0395	0.3871	0.2427	9.0000e-004		0.0139	0.0139		0.0131	0.0131	0.0000	77.7615	77.7615	0.0169	0.0000	78.1844
Total	**0.0395**	**0.3871**	**0.2427**	**9.0000e-004**		**0.0139**	**0.0139**		**0.0131**	**0.0131**	**0.0000**	**77.7615**	**77.7615**	**0.0169**	**0.0000**	**78.1844**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	1.0000e-004	2.0000e-005	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0259	0.0259	0.0000	0.0000	0.0259

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.3000e-004	6.0000e-004	6.1800e-003	2.0000e-005	1.9500e-003	1.0000e-005	1.9600e-003	5.2000e-004	1.0000e-005	5.3000e-004	0.0000	1.7117	1.7117	4.0000e-005	0.0000	1.7127
Total	**8.3000e-004**	**7.0000e-004**	**6.2000e-003**	**2.0000e-005**	**1.9800e-003**	**1.0000e-005**	**1.9900e-003**	**5.3000e-004**	**1.0000e-005**	**5.4000e-004**	**0.0000**	**1.7376**	**1.7376**	**4.0000e-005**	**0.0000**	**1.7386**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	9.8500e-003	0.0427	0.3638	9.0000e-004		1.3100e-003	1.3100e-003		1.3100e-003	1.3100e-003	0.0000	77.7614	77.7614	0.0169	0.0000	78.1843
Total	**9.8500e-003**	**0.0427**	**0.3638**	**9.0000e-004**		**1.3100e-003**	**1.3100e-003**		**1.3100e-003**	**1.3100e-003**	**0.0000**	**77.7614**	**77.7614**	**0.0169**	**0.0000**	**78.1843**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	1.0000e-004	2.0000e-005	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0259	0.0259	0.0000	0.0000	0.0259
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.3000e-004	6.0000e-004	6.1800e-003	2.0000e-005	1.9500e-003	1.0000e-005	1.9600e-003	5.2000e-004	1.0000e-005	5.3000e-004	0.0000	1.7117	1.7117	4.0000e-005	0.0000	1.7127
Total	**8.3000e-004**	**7.0000e-004**	**6.2000e-003**	**2.0000e-005**	**1.9800e-003**	**1.0000e-005**	**1.9900e-003**	**5.3000e-004**	**1.0000e-005**	**5.4000e-004**	**0.0000**	**1.7376**	**1.7376**	**4.0000e-005**	**0.0000**	**1.7386**

3.5 WTP Pipeline Installation - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.6700e-003	0.0789	0.0426	1.8000e-004		2.7200e-003	2.7200e-003		2.5100e-003	2.5100e-003	0.0000	16.2333	16.2333	5.1400e-003	0.0000	16.3617
Total	**6.6700e-003**	**0.0789**	**0.0426**	**1.8000e-004**		**2.7200e-003**	**2.7200e-003**		**2.5100e-003**	**2.5100e-003**	**0.0000**	**16.2333**	**16.2333**	**5.1400e-003**	**0.0000**	**16.3617**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.1000e-004	7.1600e-003	1.3100e-003	2.0000e-005	3.9000e-004	3.0000e-005	4.2000e-004	1.1000e-004	3.0000e-005	1.3000e-004	0.0000	1.7615	1.7615	8.0000e-005	0.0000	1.7636
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-004	2.6000e-004	2.7000e-003	1.0000e-005	7.6000e-004	1.0000e-005	7.7000e-004	2.0000e-004	0.0000	2.1000e-004	0.0000	0.6899	0.6899	2.0000e-005	0.0000	0.6904
Total	**5.6000e-004**	**7.4200e-003**	**4.0100e-003**	**3.0000e-005**	**1.1500e-003**	**4.0000e-005**	**1.1900e-003**	**3.1000e-004**	**3.0000e-005**	**3.4000e-004**	**0.0000**	**2.4514**	**2.4514**	**1.0000e-004**	**0.0000**	**2.4539**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.2400e-003	9.7000e-003	0.0821	1.8000e-004		3.0000e-004	3.0000e-004		3.0000e-004	3.0000e-004	0.0000	16.2333	16.2333	5.1400e-003	0.0000	16.3617
Total	**2.2400e-003**	**9.7000e-003**	**0.0821**	**1.8000e-004**		**3.0000e-004**	**3.0000e-004**		**3.0000e-004**	**3.0000e-004**	**0.0000**	**16.2333**	**16.2333**	**5.1400e-003**	**0.0000**	**16.3617**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.1000e-004	7.1600e-003	1.3100e-003	2.0000e-005	3.9000e-004	3.0000e-005	4.2000e-004	1.1000e-004	3.0000e-005	1.3000e-004	0.0000	1.7615	1.7615	8.0000e-005	0.0000	1.7636
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-004	2.6000e-004	2.7000e-003	1.0000e-005	7.6000e-004	1.0000e-005	7.7000e-004	2.0000e-004	0.0000	2.1000e-004	0.0000	0.6899	0.6899	2.0000e-005	0.0000	0.6904
Total	**5.6000e-004**	**7.4200e-003**	**4.0100e-003**	**3.0000e-005**	**1.1500e-003**	**4.0000e-005**	**1.1900e-003**	**3.1000e-004**	**3.0000e-005**	**3.4000e-004**	**0.0000**	**2.4514**	**2.4514**	**1.0000e-004**	**0.0000**	**2.4539**

3.6 Raw Water/Feed Water Connection Pipeline to WTP - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0167	0.1973	0.1064	4.5000e-004		6.8100e-003	6.8100e-003		6.2700e-003	6.2700e-003	0.0000	40.5833	40.5833	0.0128	0.0000	40.9043

Total	**0.0167**	**0.1973**	**0.1064**	**4.5000e-004**		**6.8100e-003**	**6.8100e-003**		**6.2700e-003**	**6.2700e-003**	**0.0000**	**40.5833**	**40.5833**	**0.0128**	**0.0000**	**40.9043**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.5000e-004	8.7200e-003	1.6000e-003	2.0000e-005	4.7000e-004	3.0000e-005	5.1000e-004	1.3000e-004	3.0000e-005	1.6000e-004	0.0000	2.1445	2.1445	1.0000e-004	0.0000	2.1470
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.8000e-004	6.6000e-004	6.7400e-003	2.0000e-005	1.9000e-003	1.0000e-005	1.9200e-003	5.1000e-004	1.0000e-005	5.2000e-004	0.0000	1.7248	1.7248	5.0000e-005	0.0000	1.7259
Total	**1.1300e-003**	**9.3800e-003**	**8.3400e-003**	**4.0000e-005**	**2.3700e-003**	**4.0000e-005**	**2.4300e-003**	**6.4000e-004**	**4.0000e-005**	**6.8000e-004**	**0.0000**	**3.8692**	**3.8692**	**1.5000e-004**	**0.0000**	**3.8729**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.6000e-003	0.0243	0.2052	4.5000e-004		7.5000e-004	7.5000e-004		7.5000e-004	7.5000e-004	0.0000	40.5832	40.5832	0.0128	0.0000	40.9042
Total	**5.6000e-003**	**0.0243**	**0.2052**	**4.5000e-004**		**7.5000e-004**	**7.5000e-004**		**7.5000e-004**	**7.5000e-004**	**0.0000**	**40.5832**	**40.5832**	**0.0128**	**0.0000**	**40.9042**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.5000e-004	8.7200e-003	1.6000e-003	2.0000e-005	4.7000e-004	3.0000e-005	5.1000e-004	1.3000e-004	3.0000e-005	1.6000e-004	0.0000	2.1445	2.1445	1.0000e-004	0.0000	2.1470
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.8000e-004	6.6000e-004	6.7400e-003	2.0000e-005	1.9000e-003	1.0000e-005	1.9200e-003	5.1000e-004	1.0000e-005	5.2000e-004	0.0000	1.7248	1.7248	5.0000e-005	0.0000	1.7259
Total	**1.1300e-003**	**9.3800e-003**	**8.3400e-003**	**4.0000e-005**	**2.3700e-003**	**4.0000e-005**	**2.4300e-003**	**6.4000e-004**	**4.0000e-005**	**6.8000e-004**	**0.0000**	**3.8692**	**3.8692**	**1.5000e-004**	**0.0000**	**3.8729**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	4.5700e-003	0.0217	0.0568	1.9000e-004	0.0157	1.8000e-004	0.0159	4.2100e-003	1.7000e-004	4.3900e-003	0.0000	17.0645	17.0645	6.2000e-004	0.0000	17.0801
Unmitigated	4.5700e-003	0.0217	0.0568	1.9000e-004	0.0157	1.8000e-004	0.0159	4.2100e-003	1.7000e-004	4.3900e-003	0.0000	17.0645	17.0645	6.2000e-004	0.0000	17.0801

4.2 Trip Summary Information

	Average Daily Trip Rate	Unmitigated	Mitigated

Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Heavy Industry	14.40	14.40	14.40	42,041	42,041
Total	14.40	14.40	14.40	42,041	42,041

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Heavy Industry	9.50	7.30	7.30	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Heavy Industry	0.577244	0.040114	0.186710	0.126359	0.018084	0.005120	0.010527	0.023222	0.001588	0.001850	0.005513	0.002759	0.000910

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	190.2915	190.2915	0.0190	3.9400e-003	191.9405
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	190.2915	190.2915	0.0190	3.9400e-003	191.9405
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Heavy Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Heavy Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			

General Heavy Industry	1.44662e+006	190.2915	0.0190	3.9400e-003	191.9405
Total		**190.2915**	**0.0190**	**3.9400e-003**	**191.9405**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Heavy Industry	1.44662e+006	190.2915	0.0190	3.9400e-003	191.9405
Total		**190.2915**	**0.0190**	**3.9400e-003**	**191.9405**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0425	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.7000e-004	1.7000e-004	0.0000	0.0000	1.8000e-004
Unmitigated	0.0425	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.7000e-004	1.7000e-004	0.0000	0.0000	1.8000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	5.0100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0375					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.7000e-004	1.7000e-004	0.0000	0.0000	1.8000e-004
Total	**0.0425**	**0.0000**	**9.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.7000e-004**	**1.7000e-004**	**0.0000**	**0.0000**	**1.8000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	5.0100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0375					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	9.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.7000e-004	1.7000e-004	0.0000	0.0000	1.8000e-004
Total	**0.0425**	**0.0000**	**9.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.7000e-004**	**1.7000e-004**	**0.0000**	**0.0000**	**1.8000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	2.2844	0.0725	1.7400e-003	4.6156
Unmitigated	2.2844	0.0725	1.7400e-003	4.6156

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Heavy Industry	2.22 / 0	2.2844	0.0725	1.7400e-003	4.6156
Total		**2.2844**	**0.0725**	**1.7400e-003**	**4.6156**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Heavy Industry	2.22 / 0	2.2844	0.0725	1.7400e-003	4.6156
Total		**2.2844**	**0.0725**	**1.7400e-003**	**4.6156**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	2.4156	0.1428	0.0000	5.9845
Unmitigated	2.4156	0.1428	0.0000	5.9845

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			

General Heavy Industry	11.9	2.4156	0.1428	0.0000	5.9845
Total		**2.4156**	**0.1428**	**0.0000**	**5.9845**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Heavy Industry	11.9	2.4156	0.1428	0.0000	5.9845
Total		**2.4156**	**0.1428**	**0.0000**	**5.9845**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

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Construction Health Risk Assessment

date	January 25, 2018
to	Matthew Fagundes, ESA
from	Brian Schuster, ESA
subject	Brackish Water Desalination Project – Construction Period Health Risk Assessment (HRA)

Executive Summary

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 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.

Construction of the proposed project would generate diesel particulate matter (DPM) emissions from operation of off-road equipment and heavy duty trucks. Diesel particulate matter is recognized as a carcinogen by the Office of Environmental Health Hazard Assessment (OEHHA) and based on Proposition 65. Proposition 65, also known as the Safe Drinking Water and Toxic Enforcement Act of 1986, requires California to maintain and update a list of chemicals known to cause cancer. In March 2015, OEHHA revised its health risk assessment guidelines to consider short-term emissions such as construction activities, while clarifying that, "[t]here is considerable uncertainty in trying to evaluate the cancer risk from projects that will only last a small fraction of a lifetime" (OEHHA 2015). The Bay Area Air Quality Management District (BAAQMD) health risk assessment (HRA) Guidelines generally conform to the Health Risk Assessment Guidelines adopted by OEHHA in evaluating construction impacts in environmental documents prepared pursuant to the California Environmental Quality Act (CEQA) (BAAQMD, 2017). Consequently, ESA has prepared a screening-level construction period HRA for the proposed project based on the revised OEHHA guidelines.

Table ES-1, Maximum Increase in Health Risk from Construction Emissions for Off-Site Residential Sensitive Receptors, summarizes the incremental increase in lifetime cancer risk, non-cancer chronic hazards, and annual average fine particulate matter (PM2.5) concentrations for the maximally exposed residential and school receptor that would be caused by construction of the proposed project as proposed, and by construction of the proposed project with incorporation of mitigation. As shown in the table, the proposed project would result in a significant cancer risk and annual average PM2.5 concentrations for residential land uses in the vicinity of both the pump station site and the desalination facility site. However, with mitigation, the cancer risk and annual average PM2.5 concentrations for residential land uses would be below the BAAQMD-recommended project threshold of 10 in one million for cancer and 0.3 micrograms per cubic meter (µg/m^3) for PM2.5 (BAAQMD, 2017).

TABLE ES-1
MAXIMUM INCREASE IN HEALTH RISK FROM CONSTRUCTION EMISSIONS FOR OFF-SITE RESIDENTIAL SENSITIVE RECEPTORS

Scenario / Project Component	Maximum Cancer Risk (# in one million)	Maximum Non-Cancer Risk (Chronic Hazard Index)	Maximum Annual Average PM2.5 Concentration (µ/m^3)
Unmitigated			
River Pump Station	101.2	0.19	0.91
Desalination Facility	87.0	0.14	0.66
BAAQMD Threshold	**10**	**1**	**0.3**
Exceeds Threshold?			
River Pump Station	Yes	No	Yes
Desalination Facility	Yes	No	Yes
Mitigated			
River Pump Station	8.7	0.02	0.08
Desalination Facility	8.0	0.01	0.06
BAAQMD Threshold	**10**	**1**	**0.3**
Exceeds Threshold?			
River Pump Station	No	No	No
Desalination Facility	No	No	No

Introduction

The City proposes to construct, operate, and maintain the Antioch Brackish Water Desalination 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 mgd of desalinated product water.

Construction of the proposed project would result in emissions of DPM resulting from operation of equipment and heavy duty trucks. Diesel exhaust is a complex mixture of pollutants, including more than 40 cancer-causing substances in addition to very small carbon particles, or "soot" coated with numerous organic compounds. In 1998, California identified DPM as a toxic air contaminant (TAC) based on its potential to cause cancer (CARB, 1998). Other agencies, such as the National Toxicology Program, the U.S. Environmental Protection Agency, and the National Institute of Occupational Safety and Health, concluded that exposure to diesel exhaust likely causes cancer (CARB, 2016). The most recent assessment (2012) came from the World Health Organization's International Agency for Research on Cancer (IARC). IARC's extensive literature review led to the conclusion that diesel engine exhaust is "carcinogenic to humans," thereby substantiating and further strengthening California's earlier TAC determination (CARB, 2016).

The proposed project consists of the following components:

1. New intake pump station and fish screen to replace existing river intake facilities;
2. 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;
3. 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; and
4. Brine disposal pipeline and connection to Delta Diablo's Wastewater Treatment Plant (WWTP) outfall.

Construction health risks were calculated for component 1 (river pump station) and component 3 (desalination facility) for sensitive receptor locations within 1,000 feet of construction activities, per BAAQMD CEQA guidelines, *California Environmental Quality Act: Air Quality Guidelines* (BAAQMD, 2017). Components 2 and 4 would involve construction activities along the entire pipeline at a rate of 100-200 feet per day, so no single receptor within 1,000 feet of pipeline construction activities would be exposed to TAC emissions for more than a few days. Therefore, health risk impacts associated with these components are expected to be less than significant.

In March 2015, the OEHHA adopted a revised guidance manual for use in the Air Toxics Hot Spots Program or for the permitting of existing, new, or modified stationary sources, the *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments*. Unlike previous iterations of this manual, the revised manual provides considerations for short-term temporary exposure for durations as short as two months, such as during construction activities, while noting that there is "considerable uncertainty in trying to evaluate the cancer risk from projects that will only last a small fraction of a lifetime." The revised OEHHA's guidance also considers more conservative assumptions and updated scientific research. Health risk impacts calculated in accordance with the OEHHA's revised manual are approximately two to ten times higher than those calculated in accordance with the previous methodology. In accordance with Regulation 2-5-402, the BAAQMD HRA Guidelines generally conform to the Health Risk Assessment Guidelines adopted by OEHHA for use in the Air Toxics Hot Spots Program (BAAQMD, 2016).

A screening-level HRA was conducted to estimate the health risk impact associated with construction of the proposed project. The methodology used to evaluate the health risks from on-site construction activities is summarized below, along with the results of the HRA. Due to the short-term nature of construction activities, the screening-level approach is appropriate to estimate the worst-case health risks associated with project construction.

Methods

The methods and assumptions used in this HRA are consistent with the guidance recommended by OEHHA's *Air Toxic Hot Spots Program Risk Assessment Guidelines* (2015), the BAAQMD's *Recommended Methods for Screening and Modeling Local Risks and Hazards* (2012), and the BAAQMD's *Air Toxics NSR Program Health Risk Assessment Guidelines* (2016). The OEHHA methodology used in this assessment uses a dose-response assessment to characterize risk from cancer due to inhaled TACs. Refer to Appendix A for the calculation and modeling files used in the screening HRA.

Based on the OEHHA guidance, the evaluation of potential health risks uses the following standard four-step risk assessment process:

1. hazard identification;
2. exposure assessment;
3. dose-response assessment; and
4. risk characterization.

Each step is described in detail below.

Hazard Identification

The hazard identification process is undertaken to determine what TACs would potentially be present in the assessment area, and if present, identifies what the pollutants of concern are along with their potential adverse health effects. In this HRA, the primary hazard is DPM emissions from operation of off-road construction equipment. DPM from heavy duty trucks was not considered, since the vast majority of truck DPM emissions would occur along the truck haul routes away from the sensitive receptors surrounding the proposed project sites. In addition, total on-road truck emissions for all travel locations are minor compared to off-road construction equipment emissions (on-road truck emissions represent approximately 0.2 percent of total DPM emissions from construction).

DPM historically has been used as a surrogate measure of exposure for whole diesel exhaust emissions. Diesel exhaust is a complex mixture of thousands of gases and fine particles (commonly known as soot). Diesel exhaust particles and gases are suspended in the air due to thermal buoyancy and the small size of the particles. The composition of diesel exhaust varies depending on engine type, operating conditions, fuel composition, lubricating oil, and presence of an emission control system. One of the main characteristics of diesel exhaust is the release of particles at a relative rate approximately 20 times greater than from gasoline exhaust, on an equivalent fuel basis. Diesel particulates are mainly aggregates of spherical carbon particles coated with inorganic and organic substances. The inorganic fraction primarily consists of small carbon (elemental carbon) particles ranging from 0.01 to 0.08 micron in diameter. The organic fraction consists of soluble organic compounds (CARB 1998).

Exposure Assessment

The degree of the residences exposure to DPM from project construction activities was evaluated under the exposure assessment portion of the HRA. This assessment involves the quantification of DPM emissions and dispersion modeling. The amount of DPM emissions generated by construction activities was determined using particulate matter with an aerodynamic diameter equal to or less than 10 microns (PM10) from diesel exhaust as a surrogate. OEHHA guidance indicates that the cancer potency factor to be used to evaluate cancer risks were developed based on whole (gas and particulate matter) diesel exhaust, and that the surrogate for whole diesel exhaust is DPM, with PM10 serving as the basis for the potential risk calculations (OEHHA, 2003). In addition to evaluating the effects of TAC concentrations, this screening HRA also evaluated annual average exhaust PM2.5 concentrations. This is consistent with BAAQMD's CEQA Guidelines, which indicate that PM2.5 be evaluated in community-scale impacts of air pollution based on scientific studies and recommendations by the Bay Area Health Directors to the BAAQMD's Advisory Council (BAAQMD, 2017).

The greatest potential for TAC emissions would be related to DPM emissions associated with off-road heavy equipment operations during demolition, grading and excavation, and construction activities. The potential exposure through other pathways (e.g., ingestion) requires substance and site-specific data, and the specific parameters for DPM are not known for these pathways (CARB, 1998). OEHHA developed necessary data to evaluate carcinogenicity of DPM through the inhalation pathway only. Once determined, the dose is multiplied by the compound-specific inhalation cancer potency factor to derive the cancer risk estimate. The dose takes into account the concentration at a sensitive receptor. The cancer potency factor is compound-specific.

Emissions Inventory

Emissions analyzed in the HRA were based on the air quality emissions estimates for the project prepared for the Draft Environmental Impact Report (DEIR). The construction emissions were estimated using the BAAQMD-approved California Emissions Estimator Model (CalEEMod) model (version 2016.3.2). The air quality analysis prepared for the DEIR estimated maximum daily emissions for each construction phase. The construction emissions used in this HRA assumed the same construction schedule and equipment types as the analysis prepared for the DEIR.

The emissions estimates represent the average daily emissions from each phase that would be expected from construction of the proposed project using annual average daily heavy-duty construction equipment activity levels. For the purposes of this quantitative construction HRA, the use of average daily emissions to estimate health risks results in a reasonable approximation of impacts because construction-related health risks are calculated based on long-term emissions and not short-term maximum daily emissions.

The US Environmental Protection Agency (USEPA) sets emissions standards for off-road (construction) equipment ranging from Tier 0 through Tier 4. Tier 4 emissions compliant equipment is the most stringent standard and is required for model years 2015 and newer. The proposed project evaluated impacts under an unmitigated scenario where emissions were uncontrolled and a mitigated scenario where construction equipment would be compliant with Tier 4 interim emissions standards.

For the river pump station, total unmitigated (average fleet mix) DPM and PM2.5 emissions are 178.4 pounds and 168.4 pounds, respectively; total mitigated (Tier 4) DPM and PM2.5 emissions are 15.4 pounds each. For the desalination facility, total unmitigated DPM and PM2.5 emissions are 155.4 pounds and 147.0, respectively; total mitigated DPM and PM2.5 emissions are 14.2 pounds each.

Emission Rates

Because each emission source was modeled separately within AERSCREEN (see section below), ESA used a unitized emission rate concept for each source, where each source is modeled with a unitized emission rate of 1 gram/second (g/s). The modeled concentration at each receptor ([μ/m^3]/[g/s]) represents a "dispersion factor," which was then multiplied by the actual emission rate of each source to determine actual concentrations, and the final result from all the sources was superimposed. This approach is called the "Summation Concept," where the concentration and deposition fluxes at each receptor are the linear addition of the resulting values from each source.

Actual emission rates from construction activities were based on the anticipated hours of activity for each source and other information as described in the *Emissions Inventory* section above. A total emission rate in terms of grams per second was calculated for each emission source to multiply with the AERSCREEN dispersion factors to estimate actual concentrations for each source. The emission rates would vary day to day, with some days having no emissions. For simplicity, the model assumed a constant emission rate during an entire year, and is based on the total duration of construction activities (390 calendar days or 1.07 years for the desalination facility and 334 calendar days or 0.92 years for the river pump station), 24 hours per day, and 3,600 seconds per hour, consistent with AERSCREEN dispersion parameters.

Dispersion Modeling

Dispersion modeling predicts the air pollutant concentrations due to emissions from a source at defined receptor point locations. Dispersion modeling was performed using the USEPA approved AERSCREEN model. The model estimates "worst-case" 1-hour concentrations for a single source. AERSCREEN is based on the American Meteorological Society/USEPA regulatory air dispersion model (AERMOD version 9.3.0). AERSCREEN is intended to produce concentration estimates that are equal to or greater than the estimates produced by AERMOD with a fully developed set of meteorological and terrain data, but the degree of conservatism will vary depending on the application. The AERSCREEN model requires numerous inputs, such as general meteorological data, source parameters, topographical data, and receptor characteristics. Where project-specific information is not available, ESA used default parameter sets that are designed to produce conservative (i.e., overestimates of) air concentrations (USEPA 2016a, 2016b). **Table 1**, **Overall AERSCREEN Modeling**

Parameters, summarizes the overall modeling parameters used in AERSCREEN. For values not listed, defaults were used. Refer to Appendix A for the AERSCREEN modeling outputs used in the screening HRA.

TABLE 1
OVERALL AERSCREEN MODELING PARAMETERS

Pathway	Description	Parameter
Control	Rural/Urban	Urban
	Urban Population	110,898 [a]
	Model Version	AERSCREEN v 16216
Receptor	Receptor Height	1.5 m [b]
Meteorology	Minimum ambient temperature	37° F
	Maximum ambient temperature	91° F
	Dominant surface profile	7 (Urban)
	Dominant climate profile	1 (Average Moisture)

NOTES:

[a] For July 1, 2017, Antioch City, California (US Census Bureau, 2018).

[b] From BAAQMD (2012)

ABBREVIATIONS: m = meters; F = Fahrenheit

SOURCES:

1. United States Census Bureau. 2018. QuickFacts: Antioch city, California. Available at https://www.census.gov/quickfacts/fact/table/antiochcitycalifornia,US/PST045217. Accessed January 2018.
2. Bay Area Air Quality Management District. 2012. *Recommended Methods for Screening and Modeling Local Risks and Hazards*. Available at http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/risk-modeling-approach-may-2012.pdf. Accessed January 2018.

Source Parameters

Source parameters are required to model the dispersion of emissions. Off-road construction equipment was modeled as an area source within AERSCREEN using the same release parameters used in the San Francisco Citywide HRA, which evaluates the cumulative lifetime cancer risks and annual average exhaust $PM_{2.5}$ concentrations from existing known sources of air pollution as part of the development of a Community Risk Reduction Plan (CRRP) (referred to as the CRRP-HRA). Parameters from the CRRP-HRA include a release height of 3.89 meters and an initial vertical dimension of 1.4 meters (BAAQMD, SF DPH & SF Planning, 2012). Construction activities at the pump station site were modeled as a single area source occupying 1.7-acres (443 by 164 feet = 72,431 square feet). Construction of the desalination facility was modeled with a single area source occupying 1.8-acres (495 by 156 feet = 77,105 square feet). **Table 2**, **Source Modeling Parameters for Off-Road Construction Equipment**, summarizes the source modeling parameters used in AERSCREEN. For values not listed, AERSCREEN defaults were used.

TABLE 2
SOURCE MODELING PARAMETERS FOR OFF-ROAD CONSTRUCTION EQUIPMENT

Source	Project Component	Source Type	Source Dimension [m]	Number of Sources	Release Height [m]	Initial Vertical Dimension [m]
Off-Road Construction Equipment	River Pump Station	Area	135 x 50	1	3.89	1.4
	Desalination Facility	Area	154 x 47	1	3.89	1.4

Sensitive Receptors

Residential sensitive receptors were assumed to be located 50 feet east of the pump station site. There are no schools or daycares within 1,000 feet of this site. During construction of the desalination facility, residential sensitive receptors may be located within 30 feet of construction activities (to the west and south). The Sutter Elementary School is located 1,300 feet south of the site; although this is beyond 1,000 feet, this school receptor was modeled to determine the health risk from the school closest to the proposed project. Receptor heights were set at 1.5 meters to represent flagpole receptor concentrations, consistent with BAAQMD modeling guidance (BAAQMD, 2012). The proposed project does not include any residential uses and will not include any sensitive receptors on site. Consequently, no onsite receptors were modeled.

Dose-Response Assessment

The dose-response assessment is the process of characterizing the relationship between exposure to diesel exhaust and the incidence of an adverse health effect in exposed populations.

The estimation of potential inhalation cancer risk posed by exposure to DPM requires a cancer potency factor. Cancer potency factors are expressed as the upper bound probability of developing cancer assuming continuous lifetime exposure to diesel exhaust at a dose of one milligram per kilogram of body weight, and are expressed in units of inverse dose as a potency slope (i.e., $[mg/kg/day]^{-1}$). A cancer potency factor when multiplied by the dose of a carcinogen gives the associated lifetime cancer risk. OEHHA’s recommended cancer potency factor for DPM is 1.1 $(mg/kg/day)^{-1}$. The estimation of potential inhalation chronic non-cancer effects posed by exposure to DPM requires a chronic reference exposure level (REL). A chronic REL is a concentration level (that is expressed in units of $\mu g/m^3$ for inhalation exposures), at or below which no adverse health effects are anticipated following long-term exposure. OEEHA’s recommended chronic REL for DPM is 5 $\mu g/m^3$ (CARB & OEHHA, 2017). The chronic hazard index target organ for DPM is the respiratory system.

Risk Characterization

Risk characterization combines the maximum annual average ground-level DPM concentration from the exposure assessment and the cancer potency factor and chronic REL from the dose-response analysis to estimate the potential inhalation cancer risk from exposure to DPM emissions.

In performing health risk calculations, carcinogenic compounds are not considered to have threshold levels (i.e., dose levels below which there are no risks). Any exposure, therefore, will have some associated risk. Incremental health risks associated with exposure to carcinogenic compounds is defined in terms of the probability of developing cancer as a result of exposure to a chemical at a given concentration. Under a deterministic approach (i.e., point estimate methodology), the cancer risk probability is determined by multiplying the chemical’s annual concentration by its unit risk factor (URF). The URF for DPM recommended by the Scientific Review Panel[1] is 3.0×10^{-4} $\mu g/m^3$ (CARB, 1998). This value corresponds to a Cancer Potency Factor (CPF) of 1.1 per milligram/kilogram (body weight) per day (mg/kg(bw)-day) (CARB & OEHHA, 2017). The URF for DPM means that for receptors with an annual average concentration of 1 $\mu g/m^3$ in the ambient air, the probability of

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[1] The Scientific Review Panel is charged with evaluating the risk assessments of substances proposed for identification as toxic air contaminants by CARB, OEHHA, and the Department of Pesticide Regulation (DPR), and the review of guidelines prepared by OEHHA.

contracting cancer over a 70-year lifetime of exposure is 300 in 1 million. The URF also assumes that a person is exposed continuously for a 70-year lifetime. This approach for calculating cancer risk is intended to result in conservative (i.e., health protective) estimates of health impacts and is used for assessing risks to sensitive receptors. The estimation of cancer risk generally uses the following algorithms (OEHHA, 2015):

Cancer Risk = Dose inhalation × Inhalation CPF × ASF × ED/AT × FAH (Equation 1)

Where:

Cancer Risk = residential inhalation cancer risk

Dose inhalation (mg/kg-day) = C_{AIR} × DBR × A × EF × 10^{-6} (Equation 2)

Inhalation CPF = inhalation cancer potency factor ($[\text{mg/kg/day}]^{-1}$)

ASF = age sensitivity factor for a specified age group (unitless)

ED = exposure duration for a specified age group (years)

AT = averaging time period over which exposure is averaged in days (years)

FAH = fraction of time at home (unitless)

Where:

C_{AIR} = concentration of compound in air in micrograms per cubic meter ($\mu g/m^3$)

DBR = daily breathing rate in liter per kilogram of body weight per day (L/kg-body weight/day)

A = inhalation absorption factor (1 for DPM, unitless)

EF = exposure frequency in days per year (unitless, days/365 days)

10^{-6} = micrograms to milligrams conversion, liters to cubic meters conversion

The OEHHA-recommended values for the parameters listed above were used in the HRA analysis. The daily breathing rate (DBR) used in the analysis was based on OEHHA recommendations, which vary depending on age, as shown in **Table 3, Daily Breathing Rates, Fraction of Time at Home, and Age Sensitivity Factors**. The recommended residential exposure frequency (EF) is 350 days per year, which is equivalent to 0.96 (350 days / 365 days a year). The recommended school exposure frequency (EF) is 180 days per year, which is equivalent to 0.49 (180 days / 365 days a year). The inhalation absorption factor (A) is assumed to be 1 for inhalation based risk assessment. As indicated in Equation 1 above, each age group has different exposure parameters that require cancer risk to be calculated separately for each age group. Values for fraction of time at home (FAH) also vary depending on age, as shown in Table 3. Once dose is calculated, cancer risk is calculated by accounting for cancer potency of the specific pollutant, and the age sensitivity factor (ASF), which also varies by age as shown in Table 3.

TABLE 3
DAILY BREATHING RATES, FRACTION OF TIME AT HOME, AND AGE SENSITIVITY FACTORS

Parameter	3rd Trimester	Age 0 < 2	Age 2 < 9
Daily Breathing Rate (DBR) (L/kg-body weight/day)			
Residential Child Receptor [a]	361	1,090	n/a
School Receptor [b]	n/a	n/a	640
Exposure Frequency (EF)			
Residential Child Receptor [c]	0.96	0.96	0.96
School Receptor [d]	0.49	0.49	0.49
Fraction of Time at Home (FAH) for residential receptors [e]	1	0.85	0.72
Age Sensitivity Factor (ASF) [f]	10	10	3

NOTES:

[a] Daily breathing rate for residential receptor is based on the OEHHA 95th percentile values (Table 5.6). Since total exposure is 390 days, the 2<9 age group is not applicable.

[b] Daily breathing rate for school receptor is based on the OEHHA 95th percentile 8-hour moderate intensity breathing rates (Table 5.8). School receptor assumed to start exposure as early as age 2.

[c] The recommended residential exposure frequency (EF) is 350 days per year, which is equivalent to 0.96 (350 days / 365 days a year).

[d] The recommended school exposure frequency (EF) is 180 days per year, which is equivalent to 0.49 (180 days / 365 days a year).

[e] Fraction of time at home is set to 0.85 for residential since the nearest school has an unmitigated cancer risk of 0.8 per million (see Table 2 below), which is less than one in a million, per OEHHA Table 5.8. FAH is not applicable to school receptors.

[f] ASF is the same for both residential and school receptors.

SOURCE: Office of Environmental Health Hazard Assessment, 2015. *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments*. February.

The estimation of non-cancer inhalation chronic risk uses the following algorithm (OEHHA, 2015):

$$\textbf{Hazard Quotient} = \mathbf{C_{air} / REL} \qquad \textbf{(Equation 3)}$$

Where:

Hazard Quotient = chronic non-cancer hazard

C_{AIR} = concentration of compound in air in micrograms per cubic meter (µg/m^3)

REL = Chronic non-cancer Reference Exposure Level for substance (µg/m^3)

As noted above, the REL for DPM is 5 µg/m^3 (CARB & OEHHA, 2017). The chronic hazard index target organ for DPM is the respiratory system.

Health Risk Calculations

The resulting health risk calculations were performed using a spreadsheet tool consistent with the OEHHA guidance. The spreadsheet tool incorporates the algorithms, equations, and the variables described above as well as in the OEHHA guidance, and incorporates the results of the AERSCREEN dispersion model. **Table 4, Maximum Increase in Health Risk from Construction Emissions for Off-Site Sensitive Receptors - Unmitigated** summarizes the carcinogenic risk for the maximum impacted sensitive receptors for the unmitigated scenario. **Table 5, Maximum Increase in Health Risk from Construction Emissions for Off-Site Sensitive Receptors - Mitigated** summarizes the carcinogenic risk for the maximum impacted sensitive receptors for the mitigated scenario.

For carcinogenic exposures, the cancer risk from DPM emissions for the unmitigated construction scenario is estimated to result in a maximum carcinogenic risk of approximately 101.2 per one million for the river pump station and 87.0 per one million for the desalination facility. Under the mitigated construction scenario, the proposed project is estimated to result in a maximum incremental increase in carcinogenic risk of 8.7 per one million for the river pump station and 8.0 per one million for the desalination facility. The maximum impact for the river pump station would occur at the residential land uses directly east of the site. The maximum impact for the desalination facility would occur at the residential land uses directly south and west of the site. As discussed previously, the lifetime exposure under OEHHA guidelines takes into account early life (infant and children) exposure. It should be noted that the calculated cancer risk assumes sensitive receptors (residential uses) would not have any emission controls such as mechanical filtration and exposure would occur with windows open. This HRA focuses on residential and school impacts and does not include impacts for on-site or off-site workers. Although off-site workers may be in close proximity to the proposed project site, their intermittent exposure duration would be less than that of a residence (8 hours compared to 24 hours) and adult breathing rates compared to children are also lower (e.g. 261 for age 16<30 versus 1,090 for age 0<2 years). Therefore, worker impacts would be less than that of a residence.

TABLE 4
MAXIMUM INCREASE IN HEALTH RISK FROM CONSTRUCTION EMISSIONS FOR OFF-SITE SENSITIVE RECEPTORS - UNMITIGATED

Project Component / Sensitive 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**

Health risk calculations are provided in Appendix A

TABLE 5
MAXIMUM INCREASE IN HEALTH RISK FROM CONSTRUCTION EMISSIONS FOR OFF-SITE SENSITIVE RECEPTORS - MITIGATED

Project Component / Sensitive 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	8.7	0.02	0.08
BAAQMD Threshold	**10**	**1**	**0.3**
Exceeds Threshold?	**No**	**No**	**No**
Desalination Facility			
Residential Receptor	8.0	0.01	0.06
School Receptor	<0.1	<0.001	<0.01
BAAQMD Threshold	**10**	**1**	**0.3**
Exceeds Threshold?			
Residential Receptor	**No**	**No**	**No**
School Receptor	**No**	**No**	**No**

Health risk calculations are provided in Appendix A

The process of assessing health risks and impacts includes a degree of uncertainty. The level of uncertainty is dependent on the availability of data and the extent to which assumptions are relied upon in cases where the data are incomplete or unknown. All HRAs rely upon scientific studies in order to reduce the level of uncertainty; however, it is not possible to completely eliminate uncertainty from the analysis. Where assumptions are used to substitute for incomplete or unknown data, it is standard practice in performing HRAs to err on the side of health protection in order to avoid underestimating or underreporting the risk to the public by assessing risk on the most sensitive populations, such as children and the elderly.

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APPENDICES

Appendix A: Health Risk Assessment Calculations

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Appendix A

Health Risk Assessment Calculations

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A-1 Summary Tables

Tables for EIR

Updated: 1/19/2018

Green = use in document

Unmitigated Construction Health Risk

Table 3.2- 5

Project Phase / Receptor Type	Maximum Cancer Risk (per million)	Maximum Non-Cancer Risk (Chronic Hazard Index)	Maximum Annual Average PM2.5 Concentration	Actual Data		
				Cancer Risk	Chronic HI	PM2.5
River Pump Station						
Residential Receptor	101.2	0.19	0.91	101.17	0.190	0.910
BAAQMD Threshold	**10**	**1**	**0.3**			
Significant Impact?	**Yes**	**No**	**Yes**			
Desalination Facility						
Residential Receptor	87.0	0.14	0.66	87.04	0.136	0.658
School Receptor	0.8	0.01	0.05	0.83	0.010	0.050
BAAQMD Threshold	**10**	**1**	**0.3**			
Significant Impact?						
Residential Receptor	**Yes**	**No**	**Yes**			
School Receptor	**No**	**No**	**No**			

Mitigated Construction Health Risk

Table 3.2- 6

Project Phase / Receptor Type	Maximum Cancer Risk (per million)	Maximum Non-Cancer Risk (Chronic Hazard Index)	Maximum Annual Average PM2.5 Concentration	Actual Data		
				Cancer Risk	Chronic HI	PM2.5
River Pump Station						
Residential Receptor	8.7	0.02	0.08	8.71	0.016	0.083
BAAQMD Threshold	**10**	**1**	**0.3**			
Significant Impact?	**No**	**No**	**No**			
Desalination Facility						
Residential Receptor	8.0	0.01	0.06	7.98	0.012	0.063
School Receptor	<0.1	<0.001	<0.01	0.08	0.001	0.005
BAAQMD Threshold	**10**	**1**	**0.3**			
Significant Impact?						
Residential Receptor	**No**	**No**	**No**			
School Receptor	**No**	**No**	**No**			

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A-2 Construction Schedule

Construction Schedule

Updated: 1/8/2018

For CalEEMod Entry

Schedule					**Work Days by Year**			**Calendar Days by Year (HRA)**			
Phase	**Start Date**	**End Date**	**Work Days**	**Days/week**	**2019**	**2020**	**Total**	**2019**	**2020**	**Total**	**Years**
Brine Disposal Pipeline	2/4/2019	7/24/2019	123	5	123	0	**123**				
Desal Facility Construction	2/28/2019	3/25/2020	280	5	219	61	**280**	306	84	**390**	**1.07**
Demolition/Construction of River Pump S	3/28/2019	2/26/2020	240	5	199	41	**240**	278	56	**334**	**0.92**
Raw Water/Feed Water Connection Pipe	8/29/2019	10/1/2019	24	5	24	0	**24**				
ALL CONSTRUCTION	**2/4/2019**	**3/25/2020**	**298**		**237**	**61**	**298**				
		Years:	**1.14**								

Schedule Overlap

	2019											**2020**		
Phase	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**Septembe**	**October**	**November**	**December**	**January**	**February**	**March**
Brine Disposal Pipeline		1	1	1	1	1	1								
Desal Facility Construction		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Demolition/Construction of River Pump S			1	1	1	1	1	1	1	1	1	1	1	1	
Raw Water/Feed Water Connection Pipe								1	1	1					
ALL CONSTRUCTION															

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A-3 HRA Calculations

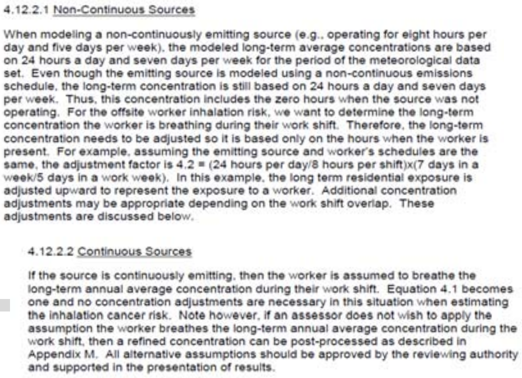
HRA - Screening

Updated: 1/19/2018

HRA Notes:

Emission Rates / Scaling Factors

	Construction River Pump Station	Construction Desal Plant	NOTES
DPM g/s			
Unmitigated			
All Construction	2.80E-03	2.09E-03	
Mitigated			
All Construction	2.41E-04	1.92E-04	
PM2.5 g/s			
Unmitigated			
2019	2.69E-03	2.02E-03	
2020	2.46E-03	1.82E-03	
Mitigated			
2019	2.41E-04	1.91E-04	
2020	2.46E-04	1.94E-04	



4.12.2.1 Non-Continuous Sources

When modeling a non-continuously emitting source (e.g., operating for eight hours per day and five days per week), the modeled long-term average concentrations are based on 24 hours a day and seven days per week for the period of the meteorological data set. Even though the emitting source is modeled using a non-continuous emissions schedule, the long-term concentration is still based on 24 hours a day and seven days per week. Thus, this concentration includes the zero hours when the source was not operating. For the offsite worker inhalation risk, we want to determine the long-term concentration the worker is breathing during their work shift. Therefore, the long-term concentration needs to be adjusted so it is based only on the hours when the worker is present. For example, assuming the emitting source and worker's schedules are the same, the adjustment factor is 4.2 = (24 hours per day/8 hours per shift)x(7 days in a week/5 days in a work week). In this example, the long term residential exposure is adjusted upward to represent the exposure to a worker. Additional concentration adjustments may be appropriate depending on the work shift overlap. These adjustments are discussed below.

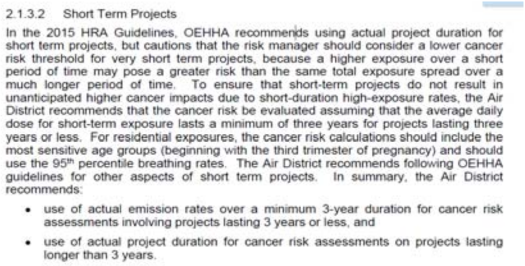
4.12.2.2 Continuous Sources

If the source is continuously emitting, then the worker is assumed to breathe the long-term annual average concentration during their work shift. Equation 4.1 becomes one and no concentration adjustments are necessary in this situation when estimating the inhalation cancer risk. Note however, if an assessor does not wish to apply the assumption the worker breathes the long-term annual average concentration during the work shift, then a refined concentration can be post-processed as described in Appendix M. All alternative assumptions should be approved by the reviewing authority and supported in the presentation of results.

Cancer Risk Calculations

	Construction River Pump Station	Construction Desal Plant	NOTES
Average Annual Scaler Concentrations (ug/m3)			
Residential	338.92	325.39	
Hospital			
Daycare			
School	8.07	24.81	
Average Annual SCALED Concentrations (ug/m3)			
Unmitigated			
Residential	0.950379861	0.680678845	
Hospital			
Daycare			
School	0.022619332	0.051897604	
Mitigated			
Residential	8.18E-02	0.06237366	
Hospital			
Daycare			
School	1.95E-03	0.004755611	
Risk Factors			
Residential	106.45	127.87	Sum of 3rd tri - 0<2 age groups; same for all scenarios
Hospital			
Daycare			
School	13.62	15.90	2<9 age group

	Construction River Pump Station	Construction Desal Plant
Cancer Risk - Unmitigated		
Residential	101.17	87.04
Hospital	0.00	0.00
Daycare	0.00	0.00
School	0.31	0.83
Cancer Risk - Mitigated		
Residential	8.71	7.98
Hospital	0.00	0.00
Daycare	0.00	0.00
School	0.03	0.08



2.1.3.2 Short Term Projects

In the 2015 HRA Guidelines, OEHHA recommends using actual project duration for short term projects, but cautions that the risk manager should consider a lower cancer risk threshold for very short term projects, because a higher exposure over a short period of time may pose a greater risk than the same total exposure spread over a much longer period of time. To ensure that short-term projects do not result in unanticipated higher cancer impacts due to short-duration high-exposure rates, the Air District recommends that the cancer risk be evaluated assuming that the average daily dose for short-term exposure lasts a minimum of three years for projects lasting three years or less. For residential exposures, the cancer risk calculations should include the most sensitive age groups (beginning with the third trimester of pregnancy) and should use the 95th percentile breathing rates. The Air District recommends following OEHHA guidelines for other aspects of short term projects. In summary, the Air District recommends:

- use of actual emission rates over a minimum 3-year duration for cancer risk assessments involving projects lasting 3 years or less, and
- use of actual project duration for cancer risk assessments on projects lasting longer than 3 years.

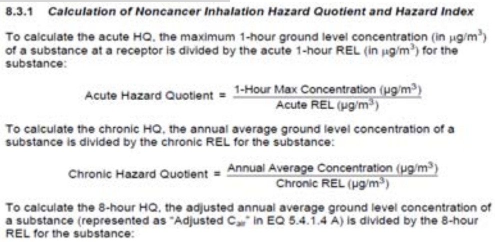
Chronic Hazard Index

Chronic REL (µg/m3) 5.0

California Air Resources Board, "Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values" and "OEHHA/ARB Approved Chronic Reference Exposure Levels and Target Organs," http://www.ar

Table last updated: February 23, 2017. Downloaded 10/9/17

Chronic Hazard Index	Construction River Pump Station	Construction Desal Plant	NOTES
Unmitigated			
Residential	0.2	0.1	
Hospital	0.0	0.0	
Daycare	0.0	0.0	
School	0.0	0.0	
Mitigated			
Residential	0.0	0.0	
Hospital	0.0	0.0	
Daycare	0.0	0.0	
School	0.0	0.0	



8.3.1 *Calculation of Noncancer Inhalation Hazard Quotient and Hazard Index*

To calculate the acute HQ, the maximum 1-hour ground level concentration (in µg/m^3) of a substance at a receptor is divided by the acute 1-hour REL (in µg/m^3) for the substance:

$$\text{Acute Hazard Quotient} = \frac{\text{1-Hour Max Concentration } (\mu g/m^3)}{\text{Acute REL } (\mu g/m^3)}$$

To calculate the chronic HQ, the annual average ground level concentration of a substance is divided by the chronic REL for the substance:

$$\text{Chronic Hazard Quotient} = \frac{\text{Annual Average Concentration } (\mu g/m^3)}{\text{Chronic REL } (\mu g/m^3)}$$

To calculate the 8-hour HQ, the adjusted annual average ground level concentration of a substance (represented as "Adjusted C_{air}" in EQ 5.4.1.4 A) is divided by the 8-hour REL for the substance:

ESTIMATED PM2.5 Concentrations - Average Annual (ug/m3)

	Construction River Pump Station	Construction Desal Plant	NOTES
Average Annual Scaler Concentration (ug/m3)			
Residential	338.92	325.39	
Hospital			
Daycare			
School	8.0664	24.809	
Average Annual SCALED Concentrations (ug/m3)			
Unmitigated			
Residential	9.10E-01	6.58E-01	
Hospital	0.00E+00	0.00E+00	
Daycare	0.00E+00	0.00E+00	
School	2.17E-02	5.01E-02	
Mitigated			
Residential	8.32E-02	6.30E-02	
Hospital	0.00E+00	0.00E+00	
Daycare	0.00E+00	0.00E+00	
School	1.98E-03	4.81E-03	

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A-4 Risk Factors

Risk Factors

Updated: 1/19/2018

Notes

Normally, we use a worker adjustment factor to estimate risk for school and daycare receptors, but this is used if AERMOD models sources using a non-continuous emissions schedule (e.g. work hours). However, because which assumes a continuous emission rate based on the actual construction schedule of 5 days per week and 8 hrs/day (and estimates maximum 1-hr concentrations), concentrations are based on continuous emissions, adjustment factor.

Also modeled school for purposes of fraction of time at home

Dose Calculation

NOT USED = grey

Dose Factors	**3rd Trimester**	**Age 0<2 Years**	**Age 2<9 Years**	**Notes / Source**
Daily Breathing Rate (DBR) [L/kg-day or L/kg-8hrs]				
Residential	361	1090	631	95th percentile 24-hour breathing rates (OEHHA Table 5.6) for 3rd trimester and age 0<2 years and 80th perc
School			640	95th percentile 8-hour moderate intensity breathing rates (OEHHA Table 5.8) for age 2<16 years.
Inhalation Absorption Factor (A)	1	1	1	
Exposure Frequency (EF) [days/365 days]				
Residential	0.96	0.96	0.96	
School	0.49	0.49	0.49	180 days/yr
Conversion	0.000001	0.000001	0.000001	

Dose Factor (no concentration)	**3rd Trimester**	**Age 0<2 Years**	**Age 2<9 Years**
Residential	0.000346164	0.001045205	0.000605068
School	0	0	0.000315616

Risk Calculation

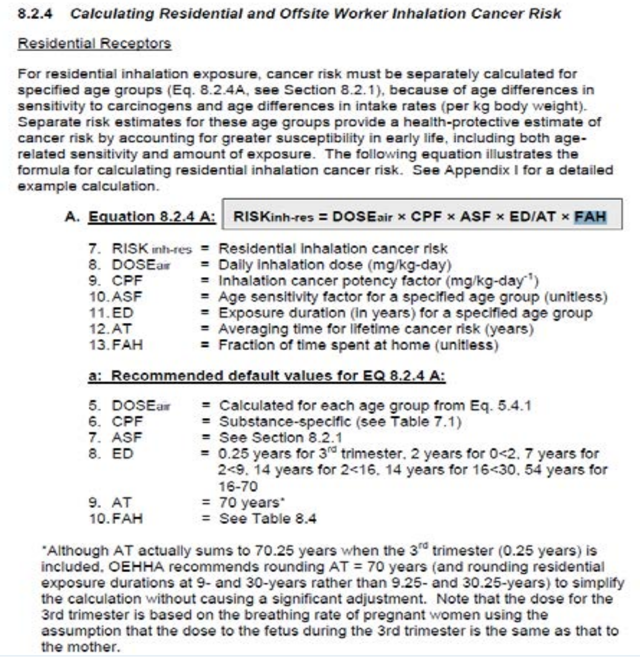
Risk Factors	**3rd Trimester**	**Age 0<2 Years**	**Age 2<9 Years**	
Inhalation Cancer Potency Factor (CPF)	1.1	1.1	1.1	CARB / OEHHA 2017: https://www.arb.ca.gov/toxics/healthval/healthval.htm
Age Sensitivity Factor (ASF) [unitless]	10	10	3	
Exposure Duration (ED) [years]				
Pump: Residential	0.25	0.67	0.22	
Desal: Residential	0.25	0.82	0.07	
Pump: School			0.92	Accepts kids grade 1-12 (ages 6-18), but assumed age 2 start to be conservative. http://www.corpuschristifre
Desal: School			1.07	
Averaging Time (AT) [years]	70	70	70	
Fraction of Time at Home (FAH) [unitless]	1	0.85	1	Fraction of time at home is set to 0.85 for residential since nearest school has a cancer risk of 0.8 per calcs on the HRA tab. Since this is less than one in a million, BAAQMD guidance (2016) says to use values from OEHHA (2015) Table 8.4
Chances per Million	1,000,000	1,000,000	1,000,000	

Risk Factor (no concentration)	**3rd Trimester**	**Age 0<2 Years**	**Age 2<9 Years**
Pump: Residential	13.60	92.85	6.33
Desal: Residential	13.60	114.27	2.04
Pump: School	0.00	0.00	13.62
Desal: School	0.00	0.00	15.90

Multiply risk factors by concentration to determine risk

QA test calc, construction res

1g/s conc			
pump station	338.92		
desal	325.39		
Emission rate mit g/s			
pump station	2.41E-04		
desal	1.92E-04		
Scaled conc			
pump station	0.081826427		
desal	0.06237366		
Dose by Age Group			
pump station	2.83254E-05	8.55254E-05	
desal	2.15915E-05	6.51933E-05	
Cancer risk by Age Group			
pump station	1.112783368	7.597578802	
desal	0.848239053	7.127406458	
Cancer risk total			
pump station	8.71036217	*8.71036217*	<-table
desal	7.975645511	*7.975645511*	<-table



8.2.4 *Calculating Residential and Offsite Worker Inhalation Cancer Risk*

Residential Receptors

For residential inhalation exposure, cancer risk must be separately calculated for specified age groups (Eq. 8.2.4A, see Section 8.2.1), because of age differences in sensitivity to carcinogens and age differences in intake rates (per kg body weight). Separate risk estimates for these age groups provide a health-protective estimate of cancer risk by accounting for greater susceptibility in early life, including both age-related sensitivity and amount of exposure. The following equation illustrates the formula for calculating residential inhalation cancer risk. See Appendix I for a detailed example calculation.

A. Equation 8.2.4 A: $RISK_{inh\text{-}res} = DOSE_{air} \times CPF \times ASF \times ED/AT \times FAH$

7. $RISK_{inh\text{-}res}$ = Residential inhalation cancer risk
8. $DOSE_{air}$ = Daily inhalation dose (mg/kg-day)
9. CPF = Inhalation cancer potency factor ($mg/kg\text{-}day^{-1}$)
10. ASF = Age sensitivity factor for a specified age group (unitless)
11. ED = Exposure duration (in years) for a specified age group
12. AT = Averaging time for lifetime cancer risk (years)
13. FAH = Fraction of time spent at home (unitless)

a: Recommended default values for EQ 8.2.4 A:

5. $DOSE_{air}$ = Calculated for each age group from Eq. 5.4.1
6. CPF = Substance-specific (see Table 7.1)
7. ASF = See Section 8.2.1
8. ED = 0.25 years for 3rd trimester, 2 years for 0<2, 7 years for 2<9, 14 years for 2<16, 14 years for 16<30, 54 years for 16-70
9. AT = 70 years*
10. FAH = See Table 8.4

*Although AT actually sums to 70.25 years when the 3rd trimester (0.25 years) is included, OEHHA recommends rounding AT = 70 years (and rounding residential exposure durations at 9- and 30-years rather than 9.25- and 30.25-years) to simplify the calculation without causing a significant adjustment. Note that the dose for the 3rd trimester is based on the breathing rate of pregnant women using the assumption that the dose to the fetus during the 3rd trimester is the same as that to the mother.

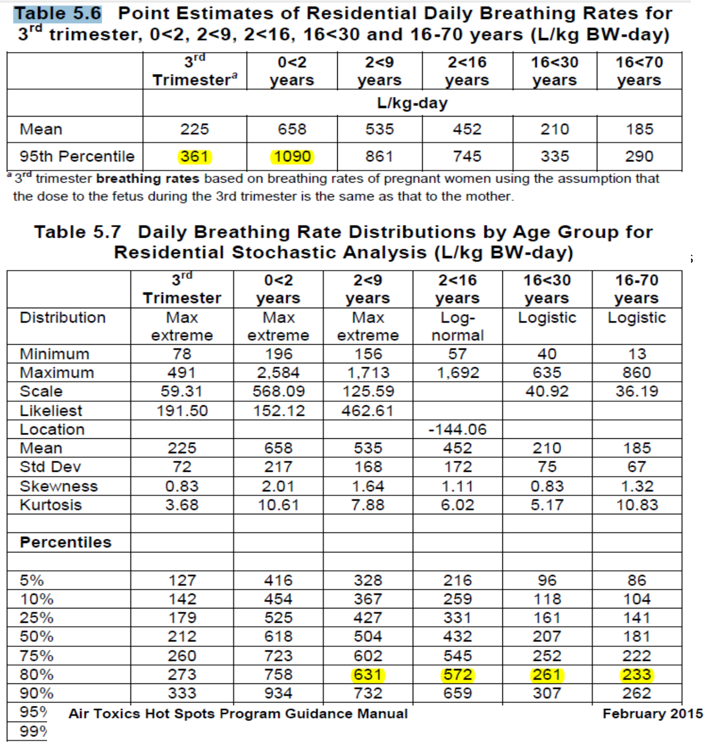


Table 5.6 Point Estimates of Residential Daily Breathing Rates for 3rd trimester, 0<2, 2<9, 2<16, 16<30 and 16-70 years (L/kg BW-day)

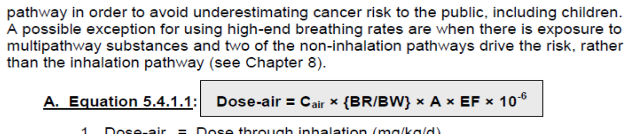
	3rd Trimester[a]	0<2 years	2<9 years	2<16 years	16<30 years	16<70 years
	L/kg-day					
Mean	225	658	535	452	210	185
95th Percentile	361	1090	861	745	335	290

[a] 3rd trimester **breathing rates** based on breathing rates of pregnant women using the assumption that the dose to the fetus during the 3rd trimester is the same as that to the mother.

Table 5.7 Daily Breathing Rate Distributions by Age Group for Residential Stochastic Analysis (L/kg BW-day)

	3rd Trimester	0<2 years	2<9 years	2<16 years	16<30 years	16-70 years
Distribution	Max extreme	Max extreme	Max extreme	Log-normal	Logistic	Logistic
Minimum	78	196	156	57	40	13
Maximum	491	2,584	1,713	1,692	635	860
Scale	59.31	568.09	125.59		40.92	36.19
Likeliest	191.50	152.12	462.61			
Location				-144.06		
Mean	225	658	535	452	210	185
Std Dev	72	217	168	172	75	67
Skewness	0.83	2.01	1.64	1.11	0.83	1.32
Kurtosis	3.68	10.61	7.88	6.02	5.17	10.83
Percentiles						
5%	127	416	328	216	96	86
10%	142	454	367	259	118	104
25%	179	525	427	331	161	141
50%	212	618	504	432	207	181
75%	260	723	602	545	252	222
80%	273	758	631	572	261	233
90%	333	934	732	659	307	262
95%						
99%						

Air Toxics Hot Spots Program Guidance Manual **February 2015**



pathway in order to avoid underestimating cancer risk to the public, including children. A possible exception for using high-end breathing rates are when there is exposure to multipathway substances and two of the non-inhalation pathways drive the risk, rather than the inhalation pathway (see Chapter 8).

A. Equation 5.4.1.1: $Dose\text{-}air = C_{air} \times \{BR/BW\} \times A \times EF \times 10^{-6}$

1. Dose-air = Dose through inhalation (mg/kg/d)

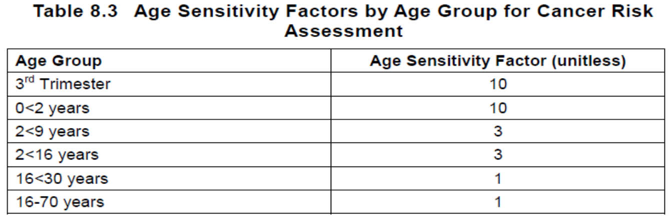
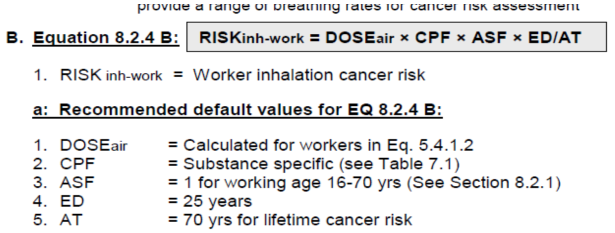


Table 8.3 Age Sensitivity Factors by Age Group for Cancer Risk Assessment

Age Group	Age Sensitivity Factor (unitless)
3rd Trimester	10
0<2 years	10
2<9 years	3
2<16 years	3
16<30 years	1
16-70 years	1



provide a range of breathing rates for cancer risk assessment

B. Equation 8.2.4 B: $RISK_{inh\text{-}work} = DOSE_{air} \times CPF \times ASF \times ED/AT$

1. $RISK_{inh\text{-}work}$ = Worker inhalation cancer risk

a: Recommended default values for EQ 8.2.4 B:

1. $DOSE_{air}$ = Calculated for workers in Eq. 5.4.1.2
2. CPF = Substance specific (see Table 7.1)
3. ASF = 1 for working age 16-70 yrs (See Section 8.2.1)
4. ED = 25 years
5. AT = 70 yrs for lifetime cancer risk

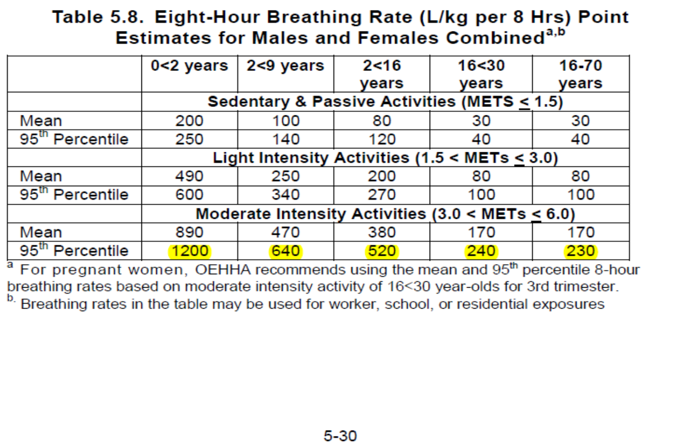


Table 5.8. Eight-Hour Breathing Rate (L/kg per 8 Hrs) Point Estimates for Males and Females Combined[a,b]

	0<2 years	2<9 years	2<16 years	16<30 years	16-70 years
	Sedentary & Passive Activities (METS ≤ 1.5)				
Mean	200	100	80	30	30
95th Percentile	250	140	120	40	40
	Light Intensity Activities (1.5 < METs ≤ 3.0)				
Mean	490	250	200	80	80
95th Percentile	600	340	270	100	100
	Moderate Intensity Activities (3.0 < METs ≤ 6.0)				
Mean	890	470	380	170	170
95th Percentile	1200	640	520	240	230

[a] For pregnant women, OEHHA recommends using the mean and 95th percentile 8-hour breathing rates based on moderate intensity activity of 16<30 year-olds for 3rd trimester.
[b] Breathing rates in the table may be used for worker, school, or residential exposures

5-30

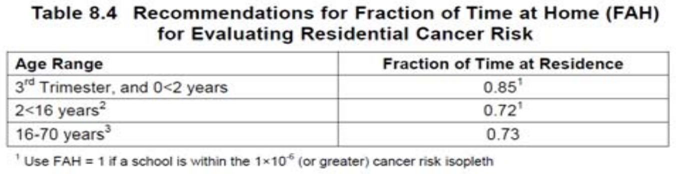


Table 8.4 Recommendations for Fraction of Time at Home (FAH) for Evaluating Residential Cancer Risk

Age Range	Fraction of Time at Residence
3rd Trimester, and 0<2 years	0.85[1]
2<16 years[2]	0.72[1]
16-70 years[3]	0.73

[1] Use FAH = 1 if a school is within the 1×10^{-6} (or greater) cancer risk isopleth

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A-5 Emission Rates

DPM and PM2.5 Emission Rates

Updated: 1/18/2018

HRA Notes:

BAAQMD recommends short-term projects "use of actual emission rates over a minimum 3-year duration for cancer risk assessments involving projects lasting 3 years or less." This was
Since AERSCREEN calculates maximum 1-hr concentration based on continuous emissions (which is then converted to annual), the 1-hr emission rate should be based on the emission rate during the entire construction period (24 hrs/day, 7 days per week).

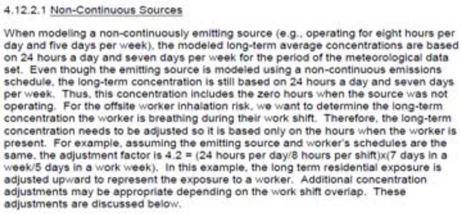
To estimate annual average PM2.5 concentrations, divided PM2.5 exhaust emissions by the full 24hrs/day and 7 days/week when construction is occurring. This is still conservative because emissions would not occur for 2-4 months of the year (depending on the year). Could divide by the full 365 days/year for the entire year to be less conservative, but did not do this.

DPM Emission Rates

	Construction River Pump Station	Construction Desal Plant	NOTES	
DPM Emissions (lbs)				
Unmitigated				
2019	150.6	124.6	From *Emissions Summary 011718.xls*	
2020	27.8	30.8	""	
All Construction	178.4	155.4	""	24.1%
Mitigated				
2019	12.74	11.14	off-road includes equip + onsite trucks	
2020	2.62	3.1	""	
All Construction	15.36	14.24	""	12.8%
Time Values for Emission Rates				
Total Calendar Days - 2019	278	306		
Total Calendar Days - 2020	56	84		
Total Calendar Days - all construction	334	390	Total calendar days (7 days/week); see note above	
Hours per day	24	24	24 hrs/day; see note above	
Emission Rates - Scaling Factors (g/s)				
Unmitigated				
2019	2.84E-03	2.14E-03		
2020	2.61E-03	1.92E-03		
All Construction	2.80E-03	2.09E-03		
Mitigated				
2019	2.41E-04	1.91E-04		
2020	2.46E-04	1.94E-04		
All Construction	2.41E-04	1.92E-04		

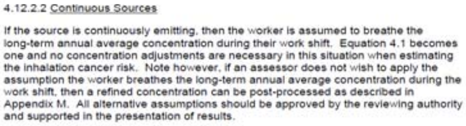
PM2.5 Exhaust Emission Rates

	Construction River Pump Station	Construction Desal Plant	NOTES
PM2.5 Exhaust Emissions (lbs)			
Unmitigated			
2019	142.2	117.8	From *Emissions Summary 011718.xls*
2020	26.2	29.2	""
All Construction	168.4	147	""
Mitigated			
2019	12.74	11.14	off-road includes equip + onsite trucks
2020	2.62	3.1	""
All Construction	15.36	14.24	""
Emission Rates - Scaling Factors (g/s)			
Unmitigated			
2019	2.69E-03	2.02E-03	
2020	2.46E-03	1.82E-03	
All Construction	2.65E-03	1.98E-03	
Mitigated			
2019	2.41E-04	1.91E-04	
2020	2.46E-04	1.94E-04	
All Construction	2.41E-04	1.92E-04	



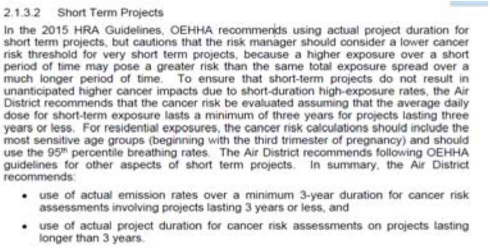
4.12.2.1 Non-Continuous Sources

When modeling a non-continuously emitting source (e.g., operating for eight hours per day and five days per week), the modeled long-term average concentrations are based on 24 hours a day and seven days per week for the period of the meteorological data set. Even though the emitting source is modeled using a non-continuous emissions schedule, the long-term concentration is still based on 24 hours a day and seven days per week. Thus, this concentration includes the zero hours when the source was not operating. For the offsite worker inhalation risk, we want to determine the long-term concentration the worker is breathing during their work shift. Therefore, the long-term concentration needs to be adjusted so it is based only on the hours when the worker is present. For example, assuming the emitting source and worker's schedules are the same, the adjustment factor is 4.2 = (24 hours per day/8 hours per shift)x(7 days in a week/5 days in a work week). In this example, the long term residential exposure is adjusted upward to represent the exposure to a worker. Additional concentration adjustments may be appropriate depending on the work shift overlap. These adjustments are discussed below.



4.12.2.2 Continuous Sources

If the source is continuously emitting, then the worker is assumed to breathe the long-term annual average concentration during their work shift. Equation 4.1 becomes one and no concentration adjustments are necessary in this situation when estimating the inhalation cancer risk. Note however, if an assessor does not wish to apply the assumption the worker breathes the long-term annual average concentration during the work shift, then a refined concentration can be post-processed as described in Appendix M. All alternative assumptions should be approved by the reviewing authority and supported in the presentation of results.



2.1.3.2 Short Term Projects

In the 2015 HRA Guidelines, OEHHA recommends using actual project duration for short term projects, but cautions that the risk manager should consider a lower cancer risk threshold for very short term projects, because a higher exposure over a short period of time may pose a greater risk than the same total exposure spread over a much longer period of time. To ensure that short-term projects do not result in unanticipated higher cancer impacts due to short-duration high-exposure rates, the Air District recommends that the cancer risk be evaluated assuming that the average daily dose for short-term exposure lasts a minimum of three years for projects lasting three years or less. For residential exposures, the cancer risk calculations should include the most sensitive age groups (beginning with the third trimester of pregnancy) and should use the 95th percentile breathing rates. The Air District recommends following OEHHA guidelines for other aspects of short term projects. In summary, the Air District recommends:

- use of actual emission rates over a minimum 3-year duration for cancer risk assessments involving projects lasting 3 years or less, and
- use of actual project duration for cancer risk assessments on projects lasting longer than 3 years.

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A-6 AERSCREEN Output Summary

AERSCREEN Inputs and Outputs

Updated: 1/19/2018

Notes

Concentrations modeled using AERSCREEN worst-case 1-hr, scaled to annual

Project Site Dimensions	**Feet**	**Meters**	**Notes / Source**
River Pump Station			*Draft RPS fish screen and pipelines scw (w dimensions).PDF*
Length:	443	135	
Width	164	50	
Total Area (sqft)	72,431	6,729	
Total Area (sqft) - from PDF	*72,431*	*1.7*	
Desal Plant			*Fig 3-3 Site Plan scw (w dimensions).PDF*
Length:	495	151	
Width:	156	47	
Total Area (sqft)	77,105	7,163	
Total Area (sqft) - from PDF	*77,105*	*1.8*	

Input

	Construction River Pump Statio	**Construction Desal Plant**	**Notes**
Title	Pump	Desal	
Units	M	M	
Source Type	A	A	
DPM emission rate (g/s)	1	1	Unit emission rate for scaling
Release Height above ground (meters)	3.89	3.89	Release height for off -road construction equipment from the CRRP-HRA (BAAQMD, SF DPH & SF Planning, 2012).
Maximum horizontal dimension of area source (meters)	***135***	***151***	*see above*
Minimum horizontal dimension of area source (meters)	***50***	***47***	*see above*
Initial Vertical Dimension (meters)	1.4	1.4	Initial vertical dimension for off-road construction equipment from the CRRP-HRA (BAAQMD, SF DPH & SF Planning, 2012).
rural/urban	urban	urban	Although CRRP uses rural (page 31), AERSCREEN is already exceedingly conservative, so per the AQTR SOW used urban instead.
population of urban area	*110,898*	*110,898*	https://www.census.gov/quickfacts/fact/table/antiochcitycalifornia,US/PST045217
min distance to ambient air (meters)	default	default	
NO2 chemistry	1	1	
max distance to probe	default	default	
include discrete receptors	no	no	
use flagpole receptors	yes	yes	
flagpole receptor height (meters)	1.5	1.5	BAAQMD 2012, Recommended Methods for Screening and Modeling Local Risks and Hazards
source elevation	default	default	
min ambient temperature (F)	*37*	*37*	http://www.intellicast.com/Local/History.aspx?location=USCA0034
max ambient temperature (F)	*91*	*91*	http://www.intellicast.com/Local/History.aspx?location=USCA0034
min ambient temperature (K)	276	276	
max ambient temperature (K)	306	306	
min wind speed (m/s)	default	default	
anemometer height (m)	default	default	
surface characteristics	2	2	
Dominant surface profile	7	7	
dominant climate profile	1	1	
adjust	no	no	
debug	no	no	
Output file name	Pump.out	Desal.out	

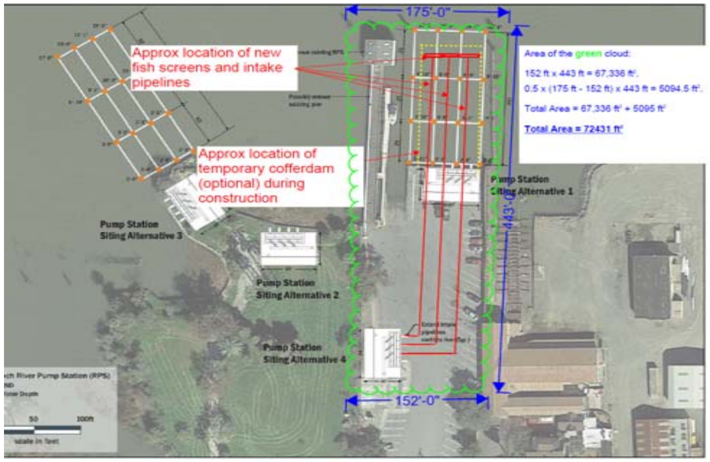
Outputs

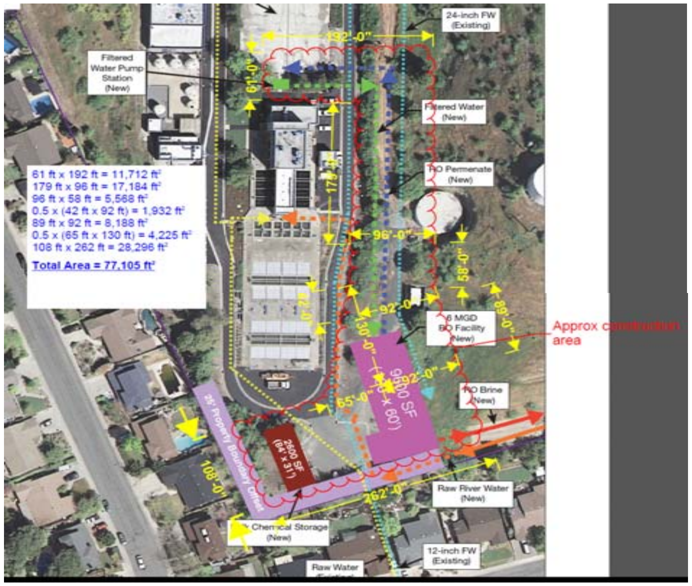
	Construction River Pump Statio	**Construction Desal Plant**		
Closest Receptors				
Concentrations - Maximum 1-hr (ug/m3)			**Distance (m)**	**Receptor Location**
Residential	3389.20	3253.90	68	Residential surrounding site
Hospital				
Daycare				
School	80.664	248.09		900m from pump, 400m from desal
Concentrations - Average Annual (ug/m3)				
Residential	338.92	325.39		
Hospital				
Daycare				
School	8.0664	24.809		

61
179
58
89
108
495

All Receptors

	Paste from AERSCREEN Output								
Distance (m)	**Concentrations - Max 1-hr (ug/m3)**		**Distance (m)**			**smaller site = 192' w**		**smaller site = 130' w**	
1	2624.6	2578.80	1	7.975645511		2153.9	1	2893.7	1
25	2974.9	2866.00	25			2427.1	25	3187.6	25
50	3240.3	3082.80	50	12.6	50	2636.5	50	3404.6	50
68	**3389.2**	3248.10	75	7.1	75	2799	75	3567.3	75
75	3093.6	**3253.90**	**76**	10	61.81818	**2804.8**	**76**	**3573**	**76**
100	1879.8	2122.10	100			1915.9	100	2247	100
125	1322	1390.50	125			1312.3	125	1431.4	125
150	1001.7	1038.40	150			995.96	150	1060	150
175	797.15	818.66	175			793.11	175	831.95	175
200	656.47	670.28	200			653.06	200	678.85	200
225	553.85	563.65	225			551.54	225	569.2	225
250	477.08	483.45	250			474.94	250	488.01	250
275	416.52	421.41	275			414.85	275	424.83	275
300	368.48	372.39	300			367.31	300	374.7	300
325	329.55	332.38	325			328.41	325	334.22	325
350	297.01	299.32	350			296.01	350	300.91	350
375	269.76	271.58	375						
400	246.61	**248.09**	**400**			Cancer:	8.71	7.98	
425	226.69	227.96	425						
450	209.44	210.50	450						
475	194.37	195.20	475						
500	181.02	181.75	500						
525	169.2	169.85	525						
550	158.67	159.25	550						
575	149.24	149.76	575						
600	140.74	141.23	600						
625	133.06	133.51	625						
650	126.09	126.50	650						
675	119.73	120.10	675						
700	113.92	114.23	700						
725	108.58	108.85	725						
750	103.65	103.89	750						
775	99.091	99.29	775						
800	94.871	95.03	800						
825	90.939	91.07	825						
850	87.272	87.40	850						
875	83.855	83.97	875						
900	**80.664**	80.77	900						
925	77.678	77.78	925						
950	74.879	74.97	950						
975	72.251	72.48	975						
1000	69.982	70.00	1000						





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A-7 Sensitive Receptor Locations

Sensitive Receptors

Updated: 1/19/2018

Type	Description	Address	Distance	Note	
Pump Station					
Residents:	Dwelling west of site		50 ft		
	South of site 800 ft+		800 ft		
Schools	Rosary Catholic School		3000 ft	beyond 1,000 ft	914.4
Daycares:	Brighter beginnings		3000 ft	beyond 1,000 ft	
Hospital	Antioch Convalescent Hospital		2700 ft	beyond 1,000 ft	
Desal Facility					
Residents:	Surrounding site from 10m outward		10m+		
School	Sutter Elementary School		1300 ft	beyond 1,000 ft	396.24
	Park Middle School		1400ft	beyond 1,000 ft	
Daycares:	Kathy's daycare		2500 ft	beyond 1,000 ft	
Hospital	Sutter Delta Medical Center		2500 ft	beyond 1,000 ft	

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A-8 Constants

Constants

Updated: 1/8/2018

hrs/day	24	
seconds/hr	3,600	
grams per lb	453.592	
1hr to annual concentration	0.1	https://www3.epa.gov/ttn/scram/models/screen/aerscreen_userguide.pdf
square feet per acre	43,560	
feet per meter	3.28084	

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A-9 AERSCREEN Inputs – Desalination Facility

```
                                                         Desal

Start date and time  01/19/18 16:27:34
                             AERSCREEN 16216

Desal

            Desal


         -----------------  DATA ENTRY VALIDATION  -----------------
                        METRIC              ENGLISH
 ** AREADATA **  ---------------     ----------------

 Emission Rate:       1.0000 g/s             7.937 lb/hr
 Area Height:           3.89 meters          12.76 feet
 Area Source Length:  151.00 meters         495.41 feet
 Area Source Width:    47.00 meters         154.20 feet
 Vertical Dimension:    1.40 meters           4.59 feet
 Model Mode:           URBAN
 Population:          110898
 Dist to Ambient Air:           1.0 meters             3. feet


 ** BUILDING DATA **

 No Building Downwash Parameters


 ** TERRAIN DATA **

 No Terrain Elevations
 Source Base Elevation:   0.0 meters        0.0  feet

 Probe distance:   5000. meters       16404. feet
 Flagpole Receptor Height:      1.5 meters             5. feet

 No discrete receptors used


 ** FUMIGATION DATA **

 No fumigation requested


 ** METEOROLOGY DATA **

 Min/Max Temperature:  276.0 / 306.0 K   37.1 /  91.1 Deg F

 Minimum Wind Speed:     0.5 m/s

 Anemometer Height:   10.000 meters

 Dominant Surface Profile: Urban
 Dominant Climate Type:    Average Moisture

 Surface friction velocity (u*): not adjusted

DEBUG OPTION OFF



 AERSCREEN output file:
 Desal.out


 *** AERSCREEN Run is Ready to Begin



 No terrain used, AERMAP will not be run
```

```
**************************************************

SURFACE CHARACTERISTICS & MAKEMET
Obtaining surface characteristics...

Using AERMET seasonal surface characteristics for Urban with Average Moisture
Season            Albedo     Bo       zo
Winter             0.35     1.50     1.000
Spring             0.14     1.00     1.000
Summer             0.16     2.00     1.000
Autumn             0.18     2.00     1.000

Creating met files aerscreen_01_01.sfc & aerscreen_01_01.pfl

Creating met files aerscreen_02_01.sfc & aerscreen_02_01.pfl

Creating met files aerscreen_03_01.sfc & aerscreen_03_01.pfl

Creating met files aerscreen_04_01.sfc & aerscreen_04_01.pfl

Buildings and/or terrain present or rectangular area source, skipping probe

FLOWSECTOR   started 01/19/18 16:28:55
 ********************************************

  Running AERMOD
 Processing Winter

Processing surface roughness sector  1

*****************************************************
Processing wind flow sector   1

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector   0

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   2

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector   5

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   3

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector  10

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   4

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector  15

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   5

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector  20

    ********   WARNING MESSAGES   ********
               ***  NONE  ***
 ********************************************
```

```
  Running AERMOD
 Processing Spring

Processing surface roughness sector  1

*****************************************************
Processing wind flow sector   1

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector   0

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   2

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector   5

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   3

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector  10

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   4

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector  15

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   5

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector  20

    ********   WARNING MESSAGES   ********
               ***  NONE  ***
 ********************************************

  Running AERMOD
 Processing Summer

Processing surface roughness sector  1

*****************************************************
Processing wind flow sector   1

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector   0

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   2

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector   5

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   3
```

```
 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector  10

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   4

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector  15

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   5

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector  20

    ********   WARNING MESSAGES   ********
               ***  NONE  ***
 ********************************************

  Running AERMOD
 Processing Autumn

Processing surface roughness sector  1

*****************************************************
Processing wind flow sector   1

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector   0

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   2

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector   5

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   3

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector  10

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   4

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector  15

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   5

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector  20

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

FLOWSECTOR   ended 01/19/18 16:29:10
```

```
REFINE       started 01/19/18 16:29:10

 AERMOD Finishes Successfully for REFINE stage 3 Winter sector   0

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

REFINE       ended 01/19/18 16:29:14

 **********************************************
 AERSCREEN Finished Successfully
 With no errors or warnings
 Check log file for details
 ***********************************************

 Ending date and time  01/19/18 16:29:14
```

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A-10 AERSCREEN Inputs – River Pump Station

```
                                                     Pump

Start date and time  01/19/18 16:31:14
                             AERSCREEN 16216

Pump

            Pump


         -----------------  DATA ENTRY VALIDATION  -----------------
                        METRIC              ENGLISH
 ** AREADATA **  ---------------     ----------------

 Emission Rate:       1.0000 g/s             7.937 lb/hr
 Area Height:           3.89 meters          12.76 feet
 Area Source Length:  135.00 meters         442.91 feet
 Area Source Width:    50.00 meters         164.04 feet
 Vertical Dimension:    1.40 meters           4.59 feet
 Model Mode:           URBAN
 Population:          110898
 Dist to Ambient Air:           1.0 meters             3. feet


 ** BUILDING DATA **

 No Building Downwash Parameters


 ** TERRAIN DATA **

 No Terrain Elevations
 Source Base Elevation:   0.0 meters        0.0  feet

 Probe distance:   5000. meters       16404. feet
 Flagpole Receptor Height:      1.5 meters             5. feet

 No discrete receptors used


 ** FUMIGATION DATA **

 No fumigation requested


 ** METEOROLOGY DATA **

 Min/Max Temperature:  276.0 / 306.0 K   37.1 /  91.1 Deg F

 Minimum Wind Speed:     0.5 m/s

 Anemometer Height:   10.000 meters

 Dominant Surface Profile: Urban
 Dominant Climate Type:    Average Moisture

 Surface friction velocity (u*): not adjusted

DEBUG OPTION OFF



 AERSCREEN output file:
 Pump.out


 *** AERSCREEN Run is Ready to Begin



 No terrain used, AERMAP will not be run
```

```
**************************************************

SURFACE CHARACTERISTICS & MAKEMET
Obtaining surface characteristics...

Using AERMET seasonal surface characteristics for Urban with Average Moisture
Season            Albedo     Bo       zo
Winter             0.35     1.50     1.000
Spring             0.14     1.00     1.000
Summer             0.16     2.00     1.000
Autumn             0.18     2.00     1.000

Creating met files aerscreen_01_01.sfc & aerscreen_01_01.pfl

Creating met files aerscreen_02_01.sfc & aerscreen_02_01.pfl

Creating met files aerscreen_03_01.sfc & aerscreen_03_01.pfl

Creating met files aerscreen_04_01.sfc & aerscreen_04_01.pfl

Buildings and/or terrain present or rectangular area source, skipping probe

FLOWSECTOR   started 01/19/18 16:32:39
 ********************************************

  Running AERMOD
 Processing Winter

Processing surface roughness sector  1

*****************************************************
Processing wind flow sector   1

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector   0

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   2

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector   5

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   3

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector  10

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   4

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector  15

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   5

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector  20

    ********   WARNING MESSAGES   ********
               ***  NONE  ***
```

```
*****************************************************
Processing wind flow sector   6

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Winter sector  25

    ********   WARNING MESSAGES   ********
               ***  NONE  ***
 ********************************************

  Running AERMOD
 Processing Spring

Processing surface roughness sector  1

*****************************************************
Processing wind flow sector   1

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector   0

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   2

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector   5

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   3

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector  10

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   4

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector  15

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   5

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector  20

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   6

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Spring sector  25

    ********   WARNING MESSAGES   ********
               ***  NONE  ***
 ********************************************

  Running AERMOD
 Processing Summer

Processing surface roughness sector  1

*****************************************************
Processing wind flow sector   1
```

```
 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector   0

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   2

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector   5

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   3

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector  10

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   4

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector  15

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   5

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector  20

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   6

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Summer sector  25

    ********   WARNING MESSAGES   ********
               ***  NONE  ***
 ********************************************

  Running AERMOD
 Processing Autumn

Processing surface roughness sector  1

*****************************************************
Processing wind flow sector   1

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector   0

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   2

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector   5

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

*****************************************************
Processing wind flow sector   3
```

```
 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector  10

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

****************************************************
Processing wind flow sector   4

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector  15

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

****************************************************
Processing wind flow sector   5

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector  20

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

****************************************************
Processing wind flow sector   6

 AERMOD Finishes Successfully for FLOWSECTOR stage 2 Autumn sector  25

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

FLOWSECTOR   ended 01/19/18 16:32:56

REFINE       started 01/19/18 16:32:56

 AERMOD Finishes Successfully for REFINE stage 3 Winter sector   0

    ********   WARNING MESSAGES   ********
               ***  NONE  ***

REFINE       ended 01/19/18 16:32:58

 **********************************************
 AERSCREEN Finished Successfully
 With no errors or warnings
 Check log file for details
 ***********************************************

 Ending date and time  01/19/18 16:32:59
```

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A-11 AERSCREEN Outputs – Desalination Facility

	Concentrat	Distance	Elevation	Diag	Season/M	Zo sector	Date	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	HT	REF TA	HT
	2.58E+03	1	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.87E+03	25	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.08E+03	50	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.25E+03	75	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
*	3.25E+03	76	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.12E+03	100	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.39E+03	125	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.04E+03	150	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	8.19E+02	175	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	6.70E+02	200	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	5.64E+02	225	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	4.83E+02	250	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	4.21E+02	275	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.72E+02	300	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.32E+02	325	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.99E+02	350	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.72E+02	375	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.48E+02	400	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.28E+02	425	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.11E+02	450	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.95E+02	475	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.82E+02	500	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.70E+02	525	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.59E+02	550	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.50E+02	575	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.41E+02	600	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.34E+02	625	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.27E+02	650	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.20E+02	675	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.14E+02	700	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.09E+02	725	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.04E+02	750	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	9.93E+01	775	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	9.50E+01	800	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	9.11E+01	825	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	8.74E+01	850	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	8.40E+01	875	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	8.08E+01	900	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	7.78E+01	925	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	7.50E+01	950	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	7.25E+01	975	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	7.00E+01	1000	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	6.77E+01	1025	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	6.55E+01	1050	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	6.34E+01	1075	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	6.14E+01	1100	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	5.96E+01	1125	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	5.78E+01	1150	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	5.61E+01	1175	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	5.45E+01	1200	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	5.30E+01	1225	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	5.15E+01	1250	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	5.02E+01	1275	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	4.88E+01	1300	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	4.76E+01	1325	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	4.64E+01	1350	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	4.52E+01	1375	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	4.41E+01	1400	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	4.31E+01	1425	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	4.20E+01	1450	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	4.11E+01	1475	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	4.01E+01	1500	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.92E+01	1525	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.84E+01	1550	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.75E+01	1575	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.67E+01	1600	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.60E+01	1625	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.52E+01	1650	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.45E+01	1675	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.38E+01	1700	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.31E+01	1725	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.25E+01	1750	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.19E+01	1775	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.13E+01	1800	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.07E+01	1824.99	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	3.01E+01	1850	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.96E+01	1875	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.90E+01	1900	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.85E+01	1924.99	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.80E+01	1950	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.75E+01	1975	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.71E+01	2000	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.66E+01	2025	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.62E+01	2050	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.57E+01	2075	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.53E+01	2100	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.49E+01	2125	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.45E+01	2150	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.41E+01	2175	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.38E+01	2200	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.34E+01	2225	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.30E+01	2250	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.27E+01	2275	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.23E+01	2300	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.20E+01	2325	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.17E+01	2350	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.14E+01	2375	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.11E+01	2400	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.08E+01	2425	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.05E+01	2450	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	2.02E+01	2475	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.99E+01	2500	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.97E+01	2525	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.94E+01	2550	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.91E+01	2575	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.89E+01	2600	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.87E+01	2625	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.84E+01	2650	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.82E+01	2675	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.79E+01	2700	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.77E+01	2725	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.75E+01	2750	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.73E+01	2775	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.71E+01	2800	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.69E+01	2825	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.67E+01	2850	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.65E+01	2875	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.63E+01	2900	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.61E+01	2925	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.59E+01	2950	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.57E+01	2975	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
	1.55E+01	3000	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2

1.54E+01	3025	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.52E+01	3050	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.50E+01	3075	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.49E+01	3100	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.47E+01	3125	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.45E+01	3150	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.44E+01	3175	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.42E+01	3200	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.41E+01	3225	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.39E+01	3250	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.38E+01	3275	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.36E+01	3300	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.35E+01	3325	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.34E+01	3350	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.32E+01	3375	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.31E+01	3400	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.30E+01	3425	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.28E+01	3450	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.27E+01	3475	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.26E+01	3500	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.25E+01	3525	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.23E+01	3550	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.22E+01	3575	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.21E+01	3600	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.20E+01	3625	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.19E+01	3650	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.18E+01	3675	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.17E+01	3700	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.16E+01	3725	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.14E+01	3750	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.13E+01	3775	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.12E+01	3800	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.11E+01	3825	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.10E+01	3849.99	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.09E+01	3875	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.09E+01	3900	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.08E+01	3925	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.07E+01	3950	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.06E+01	3975	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.05E+01	4000	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.04E+01	4025	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.03E+01	4050	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.02E+01	4075	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.01E+01	4100	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.00E+01	4125	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.97E+00	4149.99	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.88E+00	4175	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.80E+00	4200	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.72E+00	4225	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.65E+00	4250	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.57E+00	4275	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.49E+00	4300	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.42E+00	4325	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.34E+00	4350	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.27E+00	4375	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.20E+00	4400	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.13E+00	4425	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.06E+00	4449.99	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.99E+00	4475	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.92E+00	4500	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.85E+00	4525	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.79E+00	4550	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.72E+00	4575	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.66E+00	4600	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.59E+00	4625	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.53E+00	4650	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.47E+00	4675	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.41E+00	4700	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.35E+00	4725	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.29E+00	4750	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.23E+00	4775	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.17E+00	4800	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.11E+00	4825	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.05E+00	4850	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.00E+00	4875	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
7.94E+00	4900	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
7.89E+00	4924.99	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
7.83E+00	4950	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
7.78E+00	4975	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
7.72E+00	5000	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2

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A-12 AERSCREEN Outputs – River Pump Station

Concentrat	Distance	Elevation	Diag	Season/Mc	Zo	sector	Date	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O	LEN	Z0	BOWEN	ALBEDO	REF	WS	HT	REF	TA	HT
2.62E+03	1	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.97E+03	25	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.24E+03	50	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
* 3.39E+03	68	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.09E+03	75	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.88E+03	100	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.32E+03	125	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.00E+03	150	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
7.97E+02	175	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
6.56E+02	200	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
5.54E+02	225	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
4.77E+02	250	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
4.17E+02	275	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.68E+02	300	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.30E+02	325	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.97E+02	350	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.70E+02	375	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.47E+02	400	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.27E+02	425	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.09E+02	450	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.94E+02	475	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.81E+02	500	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.69E+02	525	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.59E+02	550	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.49E+02	575	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.41E+02	600	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.33E+02	625	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.26E+02	650	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.20E+02	675	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.14E+02	700	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.09E+02	725	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.04E+02	750	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
9.91E+01	775	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
9.49E+01	800	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
9.09E+01	825	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
8.73E+01	850	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
8.39E+01	875	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
8.07E+01	900	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
7.77E+01	925	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
7.49E+01	950	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
7.23E+01	975	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
7.00E+01	1000	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
6.76E+01	1025	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
6.54E+01	1050	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
6.34E+01	1075	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
6.14E+01	1100	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
5.95E+01	1125	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
5.78E+01	1150	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
5.61E+01	1175	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
5.45E+01	1200	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
5.30E+01	1225	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
5.15E+01	1250	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
5.01E+01	1275	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
4.88E+01	1300	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
4.76E+01	1325	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
4.64E+01	1350	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
4.52E+01	1375	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
4.41E+01	1400	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
4.30E+01	1425	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
4.20E+01	1450	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
4.11E+01	1475	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
4.01E+01	1500	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.92E+01	1525	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.84E+01	1550	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.75E+01	1575	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.67E+01	1600	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.60E+01	1625	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.52E+01	1650	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.45E+01	1675	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.38E+01	1700	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.31E+01	1725	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.25E+01	1750	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.19E+01	1775	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.13E+01	1800	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.07E+01	1825	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
3.01E+01	1850	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.96E+01	1875	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.90E+01	1900	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.85E+01	1924.99	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.80E+01	1950	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.75E+01	1975	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.71E+01	2000	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.66E+01	2025	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.62E+01	2050	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.57E+01	2075	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.53E+01	2100	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.49E+01	2124.99	0	25	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.45E+01	2150	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.41E+01	2175	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.37E+01	2200	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.34E+01	2224.99	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.30E+01	2250	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.27E+01	2275	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.23E+01	2300	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.20E+01	2325	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.17E+01	2350	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.14E+01	2375	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.11E+01	2400	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.08E+01	2425	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.05E+01	2449.99	0	25	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
2.02E+01	2475	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.99E+01	2500	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.97E+01	2525	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.94E+01	2550	0	25	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.91E+01	2575	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.89E+01	2600	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.86E+01	2625	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.84E+01	2650	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.82E+01	2675	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.79E+01	2700	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.77E+01	2725	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.75E+01	2750	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.73E+01	2775	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.71E+01	2800	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.69E+01	2825	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.67E+01	2850	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.65E+01	2875	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.63E+01	2900	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.61E+01	2925	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.59E+01	2950	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.57E+01	2975	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				
1.55E+01	3000	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2				

1.54E+01	3025	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.52E+01	3050	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.50E+01	3075	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.48E+01	3100	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.47E+01	3125	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.45E+01	3150	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.44E+01	3175	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.42E+01	3200	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.41E+01	3225	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.39E+01	3250	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.38E+01	3275	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.36E+01	3300	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.35E+01	3325	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.34E+01	3350	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.32E+01	3375	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.31E+01	3400	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.30E+01	3425	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.28E+01	3450	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.27E+01	3475	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.26E+01	3500	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.25E+01	3525	0	25	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.23E+01	3550	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.22E+01	3575	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.21E+01	3600	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.20E+01	3625	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.19E+01	3650	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.18E+01	3675	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.17E+01	3700	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.16E+01	3725	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.14E+01	3750	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.13E+01	3775	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.12E+01	3800	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.11E+01	3825	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.10E+01	3850	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.09E+01	3875	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.08E+01	3900	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.08E+01	3925	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.07E+01	3950	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.06E+01	3975	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.05E+01	4000	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.04E+01	4025	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.03E+01	4050	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.02E+01	4075	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.01E+01	4100	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
1.00E+01	4125	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.96E+00	4149.99	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.88E+00	4175	0	25	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.80E+00	4200	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.72E+00	4225	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.64E+00	4250	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.57E+00	4275	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.49E+00	4300	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.42E+00	4325	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.34E+00	4350	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.27E+00	4375	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.20E+00	4400	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.13E+00	4425	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
9.06E+00	4449.99	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.99E+00	4475	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.92E+00	4500	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.85E+00	4525	0	10	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.78E+00	4550	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.72E+00	4575	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.65E+00	4600	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.59E+00	4625	0	25	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.53E+00	4650	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.47E+00	4675	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.40E+00	4700	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.34E+00	4725	0	25	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.28E+00	4750	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.22E+00	4775	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.17E+00	4800	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.11E+00	4825	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
8.05E+00	4850	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
7.99E+00	4875	0	20	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
7.94E+00	4900	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
7.88E+00	4924.99	0	15	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
7.83E+00	4950	0	5	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
7.78E+00	4975	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2
7.72E+00	5000	0	0	Winter	0-360	10011001	-1.29	0.043	-9	0.02	-999	21	6	1	1.5	0.35	0.5	10	306	2

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APPENDIX C

Special-Status Terrestrial Plant and Wildlife Species Considered

TABLE C-1
LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN WITHIN THE VICINITY OF THE PROPOSED PROJECT

Common Name ***Scientific Name***	**Listing Status USFWS/CDFW/ CNPS**	**General Habitat Requirements**	**Potential for Species Occurrence Within the Project Area**
FEDERAL AND STATE LISTED SPECIES OR PROPOSED FOR LISTING			
ANIMALS			
Invertebrates			
Lange's metalmark butterfly *Apodemia mormo langei*	FE/--/--	Currently only found at the Antioch Dunes NWR in Contra Costa County. They require naked stemmed buckwheat (*Eriogonum nudum* var. nudum) for their lifecycle.	**Unlikely.** The River Intake Pump Station is located 0.15 miles to the west of the Antioch Dunes NWR. The Pump Station does not have suitable habitat to support this species.
Conservancy fairy shrimp *Branchinecta conservatio*	FE/--/--	Large, cool-water vernal pools with moderately turbid water. Only eight populations known in California.	**Unlikely.** There are no vernal pools located in the project area to support this species.
Longhorn fairy shrimp *Branchinecta longiantenna*	FE/--/--	Vernal pools with clear to rather turbid water. Only known from four populations in San Luis Obispo, Merced, Alameda, and Contra Costa County.	**Unlikely.** There are no vernal pools located in the project area. This species is mapped by topographic quadrangle and the closest quad is located 8.5 miles to the south east (Byron Hot Springs).
Vernal pool fairy shrimp *Branchinecta lynchi*	FT/--/--	Vernal pools in central valley grasslands, Central Coast mountains, South Coast mountains in rain-fed pools.	**Unlikely.** There are no vernal pools located in the project area. The closest CNDDB occurrence overlaps with the Delta Diablo's WWTP and was last identified in 1999. Construction activities in the vicinity of this occurrence would occur within the Delta Diablo's WWTP facility and would not effect this population.
San Bruno elfin butterfly *Callophrys mossii bayensis*	FE/--/--	Inhabits rocky outcrops and cliffs in coastal scrub on steep, mainly north facing slopes on the San Francisco Peninsula. Lives near prolific growths of the larval food plant, broadleaf stonecrop, low growing succulent.	**Absent.** There are no rocky outcrops and cliffs in the project area. Additionally, the closest CNDDB occurrence is located 7.6 miles away in Mt. Diablo State Park.
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT/--/--	Found only in association with host plant, red or blue elderberry (*Sambucus* spp.). Usually along rivers and streams. Known to occur from southern Shasta County to Fresno County.	**Absent.** There are no elderberry shrubs located within the project area. The closest CNDDB occurrence is located 18.9 miles to the north west in northern end of the sloughs in Grizzly Bay.
Delta Green Ground Beetle *Elaphrus viridis*	FT/--/--	This beetle has only been found at Jepson Prairie area in south-central Solano County. Its preferred habitat is more open habitat like grassland-playa pool matrix, edges of pools, trails, roads, and ditches.	**Absent.** The only suitable habitat located in the project area is roads and ditches. The only known CNDDB occurrence records are located 15.8 miles to the north of the project area.
Vernal pool tadpole shrimp *Lepidurus packardi*	FE/--/--	Vernal pools, clay flats, alkaline pools, ephemeral stock tanks, road side ditches, and road ruts. Commonly co-occurs with vernal pool fairy shrimp.	**Unlikely.** There are no vernal pools located in the project area. Construction activities will be located in road ROW, and there is a potential for road side ditches and road ruts to fill with water during the wet season. The closest CNDDB occurrence is located 2.4 miles to the south of the project area near Empire Mine Road in a ranching field.

TABLE C-1
LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN WITHIN THE VICINITY OF THE PROPOSED PROJECT

Common Name ***Scientific Name***	**Listing Status USFWS/CDFW/ CNPS**	**General Habitat Requirements**	**Potential for Species Occurrence Within the Project Area**
FEDERAL AND STATE LISTED SPECIES OR PROPOSED FOR LISTING (cont.)			
ANIMALS (CONT.)			
Amphibians			
California tiger salamander *Ambystoma californiense*	FT/CT/WL	Wintering sites occur in grasslands occupied by burrowing mammals; breeds in ponds, vernal pools, and slow-moving or receding streams.	**Unlikely.** The closest CNDDB occurrence overlaps with a large portion of the River Intake Pump Station to the Antioch Water Treatment Plant, but this occurrence has been extirpated. Several other extant occurrences are located south of the project area in open space areas such as community parks and regional parks. The non-native annual grassland area located to the north of the Pittsburg-Antioch Highway, in proximity to where the new pipeline is to be installed, may provide burrows and suitable streams or vernal pools.
Foothill yellow-legged frog *Rana boylii*	--/Candidate Threatened/SSC	Rarely occurs far from permanent water. Rocky streams in a variety of habitats (valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, wet meadows).	**Absent.** There is no suitable habitat located in the project area for this species. The closest CNDDB occurrence is located 8.7 miles to the south of the project area.
California red-legged frog *Rana draytonii*	FT/--/SSC	Breed in stock ponds, pools, and slow-moving streams.	**Unlikely.** The closest CNDDB occurrence is a 2002 sighting 1.7 miles to the west of the project area. There are several locations where freshwater marsh or riparian corridors occur within 1,000 feet of the project area. These locations include areas to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP (Dow Wetlands Preserve).
Reptiles			
Giant gartersnake *Thamnophis gigas*	FT/CT/--	Extremely aquatic species, rarely found away from water. Primarily associated with marshes and sloughs, less with slow-moving creeks, absent from larger rivers. Requires emergent vegetation such as cattails and tules and small mammal burrows, crevices and surface objects.	**Unlikely.** The delta habitat with tules and water hyacinth near the River Intake Pump Station provide basking surfaces and the uplands maintained grass field does have small mammal burrows, but with the concrete and wooden retaining wall it is unlikely that the giant gartersnake would utilize this area. Additionally, the width and speed of the San Joaquin River most likely deters this species from occurring. The closest CNDDB record is located 1.7 miles to the north east of the project area near Sherman Lake across the San Joaquin River.
Alameda whipsnake *Masticophis lateralis euryxanthus*	FT/CT/--	Dependent on chaparral, sage scrub, and coastal scrub with rocky outcrops as refugia. Will use adjacent habitats such as grasslands, oak savanna, and occasionally oak-bay woodland.	**Absent.** There is no suitable habitat for this species within the project area or in the near vicinity. Alameda whipsnake is mapped by the CNDDB by topographic quadrangle and the Antioch South quad overlaps with the project area. This occurrence record is from 1990 and states that the species was found in chaparral, grassland, and woodland mosaic.
Birds			
Swainson's hawk *Buteo swainsoni*	--/CT/BCC 3503.5	Prefers open grasslands and desert-like habitats, also found in agricultural areas. Scattered, large trees or small groves for nesting and roosting.	**High potential.** There are numerous large eucalyptus trees in close proximity to the project area that could provide suitable nesting habitat. Foraging habitat is present in the proximity of the project area. Nests were not identified during the reconnaissance-level survey but the closest CNDDB record is located 1.6 miles to the east southeast of the project area and has been an active nest since 2015.

TABLE C-1
LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN WITHIN THE VICINITY OF THE PROPOSED PROJECT

Common Name ***Scientific Name***	**Listing Status USFWS/CDFW/ CNPS**	**General Habitat Requirements**	**Potential for Species Occurrence Within the Project Area**
FEDERAL AND STATE LISTED SPECIES OR PROPOSED FOR LISTING (cont.)			
ANIMALS (CONT.)			
Birds (cont.)			
California black rail *Laterallus jamaicensis coturniculus*	--/CT/FP/BCC	Occurs in salt and brackish marshes, also freshwater marshes at low elevations.	**Unlikely.** The delta habitat with tules and water hyacinth near the River Intake Pump Station provide mediocre suitable habitat near the River Intake Pump Station. The delta habitat present in the project area is very small and in close proximity to human activities such as fishing and a boat ramp. Higher quality marsh can be found in the Dow Wetlands Preserve, on Browns Island, on Kimball Island, and in the Antioch Dunes NWR. CNDDB occurrence area located on both Browns Island and Kimball Island.
Ridgway's rail *Rallus obsoletus obsoletus*	FE/CE/FP	Occurs in salt marshes and tidal sloughs. Requires tidal mudflats for foraging habitat. Prefers cordgrass for cover and nesting, but can be occasionally found in bulrush and cattails.	**Unlikely.** The delta habitat with tules and water hyacinth near the River Intake Pump Station provide mediocre habitat for cover and nesting near the River Intake Pump Station. There are no tidal mudflats for foraging in the project area. The delta habitat present in the project area is very small and in close proximity to human activities such as fishing and a boat ramp. The closest CNDDB occurrence is located 8.3 miles to the north west of the project area in the Suisun Bay.
Bank swallow *Riparia riparia*	--/CT/-- (Nesting)	Vertical banks and cliffs with fine-textured or sandy soils near streams, rivers, ponds, lakes and ocean for nesting. Feeds over grassland, shrubland, savannah, and open riparian areas during nesting season.	**Unlikely.** Suitable habitat is not present in the project area for nesting. The closest CNDDB record is located 9.6 miles to the north east of the project area.
California least tern *Sterna antillarum browni*	FE/CE/FP (Nesting colony)	Lives along the coast with nesting habitat on open beaches free of vegetation due to the tide. Ranges from San Francisco to Baja California. Wintering in Mexico.	**Unlikely.** There is no suitable habitat in the project area for nesting. The farthest inland nesting site in California is located 4.1 miles to the north west of the project site.
Mammals			
Salt-marsh harvest mouse *Reithrodontomys raviventris*	FE/CE/FP	Tidally-influenced salt marshes with dense pickleweed and upland transitional vegetation of San Francisco Bay and tributaries.	**Unlikely.** The delta habitat at the River Intake Pump Station does not provide suitable marsh or upland transitional vegetation for this species. The closest CNDDB occurrence is located in the Dow Wetlands Preserve which borders the northern end of the Delta Diablo's WWTP. All construction activities will be located in the Delta Diablo's WWTP facility and not impact this species.
San Joaquin kit fox *Vulpes macrotis mutica*	FE/CT/--	Annual grasslands or grassy open stages of vegetation dominated by scattered brush, shrubs, and scrub. Dens in open, level areas with loose-textured, sandy and loamy soils.	**Unlikely.** The project area is at the northern end of this species range. The only suitable habitat is the non-native annual grasslands located on the northern end of the Pittsburg-Antioch Highway, which has little to no wildlife corridors to surrounding open space. The closest CNDDB records are located 1.3 miles to the south southwest of the project area and are dated older than 1995.

TABLE C-1
LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN WITHIN THE VICINITY OF THE PROPOSED PROJECT

Common Name ***Scientific Name***	**Listing Status USFWS/CDFW/ CNPS**	**General Habitat Requirements**	**Potential for Species Occurrence Within the Project Area**
FEDERAL AND STATE LISTED SPECIES OR PROPOSED FOR LISTING (cont.)			
Plants			
Sonoma Alopecurus *Alopecurus aequalis var. sonomensis*	FE/--/1B.1	Freshwater marshes and swamps, and riparian scrub. El. 5 - 365 meters.	**Absent.** The project area is south and more inland than this species known CNDDB occurrences, which are located north west of Rohnert Park to the coast and in Point Reyes National Seashore.
Large-flowered fiddleneck *Amsinckia grandiflora*	FE/CE/1B.1	Cismontane woodland, and valley and foothill grasslands. El. 270 – 550 meters.	**Unlikely.** This species is only known from 3 presumed extant CNDDB records. The closest record is 3.8 miles to the south west of the project area in Black Diamond Mines Regional Park. This occurrence was a reintroduction and in 2010 only 2 plants remained.
Soft bird's beak *Cordylanthus mollis* spp. *mollis*	FE/CR/1B.2	Found in coastal salt marshes and swamps on north shores of San Francisco Bay. El. 0 -3 meters.	**Unlikely.** There is no suitable coastal salt marsh or swamp habitat in the project area. Closest CNDDB occurrence is located 2.8 miles to the north east of the project area and is believed extirpated.
Contra Costa wallflower *Erysimum capitatum* var. *angustatum*	FE/CE/1B.1	Inland dunes. El. 3 – 20 meters.	**Unlikely.** There is no suitable dune habitat in the project area, which is within Fulton Shipyard Road in the vicinity of the Antioch Dunes NWR. There is dune habitat and CNDDB records located 0.06 miles to the north east of the River Intake Pump Station pipeline alignment in the Antioch Dunes NWR. The project is within a designated critical habitat unit for this species; however, no habitat or principal constituent elements for this species would be impacted.
Boggs Lake hedge-hyssop *Gratiola heterosepala*	--/CE/1B.2	Clay in marshes and swamps (lake margins), and vernal pools. El. 10 – 2375 meters.	**Absent.** There is no suitable marsh, swamp, or vernal pool habitat in the project area. The closest CNDDB record is located 16.4 miles to the north of the project area.
Contra Costa goldfields *Lasthenia conjugens*	FE/--/1B.1	Cismontane woodland, alkaline playas, valley and foothill grassland and vernal pools. El. 0 - 470 meters.	**Absent.** There is no suitable playa or vernal pool habitat in the project area. The closest CNDDB record over laps with the project area but is extirpated. The closest presumed extant population is located 15.6 miles to the north west of the project area near Suisun City and Fairfield.
Colusa grass *Neostapfia colusana*	FT/CE/1B.1	Vernal pools (adobe, large). El. 5 - 200 meters.	**Absent.** There is no suitable vernal pool habitat in the project area. The closest CNDDB record is located 16.4 miles to the north of the project area near Travis Air Force Base.
Antioch Dunes evening-primrose *Oenothera deltoides* ssp. *howellii*	FE/CE/1B.1	Inland dunes. El. 0 - 30 meters.	**Unlikely.** There is no suitable dune habitat in the project area, which is within Fulton Shipyard Road in the vicinity of the Antioch Dunes NWR. There is dune habitat and CNDDB records located immediately adjacent to the north east of the River Intake Pump Station pipeline alignment in the Antioch Dunes NWR. The project is within a designated critical habitat unit for this species; however, no habitat or principal constituent elements for this species would be impacted.
Keck's checkerbloom *Sidalcea keckii*	FE/--/1B.1	Serpentine and clay in cismontane woodlands, and valley and foothill grassland. El. 75 – 650 meters.	**Absent.** There may be potential suitable grassland habitat located to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the pipeline alignment. The closest CNDDB record is located 6.9 miles to the north of the project area near Birds Landing.

TABLE C-1
LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN WITHIN THE VICINITY OF THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/CDFW/ CNPS	General Habitat Requirements	Potential for Species Occurrence Within the Project Area
FEDERAL AND STATE SPECIES OF SPECIAL CONCERN			
ANIMALS			
Reptiles			
Western pond turtle *Actinemys marmorata*	--/--/SSC	Fresh water lakes, ponds, reservoirs, and slow-moving streams and rivers edged with sandy soils for laying eggs. Primarily in foothills and lowlands.	**Unlikely.** The closest CNDDB occurrence is located 0.36 miles to the east of the Delta Diablo's WWTP in the Dow Wetlands Preserve. This occurrence was reported 18 adults in 1998, and found in a permanent brackish marsh pond vegetated by cattails and bulrush. There are several locations to the south of this known occurrence where willow and black walnut riparian corridor occur in the vicinity of the project area. These locations include areas to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP.
Northern California legless lizard *Anniella pulchra*	--/--/SSC	Coastal dune, valley-foothill, chaparral, and coastal scrub types. Seeks cover under objects such as flat boards and rocks with loose soil and leaf litter.	**Unlikely.** A CNDDB occurrence in the Antioch Dunes NWR overlaps with the pipeline alignment from the River Intake Pump Station. There is a chain-link fence that borders the boundary of the Refuge, but does not qualify as a wildlife barrier. From the reconnaissance-level survey it appears that the habitat closest to the road ROW is grasslands with some coastal dune.
California glossy snake *Arizona elegans occidentalis*	--/--/SSC	Occur in chaparral, sagebrush, valley-foothill hardwood, pine-juniper, and annual grass. Uses mammal burrows and rock outcrops, will occasionally burrow in loose soil. Occurs from the eastern part of the San Francisco Bay Area south to northwestern Baja California. Absent along central coast.	**Unlikely.** The closest CNDDB occurrence is within the Antioch Dunes NWR 0.9 miles to the east of the River Intake Pump Station. Project activities near potential habitat are within Fulton Shipyard Rd, which does not support glossy snake habitat. No wildlife barriers are present between the road and the refuge; however, snakes are not expected within the active road.
San Joaquin coachwhip *Masticophis flagellum ruddocki*	--/--/SSC	Open terrain such as grass, desert, scrub, chaparral, and pasture habitats. Seek cover in rodent burrows, bushes, trees and rock piles. Occurs from Arbuckle in Sacramento Valley in Colusa County southward to the grapevine in Kern County, and westward into the inner South Coast Ranges.	**Unlikely.** The project area is above the northern limit of this species. The nearest CNDDB occurrence is located 11.2 miles to the south southeast of the project area in the dunes of Los Vaqueros Reservoir.
Coast horned lizard *Phrynosoma blainvillii*	--/--/SSC	Open areas of sandy soil and low vegetation in valleys, foothills, and semiarid mountains. Found in grasslands, coniferous forests, woodlands, and chaparral with open areas and loose soil. Occurs north of the Bay Area and inland as far as Shasta Reservoir and south into Baja California.	**Unlikely.** There is potential suitable grassland habitat with open areas of sandy soil located to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline alignment. There is a chain-link fence that borders the boundary of the adjacent property, but does not qualify as a wildlife barrier. The closest CNDDB occurrence is located 8.8 miles to the south west of the project area and is located in the Mt. Diablo State Park in chamise chaparral.
Birds			
Short-eared owl *Asio flammeus*	--/--/SSC 3503.5 (Nesting)	Open areas with few trees such as annual and perennial grasslands, prairies, dunes, meadows, irrigated lands, and saline and fresh emergent wetlands. Nests on the ground in a depression concealed by vegetation.	**Unlikely.** There is potential suitable grassland habitat with open areas, and a few trees in riparian corridors located to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline alignment. The closest CNDDB occurrence is located 5.7 miles to the north west on Grizzly Island across the San Joaquin and Sacramento rivers.

TABLE C-1
LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN WITHIN THE VICINITY OF THE PROPOSED PROJECT

Common Name *Scientific Name*	**Listing Status USFWS/CDFW/ CNPS**	**General Habitat Requirements**	**Potential for Species Occurrence Within the Project Area**
FEDERAL AND STATE SPECIES OF SPECIAL CONCERN (cont.)			
ANIMALS (CONT.)			
Birds (cont.)			
Cooper's hawk *Accipiter cooperii*	--/--/WL/-- 3503.5 (Nesting)	Nests in riparian growths of deciduous trees and live oak woodlands.	**Moderate potential.** Nesting sites are available throughout the wooded riparian corridors within the vicinity of the project area. These locations include areas to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP. There are no documented nesting sites near alignment.
Tricolored blackbird *Agelaius tricolor*	--/Candidate Endangered/ SSC/BCC (Nesting colony)	Breeding colonies observed in Sacramento Valley. Nests located over or near fresh emergent wetlands with tall, dense cattails or tules but also in thickets of willow, blackberry, wild rose, and tall herbs.	**Unlikely.** There are no suitable fresh or emergent wetlands in the project area or in the near vicinity to the project area. The closest CNDDB occurrence is located 3.9 miles to the south of the project area.
Grasshopper sparrow *Ammodramus savannarum*	--/--/SSC (Nesting)	Dense, dry or well-drained grassland, with mix of grasses and forbs. Uses scattered shrubs for singing perches. Nests in slight depression in ground built out of grasses and forbs at base of clump of grasses.	**Unlikely.** There is potential suitable grassland habitat with a few scattered shrubs for perches in the non-native annual grassland to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline alignment. The closest CNDDB occurrence is located 16.8 miles to the south southeast of the project area.
Golden eagle *Aquila chrysaetos*	--/--/FP/BCC 3503.5 (Nesting and wintering)	Open areas and cliff-walled canyons provide nesting habitat, this species nests in large trees, snags, and cliffs. Forages in rolling foothills, mountain areas, flats and deserts.	**Unlikely.** There are numerous large eucalyptus trees in close proximity to the project area that would provide suitable nesting habitat. Foraging habitat is present in the proximity of the project area. Nests were not identified during the reconnaissance-level survey. The closest CNDDB record is located 7.6 miles to the west of the project area and was seen winter foraging at the Concord Naval Weapons Station. The closest CNDDB nesting record is located 9.9 miles to the south southeast of the project area and is dated 1994.
Great blue heron (rookery) *Ardea herodias*	--/--/* (Nesting colony)	West coast of California; Salton Sea and Colorado River area. Colonies nest in tops of secluded large snags, sea cliffs, mats of tules, or shrubs. They are generally protected from human disturbances, which often cause nest desertion.	**Unlikely.** There is no suitable colony nesting locations in the project area, and the majority of the project area is highly disturbed by human activities. The closest CNDDB record is located 5.9 miles to the north west of the project site on Decker Island.
Burrowing owl *Athene cunicularia*	--/--/SSC/BCC 3503.5 (Burrow sites and some wintering sites)	Nests and forages in low-growing grasslands and shrublands with perches and areas that support burrowing mammals.	**Moderate potential.** There is potential suitable grassland habitat with a few scattered shrubs for perches in the non-native annual grassland to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline alignment. The closest CNDDB occurrence is located 0.26 miles to the south of the project area, but was dated 2008 and was marked for development.
Ferruginous hawk *Buteo regalis*	--/--/BCC 3503.5	Occur in semiarid grasslands, rocky outcrops and shallow canyons. Nests on rocky outcrops, hillsides, rock pinnacles, or in trees.	**Unlikely.** There are no suitable nesting rocky outcrops, hillsides, or rock pinnacles in the project area. There are numerous large eucalyptus trees in close proximity to the project area that would provide suitable nesting habitat. Foraging habitat is present in the proximity of the project area. Nests were not identified during the reconnaissance-level survey. The closest CNDDB record is located 6.9 miles to the west of the project area and was seen winter foraging at the Concord Naval Weapons Station.

TABLE C-1
LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN WITHIN THE VICINITY OF THE PROPOSED PROJECT

Common Name ***Scientific Name***	**Listing Status USFWS/CDFW/ CNPS**	**General Habitat Requirements**	**Potential for Species Occurrence Within the Project Area**
FEDERAL AND STATE SPECIES OF SPECIAL CONCERN (cont.)			
ANIMALS (CONT.)			
Birds (cont.)			
Northern harrier *Circus cyaneus*	--/--/SSC 3503.5 (Nesting)	Mostly nests in emergent vegetation, wet meadows or near rivers and lakes, but may nest in grasslands away from water.	**Unlikely.** There is potential suitable nesting and foraging habitat in the project vicinity located to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP. The closest CNDDB record is located 15.8 miles to the south of the project area in Tassajara valley.
Yellow rail *Coturnicops noveboracensis*	--/--/SSC/BCC	Species is extremely rare in California, although small numbers have been reported in the Suisun Marsh region. Breeding requires sedge marsh/ meadows with moist soil and shallow standing water.	**Unlikely.** The delta habitat with tules and water hyacinth near the River Intake Pump Station provide mediocre habitat for cover and nesting near the River Intake Pump Station. The delta habitat present in the project area is very small and in close proximity to human activities such as fishing and a boat ramp. The closest CNDDB occurrence is located 7.1 miles to the north west of the project area on Grizzly Island Wildlife Area.
White-tailed kite *Elanus leucurus*	--/--/FP 3503.5 (Nesting)	Nests in oak, willow, or other large tree stands adjacent to wet meadows and open grasslands. Forages over grasslands and agricultural lands.	**High Potential.** The closest CNDDB record is 0.2 miles from a new pipeline installation located in the riparian woodland to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP. Although this record is from 1985, the habitat persists and provides a potential nesting area in the willows, and foraging in the annual grasslands.
California horned lark *Eremophila alpestris actia*	--/WL/*	Nest in desert brush lands, grasslands, and similar open habitats	**Unlikely.** There is potential suitable nesting grassland habitat in the project vicinity, located to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP. The closest CNDDB record is located 15.3 miles to the south of the project area in Tassajara valley.
Prairie falcon *Falco mexicanus*	--/--/WL/BCC 3503.5 (Nesting)	Primarily associated with perennial grasslands, savannahs, rangeland and some agricultural fields, and desert scrub. Nests is a scrape on a depression or ledge in an open site. Will nest on old raven or eagle stick nest on a cliff, bluff, or rocky outcrop.	**Unlikely.** There potential foraging habitat for this species in riparian and annual grasslands within the project vicinity, though suitable nesting habitat is not present in the project vicinity.
American peregrine falcon *Falco peregrinus anatum*	--/--/FP/BCC 3503.5 (Nesting)	Nests near wetlands, lakes, rivers, or other water on high cliffs, banks, dunes and mounds. Nests is a scrape on a depression or ledge in an open site. Will nest on human-made structures, tree or snags, or old raptor nests. Breeds and feeds near water.	**Unlikely.** There is potential foraging habitat for this species annual grasslands and dunes within the project vicinity; however, nesting habitat is not present.
Salt marsh common yellowthroat *Geothlypis trichas sinuosa*	--/--/SSC/BCC	Freshwater, salt and brackish marshes of San Francisco Bay only. Uses willows, tules, and tall grasses for nesting and cover.	**Moderate potential.** The delta habitat with tules and water hyacinth near the River Intake Pump Station provide mediocre habitat for cover and nesting near the River Intake Pump Station. The delta habitat present in the project area is very small and in close proximity to human activities such as fishing and a boat ramp. The closest CNDDB record is located 1.5 miles to the north northwest of the project area on Browns island and Kimball Island.

TABLE C-1
LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN WITHIN THE VICINITY OF THE PROPOSED PROJECT

Common Name *Scientific Name*	**Listing Status USFWS/CDFW/ CNPS**	**General Habitat Requirements**	**Potential for Species Occurrence Within the Project Area**
FEDERAL AND STATE SPECIES OF SPECIAL CONCERN (cont.)			
ANIMALS (CONT.)			
Birds (cont.)			
Loggerhead shrike *Lanius ludovicianus*	--/--/SSC/BCC (Nesting)	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. Nests in dense brush or trees.	**Moderate potential.** There are several locations within the project vicinity where willow and black walnut riparian corridor would provide suitable nesting habitat. These locations include areas to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP- all which area adjacent to urban habitat which will provide perches. The closest CNDDB record is located 5.6 miles to the east of the project area form 2003. The nest was in an ornamental tree surrounded by highly-disturbed ruderal vegetation.
Suisun song sparrow *Melospiza melodia maxillaris*	--/--/SCC	Confined to tidal salt and brackish marshes fringing the Carquinez Strait and Suisun Bay east to Antioch. Primarily associated with tidal channels in marshes dominated by pickleweed. This species will nest in riparian forests of Valley Oak with a sufficient understory of blackberry.	**Unlikely.** There is no suitable salt or brackish marsh habitat present in the project area. There is riparian habitat present in the project vicinity but is likely too far away from the marsh for this species. The closest CNDDB record is from 1998 and is 0.8 miles to the north northwest of the Delta Diablo's WWTP.
Song sparrow "Modoesto" population *Melospiza melodia*	--/--/SCC	Prefers riparian, fresh or saline emergent wetland and wet meadow habitats. Breeds riparian thickets of willows, shrubs, vines, tall herbs, and emergent vegetation.	**Unlikely.** The project area is at the western most edge of this species range. There is suitable riparian habitat located to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP. There is a CNDDB occurrence that overlaps with the River Intake Pump Station and part of the pipeline alignment but is dated 1901, and the exact location is unknown.
Double-crested cormorant *Phalacrocorax auritus*	--/--/WL/-- (Nesting colony)	Requires undisturbed nest-sites beside water for nesting, like islands or mainland. Uses wide rock ledges on cliffs, rugged slopes, and live or dead tall trees.	**Unlikely.** The majority of the project area is disturbed and would not provide suitable nesting habitat for a colony. The closest CNDDB occurrence is located 1.5 miles to the north northeast of the project area on Sherman Island.
Mammals			
Pallid bat *Antrozous pallidus*	--/--/SSC	Day roosts are mainly in caves, crevices and mines; also found in buildings and under bark. Forages in open lowland areas.	**Unlikely.** There are no caves, crevices or mines in the project area. There is potential nesting habitat in the riparian corridors in large diameter trees located in areas to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP. Bridges in project area do not provide roosting habitat. The closest CNDDB record is located 7.8 miles to the west of the project area in Concord.
Townsend's big-eared bat *Corynorhinus townsendii*	--/--/SSC	Roosts in caves, mines, buildings, or other human-made structures. Forages in open lowland areas.	**Unlikely.** There are no caves or crevices in the project area. Bridges in project area do not provide roosting habitat. The closest CNDDB record is located 8.1 miles to the south west of the project area in Mt. Diablo State Park and dated 1938.
Western red bat *Lasiurus blossevillii*	--/--/SSC	Roosts primarily in trees on edge habitats adjacent to streams, fields, or urban areas. Preferred sites are protected from above, below, and located above dark ground cover. Forages over grasslands, shrublands, open woodlands and forests, and croplands.	**Moderate potential.** A CNDDB record overlaps a large portion of the Antioch pipeline alignment. This record is dated 1998 but the exact location is unknown. There are riparian corridors within the project vicinity that could provide an edge habitat to urban and grasslands. The riparian habitats were not surveyed for density of vegetation to determine if they are a preferred habitat. The locations of the riparian corridors include to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP.

TABLE C-1
LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN WITHIN THE VICINITY OF THE PROPOSED PROJECT

Common Name *Scientific Name*	**Listing Status USFWS/CDFW/ CNPS**	**General Habitat Requirements**	**Potential for Species Occurrence Within the Project Area**
FEDERAL AND STATE SPECIES OF SPECIAL CONCERN (cont.)			
ANIMALS (CONT.)			
Mammals (cont.)			
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	--/--/SSC	Prefers moderate canopy in a variety of habitats, such as chaparral, cultivated land and open grasslands with a brushy understory. Nest is a stick and leave house at the base of tree, shrub, or hill.	**Unlikely.** The closest CNDDB record is located 8.6 miles to the south west of the project area. Suitable habitat such as riparian edge and non-native annual grasslands is present in the vicinity of the project. These areas include riparian corridors include to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP.
American badger *Taxidea taxus*	--/--/SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats with friable soil.	**Unlikely.** The only suitable habitat is the non-native annual grasslands located on the northern end of the Pittsburg-Antioch Highway, which has little to no wildlife corridors to surrounding open space. The reconnaissance-level survey did not determine if the soil in this area is friable. The closest CNDDB records are located 3.8 miles to the south southeast of the project area and are from 2000 to 2002.
Plants			
Mt. Diablo manzanita *Arctostaphylos auriculata*	--/--/1B.3	Chaparral (sandstone), and cismontane woodland. El. 135 – 650 meters.	**Unlikely.** There is no suitable chaparral or cismontane woodlands in the project area, and this species elevation range is outside of the project area topography. The closest CNDDB occurrence is located 2.2 miles to the south west of the project area just outside Black Diamond Mines Regional Park.
Contra Costa manzanita *Arctostaphylos pungens* ssp. *laevigata*	--/--/1B.2	Chaparral (rocky). El. 430 – 1100 meters.	**Unlikely.** There is no suitable chaparral in the project area, and this species elevation range is outside of the project area topography. The closest CNDDB occurrence is located 4.9 miles to the south west of the project area in Black Diamond Mines Regional Park.
Alkali milk-vetch *Astragalus tener* var. *tener*	--/--/1B.2	Alkaline soils, playas, valley and foothill grassland (adobe clay), vernal pools. El. 1 – 60 meters.	**Unlikely.** There is no playa or vernal pool habitat in the project area. There is potential suitable grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. The closest CNDDB record is located 5.4 miles to the north of the project area in Birds Landing.
Heartscale *Atriplex cordulata* var. *cordulata*	--/--/1B.2	Saline or alkaline soils, in chenopod scrub, meadows and seeps, and valley and foothill grassland (sandy). El. 0 – 560 meters.	**Unlikely.** There is no chenopod scrub in the project area. There is potential suitable grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. The closest CNDDB record is located 9.8 miles to the north of the project area above Birds Landing.
Brittlescale *Atriplex depressa*	--/--/1B.2	Clay or alkaline soils, in chenopod scrub, meadows and seeps, playas, vernal pools, and valley and foothill grassland. El. 1 – 320 meters.	**Unlikely.** There is no chenopod scrub, playa, or vernal pools in the project area. There is potential suitable grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. The closest CNDDB record is located 3.8 miles to the south of the project area east of Deer Valley Road in open space.
Big tarplant *Blepharizonia plumosa*	--/--/1B.1	Usually found in clay in valley and foothill grasslands. El. 30 - 505 meters.	**Unlikely.** There is a CNDDB occurrence that overlaps the Delta Diablo's WWTP and part of the pipeline alignment on the Pittsburg-Antioch Highway in 2000. There is suitable grassland habitat in this area to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation.

TABLE C-1
LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN WITHIN THE VICINITY OF THE PROPOSED PROJECT

Common Name ***Scientific Name***	**Listing Status USFWS/CDFW/ CNPS**	**General Habitat Requirements**	**Potential for Species Occurrence Within the Project Area**
FEDERAL AND STATE SPECIES OF SPECIAL CONCERN (cont.)			
Plants (cont.)			
Round-leaved filaree *California macrophylla*	--/--/1B.2	Clay, cismontane woodland, valley and foothill grassland. El. 15 – 1200 meters.	**Unlikely.** A CNDDB record overlaps the River Intake Pump Station and a large portion of the new pipeline installation area. This record is possibly extirpated and is only known from 1889 and 1895 collections. Other extant records are located 2.1 miles to the south west in the Black Diamond Mines Regional Park. There are no suitable cismontane woodlands in the project area. There is potential suitable grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation.
Mt. Diablo fairy-lantern *Calochortus pulchellus*	--/--/1B.2	Chaparral, cismontane woodland, riparian woodland, and valley and foothill grasslands. El. 30 – 840 meters.	**Unlikely.** There is no suitable habitat in project area. The riparian woodland and grasslands located to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP may provide suitable habitat in the vicinity of the project area. The closest CNDDB record is located 3.9 miles to the south southwest of the project area in the Black Diamond Mines Regional Park.
Chaparral harebell *Campanula exigua*	--/--/1B.2	Chaparral (rocky, usually serpentinite). El. 275 – 1250 meters.	**Unlikely.** There is no suitable chaparral habitat in the project area. The closest CNDDB record is located 8.2 miles to the south west of the project area in Mt. Diablo State Park.
Congdon's tarplant *Centromadia parryi* ssp. *congdonii*	--/--/1B.1	Alkaline soil in valley and foothill grasslands. El. 0 – 230 meters.	**Unlikely.** There is no suitable habitat in the project area. There are potential suitable grassland habitat grasslands located to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. The closest CNDDB occurrence is located 12.9 miles to the west of the project area at the Golden Eagle Refinery.
Bolander's water-hemlock *Cicuta maculata* var. *bolanderi*	--/--/2B.1	Coastal marshes and swamps in fresh or brackish water. El. 0 – 200 meters.	**Unlikely.** The delta habitat with tules and water hyacinth near the River Intake Pump Station may provide suitable habitat for this species. The closest CNDDB record is located 1.2 miles to the north west on Browns Island and was recorded in 1978, but needs field work.
Mt. Diablo bird's-beak *Cordylanthus nidularius*	--/CR/1B.1	Chaparral (serpentinite). El. 600 – 800 meters.	**Unlikely.** There is no chaparral habitat in the project area. Only known from 2 CNDDB records located in Mt. Diablo State Park 8.5 miles to the south southwest.
Hoover's cryptantha *Cryptantha hooveri*	--/--/1A	Inland dunes, and valley and foothill grassland (sandy). El. 9 – 150 meters.	**Unlikely.** There is a CNDDB record that overlaps the River Intake Pump Station and a portion of the pipeline alignment. This recorded is dated 1908 and is possibly extirpated.
Hospital Canyon larkspur *Delphinium californicum* ssp. *interius*	--/--/1B.2	Chaparral (openings), cismontane woodland (mesic), and coastal scrub. El. 195 – 1095 meters.	**Unlikely.** There is no suitable chaparral, cismontane woodlands or coastal scrub in the project area. The closest CNDDB record is located 7.8 miles to the south west on Mt. Diablo and was recorded in 1918.
Recurved larkspur *Delphinium recurvatum*	--/--/1B.2	Alkaline in chenopod scrub, cismontane woodland, and valley and foothill grasslands. El. 3 – 790 meters.	**Unlikely.** There is no suitable chenopod scrub or cismontane woodlands in the project area. There is potential suitable grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. The closest CNDDB occurrence is located 13.7 miles to the south east of the project area in Byron.

TABLE C-1
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Common Name ***Scientific Name***	**Listing Status USFWS/CDFW/ CNPS**	**General Habitat Requirements**	**Potential for Species Occurrence Within the Project Area**
FEDERAL AND STATE SPECIES OF SPECIAL CONCERN (cont.)			
Plants (cont.)			
Western leatherwood *Dirca occidentalis*	--/--/1B.2	Mesic valley and foothill grassland and vernal pools. El. 25 - 425 meters.	**Unlikely.** This species is generally located along the coastline from Bodega Bay to just past Half Moon Bay, with several occurrences in the Richmond to Oakland area. The project area is located to the west of these occurrences.
Dwarf downingia *Downingia pusilla*	--/--/2B.2	Mesic valley and foothill grassland and vernal pools. Known to occur in Napa, Sonoma and Solano counties. El. 1 - 445 meters.	**Unlikely.** There are no vernal pools in the project area. There is potential suitable grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. The closest CNDDB record is located 5.6 miles to the north of the project area, just south of Birds Landing.
Lime Ridge eriastrum *Eriastrum ertterae*	--/--/1B.1	Alkaline or semi-alkaline, and sandy in Chaparral (openings or edges). El. 200 - 290 meters.	**Unlikely.** This species is only known from two CNDDB occurrences located in Lime Ridge Open Space 10.5 miles to the south west of the project area.
Antioch Dunes buckwheat *Eriogonum nudum* var. *psychicola*	--/--/1B.1	Inland dunes. El. 0 - 20 meters.	**Unlikely.** This species is only known from one CNDDB occurrence located in the Antioch Dunes NWR, which overlaps the River Intake Pump Station pipeline. There is no suitable habitat in the project area.
Mt. Diablo buckwheat *Eriogonum truncatum*	--/--/1B.1	Sandy in chaparral, coastal scrub, and valley and foothill grassland. El. 3 - 350 meters.	**Unlikely.** There is a CNDDB occurrence that overlaps the River Intake Pump Station and a large portion of the pipeline alignment but is stated as possibly extirpated, and dated 1886. There is potential grasslands to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation.
Jepson's coyote thistle *Eryngium jepsonii*	--/--/1B.2	Found in clay in valley and foothill grasslands, and vernal pools. El. 3 – 300 meters.	**Unlikely.** There is potential grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. There are no vernal pools in the project area. The closest CNDDB record is located 3.6 miles to the south west of the project area in Black Diamond Mines Regional Park, and is dated 1998.
Spiny-sepaled button-celery *Eryngium spinosepalum*	--/--/1B.2	Valley and foothill grasslands, and vernal pools. El. 80 – 975 meters.	**Unlikely.** There is potential grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. There are no vernal pools in the project area. The closest CNDDB record is located 13.9 miles to the south east of the project area in Byron airport.
Diamond-petaled California poppy *Eschscholzia rhombipetala*	--/--/1B.1	Valley and foothill grassland (alkaline, clay). El. 0 - 975 meters.	**Unlikely.** There is a CNDDB occurrence that overlaps the River Intake Pump Station pipeline and is located in the Antioch Dunes NWR, although this record is possibly extirpated. There is potential grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation.
San Joaquin spearscale *Extriplex joaquinana*	--/--/1B.2	Chenopod scrub, meadows and seeps, playas and alkaline valley and foothill grassland. El. 1 - 835 meters.	**Unlikely.** There is no chenopod scrub, seeps, or playas in the project area. There is potential grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. The closest CNDDB occurrence is located 3.9 miles to the south east of the project area in open space and is dated 1989.

TABLE C-1
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Common Name *Scientific Name*	Listing Status USFWS/CDFW/ CNPS	General Habitat Requirements	Potential for Species Occurrence Within the Project Area
FEDERAL AND STATE SPECIES OF SPECIAL CONCERN (cont.)			
Plants (cont.)			
Fragrant fritillary *Fritillaria liliacea*	--/--/1B.2	Coastal prairie and scrub, grasslands, often on serpentine soils. El. 3 - 410 meters.	**Unlikely.** There is no coastal prairie or scrub in the project area. There is potential suitable grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. The closest CNDDB record is located 5.7 miles to the north of the project area, just south of Birds Landing.
Toren's grimmia *Grimmia torenii*	--/--/1B.3	Openings, rocky, boulder and rock walls, carbonate, and volcanic in chaparral, cismontane woodland, and lower montane coniferous forest. El. 325 - 1160 meters.	**Unlikely.** There is no suitable habitat in the project area for this species. The closest CNDDB occurrence is located 8.8 miles to the south west of the project area in Mt. Diablo State Park.
Diablo helianthella *Helianthella castanea*	--/--/1B.2	Broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland. El. 60 - 1300 meters.	**Unlikely.** There is potential suitable grassland and riparian habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP. The closest CNDDB occurrence is located 3.7 miles to the south west of the project area in Black Diamond Mines Regional Park.
Brewer's western flax *Hesperolinon breweri*	--/--/1B.2	Usually serpentinite in chaparral, cismontane woodland, valley and foothill grassland. El. 30 - 945 meters.	**Unlikely.** There is no chaparral or cismontane woodland in the project area. There is potential suitable grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. The closest CNDDB record is located 2.4 miles to the south of the project area in an open space.
Woolly rose-mallow *Hibiscus lasiocarpos* var. *occidentalis*	--/--/1B.2	Often in riprap on sides of levees in marshes and swamps (freshwater). El. 0 - 120 meters.	**Unlikely.** This species range is located to the east and north east of the project area. The delta habitat with tules and water hyacinth near the River Intake Pump Station may provide suitable habitat for this species. The closest CNDDB occurrence is located 7.6 miles to the east of the project are near Bethel Island.
Carquinez goldenbush *Isocoma argute*	--/--/1B.1	Valley and foothill grassland (alkaline). El. 1 - 20 meters.	**Unlikely.** There is potential suitable grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. The closest CNDDB record is located 8.1 miles to the north of the project area in Birds Landing.
Delta tule pea *Lathyrus jepsonii* var. *jepsonii*	--/--/1B.2	Freshwater and brackish marshes and swamps. El. 0 - 5 meters.	**Unlikely.** The delta habitat with tules and water hyacinth near the River Intake Pump Station may provide suitable habitat for this species. The closest CNDDB occurrence is located 0.25 miles to the east of the project area in the Antioch Dunes NWR along the shoreline.
Legenere *Legenere limosa*	--/--/1B.1	Chaparral and cismontane woodland (usually volcanic). El. 100 - 500 meters.	**Unlikely.** There is no chaparral or cismontane woodland in the project area. The closest CNDDB record is located 13.8 miles to the north of the project area north of Birds Landing.
Mason's lilaeopsis *Lilaeopsis masonii*	--/CR/1B.1	Brackish or freshwater marshes and swamps and riparian scrub. El. 0 - 10 meters.	**Unlikely.** The delta habitat with tules and water hyacinth near the River Intake Pump Station may provide suitable habitat for this species. There is potential riparian habitat located to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, which are in the vicinity of the new pipeline installation. The closest CNDDB occurrence is located 0.16 miles to the west of the project area growing along the bank and log that was tidally influences, this record is dated 1988.

TABLE C-1
LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN WITHIN THE VICINITY OF THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/CDFW/ CNPS	General Habitat Requirements	Potential for Species Occurrence Within the Project Area
FEDERAL AND STATE SPECIES OF SPECIAL CONCERN (cont.)			
Plants (cont.)			
Delta mudwort *Limosella australis*	--/--/2B.1	Usually mud banks in marshes and swamps (freshwater or brackish) and riparian scrub. El. 0 - 3 meters.	**Unlikely.** The delta habitat with tules and water hyacinth near the River Intake Pump Station may provide suitable mud banks for this species. The closest CNDDB occurrence is located 0.25 miles to the west of the project area in the Antioch Dunes NWR.
Showy golden madia *Madia radiata*	--/--/1B.1	Cismontane woodland, and valley and foothill grassland. El. 25 - 1215 meters.	**Unlikely.** There is no cismontane woodland in the project area. There is potential suitable grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. The closest CNDDB record is located 2.3 miles to the south west of the project area in Black Diamond Mines Regional Park.
Hall's bush-mallow *Malacothamnus hallii*	--/--/1B.2	Chaparral and coastal scrub. El. 10 - 760 meters.	**Unlikely.** There is no coastal scrub or chaparral in the project area. The closest CNDDB record is 3.4 miles to the south west of the project area in Black Diamond Mines Regional Park. This occurrence is dated 1931.
Woodland woolythreads *Monolopia gracilens*	--/--/1B.2	Serpentine in broadleafed upland forest (openings), chaparral (openings), cismontane woodland, North Coast coniferous forest (openings), and valley and foothill grassland. El. 100 - 1200 meters.	**Unlikely.** There is no suitable habitat in the project area, additionally this species elevation range is outside of the project area topography. The closest CNDDB record is located 8.2 miles to the south west of the project area in Mt. Diablo State Park.
Lime Ridge navarretia *Navarretia gowenii*	--/--/1B.1	Chaparral. El. 180 – 305 meters.	**Unlikely.** This species is only known from three CNDDB occurrences, two of which are located in Lime Ridge Open Space 10.4 miles to the south west of the project area.
Shining navarretia *Navarretia nigelliformis* ssp. *radians*	--/--/1B.2	Sometimes clay, cismontane woodland, valley and foothill grassland, and vernal pools. El. 65 – 1000 meters.	**Unlikely.** There is no vernal pools or cismontane woodlands in the project area. There is potential suitable grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. The closest CNDDB record is located 1.6 miles to the south southwest of the project area in Contra Loma Regional Park.
Mt. Diablo phacelia *Phacelia phacelioides*	--/--/1B.2	Rocky in chaparral, and cismontane woodland. El. 500 – 1370 meters.	**Unlikely.** There is no suitable chaparral or cismontane woodland habitat in the project area, additionally the elevation range for this species is much higher than the topography of the project area. The closest CNDDB record is located 7.9 miles to the south west of the project area in Mt. Diablo State Park.
Bearded popcornflower *Plagiobothrys hystriculus*	--/--/1B.1	Often vernal swales in valley and foothill grassland (mesic), and vernal pool margins. El. 0 - 274 meters.	**Unlikely.** There is no vernal swales or vernal pools in the project area. The closest CNDDB record is located 7.1 miles to the north of the project area near Birds Landing.
Eel-grass pondweed *Potamogeton zosteriformis*	--/--/2B.2	Marshes and swamps (assorted freshwater). El. 0 – 1860 meters.	**Unlikely.** The delta habitat with tules and water hyacinth near the River Intake Pump Station may provide suitable habitat for this species. The closest CNDDB occurrence is located 8.9 miles to the north east of the project area on Webb Trac 1 near Bradford Island.
California alkali grass *Puccinellia simplex*	--/--/1B.2	Alkaline, vernally mesic, sinks, flats, and lake margins in chenopod scrub, meadows and seeps, valley and foothill grassland, and vernal pools. El. 2 – 930 meters.	**Unlikely.** There are no suitable sinks, flats, lake margins, chenopod scrub or meadows and seeps habitat in the project area. There is potential suitable grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. The closest CNDDB occurrence is located 11.6 miles to the south at Los Vaqueros Reservoir and is possibly extirpated.

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Common Name ***Scientific Name***	**Listing Status USFWS/CDFW/ CNPS**	**General Habitat Requirements**	**Potential for Species Occurrence Within the Project Area**
FEDERAL AND STATE SPECIES OF SPECIAL CONCERN (cont.)			
Plants (cont.)			
Sanford's arrowhead *Sagittaria sanfordii*	--/--/1B.2	Marshes and swamps (assorted shallow freshwater). El. 0 – 650 meters.	**Unlikely.** The delta habitat with tules and water hyacinth near the River Intake Pump Station may provide suitable habitat for this species.
Rock sanicle *Sanicula saxatilis*	--/CR/1B.2	Rocky, scree, and talus in broadleafed upland forest, chaparral, and valley and foothill grasslands. El. 620 – 1175 meters.	**Unlikely.** There is no suitable rocky, scree or talus in a broadleafed upland forest or chaparral habitat in the project area, additionally the elevation range for this species is much higher than the topography of the project area. All known CNDDB occurrences are located 8.0 miles to the south west of the project area in Mt. Diablo State Park.
Chaparral ragwort *Senecio aphanactis*	--/--/2B.2	Chaparral, cismontane woodland, coastal scrub, sometimes alkaline. El. 15 – 800 meters.	**Unlikely.** There is no suitable chaparral, cismontane woodland, or coastal scrub located in the project area. The closest CNDDB occurrence is located 3.4 miles to the south west in Black Diamond Mines Regional Park and is dated 1933.
Most beautiful jewelflower *Streptanthus albidus*	--/--/1B.2	Serpentinite in chaparral, cismontane woodland, valley and foothill grasslands. El. 95 – 1000 meters.	**Unlikely.** There is no suitable cismontane woodland or chaparral habitat in the project area, additionally the elevation range for this species is much higher than the topography of the project area. The closest CNDDB occurrences is located 9.2 miles to the south west of the project area in Mt. Diablo State Park.
Mt. Diablo jewelflower *Streptanthus hispidus*	--/--/1B.3	Rocky in chaparral, and valley and foothill grassland. El. 365 – 1200 meters.	**Unlikely.** There is no rocky chaparral habitat in the project area, additionally the elevation range for this species is much higher than the topography of the project area. All known CNDDB occurrences are located 7.8 miles to the south west of the project area in Mt. Diablo State Park.
Slender-leaved pondweed *Stuckenia filiformis* ssp. *alpina*	--/--/2B.2	Marshes and swamps (assorted shallow freshwater). El. 300 – 2150 meters.	**Unlikely.** The delta habitat with tules and water hyacinth near the River Intake Pump Station may provide suitable habitat for this species, although the elevation range for this species is much higher than the topography of the project area. The closest CNDDB record is located 10.9 miles to the south west of the project area in Mt. Diablo State Park.
Suisun Marsh aster *Symphyotrichum lentum*	--/--/1B.2	Brackish and freshwater marshes and swamps. El. 0 - 3 meters.	**Unlikely.** The delta habitat with tules and water hyacinth near the River Intake Pump Station may provide suitable habitat for this species. There are two CNDDB occurrences located less than 0.2 miles to the east and west of the River Intake Pump Station.
Coastal triquetrella *Triquetrella californica*	--/--/1B.2	Found in soil in coastal bluff scrub and coastal scrub. El. 10 – 100 meters.	**Unlikely.** There are no coastal bluff scrub or coastal scrub in the project area. The closest CNDDB record is located 8.4 miles to the south west of the project area in Mt. Diablo State Park.
Caper-fruited tropidocarpum *Tropidocarpum capparideum*	--/--/1B.1	Valley and foothill grassland (alkaline hills). El. 1 – 455 meters.	**Unlikely.** There is potential suitable grassland habitat to the north of the Pittsburg-Antioch Highway near the Delta Diablo's WWTP, in the vicinity of the new pipeline installation. The closest CNDDB record is located 6.6 miles to the south west of the project area in Clayton. This record is only known from a 1896 occurrence.
Oval-leaved viburnum *Viburnum ellipticum*	--/--/2B.3	Chaparral, cismontane woodland, lower montane coniferous forest. El. 215 – 1400 meters.	**Unlikely.** There is no suitable chaparral, cismontane woodland or lower montane coniferous forest in the project area, additionally the elevation range for this species is much higher than the topography in the project area. The closest CNDDB record is located 7.8 miles to the south southwest of the project area.

TABLE D-1
LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN WITHIN THE VICINITY OF THE PROPOSED PROJECT

STATUS CODES:

Federal Categories (U.S. Fish and Wildlife Service):

FE = Listed as Endangered by the Federal Government
FT = Listed as Threatened by the Federal Government
FC = Candidate for Federal Listing

State Categories (California Department of Fish and Wildlife):

CE = Listed as Endangered by the State of California
CT = Listed as Threatened by the State of California
CR = Listed as Rare by the State of California
3511 = Fully Protected Species
* = Special Animals
CSC = California Species of Special Concern

California Rare Plant Rank (CRPR):

Rank 1B = Plants rare, threatened, or endangered in California and elsewhere
Rank 2 = Plants rare, threatened, or endangered in California, but more common elsewhere
Rank 3 = A review list of plants about which more information is needed

Threat Sub-Rankings –
0.1: Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)
0.2: Fairly endangered in California (20-80% occurrences threatened/ moderate degree and immediacy of threat)
0.3: Not very threatened in California (<20% of occurrences threatened/low degree and immediacy of threat or no current threats known

SOURCES: CDFW, 2017; CNPS, 2017;

Exponent®

EXTERNAL MEMORANDUM

TO:	Samantha Salvia
FROM:	Ryan Thacher Ph.D., P.E. Susan Paulsen Ph.D., P.E.
DATE:	June 22, 2018
PROJECT:	1405064.000
SUBJECT:	Draft - Near-Field Dilution Results

Near-Field Modeling Study of Potential Future Discharge from the Delta Diablo Sanitation District Outfall

Exponent conducted dilution analyses to characterize the potential impacts of brine discharges from the City of Antioch's (City's) proposed brackish desalination facility (the project) and assist the project team in evaluating water quality impacts for the analyses to be performed pursuant to the California Environmental Quality Act (CEQA). Both project and without-project cases were modeled to evaluate mixing and dilution in the near-field (at the edge of the zone of initial dilution [ZID]).

Near-Field (ZID) Analysis Scenarios

Exponent 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.

In coordination with Carollo and ESA, seven scenarios were developed to evaluate near-field dilution for project and without-project simulations. The only difference between project and without-project simulations was the addition of desalination brine flows in the discharge from the DDSD diffuser (see Table 1).

Prior analyses conducted by Exponent indicated that the lowest near-field dilution occurred during the fall season, so the fall season was used as the basis for receiving water conditions in scenarios 1 to 4. Scenarios 1 through 4 represent minimum (0 mgd, assumes all treated wastewater is recycled) and typical (12 mgd) DDSD secondary treated wastewater flows, and average flows from other sources to the DDSD diffuser.[1] The spring season is significant from a fisheries perspective and was used as the basis for receiving water conditions in Scenario 5, which assumed typical wastewater flows (12 mgd) and average flows from other sources. Near-field dilution during winter conditions, when maximum wet-weather flows are expected to occur, was evaluated in Scenario 6 (annual average discharge of treated wastewater referenced in the DDSD NPDES permit[2] [16.5 mgd]) and Scenario 7 (maximum wet weather flow rate of treated wastewater referenced in the permit [32.4 mgd]).

The near-field analysis was conducted using DDSD diffuser discharge data from 2013 and 2015. Water year 2013 was a dry year (based on the Sacramento Valley Index[3]), but DDSD considers 2013 a typical year in terms of effluent volume and effluent properties (e.g., salinity and temperature).[4] Thus, 2013 discharge data were used for Scenarios 1, 2, 6, and 7. Because DDSD effluent volume and properties differ between a typical year (2013) and a critical water year, diffuser data from critical water year 2015 were used in Scenarios 3-5.

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[1] The Delta Energy Center (DEC), Los Medanos Energy Center (LMEC), and Dow Chemical (Dow) are assumed to be the only other sources of flow to the DDSD diffuser.

[2] San Francisco Regional Water Quality Control Board. 2014. Order No. R2-2014-0030, NPDES No. CA0038547.

[3] See http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST.

[4] DDSD stated during an October 18, 2017 meeting that data from 2013 were representative of typical, non-drought conditions.

Table 1. Summary of the seven discharge scenarios analyzed in the near-field analysis.

	Scenario	Year Type	Season and Year	Flow (mgd)		
				Desalination Brine	Blowdown and Dow Brine	Waste-water Effluent
1	a) Without-project (Min DDSD) b) Project (Min DDSD)	Dry	Fall 2013	a) 0 b) 2	2013 Seasonal Avg.	0
2	a) Without-project (Typical DDSD) b) Project (Typical DDSD)	Dry	Fall 2013	a) 0 b) 2	2013 Seasonal Avg.	12
3	a) Without-project (Min DDSD) b) Project (Min DDSD)	Critical	Fall 2015	a) 0 b) 2	2015 Seasonal Avg.	0
4	a) Without-project (Typical DDSD) b) Project (Typical DDSD)	Critical	Fall 2015	a) 0 b) 2	2015 Seasonal Avg.	12
5	a) Without-project (Typical DDSD) b) Project (Typical DDSD)	Critical	Spring 2015	a) 0 b) 2	2015 Seasonal Avg.	12
6	a) Without-project (16 mgd) b) Project (16 mgd)	Dry	Winter 2013	a) 0 b) 2	2013 Seasonal Avg.	16
7	a) Without-project (32 mgd) b) Project (32 mgd)	Dry	Winter 2013	a) 0 b) 2	2013 Seasonal Avg.	32

Modeling Methods

Visual Plumes

The Visual Plumes UM3 model was used to calculate the near-field dilution[5] 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[6] using receiving water characteristics specified by the user. Visual Plumes is only capable of simulating discharge in a single direction; because the DDSD diffuser discharges from both sides of the diffuser (see Figure 1 and Figure 2), dilution from the diffuser was modeled as if all ports were on a single side of the diffuser (see Figure 3). Because the ambient flow of water across the diffuser is at an angle, the discharge from the diffuser is not symmetrical. To capture the plume

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[5] 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.

[6] See https://www.epa.gov/exposure-assessment-models/visual-plumes for additional details.

dynamics resulting from discharges from both sides of the diffuser, model scenarios assumed (1) all ports discharged in the landward direction, and separately (2) all ports discharged in the seaward direction.[7]

The Visual Plumes model was used to compute the plume dilution, trajectory, and the dimensions of the plume at the edge of the 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. For a sinking plume, the ZID extends to the location at which the plume reaches the seabed. For a rising plume, the ZID extends either to the water surface or to the "trapping depth" when the height of rise of the plume stops below the water surface. Within Visual Plumes, the ZID is defined as the boundary of each plume from each individual port where plumes do not merge, and as the outside edge of the larger plume where individual plumes merge. In general, a larger ZID corresponds to a higher dilution, and a smaller ZID corresponds to lower dilution.

Given that flow rates and flow velocities in the Delta in the vicinity of the DDSD diffuser are strongly tidal, additional mixing beyond the ZID is expected to occur rapidly as the ambient current continues to mix effluent discharged from the diffuser within the receiving water.[8] The spreading of the plume beyond the ZID would require additional analysis methods and information describing bathymetry near the diffuser; mixing beyond the ZID was not evaluated.

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[7] Modeling all ports on a single side of the diffuser "represents a major simplification" but "appears to be fairly accurate based on the results of informal modeling trials…" and "this approach works well when the distances of interest are somewhat beyond the point of merging." (Frick, W.E., Roberts, P.J.W., Davis, L.R., Keyes, J., Baumgartner D.J., and K.P. George. 2003. Dilution Models for Effluent Discharges. 4th Edition (Visual Plumes). United States Environmental Protection Agency. EPA/600/R-03/025. p. 4.25.) Model results obtained in this manner are expected to be conservative (i.e., to predict lower dilution values than would be measured in the field).

[8] See, for example, the discussion of vertical mixing in an estuary found in Chapter 7 of Fischer et al. (1979). In addition to tidally-driven flows, ambient mixing is induced by wind, which was not simulated in this analysis. (Fischer, H.B., E.J. List, R.C.Y. Kob, J. Imberger, and N.H. Brooks. 1979. Mixing in Inland and Coastal Waters. Academic Press, Inc., New York. 483 pp.)

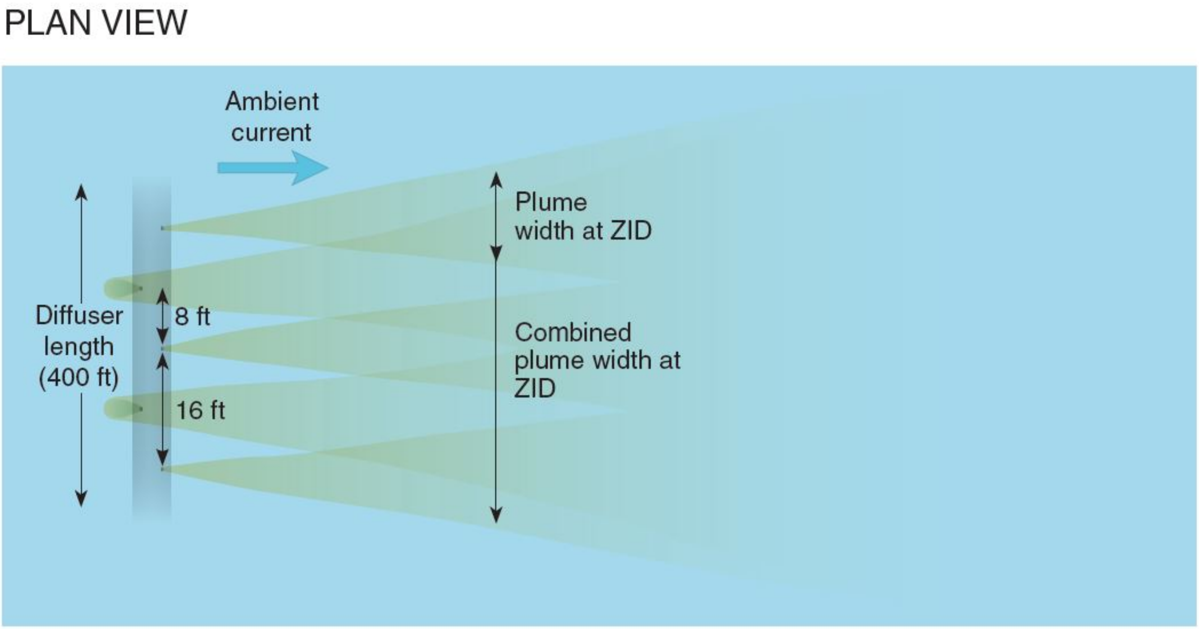

Figure 1 Plan view schematic of the DDSD diffuser as installed (not as modeled) showing port spacing and the general shape of plumes from individual ports under the influence of ambient tidal currents.

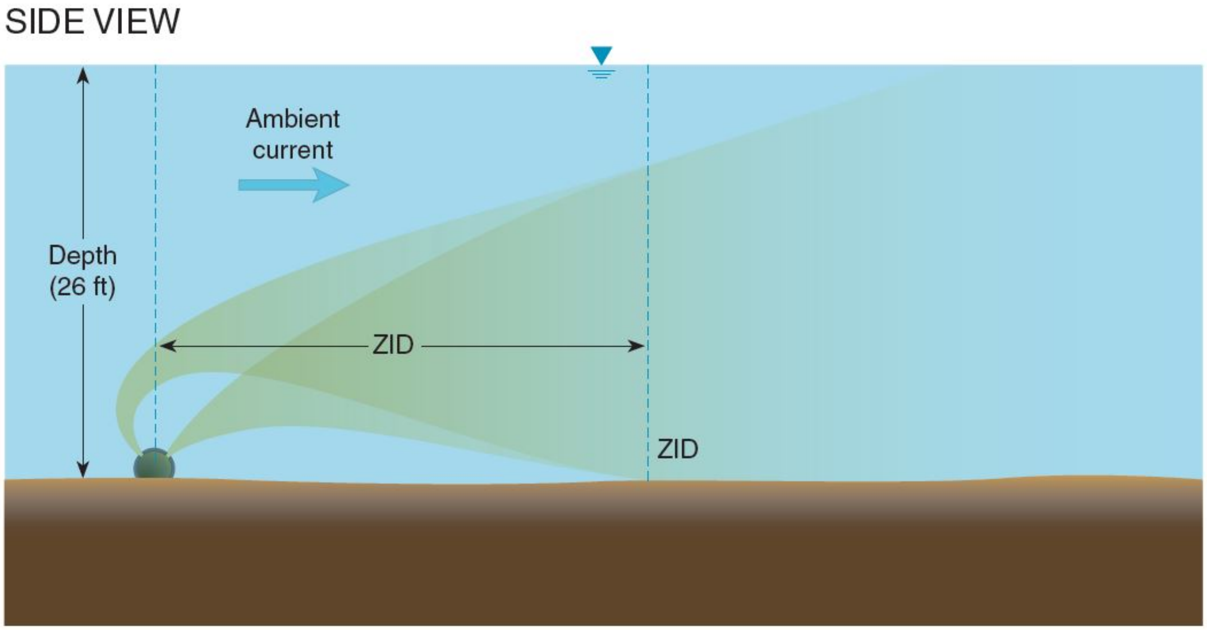

Figure 2 Side view schematic of the DDSD diffuser as installed (not as modeled) showing the general shape of plumes from individual ports under the influence of ambient tidal currents. Note that this distance to the edge of the ZID may differ for ports on the upstream and downstream sides of the diffuser.

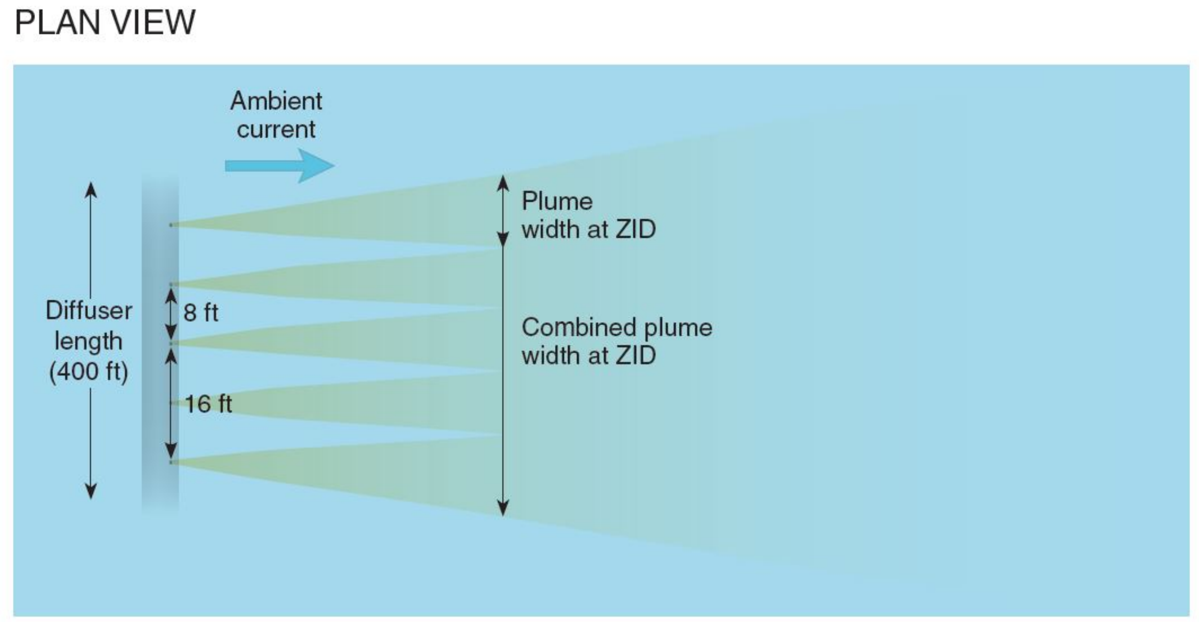

Figure 3 Plan view schematic of the diffuser as modeled in Visual Plumes. All 50 ports were modeled as discharging from a single side of the diffuser, and multiple model runs were conducted to evaluate the discharge of effluent from ports on both sides of the diffuser.

Model Validation

Although widely used in diffuser discharge analysis for rising plumes, Visual Plumes has not been extensively validated for the case of a negatively buoyant plume. A semi-empirical approach described in Kikkert et al.[9], on the other hand, is well-grounded in a relatively large set of empirical observations for negatively buoyant plumes at slack-tide (zero velocity) conditions. To provide additional validation of the ability of Visual Plumes to simulate a negatively buoyant discharge, both Visual Plumes and the method of Kikkert et al. (2007) were used to independently calculate the trajectory and dilution of a sinking plume for a slack-tide scenario.

Length parameters describing the distance to the edge of the ZID and plume height as predicted by Visual Plumes were 31 percent and 38 percent smaller than the values calculated using the Kikkert et al. (2007) approach. Dilution ratios calculated by the two methods differed by 16 percent or less, and results from the Visual Plumes method were conservative (i.e., produced

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[9] Kikkert, G.A.; Davidson, J.; and Nokes, R.I. (2007). *Inclined Negatively Buoyant Discharges*. Journal of Hydraulic Engineering, 133(5), pp. 545-554.

lower dilution values) than the dilution values calculated using the Kikkert et al. (2007) approach.

Results from this comparison of analytical methods demonstrate that the Visual Plumes model results are more conservative (show lower dilution values), and Visual Plumes was used to simulate dilution for scenarios with a tidal current.

Data and Data Sources

Diffuser Geometry

The City proposes to discharge brine from the desalination facility through the DDSD diffuser located in New York Slough. The diffuser geometry information presented in LWA (2014)[10] was used in this modeling work. The diffuser is 400 ft long and 42 inches in diameter, with three-inch diameter ports spaced eight feet on center and offset side to side (25 ports on each side of the diffuser). Because Visual Plumes can only simulate discharge in one direction, dilution and plume dynamics were simulated for all 50 ports (at eight-foot spacing) discharging in the landward direction (303°) over a tidal cycle, and for all 50 ports discharging in a seaward direction (123°) over a tidal cycle. Simulation results for the discharge direction resulting in lower dilution are reported, which is considered conservative. Table 2 describes the diffuser geometry. A plan view of the diffuser in New York Slough is shown in Figure 4.

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[10] LWA (2014). Dilution Analysis for ConcentrateConcentrate [*sic*]-Delta Diablo Discharges to New York Slough. Prepared by Larry Walker Associates for Amanda Wong Roa of Delta Diablo Sanitation District. May 9, 2014.

Table 2. Diffuser Geometry

Parameter	Value (as installed)	Value (as modeled)
Diffuser Length	400 ft	400 ft
Diffuser Diameter	42 in	42 in
Average Diffuser Depth	26 ft	26 ft
Number of Ports	50 (25 on each side)	50 (on a single side)
Port Spacing	16 ft (Figure 1)	8 ft (Figure 3)
Port Diameter	3 in	3 in
Vertical Discharge Angle	25 degrees	25 degrees
Horizontal Discharge Angle	123, 303 degrees	123, 303 degrees
Port Elevation	16.5 in	16.5 in

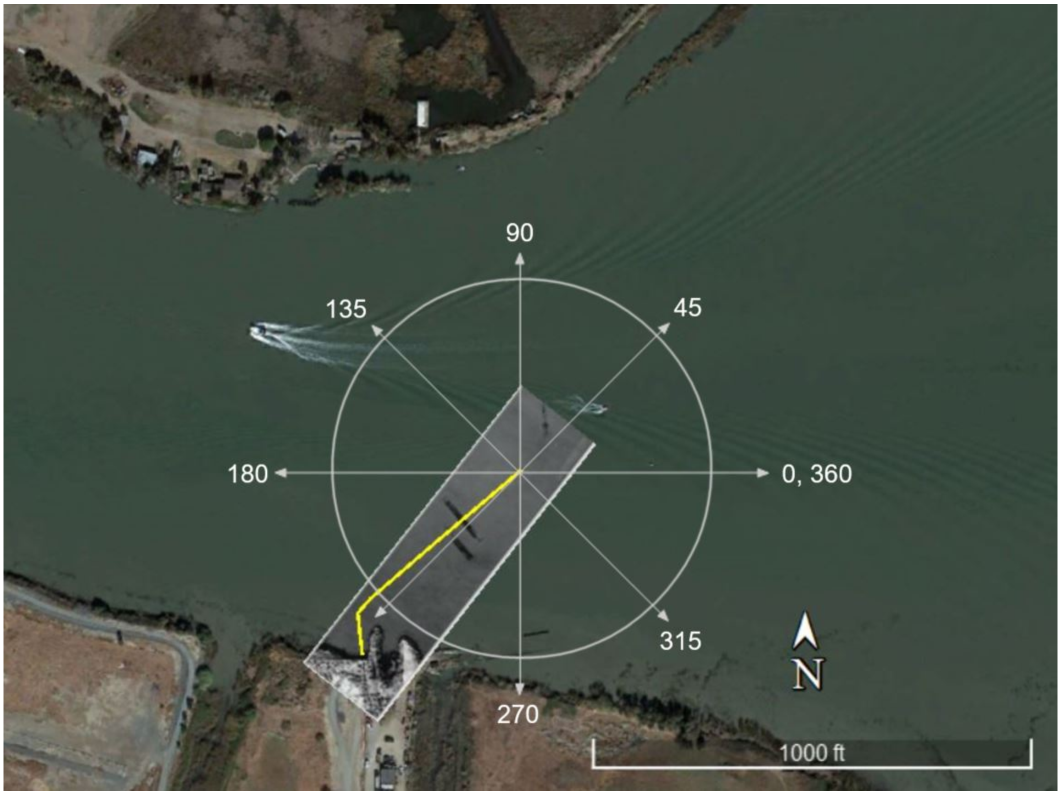

Figure 4 Approximate diffuser location (yellow line) and orientation in New York Slough. The diffuser's location[11] was superimposed on a Google Earth image.

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[11] Brown & Caldwell (1981). "Plan and Profile Sta.25+30 to Sta.33+50.50" for Contra Costa County Sanitation District No.7-A, Industrial Shore Subregional Wastewater Facilities Outfall (Former name of Delta Diablo Sanitation District), Sheet No. C-G006, Dwg. No. 8-006. Updated 5/11/1981.

Diffuser Effluent Data

Effluent data used in the near-field analysis were provided by DDSD and Carollo. The sources of flow data and total dissolved solids (TDS)[12] concentrations used in the modeling are shown in Table 3.

Table 3 Data sources and availability for the near-field dilution analysis.

			Flow Data		TDS Data	
Effluent Type	Source	Measured or Modeled	Years Data Available	Time Interval	Years Data Available	Time Interval
DDSD Secondary Treated Wastewater	DDSD	Measured	2012-2017	Daily	2010-2017	Monthly
LMEC Blowdown	DDSD	Measured	2012-2017	Daily	2012-2017	Quarterly
DEC Blowdown	DDSD	Measured	2012-2017	Daily	2012-2017	Quarterly
Dow Brine	DDSD	Measured	2013-2017	Daily[1]	2009-2012	Sporadic[2]
Desalination Brine[3]	Carollo	Modeled	1976-1991	15-min	1976-1991	15-min

[1] Dow brine is not discharged daily. Between July 2013 and June 2017 there were 393 discharge events.

[2] Nine TDS measurements were recorded between May 2009 and February 2012.

[3] Project brine flow rates and TDS were calculated from Delta Simulation Model 2 (DSM2) results for the existing conditions (EBC2) scenario. DSM2 model runs for the EBC2 scenario was obtained from DWR modeling performed for the WaterFix water right petition before the SWRCB.

Flow rates and TDS concentrations for the Dow brine and LMEC and DEC blowdown flows were provided by DDSD.[13] Flow rates and TDS concentrations for the project desalination brine ("desalination brine") were provided by Carollo Engineers; TDS concentrations were calculated by Carollo using influent data from DSM2 modeling performed by DWR. The flow rate of the combined waste stream was calculated by adding the flow rates of the individual streams, and the salinity and temperature for each scenario were calculated as flow-weighted average values. Table 4 shows the flow rate and TDS concentrations for each stream contributing to the final effluent for the without-project and project simulations.

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[12] TDS, electrical conductivity (EC), and chloride are all measures of salinity and can be calculated by use of conversion factors described here: http://wdl.water.ca.gov/suisun/facts/salin/index.cfm

[13] Email from Amanda Roa, DDSD, to Scott Buenting, November 20, 2017.

The project brine was assumed to have a 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 EBC2 model scenario. As is shown in the following section (Receiving Water Data), the peak receiving water TDS for the tidal cycle used in the near-field analysis was nearly 700 mg/L.[14] 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.

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[14] For a river TDS of 700 mg/L, the brine waste concentration would be approximately 2,800 mg/L, an order of magnitude less than the brine waste TDS assumed in the modeling.

Table 4 Diffuser discharge data used in the near-field analysis for without-projects.

	Scenario	Season	Effluent Flow Rate (mgd)						Effluent TDS (mg/L)						Effluent Temp[9]
			Waste-water[1]	DEC Blowdown[2]	LMEC Blowdown[3]	Dow Brine[4]	Desal-ination Brine	Total Flow	Waste-water[5]	DEC Blowdown[6]	LMEC Blowdown[7]	Dow Brine[8]	Desalination Brine	Flow-weighted Avg TDS	
1	a) Without-project (Min DDSD) b) Project (Min DDSD)	Fall 2013	0	1.08	0.076	0.0117	a) 0 b) 2	a) 1.2 b) 3.2	NA	3,557	2,933	286,000	a) NA b) 32,000	a) 6,346 b) 22,543	76
2	a) Without-project (Typical DDSD) b) Project (Typical DDSD)	Fall 2013	12	1.08	0.076	0.0117	a) 0 b) 2	a) 13.2 b) 15.2	793	3,557	2,933	286,000	a) NA b) 32,000	a) 1,285 b) 5,335	76
3	a) Without-project (Min DDSD) b) Project (Min DDSD)	Fall 2015	0	1.9	1.03	0.0156	a) 0 b) 2	a) 2.9 b) 4.9	NA	3,557	2,933	286,000	a) NA b) 32,000	a) 4,835 b) 15,820	76
4	a) Without-project (Typical DDSD) b) Project (Typical DDSD)	Fall 2015	12	1.9	1.03	0.0156	a) 0 b) 2	a) 14.9 b) 16.9	820	3,557	2,933	286,000	a) NA b) 32,000	a) 1,611 b) 5,198	76
5	a) Without-project (Typical DDSD) b) Project (Typical DDSD)	Spring 2015	12	0.54	0.7	0.0134	a) 0 b) 2	a) 13.3 b) 15.3	827	2,673	2,780	250,000	a) NA b) 32,000	a) 1,257 b) 5,288	70
6	a) Without-project (16 mgd) b) Project (16 mgd)	Winter 2013	16	1.54	0.65	0.0157	a) 0 b) 2	a) 18.2 b) 20.2	830	3,300	2,633	330,000	a) NA b) 32,000	a) 1,387 b) 4,417	68
7	a) Without-project (32 mgd) b) Project (32 mgd)	Winter 2013	32	1.54	0.65	0.0157	a) 0 b) 2	a) 34.2 b) 36.2	830	3,300	2,633	330,000	a) NA b) 32,000	a) 1,127 b) 2,832	68

[1] DDSD wastewater flow values were assumed by ESA in coordination with DDSD.

[2, 3, 4] Flows were calculated from data provided by DDSD as seasonal averages for the given year.

[5] Carollo assumes a brine discharge flow of 2 mgd during desalination facility operation.

[6] TDS of the secondary treated wastewater was assumed to be the same as the recycled water stream and was calculated from data provided by DDSD.

[7, 8, 9] TDS of the blowdown streams and the Dow brine stream were calculated as seasonal averages from data provided by DDSD; TDS concentrations were assumed constant for all water year types as available data were insufficient to calculate TDS concentrations for different year types.

[10] The project brine TDS concentration was assumed to be constant in this modeling effort at 32,000 mg/L, corresponding to the maximum expected brine concentration, as suggested by ESA.

[11] Temperature data were from the combined DDSD discharge, including Dow brine, DEC and LMEC blowdown flows, and secondary treated wastewater. Data were not available to characterize discharge temperatures when secondary treated wastewater is absent.

Receiving Water Data

The DDSD diffuser discharges into New York Slough, which experiences changing flows and velocities as a result of tidal currents that influence transport and mixing of the DDSD discharge. Receiving water (ambient water) current data from New York Slough were used to evaluate dilution during a typical tidal cycle. A tidal cycle from October 15, 2017, was used to evaluate dilution for the model scenarios.[15]

Ambient water quality data describing temperature and electrical conductivity (EC) on 15-minute intervals were obtained from the California Data Exchange Center (CDEC), maintained by the California Department of Water Resources,[16] for the water quality station at Antioch (station ANH). Data for EC were converted to TDS as described in footnote 12. Tidal current data on six-minute intervals were obtained from NOAA for New York Slough.[17] TDS and tidal current data from October 15, 2017 are plotted in Figure 5. Exponent used the 6-minute tidal current data to calculate hourly average velocities in both the flood and ebb tide directions and the 15-minute EC/TDS data at Antioch to calculate hourly average electrical conductivity (EC). The hourly average ambient data used in the near-field modeling are shown in Table 5.

During the tidal cycle on October 15, 2017, the peak instantaneous TDS was 671 mg/L (Figure 5) and the peak hourly average TDS was 552 mg/L (Table 5). Over longer time frames, however, TDS levels in New York Slough range to over 8,000 mg/L (see Figure 6, which plots hourly TDS concentrations at Antioch's intake location from 1976-1991, as modeled by DWR for

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[15] A single, typical tidal cycle was used for all model scenarios (see Table 1), as the range of tidal current velocities is expected to be the same for a typical tidal cycle, regardless of season. Although the receiving water TDS fluctuates over the course of a day (Figure 5) and much more substantially longer periods of time (Figure 6), the selected tidal cycle has a relatively low TDS, which maximizes the density difference between the discharge (brine TDS of 32,000 mg/L, peak discharge TDS of 22,543 mg/L in Scenario 1b). This combination of effluent and receiving water conditions thus results in conservative estimates of dilution (i.e., dilution will be lower for the selected tidal cycle than for higher salinity receiving water conditions).

[16] For more detail, please see: https://cdec.water.ca.gov/cgi-progs/selectQuery?station_id=ANH&sensor_num=&dur_code=D&start_date=&end_date=

[17] For more detail, please see: https://tidesandcurrents.noaa.gov/noaacurrents/Predictions?id=SFB1326_5&d=2017-10-15&r=1&t=am%2Fpm&u=2&tz=LST%2FLDT&i=6min&threshold=leEq&thresholdvalue=

existing conditions).[18] Note that a TDS concentration in the river of 8,000 mg/L would result in a TDS concentration for the project brine of 32,000 mg/L.

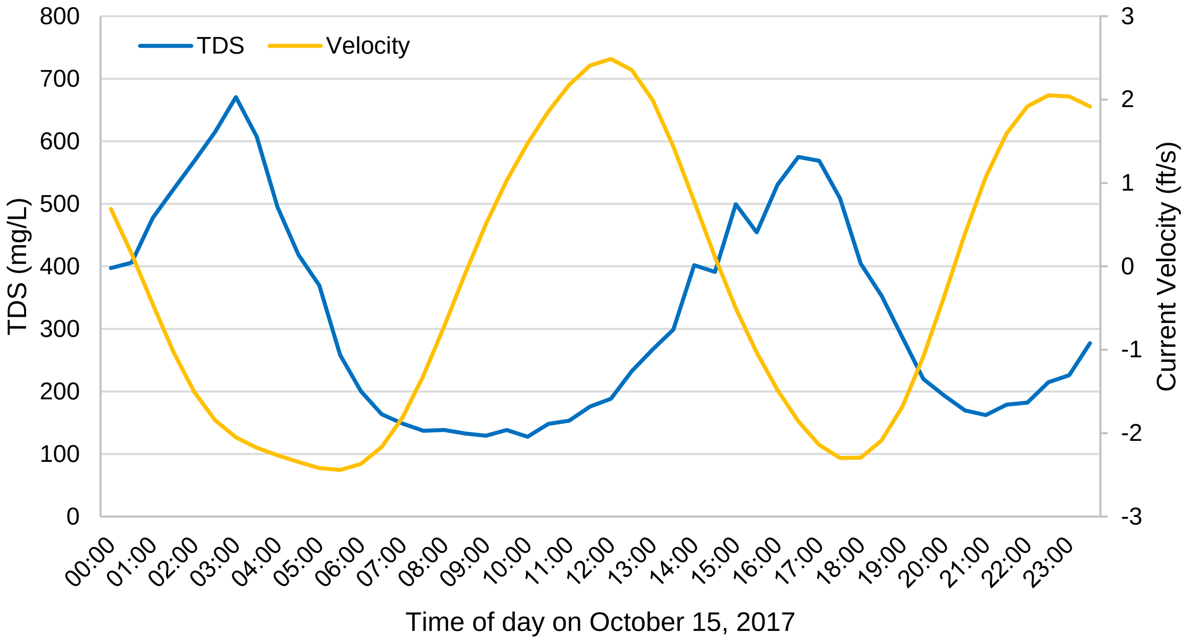

Figure 5 Tidal current velocity and receiving water TDS concentration for New York Slough from October 15, 2017. (Source: NOAA and CDEC)

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[18] TDS concentrations were computed by Exponent using model results of DSM2-simulated EC for an existing condition scenario, the “EBC2” scenario, by the Department of Water Resources (DWR).

Table 5 Ambient current velocity and receiving water salinity and temperature in New York Slough used in near-field dilution analysis.

No.	Date and Time	Current Velocity (ft/sec)[1]	EC (uS/cm)[1]	TDS (mg/L)[2]	Temperature (°F)[3]
1	10/15/2017 9:30	0.55	257	135	63
2	10/15/2017 10:30	1.5	258	135	63
3	10/15/2017 11:30	2.19	303	161	63
4	10/15/2017 12:30	2.45	373	201	63
5	10/15/2017 13:30	1.92	508	278	63
6	10/15/2017 14:30	0.71	677	374	63
7	10/15/2017 15:30	-0.54	836	464	63
8	10/15/2017 16:30	-1.51	975	544	63
9	10/15/2017 17:30	-2.14	990	552	63
10	10/15/2017 18:30	-2.25	713	395	63
11	10/15/2017 19:30	-1.59	499	273	63
12	10/15/2017 15:06 (30 min post slack current)	-0.614	897	499	63

[1] Ambient current velocity and EC are hourly-average calculated values. Positive current velocities indicate flow in the landward direction, and negative values indicate flow in the seaward direction.

[2] Ambient water EC was converted to TDS as described in footnote 12.

[3] The temperature of the receiving water fluctuated by less than 0.2 °F over the tidal cycle, so a constant value of 63 °F was chosen.

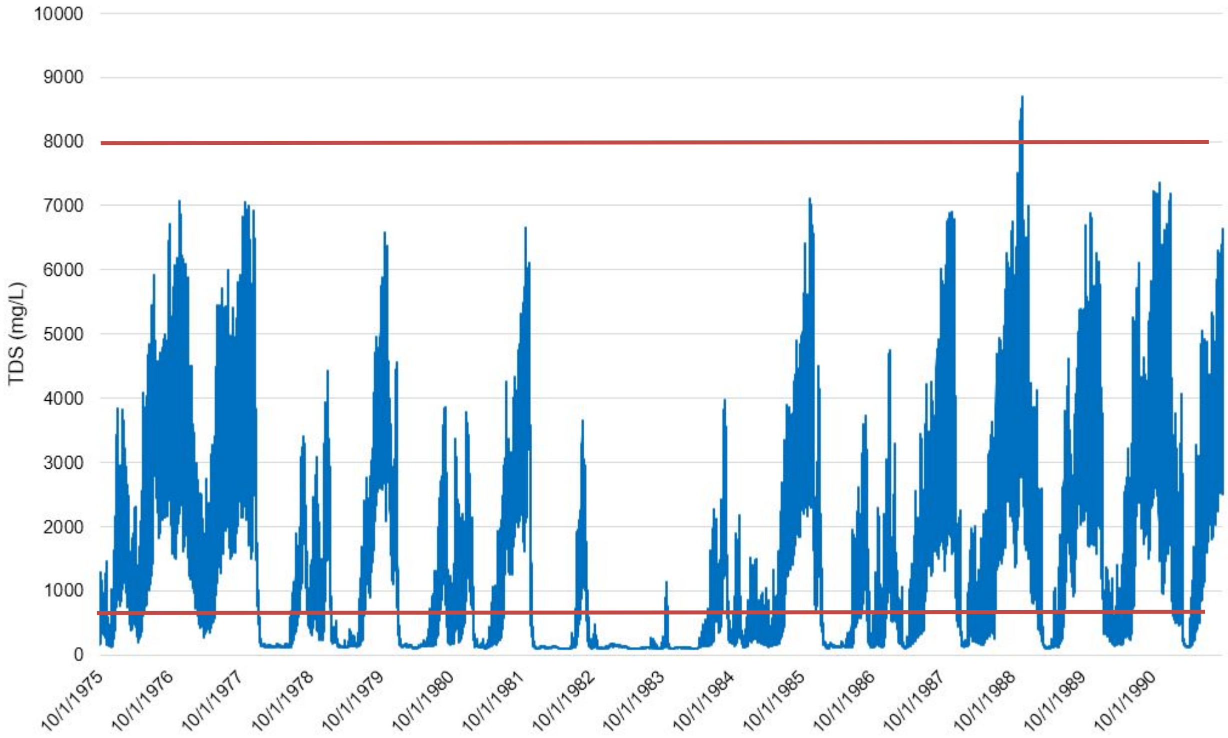

Figure 6 TDS of the receiving water at Antioch for the without-project (EBC2) scenario as modeled by DWR using DSM2. Horizontal lines indicate TDS levels of 671 mg/L (the peak receiving water TDS simulated in the near-field analysis) and 8,000 mg/L (corresponding to the brine TDS concentration of 32,000 mg/L used in the modeling).

Near-Field Modeling Results

Data Interpretation

As previously described, the diffuser was modeled with all 50 ports discharging in the landward direction (upstream, towards the Delta) and separately with all 50 ports discharging in the seaward direction (downstream, towards the Golden Gate Bridge). Throughout this memorandum, the tabulated results present scenarios with the lowest dilution and the maximum ZID dimensions.

Figure 7 presents a hypothetical set of results (plan view) for a single model scenario. For discharge modeled from the seaward ports (indicated by purple), there is a maximum hourly ZID in both the seaward ($x_{max,S,-}$) and landward ($x_{max,S,+}$) directions due to tidal currents moving in both directions, each with an associated dilution value at the ZID ($S_{x\text{-}max,S,-}$ and $S_{x\text{-}max,S,+}$), ambient TDS concentration ($\rho_{amb,S,-}$ and $\rho_{amb,S,+}$), and edge of ZID TDS concentration ($\rho_{ZID\text{-}max,S,-}$ and $\rho_{ZID\text{-}max,S,+}$). In addition, the seaward discharge will have a minimum dilution value on both sides of the diffuser ($S_{x\text{-}min,S,-}$ and $S_{x\text{-}min,S,+}$) associated with a specific minimum ZID ($x_{min,S,-}$ and $x_{min,S,+}$), as well as ambient and edge of ZID TDS concentrations associated with the minimum dilution values. An identical set of parameters result from modeling the diffuser discharge from the landward ports (indicated in green).

From these model results, both the maximum hourly ZID and the minimum dilution value were tabulated for each scenario.[19] This simplified the results shown in Figure 7 to the quantities shown in Figure 8. The footprint of the ZID over the tidal cycle was calculated as the sum of $x_{max,S,-}$ and $x_{max,L,+}$.

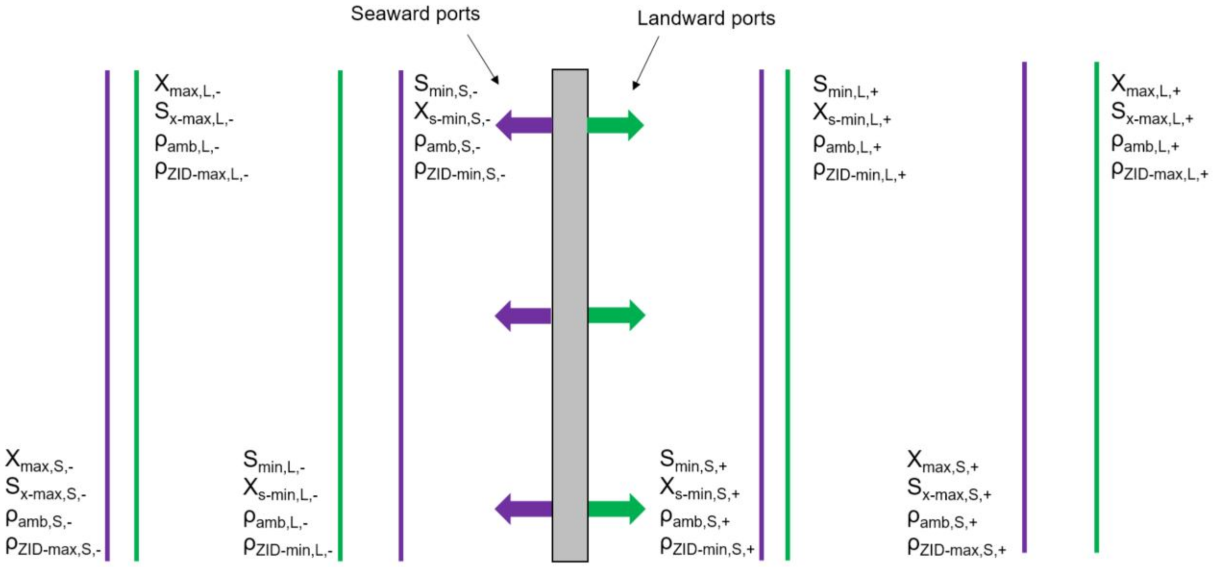

Figure 7 Data from a hypothetical model run shown in general terms. The subscripts “S” and “L” indicate a seaward or landward discharge, and the subscripts “+” and “-“ indicate the plume is on the seaward (“+”) or landward (“-“) side of the diffuser.

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[19] Note that the maximum hourly ZID and maximum hourly dilution may occur at different hours in the tidal cycle.

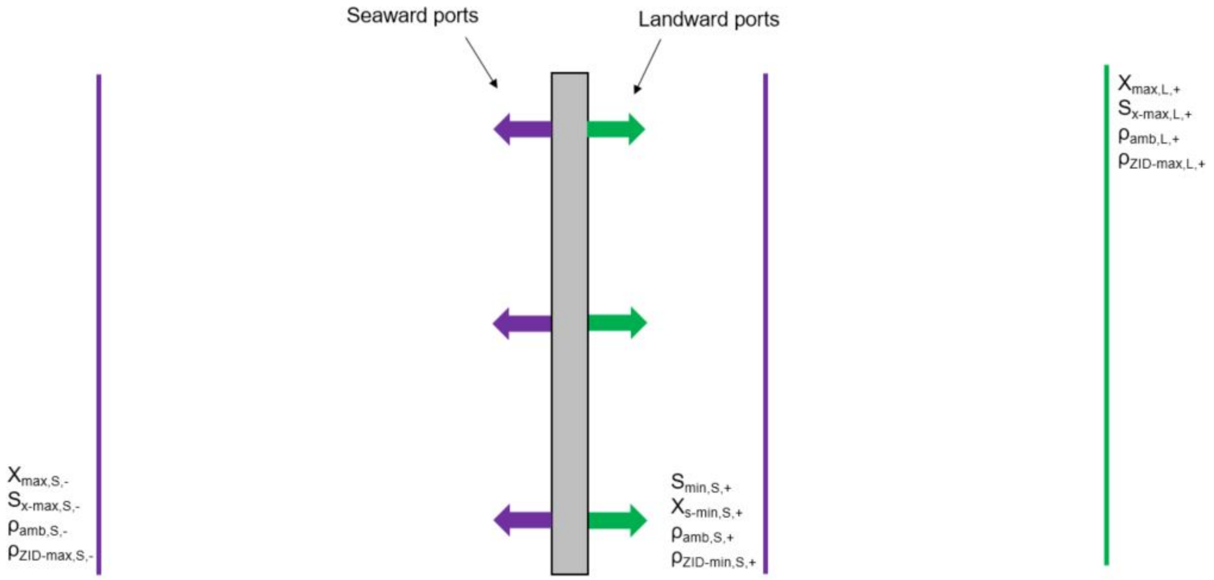

Figure 8 The maximum ZID on both sides of the diffuser, and the minimum dilution were selected for reporting from Figure 7 (shown in general terms).

Near-Field Results

The modeling results for Scenario 1a (without-project) and Scenario 1b (project) are shown in Figure 9 to Figure 11 and Figure 12 to Figure 14, respectively. For the maximum ZID cases, the corresponding ambient velocity, receiving water TDS, and TDS at the edge of the ZID are shown. Similarly, the same parameters are shown for the minimum dilution case. Results for all scenarios are tabulated in Table 6 through Table 8. As mentioned throughout this report, multiple conservative assumptions were made in the near-field modeling, so actual dilution values are expected to be higher than reported in Table 6 to Table 8.

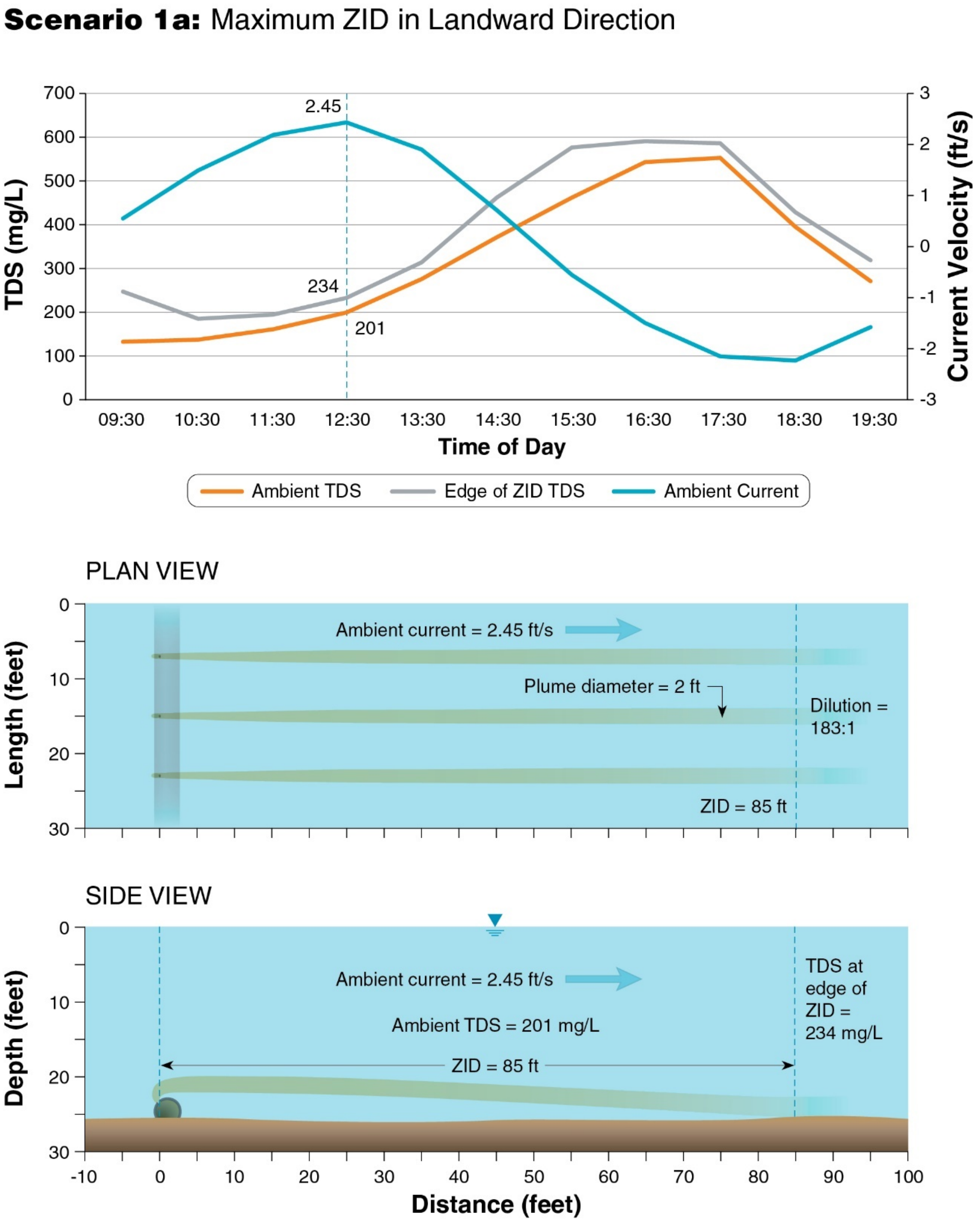

Figure 9 Schematic of the maximum ZID in the landward direction from Scenario 1a (without-project). For this case the diffuser was modeled with all 50 ports discharging in the seaward direction.

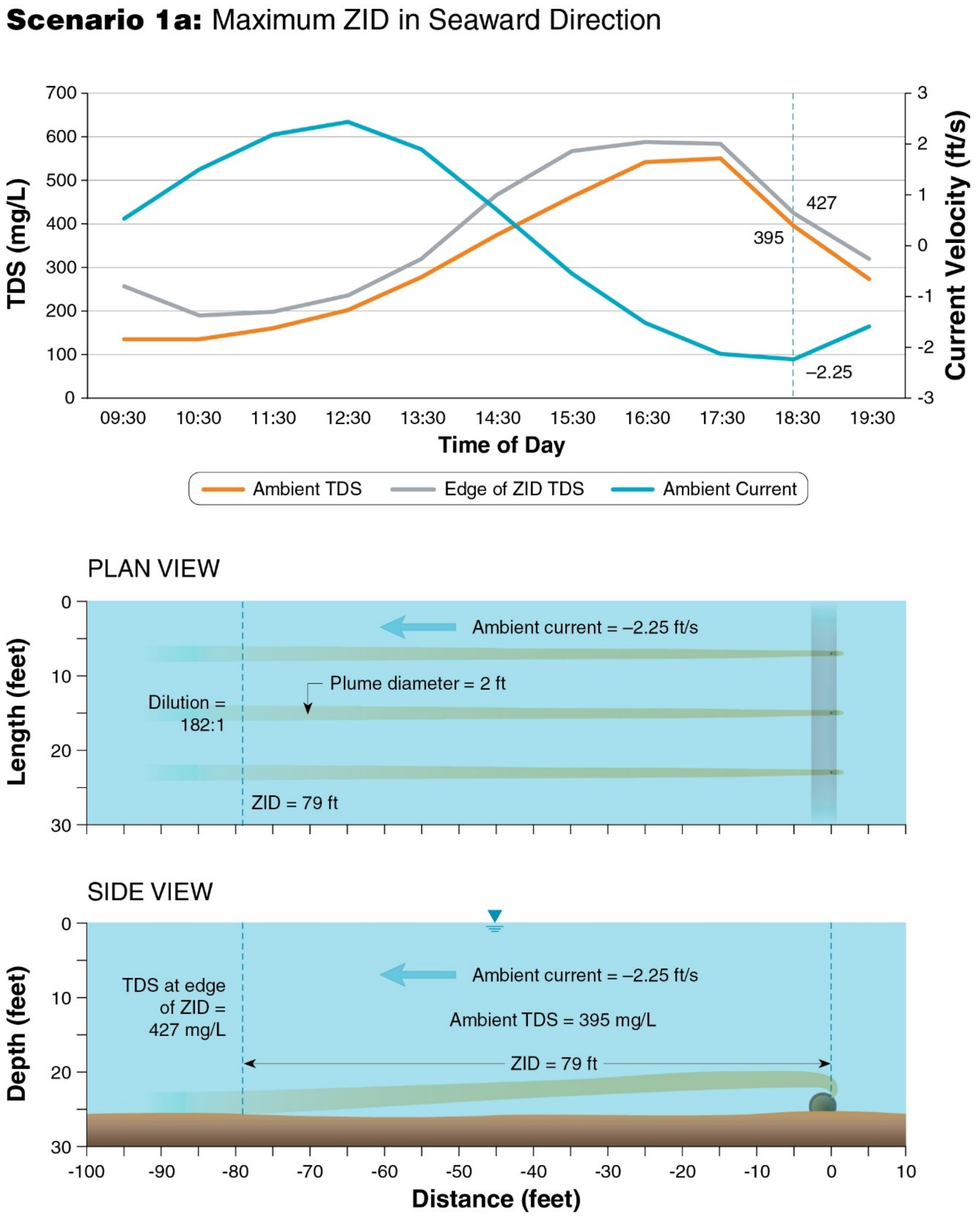

Figure 10 Schematic of the maximum ZID in the seaward direction from Scenario 1a (without-project). For this case the diffuser was modeled with all 50 ports discharging in the landward direction.

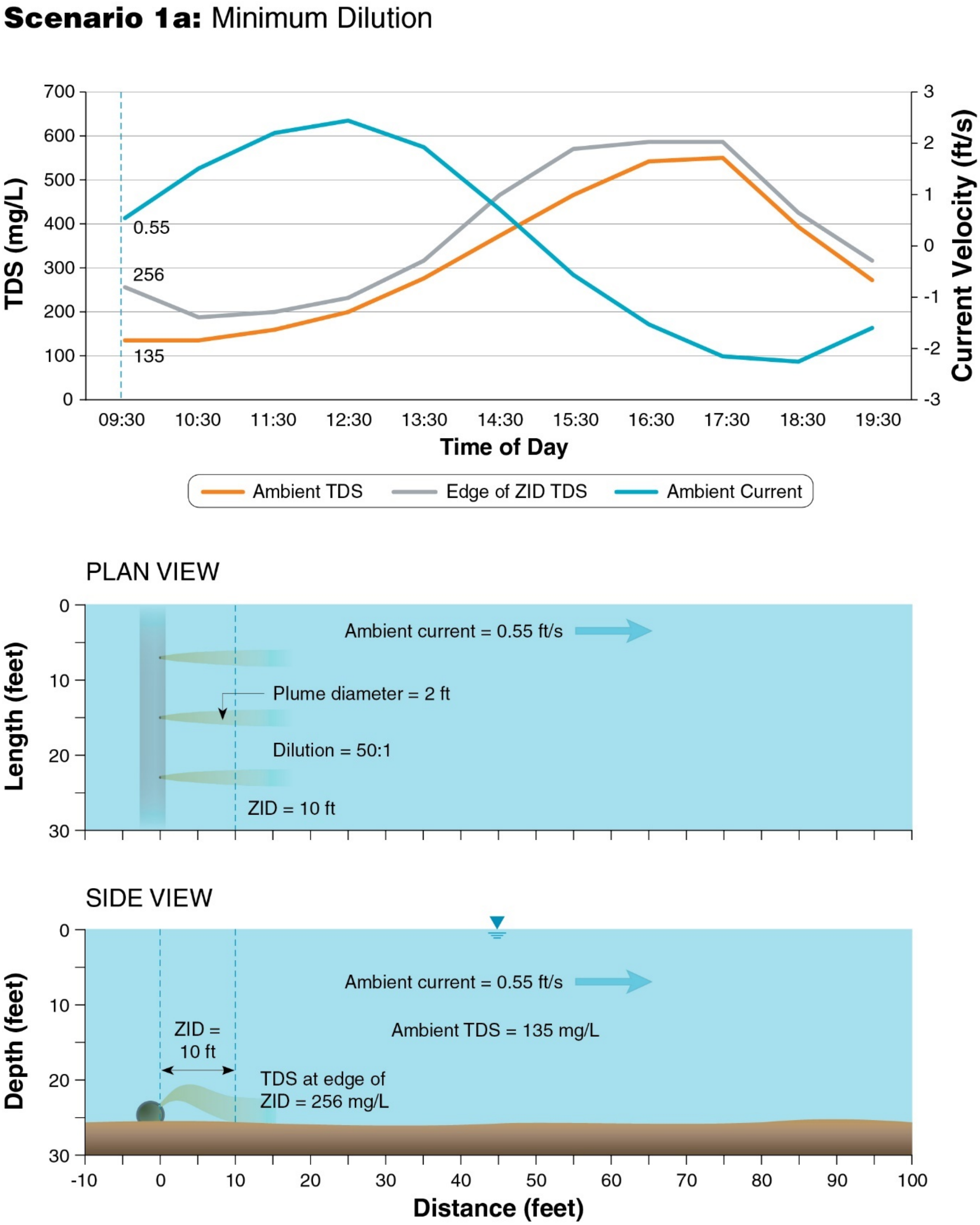

Figure 11 Schematic of the minimum dilution from Scenario 1a (without-project). For this case the diffuser was modeled with all 50 ports discharging in the landward direction.

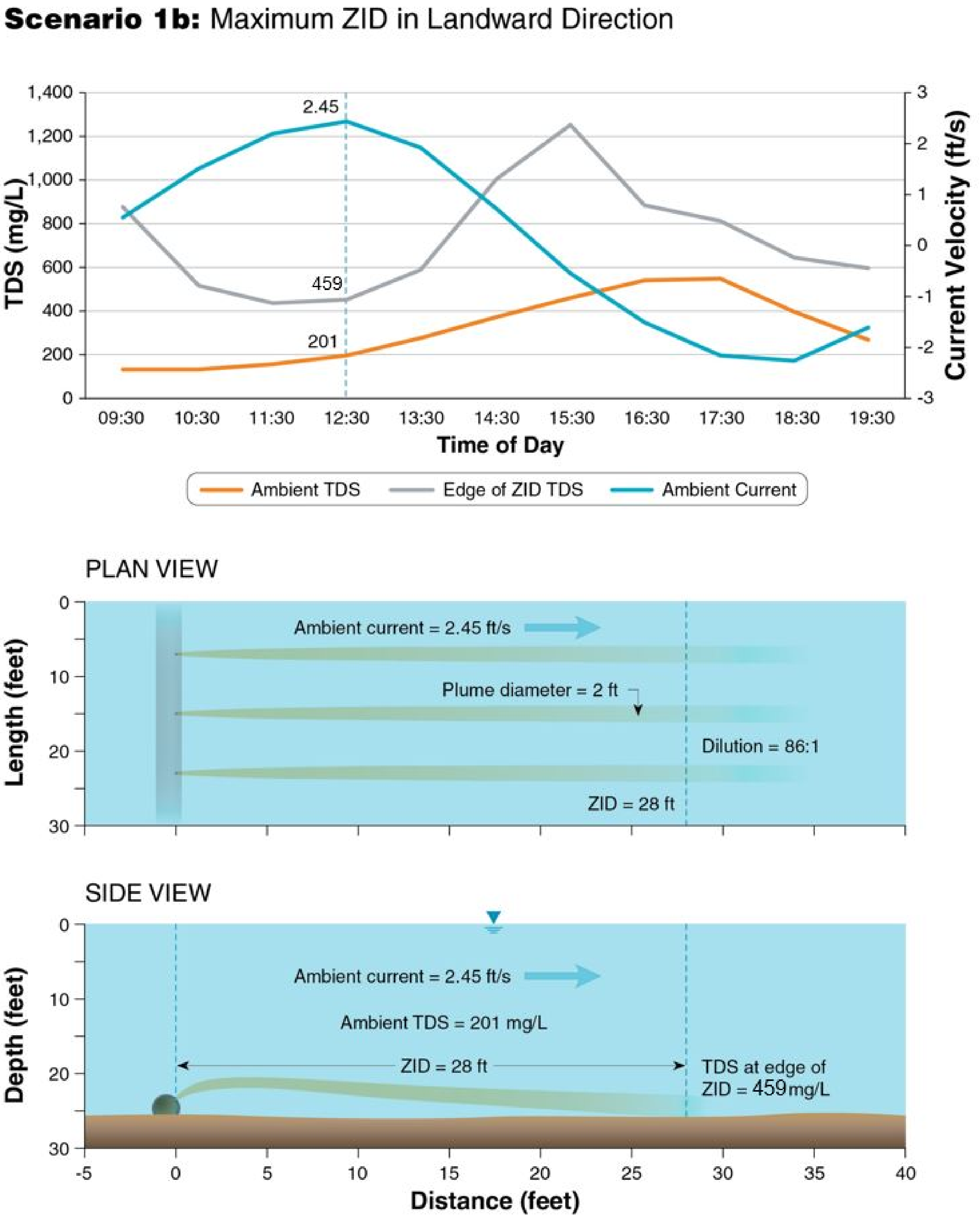

Figure 12 Schematic of the maximum ZID in the landward direction from Scenario 1b (project). For this case the diffuser was modeled with all 50 ports discharging in the landward direction.

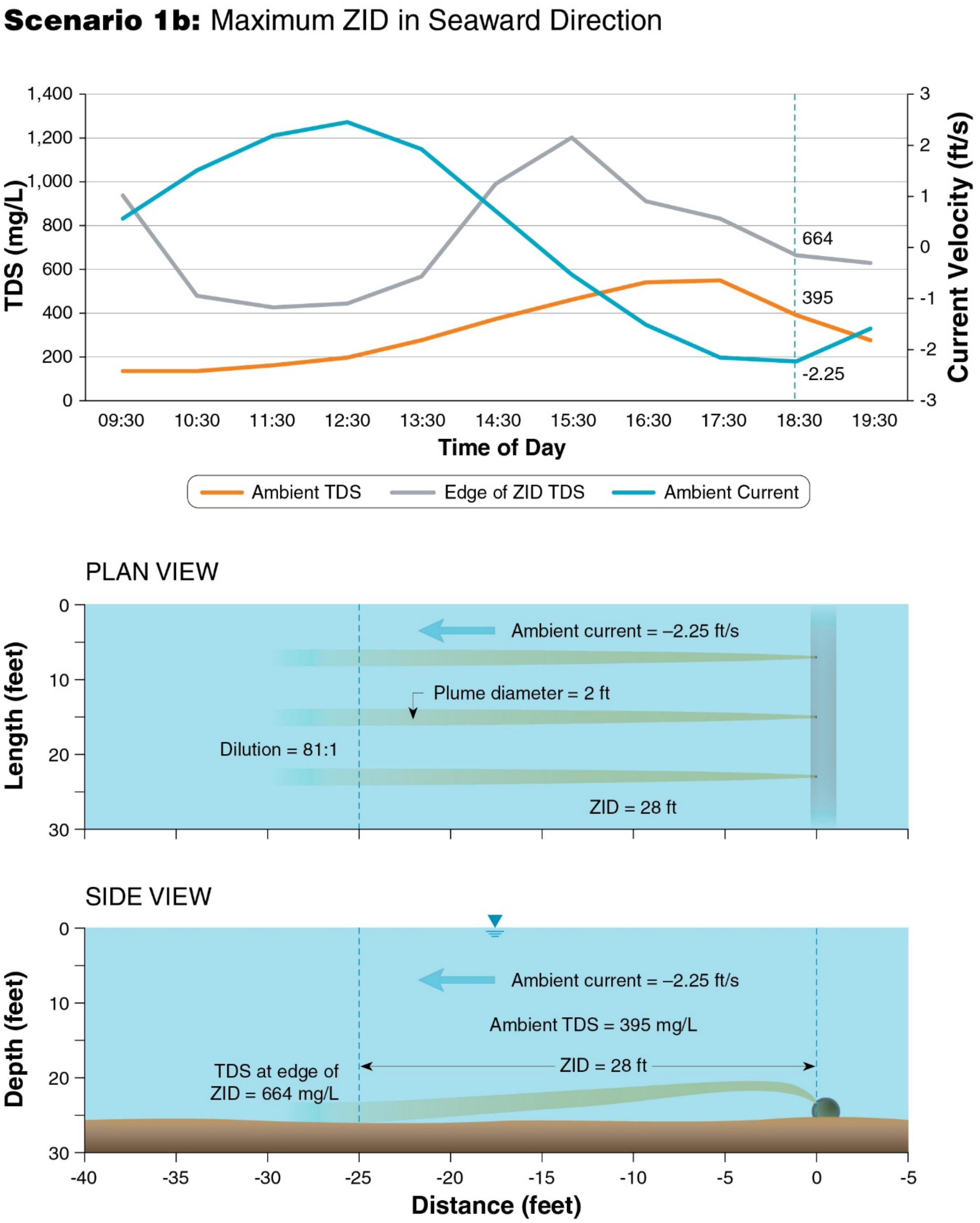

Figure 13 Schematic of the maximum ZID in the seaward direction from Scenario 1b (project). For this case the diffuser was modeled with all 50 ports discharging in the seaward direction.

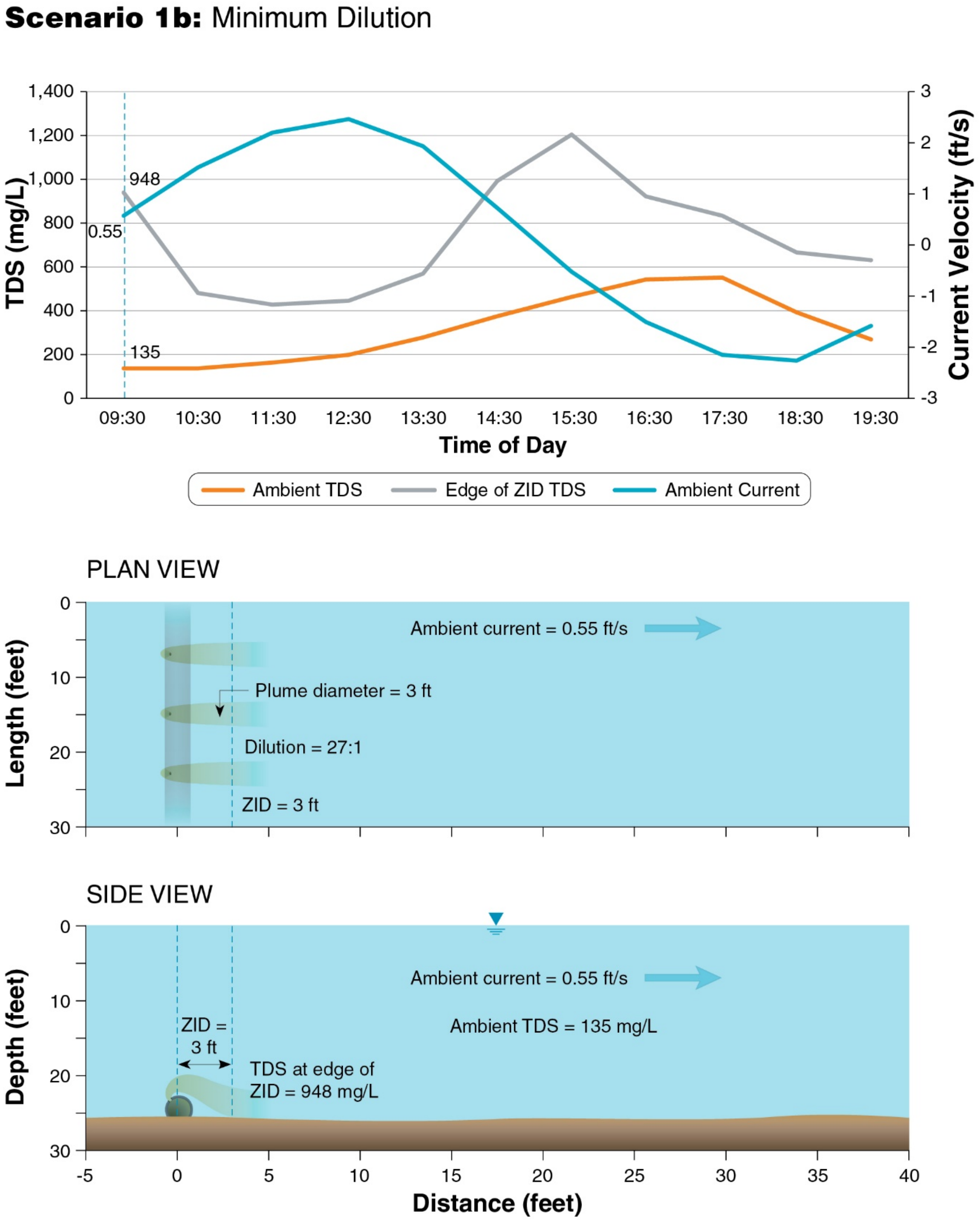

Figure 14 Schematic of the minimum dilution from Scenario 1b (project). For this case the diffuser was modeled with all 50 ports discharging in the seaward direction.

Discussion

Dilution and the dimensions of the discharge are a function of the effluent flow rate, the ambient current, the density difference between the effluent and ambient water, and the dimensions and orientation of the diffuser. In general, when there is abundant ambient flow available for mixing with effluent discharged from a diffuser (as is the case for this discharge), a larger ZID corresponds with higher dilution, and stronger ambient currents result in higher dilution. At the discharge location, plume size and dilution vary over the tidal cycle as ambient currents and ambient salinity vary.

For all scenarios (project and without-project), the discharge was denser than the receiving water, resulting in sinking plumes that contact the channel bottom at the edge of the ZID. The addition of desalination brine resulted in smaller ZIDs and lower dilution at the edge of the ZID. For example, the effluent TDS increased from 1,285 mg/L for Scenario 2a (without-project, typical DDSD wastewater flow) to 5,335 mg/L TDS for Scenario 2b (desalination brine added), which decreased the hourly dilution from 55 (Scenario 2a) to 24 (Scenario 2b), a 57 percent decrease, during the same hour of the tidal cycle (Table 6a). The largest difference in minimum dilution occurred for Scenario 3, where dilution decreased from 63 (Scenario 3a) to 25 (Scenario 3b, desalination brine added), a 60 percent decrease. The addition of desalination brine to the discharge had the smallest impact on dilution for Scenario 7, because the high wet weather flows of this scenario diluted the 2 mgd desalination brine.

The minimum hourly dilution (Table 7a) did not vary much from scenarios 1 to 6 for project scenarios. Despite the wide range in discharge flow rate and effluent TDS, dilution ranged from 23 (Scenario 5b) to 27 (Scenario 1b). Scenario 7b, the highest wet weather flow scenario, resulted in the highest minimum hourly dilution value of 34. In contrast, the minimum hourly dilution values for without-project scenarios ranged from 25 (Scenario 6a) to 57 (Scenario 3a).

The combination of a dense plume and low discharge velocity (due to the small total flow) for Scenario 1b resulted in the smallest ZID over a tidal cycle (53 ft) and lowest average dilution over the tidal cycle (62) (see Table 8). Scenario 1b also resulted in the largest difference in TDS, with an increase of 813 mg/L (or a 602% increase) from ambient TDS (135 mg/L) to TDS at the edge of the ZID (948 mg/L). The TDS values simulated to occur at the edge of the ZID are significantly smaller than the seasonal fluctuations in TDS that occur naturally in the receiving water (see Figure 6).

Scenario 5b resulted in the lowest hourly dilution (23) and a small ZID. For this scenario, the ambient TDS (464 mg/L) would increase to 662 mg/L at the edge of the ZID, and the ZID would be relatively small—the edge of the ZID would be located a distance of five feet from the diffuser, and the diameter of plumes from individual ports would be eight feet. Scenario 1b resulted in the smallest ZID of all scenarios evaluated here—the edge of the ZID for Scenario 1b would be three feet from the diffuser, and the plume diameter would be three feet.

For each scenario, dilution values over most of the tidal cycle were significantly higher than during the hour with the minimum dilution. For example, the minimum hourly dilution for Scenario 4b (project) was 24 (Table 7a), but the average dilution over the full tidal cycle was 95 (Table 8), and the maximum hourly dilution was 133 (Table 7b). For Scenario 4a (without-project) the minimum hourly dilution was 34 (Table 7a), but the average dilution over the tidal cycle was 258 (Table 8), and the maximum hourly dilution was 540 (Table 7b).

The dimensions of the ZID along New York Slough (away from the diffuser) also varied significantly between scenarios. As shown in Table 8, the aggregate ZID ranged from 53 ft (Scenario 1b), to 2,275 ft (Scenario 2a). Without-project scenarios typically resulted in longer ZIDs than the project scenarios, because the diffuser discharge was lighter without the desalination brine.

Table 6a Minimum dilution for project scenarios and corresponding without-project results.[1]

Scenario		Total flow (mgd)	Effluent TDS (mg/L)	Effluent EC (uS/cm)	Minimum dilution	Ambient TDS (mg/L)	Ambient EC (uS/cm)	TDS at ZID (mg/L)	EC at ZID (uS/cm)	Plume diameter (ft)[2]	Distance to edge of ZID (ft)[3]
1	a) Without -project (Min DDSD)	1.2	6346	11115	55	135	271	246	465	2	10
	b) Project (Min DDSD)	3.2	22543	39393	27	135	271	948	1691	3	3
2	a) Without-project (Typical DDSD)	13.2	1285	2279	55	464	845	479	871	17	21
	b) Project (Typical DDSD)	15.2	5335	9349	24	464	845	660	1187	9	5
3	a) Without-project (Min DDSD)	2.9	4835	8477	63	464	845	532	964	4	14
	b) Project (Min DDSD)	4.9	15820	27655	25	464	845	1062	1889	3	5
4	a) Without-project (Typical DDSD)	14.9	1611	2848	34	135	271	177	343	12	10
	b) Project (Typical DDSD)	16.9	5198	9110	24	135	271	341	630	9	5
5	a) Without-project (Typical DDSD)	13.3	1257	2230	45	464	845	481	876	14	16
	b) Project (Typical DDSD)	15.3	5288	9267	23	464	845	662	1192	8	5
6	a) Without-project (16 mgd)	18.2	1387	2457	38	374	688	400	733	13	12
	b) Project (16 mgd)	20.2	4417	7747	26	374	688	526	953	9	6
7	a) Without-project (32 mgd)	34.2	1127	2003	33	374	688	396	727	16	10
	b) Project (32 mgd)	36.2	2832	4979	34	374	688	444	810	16	12

[1] Without-project dilution values correspond to the same ambient conditions that resulted in the minimum project scenario dilution.

[2] For a plume diameter of 8 ft or less, plumes from individual ports do not merge. For plume diameters of more than 8 ft, individual plumes merge (see Figure 3).

[3] The distance from the diffuser to the edge of the ZID in one direction.

Table 6b Maximum dilution for project scenarios and corresponding without-project results.[1]

Scenario		Total flow (mgd)	Effluent TDS (mg/L)	Effluent EC (uS/cm)	Maximum dilution	Ambient TDS (mg/L)	Ambient EC (uS/cm)	TDS at ZID (mg/L)	EC at ZID (uS/cm)	Plume diameter (ft)[2]	Distance to edge of ZID (ft)[3]
1	a) Without-project (Min DDSD)	1.2	6346	11115	191	201	386	233	442	2	85
	b) Project (Min DDSD)	3.2	22543	39393	92	201	386	440	804	2	27
2	a) Without-project (Typical DDSD)	13.2	1285	2279	599	201	386	203	389	24	1129
	b) Project (Typical DDSD)	15.2	5335	9349	128	201	386	241	455	6	159
3	a) Without-project (Min DDSD)	2.9	4835	8477	167	201	386	228	434	3	98
	b) Project (Min DDSD)	4.9	15820	27655	99	201	386	357	658	3	35
4	a) Without-project (Typical DDSD)	14.9	1611	2848	337	201	386	205	393	16	559
	b) Project (Typical DDSD)	16.9	5198	9110	133	201	386	238	451	7	170
5	a) Without-project (Typical DDSD)	13.3	1257	2230	325	201	386	204	391	13	663
	b) Project (Typical DDSD)	15.3	5288	9267	119	201	386	243	460	6	126
6	a) Without-project (16 mgd)	18.2	1387	2457	303	201	386	205	396	18	753
	b) Project (16 mgd)	20.2	4417	7747	131	201	386	233	442	9	222
7	a) Without-project (32 mgd)	34.2	1127	2003	223	201	386	205	393	26	348
	b) Project (32 mgd)	36.2	2832	4979	218	201	386	213	407	27	512

[1] Without-project dilution values correspond to the same ambient conditions that resulted in the maximum project scenario dilution.

[2] For a plume diameter of 8 ft or less, plumes from individual ports do not merge. For plume diameters of more than 8 ft, individual plumes merge (see Figure 3).

[3] The distance from the diffuser to the edge of the ZID in one direction.

Table 6c Maximum hourly ZID for project scenarios and corresponding without-project results.[1]

Scenario		Total flow (mgd)	Effluent TDS (mg/L)	Effluent EC (uS/cm)	Dilution	Ambient TDS (mg/L)	Ambient EC (uS/cm)	TDS at ZID (mg/L)	EC at ZID (uS/cm)	Plume diameter (ft)[2]	Max. Distance to edge of ZID (ft)[3]
1	a) Without-project (Min DDSD)	1.2	6346	11115	183	201	386	234	442	2	85
	b) Project (Min DDSD)	3.2	22543	39393	86	201	386	459	836	2	28
2	a) Without-project (Typical DDSD)	13.2	1285	2279	565	552	999	554	1002	27	844
	b) Project (Typical DDSD)	15.2	5335	9349	121	552	999	592	1067	7	172
3	a) Without-project (Min DDSD)	2.9	4835	8477	158	201	386	230	437	3	102
	b) Project (Min DDSD)	4.9	15820	27655	90	201	386	372	686	3	36
4	a) Without-project (Typical DDSD)	14.9	1611	2848	501	552	999	554	728	27	840
	b) Project (Typical DDSD)	16.9	5198	9110	127	552	999	589	1062	9	206
5	a) Without-project (Typical DDSD)	13.3	1257	2230	495	552	999	554	515	24	981
	b) Project (Typical DDSD)	15.3	5288	9267	110	552	999	595	1074	7	145
6	a) Without-project (16 mgd)	18.2	1387	2457	408	552	999	554	1002	27	1001
	b) Project (16 mgd)	20.2	4417	7747	129	552	999	582	1051	11	226
7	a) Without-project (32 mgd)	34.2	1127	2003	223	201	386	205	393	26	348
	b) Project (32 mgd)	36.2	2832	4979	218	201	386	213	407	27	512

[1] Without-project maximum ZIDs correspond to the same ambient conditions that resulted in the maximum project scenario ZIDs.

[2] For a plume diameter of 8 ft or less, plumes from individual ports do not merge. For plume diameters of more than 8 ft, individual plumes merge (see Figure 3).

[3] The distance from the diffuser to the edge of the ZID in one direction.

Table 7a Minimum hourly dilution over a tidal cycle for project and without-project scenarios.[1]

Scenario		Total flow (mgd)	Effluent TDS (mg/L)	Effluent EC (uS/cm)	Minimum Dilution	Ambient TDS (mg/L)	Ambient EC (uS/cm)	TDS at ZID (mg/L)	EC at ZID (uS/cm)	Plume diameter (ft)[2]	Distance to edge of ZID (ft)[3]
1	a) Without-project (Min DDSD)	1.2	6346	11115	50	135	271	256	483	2	10
	b) Project (Min DDSD)	3.2	22543	39393	27	135	271	948	1668	3	3
2	a) Without-project (Typical DDSD)	13.2	1285	2279	54	135	271	156	307	16	21
	b) Project (Typical DDSD)	15.2	5335	9349	24	464	845	660	1185	9	5
3	a) Without-project (Min DDSD)	2.9	4835	8477	57	135	271	216	412	3	15
	b) Project (Min DDSD)	4.9	15820	27655	25	464	845	1062	1876	3	5
4	a) Without-project (Typical DDSD)	14.9	1611	2848	34	135	271	177	344	12	10
	b) Project (Typical DDSD)	16.9	5198	9110	24	135	271	341	624	9	5
5	a) Without-project (Typical DDSD)	13.3	1257	2230	45	135	271	159	313	14	17
	b) Project (Typical DDSD)	15.3	5288	9267	23	464	845	662	1196	8	5
6	a) Without-project (16 mgd)	18.2	1387	2457	25	135	271	183	355	10	6
	b) Project (16 mgd)	20.2	4417	7747	26	374	688	526	949	9	6
7	a) Without-project (32 mgd)	34.2	1127	2003	33	374	688	396	727	16	10
	b) Project (32 mgd)	36.2	2832	4979	34	374	688	444	811	16	12

[1] Note that minimum dilution may occur during a different hour of the tidal cycle for project and without-project scenarios.

[2] For a plume diameter of 8 ft or less, plumes from individual ports do not merge. For plume diameters of more than 8 ft, individual plumes merge (see Figure 3).

[3] The distance from the diffuser to the edge of the ZID in one direction.

Table 7b Maximum hourly dilution over a tidal cycle for project and without-project scenarios.[1]

Scenario		Total flow (mgd)	Effluent TDS (mg/L)	Effluent EC (uS/cm)	Maximum Dilution	Ambient TDS (mg/L)	Ambient EC (uS/cm)	TDS at ZID (mg/L)	EC at ZID (uS/cm)	Plume diameter (ft)[2]	Distance to edge of ZID (ft)[3]
1	a) Without-project (Min DDSD)	1.2	6346	11115	191	201	386	233	442	2	85
	b) Project (Min DDSD)	3.2	22543	39393	92	201	386	440	805	2	27
2	a) Without-project (Typical DDSD)	13.2	1285	2279	666	201	386	203	389	28	1287
	b) Project (Typical DDSD)	15.2	5335	9349	128	201	386	241	455	6	159
3	a) Without-project (Min DDSD)	2.9	4835	8477	167	201	386	228	434	3	98
	b) Project (Min DDSD)	4.9	15820	27655	99	201	386	357	658	3	35
4	a) Without-project (Typical DDSD)	14.9	1611	2848	540	395	725	397	729	28	1023
	b) Project (Typical DDSD)	16.9	5198	9110	133	201	386	238	451	7	170
5	a) Without-project (Typical DDSD)	13.3	1257	2230	495	552	999	554	1001	24	981
	b) Project (Typical DDSD)	15.3	5288	9267	119	201	386	243	460	6	126
6	a) Without-project (16 mgd)	18.2	1387	2457	408	552	999	554	1002	27	1001
	b) Project (16 mgd)	20.2	4417	7747	131	201	386	233	442	9	222
7	a) Without-project (32 mgd)	34.2	1127	2003	223	201	386	205	393	26	348
	b) Project (32 mgd)	36.2	2832	4979	218	201	386	213	407	27	512

[1] Note that maximum dilution may occur during a different hour of the tidal cycle for project and without-project scenarios.

[2] For a plume diameter of 8 ft or less, plumes from individual ports do not merge. For plume diameters of more than 8 ft, individual plumes merge (see Figure 3).

[3] The distance from the diffuser to the edge of the ZID in one direction.

Table 7c Dilution 30 minutes after slack-current for project and without-project scenarios.

Scenario		Total flow (mgd)	Effluent TDS (mg/L)	Effluent EC (uS/cm)	Dilution 30 minutes post slack-current	Ambient TDS (mg/L)	Ambient EC (uS/cm)	TDS at ZID (mg/L)	EC at ZID (uS/cm)	Plume diameter (ft)[1]	Distance to edge of ZID (ft)[2]
1	a) Without-project (Min DDSD)	1.2	6346	11115	57	499	906	601	1082	2	13
	b) Project (Min DDSD)	3.2	22543	39393	30	499	906	1207	2148	3	3
2	a) Without-project (Typical DDSD)	13.2	1285	2279	91	499	906	508	921	12	34
	b) Project (Typical DDSD)	15.2	5335	9349	31	499	906	650	1170	10	9
3	a) Without-project (Min DDSD)	2.9	4835	8477	64	499	906	566	1023	3	19
	b) Project (Min DDSD)	4.9	15820	27655	29	499	906	1017	1798	3	6
4	a) Without-project (Typical DDSD)	14.9	1611	2848	53	499	906	520	942	16	21
	b) Project (Typical DDSD)	16.9	5198	9110	26	499	906	670	1210	9	7
5	a) Without-project (Typical DDSD)	13.3	1257	2230	64	499	906	511	927	17	31
	b) Project (Typical DDSD)	15.3	5288	9267	29	499	906	658	1185	10	8
6	a) Without-project (16 mgd)	18.2	1387	2457	27	499	906	531	962	10	7
	b) Project (16 mgd)	20.2	4417	7747	24	499	906	654	1180	9	6
7	a) Without-project (32 mgd)	34.2	1127	2003	37	499	906	516	935	19	14
	b) Project (32 mgd)	36.2	2832	4979	39	499	906	558	1008	20	15

[1] For a plume diameter of 8 ft or less, plumes from individual ports do not merge. For plume diameters of more than 8 ft, individual plumes merge (see Figure 3).

[2] The distance from the diffuser to the edge of the ZID in one direction.

Table 8 Average dilution and TDS at the edge the ZID, and aggregate ZID footprint over a tidal cycle for project and without-project scenarios.

Scenario		Total flow (mgd)	Effluent TDS (mg/L)	Effluent EC (uS/cm)	Average dilution over tidal cycle	Average edge of ZID TDS over tidal cycle (mg/L)	Average edge of ZID EC over tidal cycle (uS/cm)	Maximum ZID along channel over tidal cycle (ft)[1]	Maximum ZID in the cross channel direction (ft)[2]
1	a) Without-project (Min DDSD)	1.2	6346	11115	127	377	693	164	164 x 402
	b) Project (Min DDSD)	3.2	22543	39393	62	736	1320	53	53 x 402
2	a) Without-project (Typical DDSD)	13.2	1285	2279	341	324	601	2275	2275 x 428
	b) Project (Typical DDSD)	15.2	5335	9349	93	385	708	331	331 x 407
3	a) Without-project (Min DDSD)	2.9	4835	8477	118	362	668	200	200 x 403
	b) Project (Min DDSD)	4.9	15820	27655	67	589	1063	68	68 x 403
4	a) Without-project (Typical DDSD)	14.9	1611	2848	258	329	609	2013	2013 x 428
	b) Project (Typical DDSD)	16.9	5198	9110	95	384	705	392	392 x 409
5	a) Without-project (Typical DDSD)	13.3	1257	2230	241	325	603	1829	1829 x 427
	b) Project (Typical DDSD)	15.3	5288	9267	86	389	715	281	281 x 407
6	a) Without-project (16 mgd)	18.2	1387	2457	171	330	611	1762	1762 x 427
	b) Project (16 mgd)	20.2	4417	7747	93	374	688	448	448 x 411
7	a) Without-project (32 mgd)	34.2	1127	2003	99	329	610	621	621 x 426
	b) Project (32 mgd)	36.2	2832	4979	95	352	650	881	881 x 427

[1] Maximum aggregate ZID over a tidal cycle. The aggregate ZID shows the outer envelope that will contain the ZIDs for each hour in the tidal cycle.

[2] Dimensions represent the aggregate ZID length by the width of the plume in the cross channel direction. The width of the plume was calculated as the length of the diffuser plus half of a plume diameter from the last ports on each end of the diffuser.

APPENDIX D

Dilution Modeling

Exponent®

EXTERNAL MEMORANDUM

TO:	Samantha Salvia
FROM:	Ryan Thacher, Ph.D., P.E. Susan Paulsen, Ph.D., P.E.
DATE:	June 26, 2018
PROJECT:	1405064.000 Task 0301
SUBJECT:	Far-Field Dilution Analysis

Far-Field Analysis

Concentrations of electrical conductivity (EC, a measure of salinity) were calculated in the far-field (outside the ZID) to evaluate potential future cumulative impacts from the proposed desalination facility. For long-term or continuous discharges, the concentrations of TDS from discharged effluent will develop within the Delta over time and represent the balance between the supply from the discharge location and the removal of the discharge from the Delta via flushing.

Methods

For the far-field analysis, Exponent conducted DSM2 modeling using files from the California WaterFix scenarios produced by the California Department of Water Resources (DWR). The EBC2 scenario was used to represent existing conditions[1], and the Boundary 1 scenario was used to represent future conditions. The Boundary 1 scenario has been described by DWR as the

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[1] DWR previously released modeling that utilized a baseline condition designed to meet Fall X2: the EBC2 scenario, presented in the 2013 Revised Administrative Draft. However, the 2013 DEIR/EIS, the 2015 RDEIR/EIS, and the 2016 FEIR/EIS used only the EBC1 scenario, which excludes Fall X2. The 2008 BiOp presents the requirement to manage Delta outflows and operate water storage and releases to achieve the Fall X2 provision, and because current project operations include the Fall X2 requirement, the existing condition should include the Fall X2 requirement. Because the EBC2 scenario includes the Fall X2 requirement, it is the model run most representative of existing conditions.

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 Sanitation District (DDSD) diffuser and the diversion of water at the City of Antioch's (City's) intake were simulated for the EBC2 and Boundary 1 scenarios for project and without-project scenarios.

The DSM2 EBC2 and Boundary 1 scenarios do not currently include the DDSD discharge, but do include diversions by the City. Daily average flow rates and salinity[2] from the DDSD diffuser into New York Slough were inserted as additional input parameters within DSM2 for EBC2 and Boundary 1 project scenarios. Daily average diversions by the City of Antioch were updated within DSM2 for without-project scenarios to reflect the City's current operations, which are based on chloride concentrations at their intake.[3] The DSM2 input data describing the diversion flow rate at the City's intake and DDSD discharge flow and salinity were calculated for project scenarios assuming operation of the desalination facility as previously described by Carollo.[4]

DSM2 simulations evaluated 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 (Figure 1). Exponent simulated the full 16-year DSM2 simulation period (1976-1991) for the EBC2 and Boundary 1 scenarios and tracked hourly salinity at the six Delta locations.

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[2] Salinity is described in terms of electrical conductivity (EC), in 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). Conversions equations can be found at http://wdl.water.ca.gov/suisun/facts/salin/index.cfm.

[3] Antioch's operations for without-project scenarios for both EBC2 and Boundary 1 assume that when the weekly average chloride is less than 100 mg/L, the City's full demand is met by river water diverted from the City's intake. When weekly average chloride levels are greater than 100 mg/L but less than 250 mg/L, half of the City's demand is met with river water. When weekly average chloride exceeds 250 mg/L, then no river water is diverted and the City's demand is met with purchased water.

[4] The simplified brine waste stream data provided by Carollo for project scenarios assume that whenever the weekly average chloride concentration in the river is greater than 75 mg/L, the desalination facility will operate at full capacity until the weekly average chloride concentration falls and remains below 75 mg/L for seven days. While operating, the desalination facility will divert 8 mgd of river water and generate 2 mgd of brine.

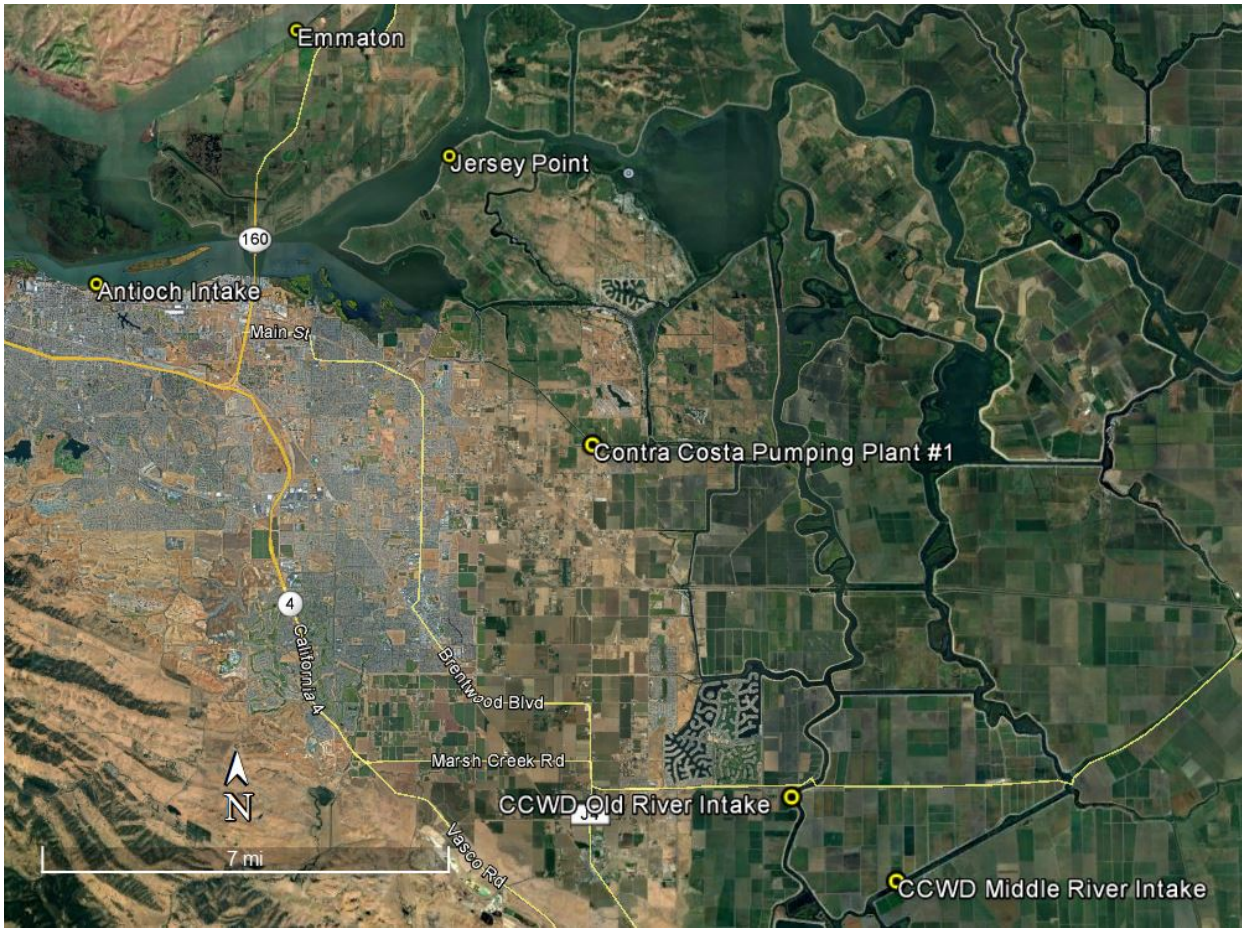

Figure 1 Locations in the Delta where salinity impacts from the proposed desalination facility were assessed using DSM2 simulation results.

Results

The DSM2 simulations were conducted for four scenarios: project and without-project scenarios under EBC2 conditions, and project and without-project scenarios for Boundary 1 conditions. Model results were captured as hourly EC at each of the six Delta locations. The results were sorted by water year type[5] and summary statistics were computed using the hourly EC data. Model results are summarized in Figure 2 through Figure 9.

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[5] Critical years: 1976, 1977, 1988, 1990, 1991; Dry years: 1981, 1985, 1987, 1989; Normal (above and below normal) years: 1978, 1979, 1980; Wet years: 1982, 1983, 1984, 1986.

Figure 2 through Figure 5 present box and whisker plots for project scenarios that show the percent of EC at each location modeled to result from the desalination facility discharge. For example, Figure 2 shows that the median EC at Contra Costa Pumping Plant #1 during critical water years under the Boundary 1 scenario will be 0.075 percent higher with the proposed desalination facility than without the facility, and that the increase in EC at that location due to the desalination facility will be less than 0.01 percent 75 percent of the time. During dry years (Figure 3), the median percent increase in EC due to the proposed desalination facility is modeled to be about 0.02 percent under the Boundary 1 scenario.[6]

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[6] For reference, a 0.02 percent EC increase for a base EC of 1,000 uS/cm would result in a final EC of 1,000.2 uS/cm.

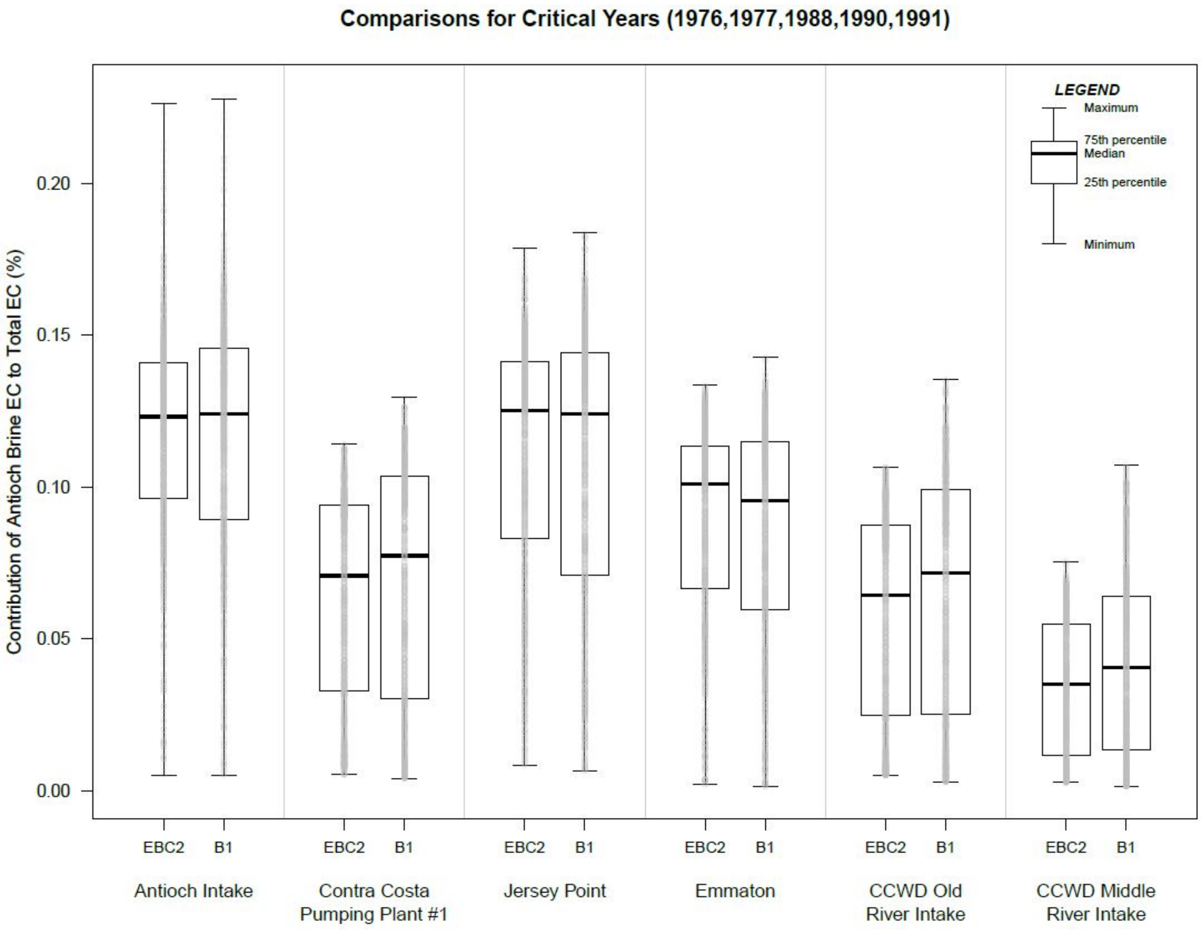

Figure 2 Summary statistics describing the percent increase in EC due to the proposed desalination facility for critical water years.

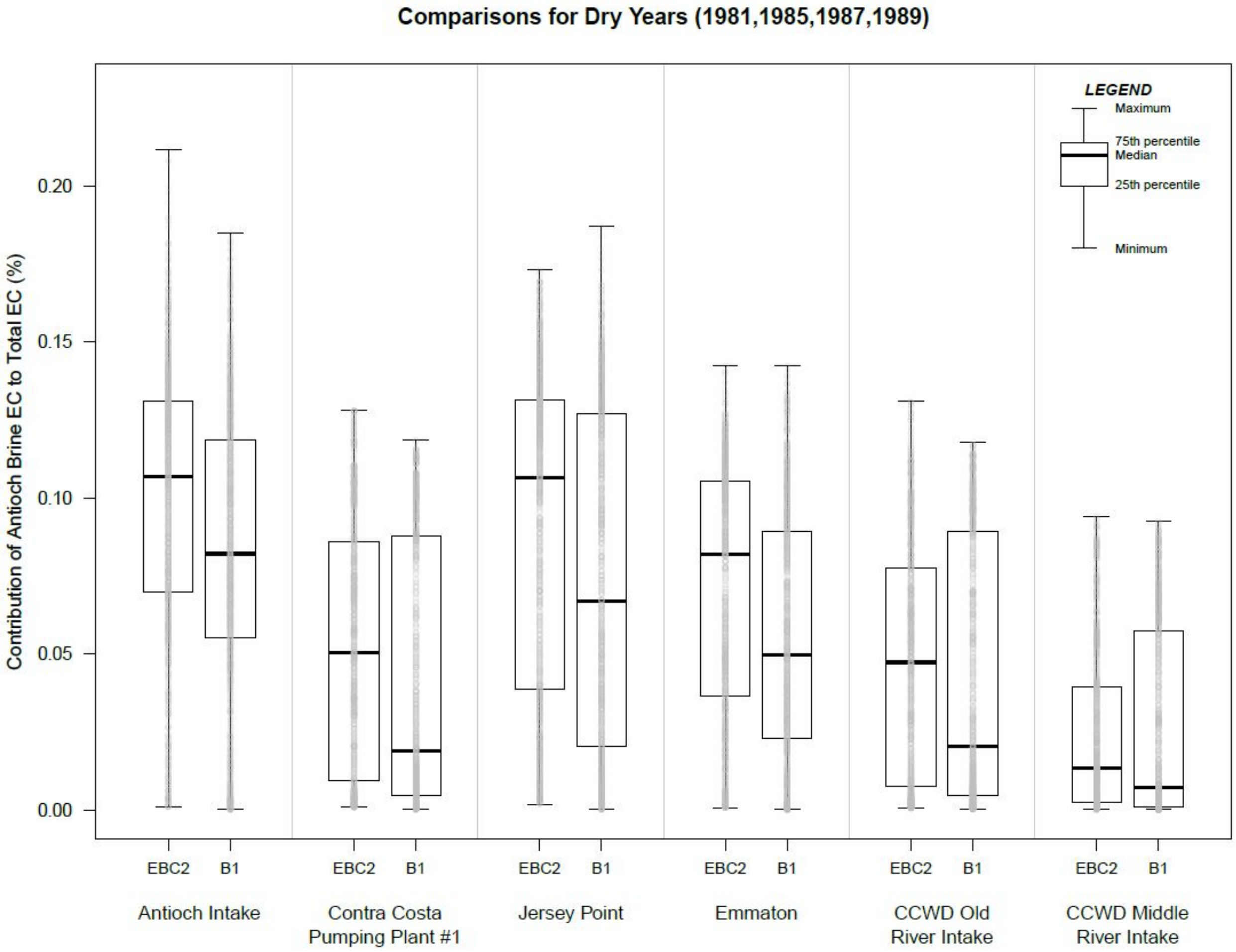

Figure 3 Summary statistics describing the percent increase in EC due to the proposed desalination facility for dry water years.

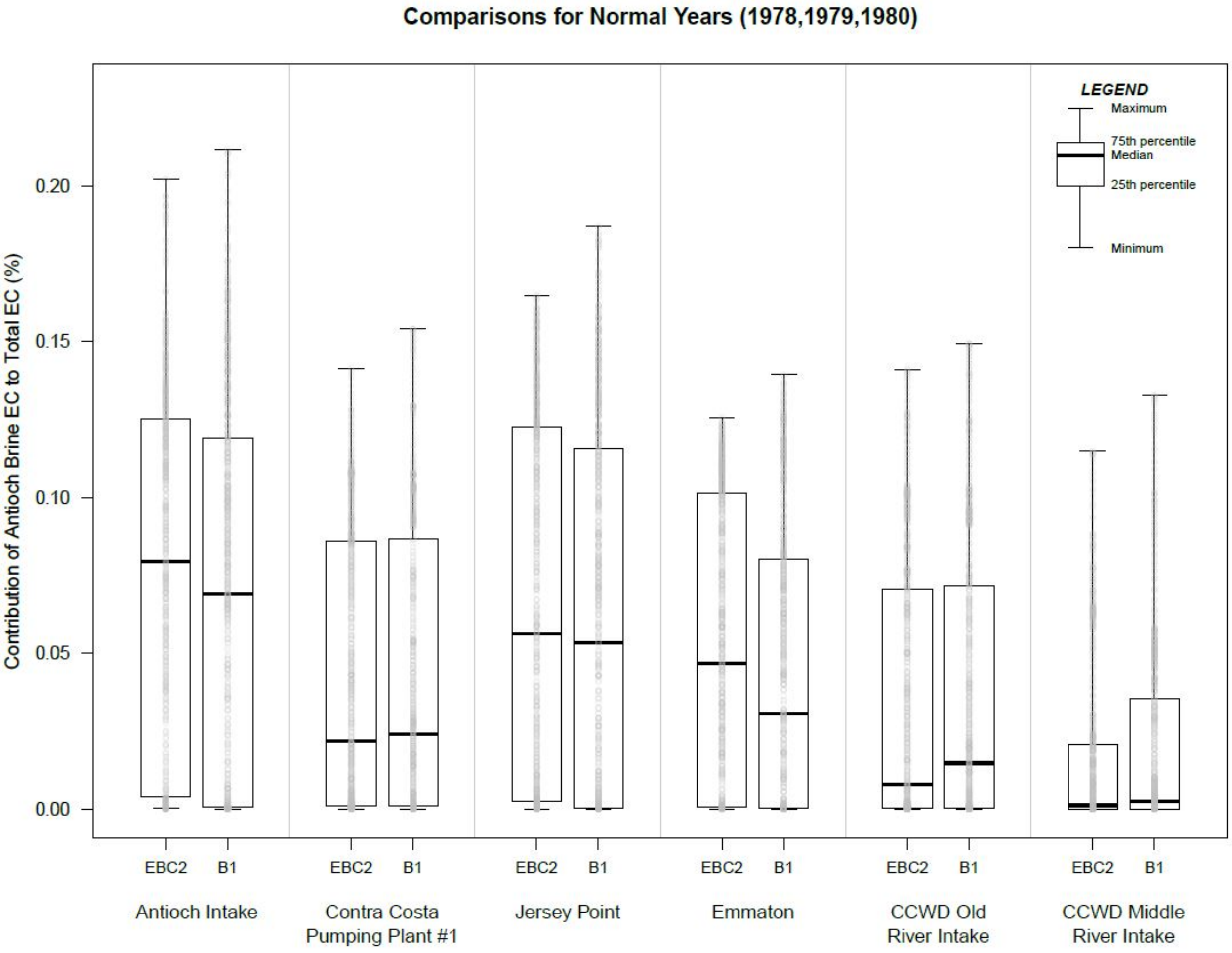

Figure 4 Summary statistics describing the percent increase in EC due to the proposed desalination facility for normal (above and below normal) water years.

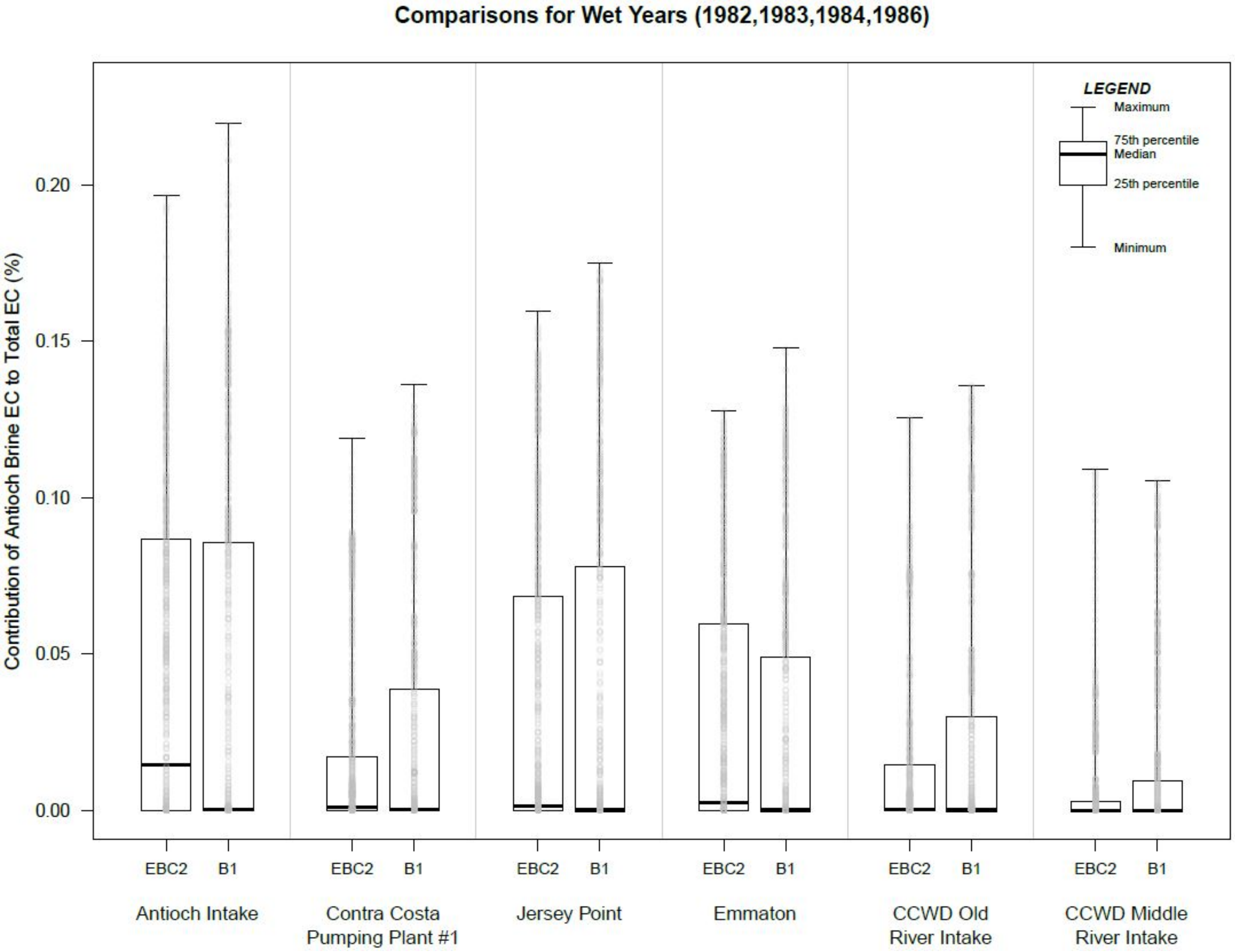

Figure 5 Summary statistics describing the percent increase in EC due to the proposed desalination facility for wet water years.

Figure 6 to Figure 9 show box and whisker plots of total EC at each location for project (w) and without-project (wo) scenarios. The change in EC between project and without-project scenarios is difficult to discern visually; Table 1a to Table 1c show numeric comparisons of median, 75th percentile, and maximum simulated EC for project and with-out project scenarios, and Table 2 shows summary statistics for the percent contribution of Antioch brine EC to total EC at each location. In addition, the monthly difference in EC with and without-project for existing conditions and the Boundary 1 scenario for each year (and grouped by water year type) at each location is shown in Tables 3a to 3d and Tables 4a to 4d, respectively.

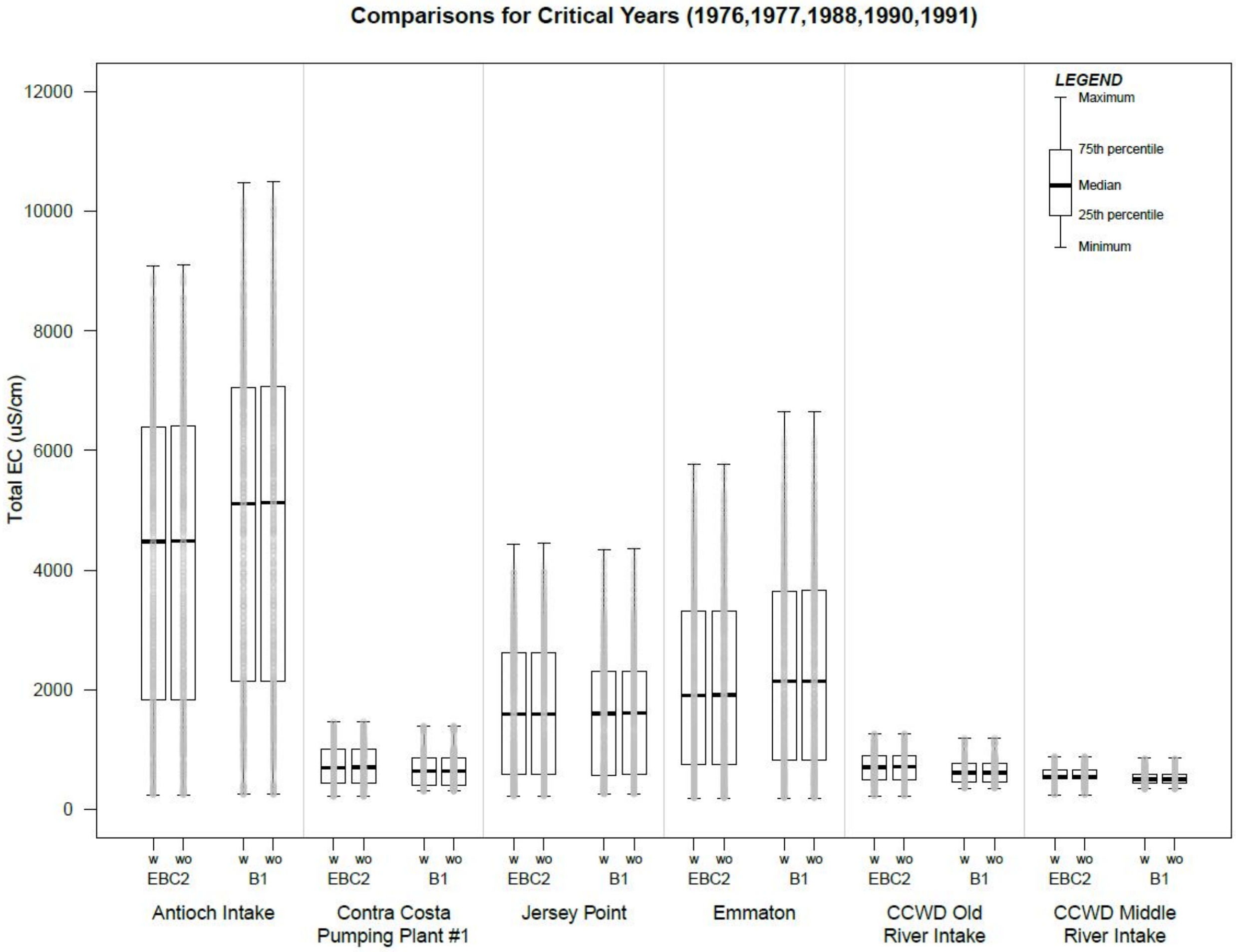

Figure 6 Summary statistics of the total EC for with project (w) and without project (wo) scenarios for critical water years.

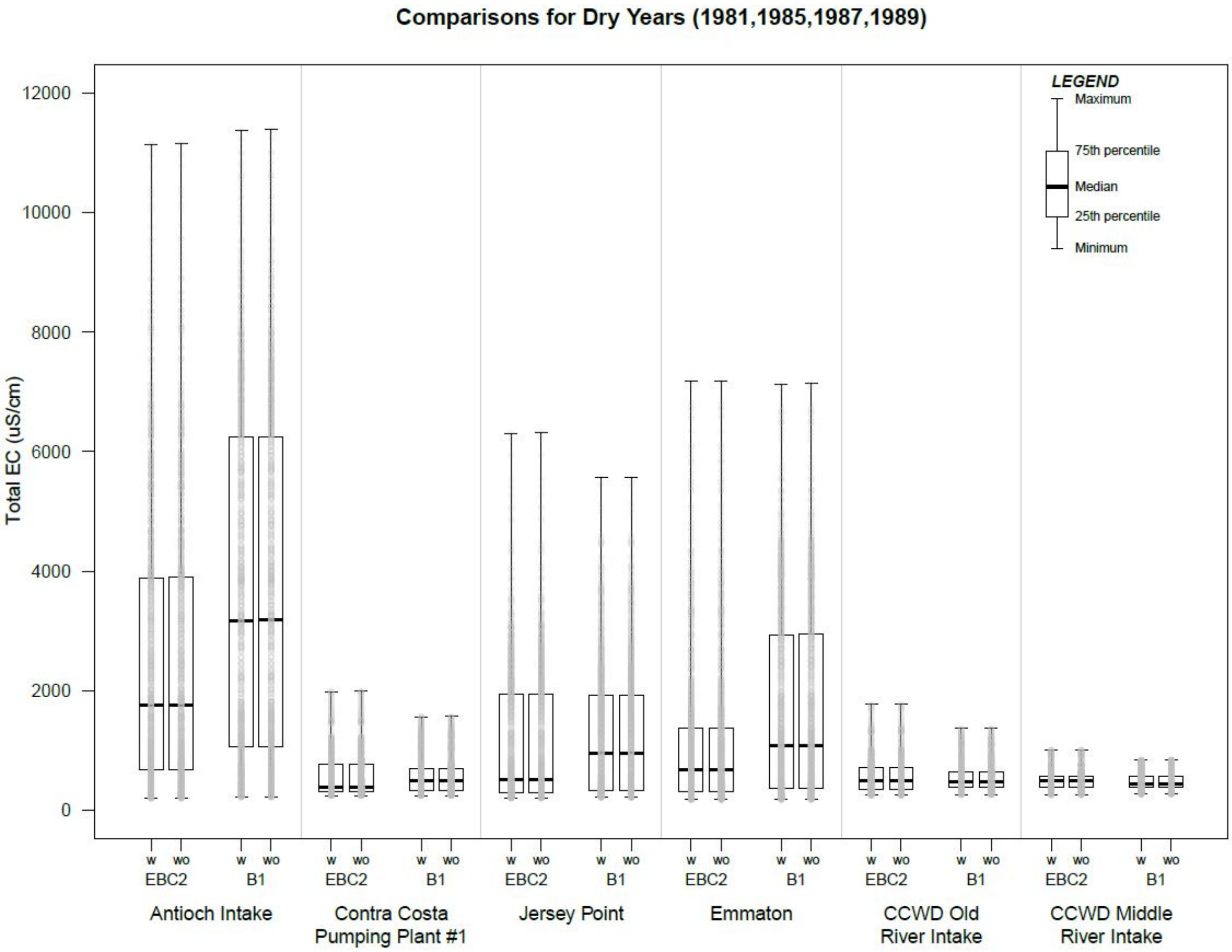

Figure 7 Summary statistics of the total EC for with project (w) and without project (wo) scenarios for dry water years.

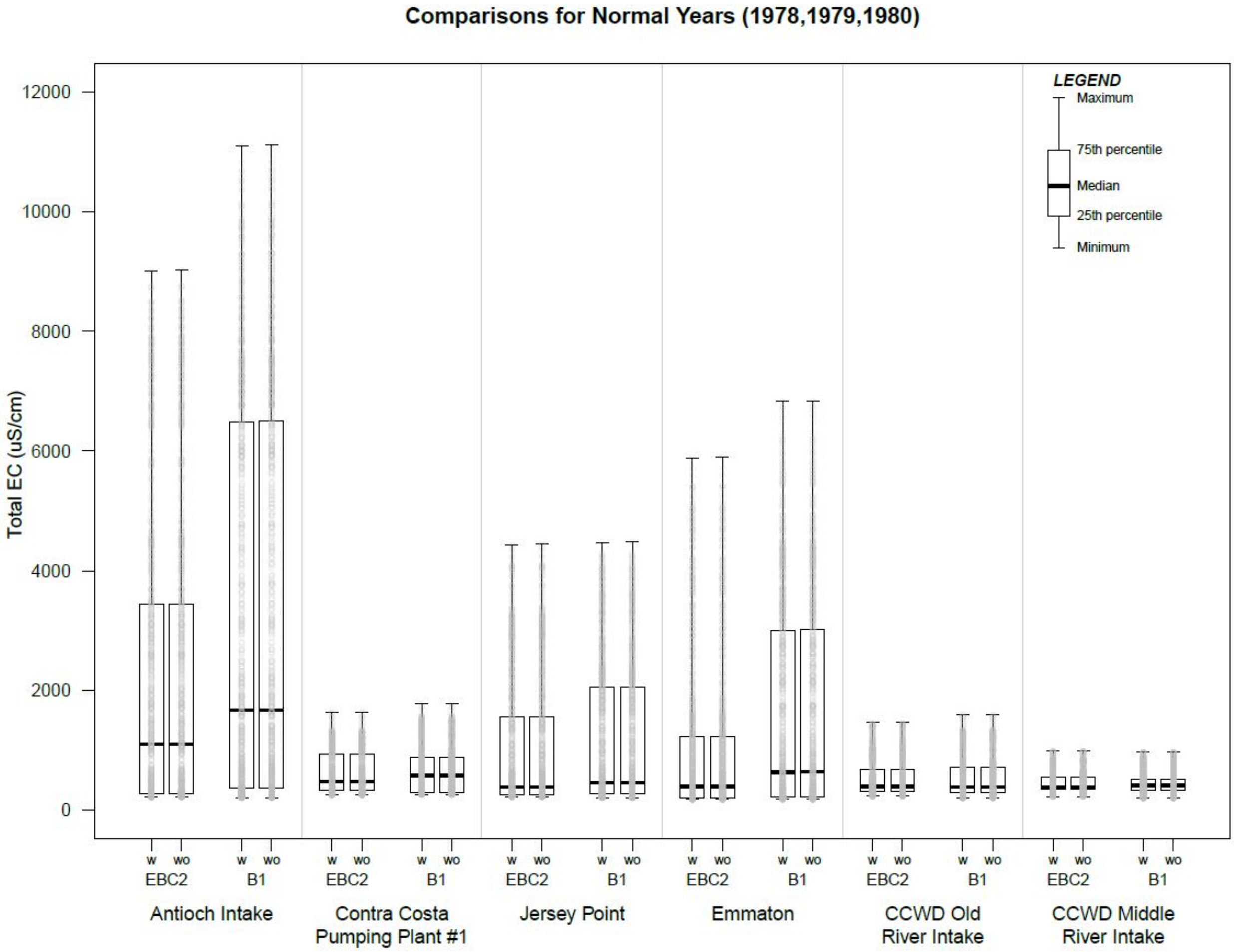

Figure 8 Summary statistics of the total EC for with project (w) and without project (wo) scenarios for normal (above and below) water years.

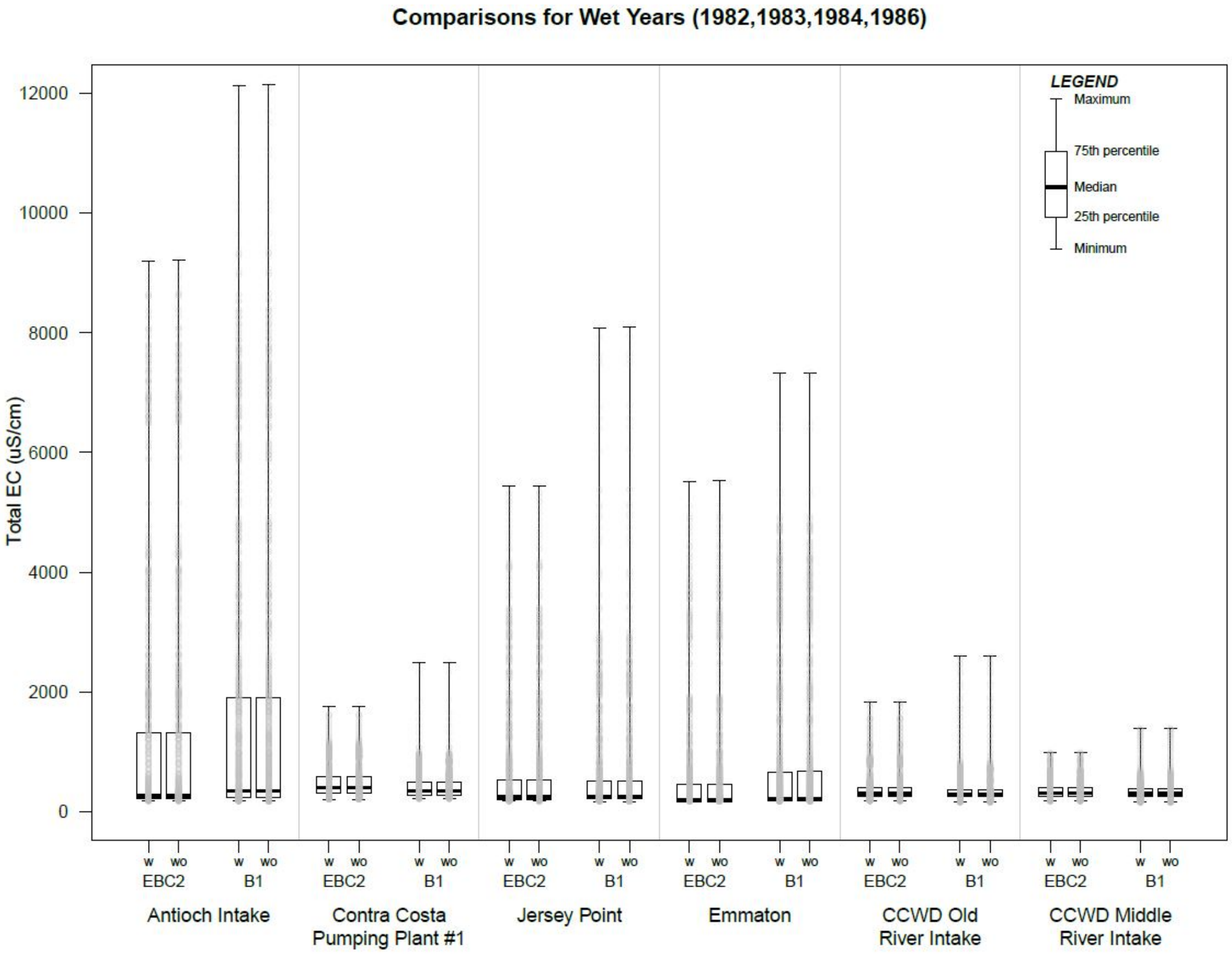

Figure 9 Summary statistics of the total EC for with project (w) and without project (wo) scenarios for wet water years.

Table 1a. Median electrical conductivity with and without contribution from Antioch brine

		Median EC (µS/cm) (50th Percentile)					
		EBC2 scenario			B1 scenario		
Location	Station	w/brine	w/o	Difference	w/brine	w/o	Difference
Normal Water Years							
Antioch Intake	RSAN007	1,094	1,092	1.3	1,664	1,661	3.6
Contra Costa Pumping Plant #1	CHCCC006	475	475	0.30	576	576	0.75
Jersey Point	RSAN018	390	389	0.52	459	458	0.76
Emmaton	RSAC092	395	395	0.095	633	632	0.69
CCWD Old River Intake	ROLD034	391	391	0.054	377	376	0.11
CCWD Middle River Intake	CHVCT000	385	385	0.064	411	411	0.13
Critical Water Years							
Antioch Intake	RSAN007	4,487	4,476	11	5,124	5,112	12
Contra Costa Pumping Plant #1	CHCCC006	702	702	0.99	638	637	1.2
Jersey Point	RSAN018	1,594	1,591	2.9	1,604	1,600	3.6
Emmaton	RSAC092	1,914	1,911	3.6	2,140	2,136	3.9
CCWD Old River Intake	ROLD034	706	706	0.51	613	612	0.83
CCWD Middle River Intake	CHVCT000	554	553	0.42	504	504	0.30
Dry Water Years							
Antioch Intake	RSAN007	1,757	1,754	3.8	3,179	3,172	7.5
Contra Costa Pumping Plant #1	CHCCC006	390	390	0.23	489	488	0.58
Jersey Point	RSAN018	512	511	0.81	952	950	2.2
Emmaton	RSAC092	677	676	1.2	1,081	1,079	2.0
CCWD Old River Intake	ROLD034	494	494	0.20	471	471	0.58
CCWD Middle River Intake	CHVCT000	489	489	0.43	433	433	0.070
Wet Water Years							
Antioch Intake	RSAN007	265	265	-0.00012	345	345	-0.083
Contra Costa Pumping Plant #1	CHCCC006	396	395	0.073	344	344	-0.00034
Jersey Point	RSAN018	245	245	0.0014	255	255	0.10
Emmaton	RSAC092	193	193	0.000031	225	225	0.067
CCWD Old River Intake	ROLD034	300	300	0.000091	295	295	0.0013
CCWD Middle River Intake	CHVCT000	306	306	0.092	300	300	0

Note: Electrical conductivity reported in uS/cm.
Normal water years include 1978, 1979, and 1980.
Critical water years include 1976, 1977, 1988, 1990, and 1991.
Dry water years include 1981, 1985, 1987, and 1989.
Wet water years include 1982, 1983, 1984, and 1986.

Table 1b. 75th percentile electrical conductivity with and without Antioch brine

		75th Percentile EC (µS/cm)					
		EBC2 scenario			B1 scenario		
Location	Station	w/brine	w/o	Difference	w/brine	w/o	Difference
Normal Water Years							
Antioch Intake	RSAN007	3,442	3,434	7.9	6,499	6,485	14
Contra Costa Pumping Plant #1	CHCCC006	933	932	1.5	876	875	1.2
Jersey Point	RSAN018	1,551	1,548	2.9	2,046	2,041	4.6
Emmaton	RSAC092	1,228	1,226	2.4	3,011	3,005	5.2
CCWD Old River Intake	ROLD034	684	683	0.48	713	712	0.91
CCWD Middle River Intake	CHVCT000	555	555	0.48	507	507	0.34
Critical Water Years							
Antioch Intake	RSAN007	6,403	6,389	14	7,070	7,056	15
Contra Costa Pumping Plant #1	CHCCC006	1,014	1,013	1.7	861	860	1.4
Jersey Point	RSAN018	2,620	2,614	6.1	2,311	2,306	5.4
Emmaton	RSAC092	3,315	3,309	6.2	3,657	3,650	7.0
CCWD Old River Intake	ROLD034	897	895	1.4	764	763	1.1
CCWD Middle River Intake	CHVCT000	653	652	0.79	576	576	0.41
Dry Water Years							
Antioch Intake	RSAN007	3,898	3,889	8.1	6,253	6,239	14
Contra Costa Pumping Plant #1	CHCCC006	765	764	1.2	697	696	1.2
Jersey Point	RSAN018	1,944	1,940	4.2	1,923	1,919	4.4
Emmaton	RSAC092	1,369	1,367	2.3	2,939	2,934	5.2
CCWD Old River Intake	ROLD034	706	705	1.1	637	636	0.65
CCWD Middle River Intake	CHVCT000	574	574	0.0012	564	564	0.13
Wet Water Years							
Antioch Intake	RSAN007	1,323	1,321	2.2	1,911	1,907	4.1
Contra Costa Pumping Plant #1	CHCCC006	590	590	0.0011	502	502	0.0016
Jersey Point	RSAN018	531	531	0.71	505	504	1.0
Emmaton	RSAC092	453	453	0.17	668	667	1.2
CCWD Old River Intake	ROLD034	406	405	0.28	358	358	0.0042
CCWD Middle River Intake	CHVCT000	400	399	0.33	378	377	0.076

Note: Electrical conductivity reported in uS/cm.
Normal water years include 1978, 1979, and 1980.
Critical water years include 1976, 1977, 1988, 1990, and 1991.
Dry water years include 1981, 1985, 1987, and 1989.
Wet water years include 1982, 1983, 1984, and 1986.

Table 1c. Maximum electrical conductivity with and without contribution from Antioch brine

		Maximum EC (µS/cm)					
		EBC2 scenario			B1 scenario		
Location	Station	w/brine	w/o	Difference	w/brine	w/o	Difference
Normal Water Years							
Antioch Intake	RSAN007	9,028	9,011	17	11,120	11,105	15
Contra Costa Pumping Plant #1	CHCCC006	1,635	1,632	2.9	1,775	1,771	3.5
Jersey Point	RSAN018	4,446	4,436	9.4	4,484	4,476	7.8
Emmaton	RSAC092	5,897	5,887	10	6,832	6,823	9.0
CCWD Old River Intake	ROLD034	1,460	1,457	2.8	1,596	1,593	3.1
CCWD Middle River Intake	CHVCT000	984	983	1.4	969	967	1.4
Critical Water Years							
Antioch Intake	RSAN007	9,108	9,092	16	10,493	10,480	14
Contra Costa Pumping Plant #1	CHCCC006	1,471	1,468	2.7	1,397	1,395	1.9
Jersey Point	RSAN018	4,449	4,439	10	4,353	4,346	7.5
Emmaton	RSAC092	5,773	5,763	9.3	6,649	6,640	8.8
CCWD Old River Intake	ROLD034	1,270	1,268	2.3	1,197	1,195	1.6
CCWD Middle River Intake	CHVCT000	887	885	1.4	853	853	0.11
Dry Water Years							
Antioch Intake	RSAN007	11,155	11,141	14	11,390	11,376	14
Contra Costa Pumping Plant #1	CHCCC006	1,989	1,986	3.4	1,565	1,563	2.5
Jersey Point	RSAN018	6,318	6,307	11	5,571	5,562	9.4
Emmaton	RSAC092	7,183	7,172	11	7,142	7,132	10
CCWD Old River Intake	ROLD034	1,773	1,770	3.0	1,372	1,370	2.1
CCWD Middle River Intake	CHVCT000	1,011	1,010	1.3	843	842	1.0
Wet Water Years							
Antioch Intake	RSAN007	9,217	9,202	15.4	12,138	12,126	12
Contra Costa Pumping Plant #1	CHCCC006	1,765	1,761	3.4	2,492	2,490	2.6
Jersey Point	RSAN018	5,445	5,434	11	8,093	8,081	12
Emmaton	RSAC092	5,530	5,521	9.2	7,332	7,324	8.5
CCWD Old River Intake	ROLD034	1,828	1,825	3.6	2,601	2,596	4.5
CCWD Middle River Intake	CHVCT000	990	989	1.5	1,390	1,387	2.2

Note: Electrical conductivity reported in uS/cm.
Normal water years include 1978, 1979, and 1980.
Critical water years include 1976, 1977, 1988, 1990, and 1991.
Dry water years include 1981, 1985, 1987, and 1989.
Wet water years include 1982, 1983, 1984, and 1986.

Table 2. Summary statistics for percent contribution of Antioch brine electrical conductivity to total electrical conductivity

		Median (50th Percentile) (%)		75th Percentile (%)		Maximum (%)	
Location	Station	EBC2	B1	EBC2	B1	EBC2	B1
Normal Water Years							
Antioch Intake	RSAN007	0.069	0.079	0.12	0.12	0.21	0.20
Contra Costa Pumping Plant #1	CHCCC006	0.024	0.022	0.087	0.086	0.15	0.14
Jersey Point	RSAN018	0.053	0.056	0.12	0.12	0.19	0.16
Emmaton	RSAC092	0.031	0.047	0.080	0.10	0.14	0.13
CCWD Old River Intake	ROLD034	0.015	0.0078	0.072	0.071	0.15	0.14
CCWD Middle River Intake	CHVCT000	0.0023	0.0011	0.035	0.021	0.13	0.11
Critical Water Years							
Antioch Intake	RSAN007	0.12	0.12	0.15	0.14	0.23	0.23
Contra Costa Pumping Plant #1	CHCCC006	0.077	0.071	0.10	0.094	0.13	0.11
Jersey Point	RSAN018	0.12	0.13	0.14	0.14	0.18	0.18
Emmaton	RSAC092	0.096	0.10	0.11	0.11	0.14	0.13
CCWD Old River Intake	ROLD034	0.072	0.064	0.099	0.087	0.14	0.11
CCWD Middle River Intake	CHVCT000	0.041	0.035	0.064	0.055	0.11	0.075
Dry Water Years							
Antioch Intake	RSAN007	0.082	0.11	0.12	0.13	0.18	0.21
Contra Costa Pumping Plant #1	CHCCC006	0.019	0.050	0.088	0.086	0.12	0.13
Jersey Point	RSAN018	0.067	0.11	0.13	0.13	0.19	0.17
Emmaton	RSAC092	0.050	0.082	0.089	0.11	0.14	0.14
CCWD Old River Intake	ROLD034	0.020	0.047	0.089	0.077	0.12	0.13
CCWD Middle River Intake	CHVCT000	0.0072	0.013	0.057	0.040	0.093	0.094
Wet Water Years							
Antioch Intake	RSAN007	0.000068	0.015	0.086	0.087	0.22	0.20
Contra Costa Pumping Plant #1	CHCCC006	0.00019	0.00080	0.039	0.017	0.14	0.12
Jersey Point	RSAN018	0.000058	0.0012	0.078	0.068	0.18	0.16
Emmaton	RSAC092	0.000028	0.0026	0.049	0.060	0.15	0.13
CCWD Old River Intake	ROLD034	0.000055	0.000070	0.030	0.014	0.14	0.13
CCWD Middle River Intake	CHVCT000	0.00000025	0.0000030	0.0094	0.0026	0.11	0.11

Note: Percent contribution of Antioch brine electrical conductivity to total electrical conductivity a location.
Normal water years include 1978, 1979, and 1980.
Critical water years include 1976, 1977, 1988, 1990, and 1991.
Dry water years include 1981, 1985, 1987, and 1989.
Wet water years include 1982, 1983, 1984, and 1986.

Table 3a. Average electrical conductivity for B1 Scenario: By Month, Location, and Water Year

Year			Water	without project (µS/cm)												with contribution from project (µS/cm)											
Type	Stn	Location	Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Critical																											
	RSAN007	Antioch Intake	1976	4644	3676	5015	5041	3940	1337	1453	1603	2511	5239	5611	6985	4655	3684	5025	5051	3949	1340	1457	1607	2517	5250	5623	7000
			1977	7616	7524	7007	6064	3690	2412	2451	3541	6192	6629	7464	8168	7632	7540	7022	6077	3699	2419	2457	3550	6205	6644	7480	8185
			1988	7183	7746	3582	722	796	1808	1553	1839	2452	4380	6171	8177	7199	7761	3589	724	796	1812	1557	1843	2458	4390	6184	8193
			1990	7749	7336	6743	3089	1232	923	1179	2794	3665	6881	6859	7684	7765	7352	6757	3096	1235	925	1182	2800	3673	6895	6873	7701
			1991	9493	9271	7235	5735	3608	909	632	2976	4689	6109	7037	8468	9510	9285	7248	5747	3616	911	632	2982	4699	6122	7052	8484
			All	7337	7111	5916	4130	2649	1478	1453	2551	3902	5848	6628	7896	7352	7124	5928	4139	2655	1481	1457	2556	3910	5860	6643	7913
	CHCCC006	Contra Costa Pump. Plant #1	1976	560	427	468	691	797	636	376	354	344	423	574	637	561	427	469	693	798	637	376	354	344	424	575	638
			1977	826	869	863	901	900	649	474	423	561	759	833	916	827	870	865	902	901	650	475	424	562	760	834	917
			1988	844	814	912	535	351	375	382	351	344	373	530	800	846	815	913	535	351	375	382	351	344	373	531	801
			1990	913	957	871	853	470	358	340	324	396	610	871	854	914	959	873	855	470	358	341	324	396	611	873	855
			1991	1025	1353	1330	1242	829	634	467	329	460	605	772	898	1027	1356	1332	1243	830	634	467	329	460	606	773	900
			All	834	884	889	844	668	531	408	356	421	554	716	821	835	885	890	846	669	531	408	356	421	555	717	822
	RSAN018	Jersey Point	1976	1237	848	1670	1981	1473	494	368	401	567	1519	1731	2197	1239	850	1674	1986	1476	495	368	402	568	1522	1735	2202
			1977	2333	2304	2191	2204	1108	618	587	853	1880	2114	2508	2798	2338	2309	2196	2209	1110	619	588	855	1884	2119	2514	2804
			1988	2244	2544	1637	410	290	423	392	440	552	1187	2033	2946	2250	2550	1641	411	290	424	393	441	553	1189	2038	2952
			1990	2540	2346	2174	1282	483	304	314	679	931	2410	2324	2619	2545	2351	2179	1285	484	305	314	680	933	2415	2330	2625
			1991	3569	3438	2642	1796	1096	411	290	818	1357	1890	2273	3047	3576	3444	2647	1800	1098	412	290	819	1360	1895	2278	3054
			All	2385	2296	2063	1535	890	450	390	638	1057	1824	2174	2721	2390	2301	2067	1538	891	451	391	640	1060	1828	2179	2727
	RSAC092	Emmaton	1976	1940	1695	1781	1635	1098	403	559	567	1312	2457	2451	3876	1944	1699	1784	1638	1100	403	560	568	1315	2462	2455	3884
			1977	4056	3850	3330	2034	1352	967	948	1772	3637	3578	3782	4686	4063	3857	3336	2038	1355	969	950	1775	3643	3585	3789	4694
			1988	3783	4069	1147	286	377	775	567	719	1159	2204	2987	4673	3791	4077	1149	286	377	776	568	720	1161	2208	2993	4681
			1990	4191	3769	3270	876	389	381	443	1374	1945	3445	3434	4345	4198	3775	3276	877	389	382	444	1376	1949	3451	3440	4353
			1991	5455	5138	3372	2575	1430	388	327	1336	2524	3208	3935	4969	5463	5145	3377	2580	1433	388	327	1338	2529	3215	3943	4978
			All	3885	3704	2580	1481	927	583	569	1154	2115	2978	3318	4510	3892	3711	2585	1484	928	584	570	1156	2119	2984	3324	4518
	ROLD034	CCWD Old River Intake	1976	496	426	456	767	712	530	460	444	406	437	505	588	497	426	457	768	713	531	460	444	406	437	506	589
			1977	739	726	757	850	815	712	576	503	532	659	721	804	740	727	758	852	816	713	576	504	533	660	722	805
			1988	719	737	812	532	446	461	468	437	404	374	500	783	720	738	814	533	446	461	468	437	404	374	500	784
			1990	813	757	743	739	471	440	429	403	421	584	728	738	815	758	744	740	472	440	429	403	421	584	729	739
			1991	1015	1095	1093	845	847	735	576	382	428	537	670	815	1017	1097	1094	846	847	735	576	382	428	538	671	816
			All	757	748	772	747	657	576	502	434	438	518	625	746	758	749	773	748	658	576	502	434	439	519	626	747
	CHVCT000	CCWD Middle River Intake	1976	408	425	384	559	627	562	503	475	433	379	374	414	408	425	384	559	627	563	503	475	433	379	375	414
			1977	483	505	564	647	722	694	602	514	490	509	494	519	483	505	565	648	723	695	602	514	490	510	495	520
			1988	489	499	595	577	535	517	517	474	428	366	357	479	489	500	596	577	535	517	517	474	428	366	357	479
			1990	507	519	566	605	527	490	473	429	429	420	500	504	508	519	567	606	527	490	473	429	430	421	501	504
			1991	584	646	736	714	780	763	676	432	393	425	474	529	584	647	737	715	780	763	676	432	393	425	475	530
			All	494	519	569	620	637	605	554	465	435	420	440	489	495	519	570	621	638	606	554	465	435	420	440	490

Table 3b. Average electrical conductivity for B1 Scenario: By Month, Location, and Water Year

Year			Water	without project (µS/cm)												with contribution from project (µS/cm)											
Type	Stn	Location	Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Dry																											
	RSAN007	Antioch Intake	1981	6711	6977	4996	3037	371	451	631	1403	1471	3855	4519	6633	6725	6993	5007	3044	371	451	631	1405	1474	3863	4529	6647
			1985	6614	5591	841	1562	1104	752	635	1040	1702	2907	3774	6321	6629	5602	842	1565	1106	753	636	1042	1706	2914	3782	6335
			1987	6575	6943	7282	4424	1339	374	797	1317	1737	3510	5379	7015	6590	6958	7296	4434	1342	374	798	1320	1741	3518	5390	7030
			1989	8574	9524	6837	4268	3310	705	290	629	1623	4560	4886	7582	8589	9539	6849	4278	3318	707	290	629	1625	4568	4896	7598
			All	7119	7259	4989	3323	1531	570	588	1097	1633	3708	4639	6888	7133	7273	4999	3330	1535	571	589	1099	1636	3716	4649	6902
	CHCCC006	Contra Costa Pump. Plant #1	1981	694	694	771	721	498	368	310	314	323	367	481	559	695	695	773	722	499	369	310	314	323	368	482	560
			1985	651	953	547	363	334	318	349	353	326	322	361	434	652	954	547	364	334	318	349	353	326	322	361	434
			1987	664	692	919	1256	762	547	395	334	322	333	449	644	665	693	921	1258	763	547	395	334	322	333	449	645
			1989	1085	1061	1430	1324	818	596	330	251	247	377	541	552	1087	1063	1433	1326	819	596	330	251	247	377	541	552
			All	774	850	917	916	603	457	346	313	304	350	458	547	775	851	918	917	604	458	346	313	304	350	458	548
	RSAN018	Jersey Point	1981	1936	2048	1818	1219	307	241	246	343	330	1211	1318	2015	1940	2053	1823	1222	307	241	246	344	330	1214	1321	2020
			1985	1992	2657	501	577	407	276	250	297	374	789	951	1861	1997	2663	501	578	408	276	250	297	375	791	953	1865
			1987	1907	2123	3155	1974	631	285	304	369	394	924	1689	2301	1911	2127	3162	1978	632	285	304	370	395	926	1693	2306
			1989	3032	3855	2847	1782	1049	346	221	253	385	1426	1525	2625	3039	3862	2853	1786	1051	346	221	253	385	1429	1528	2630
			All	2217	2671	2080	1388	598	287	255	316	371	1087	1371	2200	2222	2676	2084	1391	599	287	255	316	371	1090	1374	2205
	RSAC092	Emmaton	1981	3561	3610	1624	852	209	236	290	549	663	1474	2085	3750	3568	3617	1627	853	209	236	290	550	664	1476	2089	3758
			1985	3278	2073	288	481	360	308	292	435	789	1060	1807	3591	3284	2076	288	482	361	308	292	436	790	1062	1811	3597
			1987	3411	3594	2827	1444	383	228	347	480	808	1510	2425	3964	3418	3601	2832	1446	384	228	347	480	809	1513	2429	3972
			1989	4889	5191	2914	1303	1299	293	198	263	684	1991	2138	4360	4898	5199	2919	1306	1301	293	198	263	684	1994	2142	4368
			All	3785	3617	1913	1020	563	266	282	432	736	1509	2114	3916	3792	3623	1917	1022	564	266	282	432	737	1511	2118	3924
	ROLD034	CCWD Old River Intake	1981	597	607	676	620	529	393	398	391	393	357	415	544	598	608	677	620	530	393	398	391	393	357	415	545
			1985	572	810	471	371	366	356	434	414	389	321	332	455	572	811	471	371	367	357	434	414	389	321	333	456
			1987	570	597	827	1091	726	617	492	407	388	336	435	605	570	598	828	1093	727	618	492	407	388	336	435	606
			1989	898	1108	1189	1008	781	679	407	290	264	354	450	647	899	1110	1191	1010	782	680	407	290	264	354	451	648
			All	659	781	791	773	601	511	433	375	359	342	408	563	660	782	792	774	601	512	433	375	359	342	409	564
	CHVCT000	CCWD Middle River Intake	1981	422	434	482	558	592	554	537	438	427	329	339	393	422	435	482	558	592	555	537	438	427	329	339	393
			1985	401	468	419	402	471	494	516	438	416	331	312	369	401	469	420	402	471	494	516	438	416	331	312	369
			1987	387	403	489	796	717	678	616	443	405	336	325	419	387	403	490	797	718	678	616	443	405	336	325	419
			1989	571	635	780	801	738	722	529	335	289	287	343	416	571	635	781	802	739	722	530	335	289	287	343	416
			All	445	485	543	639	630	612	550	414	384	321	330	399	446	485	543	640	630	612	550	414	384	321	330	399

Table 3c. Average electrical conductivity for B1 Scenario: By Month, Location, and Water Year

Year			Water	without project (µS/cm)												with contribution from project (µS/cm)											
Type	Stn	Location	Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Normal																											
	RSAN007	Antioch Intake	1978	9528	9678	6545	624	327	359	328	243	705	2047	3427	5773	9544	9692	6556	624	327	359	328	243	705	2051	3434	5785
			1979	6966	7398	7170	3719	482	298	444	972	659	2593	4570	7061	6981	7414	7184	3726	483	298	444	973	659	2597	4580	7076
			1980	7786	7762	6076	688	288	227	227	487	1086	1652	3234	6000	7802	7777	6087	689	288	227	227	487	1088	1656	3242	6013
			All	8093	8279	6597	1677	365	295	333	567	817	2097	3744	6278	8109	8294	6609	1680	365	295	333	568	817	2101	3752	6292
	CHCCC006	Contra Costa Pump. Plant #1	1978	1109	1325	1475	881	851	810	570	318	273	284	296	478	1111	1327	1477	881	852	810	570	318	273	284	296	479
			1979	671	736	859	1405	1277	721	358	272	312	286	379	546	672	737	860	1407	1279	721	358	272	312	286	380	547
			1980	835	899	958	1242	605	494	274	287	284	300	313	484	836	900	960	1244	605	494	274	287	284	300	313	485
			All	872	987	1097	1176	908	675	401	292	290	290	329	503	873	988	1099	1178	908	675	401	292	290	290	330	503
	RSAN018	Jersey Point	1978	3510	3654	2751	487	346	369	334	226	243	461	840	1650	3517	3660	2756	487	346	369	334	226	243	462	842	1653
			1979	1982	2226	2946	1837	392	298	249	275	242	629	1169	2212	1986	2231	2952	1840	392	298	249	275	242	630	1171	2217
			1980	2452	2555	3209	581	285	223	208	226	274	350	689	1709	2457	2560	3216	582	285	223	208	226	274	350	690	1712
			All	2648	2812	2969	968	340	297	264	242	253	480	899	1857	2653	2817	2975	970	340	297	264	242	253	481	901	1861
	RSAC092	Emmaton	1978	5459	5398	2417	247	209	202	208	202	373	806	1520	3047	5467	5405	2420	247	209	202	208	202	373	807	1523	3053
			1979	3632	3759	2740	1108	276	215	262	394	342	1108	2363	4108	3639	3766	2745	1110	276	215	262	394	342	1109	2367	4115
			1980	4204	3793	1780	216	192	184	193	268	533	751	1753	3440	4212	3800	1783	216	192	184	193	268	534	753	1756	3446
			All	4432	4317	2312	524	225	200	221	288	416	888	1878	3532	4439	4324	2316	525	225	200	221	288	417	890	1882	3538
	ROLD034	CCWD Old River Intake	1978	1017	1184	1253	831	596	546	299	227	298	336	309	440	1019	1186	1255	831	596	546	299	227	298	336	309	441
			1979	577	642	767	1129	628	321	321	285	346	299	361	558	577	643	768	1130	628	321	321	285	346	299	361	558
			1980	751	760	1129	723	304	210	263	295	317	361	362	447	752	761	1131	723	304	210	263	295	317	361	362	448
			All	781	862	1050	894	507	359	294	269	320	332	344	482	783	863	1051	895	507	359	294	269	320	332	344	482
	CHVCT000	CCWD Middle River Intake	1978	593	694	823	807	619	541	299	222	367	430	347	354	594	695	824	807	619	541	299	222	367	430	347	354
			1979	409	453	484	777	635	317	342	329	357	325	325	398	409	453	485	778	635	317	342	329	357	325	325	398
			1980	464	459	677	613	301	208	279	328	389	460	434	384	465	459	678	614	301	208	279	328	389	460	434	384
			All	489	535	662	732	516	355	306	293	371	405	369	379	489	536	662	733	516	355	306	293	371	405	369	379

Table 3d. Average electrical conductivity for B1 Scenario: By Month, Location, and Water Year

Year			Water	without project (µS/cm)												with contribution from project (µS/cm)											
Type	Stn	Location	Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Wet																											
	RSAN007	Antioch Intake	1982	7642	7670	496	241	257	265	211	182	536	1444	3838	3178	7658	7681	497	241	257	265	211	182	536	1446	3845	3186
			1983	903	280	227	290	263	239	204	189	201	251	796	453	904	280	227	290	263	240	204	189	201	251	795	453
			1984	671	350	199	230	233	218	371	1343	1373	1773	3278	5773	672	350	199	230	233	218	371	1345	1376	1776	3285	5785
			1986	7439	7624	3193	1428	278	255	242	424	1111	1816	2549	5954	7455	7639	3200	1431	278	255	242	424	1113	1820	2555	5967
			All	4164	3981	1029	547	257	245	257	534	805	1321	2615	3840	4172	3988	1031	548	257	245	257	535	806	1323	2620	3848
	CHCCC006	Contra Costa Pump. Plant #1	1982	760	862	858	527	619	480	345	237	235	293	329	442	761	863	859	527	619	480	345	237	235	293	329	442
			1983	339	382	429	580	491	499	472	291	249	307	277	265	339	382	429	580	491	499	473	291	249	307	277	265
			1984	262	294	299	300	341	378	409	315	277	256	299	407	262	294	299	300	341	378	409	315	277	256	299	407
			1986	698	844	879	567	778	637	355	294	270	284	276	464	699	846	880	568	778	637	355	294	270	284	276	465
			All	515	596	616	494	555	499	395	284	258	285	295	395	515	596	617	494	555	499	395	284	258	285	295	395
	RSAN018	Jersey Point	1982	2363	4818	437	244	259	265	207	179	212	342	968	730	2368	4826	437	244	259	265	207	179	212	342	970	731
			1983	265	214	229	289	259	237	200	188	201	232	259	207	265	214	229	289	259	237	200	188	201	232	259	207
			1984	224	221	199	235	235	226	232	337	336	510	789	1617	224	221	199	235	235	226	232	337	337	510	790	1621
			1986	2356	2555	1223	578	277	252	235	228	289	446	553	1778	2361	2561	1226	579	277	252	235	228	289	447	554	1782
			All	1302	1952	522	336	257	245	218	233	260	382	642	1083	1305	1956	523	337	257	245	218	233	260	383	643	1085
	RSAC092	Emmaton	1982	4193	2853	191	193	185	193	180	180	303	681	1885	1752	4201	2857	191	193	185	193	180	180	303	681	1888	1756
			1983	475	207	185	199	183	180	182	179	182	215	460	274	475	207	185	199	183	180	182	179	182	215	460	274
			1984	336	238	178	186	189	186	231	523	560	552	1602	3179	336	238	178	186	189	186	231	524	561	552	1605	3185
			1986	3955	3987	962	444	186	184	200	256	534	642	1338	3391	3963	3994	964	444	186	184	200	256	534	644	1341	3397
			All	2240	1821	379	256	186	186	198	284	395	523	1322	2149	2244	1824	380	256	186	186	198	284	395	523	1324	2153
	ROLD034	CCWD Old River Intake	1982	709	1634	810	515	361	303	190	173	253	351	345	372	710	1637	811	515	361	303	190	173	253	351	346	372
			1983	341	307	267	292	270	241	184	193	204	269	282	276	341	307	267	292	270	241	184	193	204	269	282	276
			1984	288	187	205	272	239	297	314	294	301	264	292	428	288	187	205	272	239	297	314	294	301	264	293	428
			1986	691	708	633	515	504	258	246	276	294	320	303	430	692	709	633	516	504	258	246	276	294	320	303	430
			All	507	709	478	399	343	275	234	234	263	301	306	376	508	710	479	399	343	275	234	234	263	301	306	377
	CHVCT000	CCWD Middle River Intake	1982	473	863	765	541	402	301	190	171	318	451	377	310	473	865	766	541	402	301	190	171	318	451	377	310
			1983	241	242	259	292	269	241	182	192	203	264	267	260	241	242	259	292	269	241	182	192	203	264	267	260
			1984	296	189	203	270	249	295	339	336	344	292	298	360	296	189	203	270	249	295	339	336	344	292	298	360
			1986	451	475	482	522	512	256	239	273	357	387	347	364	451	476	482	522	512	256	239	273	357	387	347	364
			All	365	442	427	406	357	273	237	243	306	348	322	324	365	443	427	406	357	273	237	243	306	348	322	324

Table 4a. Average electrical conductivity for Scenario EBC2: By Month, Location, and Water Year

Year			Water	without project (µS/cm)												with contribution from project (µS/cm)											
Type	Stn	Location	Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Critical																											
	RSAN007	Antioch Intake	1976	910	706	1447	3259	3620	1795	1715	3085	4752	6359	5825	6862	910	707	1449	3265	3628	1800	1719	3092	4763	6371	5838	6876
			1977	6779	7279	6993	5144	3261	2185	2165	3211	5830	6421	6181	6707	6794	7294	7007	5156	3270	2191	2171	3219	5843	6435	6195	6722
			1988	6574	7388	3731	784	775	1484	1019	1573	2445	4482	5664	7586	6589	7404	3738	785	775	1487	1020	1576	2451	4490	5677	7603
			1990	6994	6728	6409	2914	1083	742	912	2033	2979	6419	5492	6306	7009	6743	6423	2921	1086	743	913	2037	2985	6432	5504	6320
			1991	8419	6650	6875	4405	2849	1123	472	2135	4108	5020	6081	7791	8436	6664	6889	4415	2857	1125	473	2139	4116	5030	6094	7807
			All	5935	5750	5091	3301	2316	1466	1256	2407	4023	5740	5849	7050	5947	5762	5102	3309	2321	1469	1259	2413	4032	5752	5862	7066
	CHCCC006	Contra Costa Pump. Plant #1	1976	299	266	235	528	641	491	442	430	566	899	1283	1000	299	266	235	529	641	491	443	430	566	901	1286	1002
			1977	1065	934	1014	1191	814	616	565	509	628	883	975	876	1067	935	1015	1193	816	617	565	510	629	885	977	878
			1988	903	903	1126	628	335	384	430	391	369	488	797	930	905	904	1128	629	335	384	430	391	369	488	798	932
			1990	1019	1057	996	1084	589	403	393	364	394	806	1251	944	1021	1059	998	1086	589	403	393	364	395	807	1253	945
			1991	1038	1363	1124	1032	789	589	525	399	444	811	1159	1086	1040	1365	1126	1034	790	589	525	400	444	812	1161	1088
			All	865	905	899	893	631	496	471	419	480	777	1093	967	866	906	900	894	632	497	471	419	481	779	1095	969
	RSAN018	Jersey Point	1976	415	290	563	1244	1305	660	526	888	1529	3411	2606	2792	416	290	564	1246	1308	661	527	890	1532	3419	2612	2799
			1977	2404	2691	2727	1912	1069	670	611	911	2046	2554	2205	2482	2409	2697	2733	1916	1071	671	612	913	2051	2560	2209	2488
			1988	2376	2889	1942	474	306	421	333	426	659	1768	2200	3077	2381	2895	1946	475	306	421	334	427	660	1772	2205	3084
			1990	2833	2597	2875	1556	470	302	300	545	848	3215	2697	2498	2840	2603	2882	1559	471	303	300	545	850	3222	2703	2504
			1991	3459	2448	2596	1647	896	500	277	613	1322	2692	2705	3228	3466	2452	2602	1651	898	501	277	614	1325	2699	2711	3236
			All	2298	2183	2141	1367	809	511	410	676	1281	2728	2483	2816	2302	2188	2145	1369	811	511	410	678	1284	2734	2488	2822
	RSAC092	Emmaton	1976	321	302	496	1192	1317	609	738	1733	2876	2435	2606	3553	321	302	497	1194	1320	610	740	1736	2881	2439	2611	3559
			1977	3781	4132	3427	2167	1251	1051	1095	1909	3621	3210	3653	3962	3788	4139	3433	2171	1253	1053	1098	1913	3628	3216	3661	3970
			1988	3739	4064	1282	308	406	723	457	763	1270	1944	2942	4581	3746	4071	1284	308	406	724	458	764	1272	1947	2948	4589
			1990	3564	3508	2686	843	430	359	413	1086	1708	2691	2210	3627	3571	3515	2692	845	431	360	413	1088	1711	2696	2214	3634
			1991	5114	4120	3872	2147	1298	509	299	1154	2268	1700	3005	4659	5123	4127	3879	2151	1301	509	300	1156	2272	1703	3010	4668
			All	3304	3225	2353	1331	939	650	601	1329	2348	2396	2883	4076	3310	3231	2357	1334	941	651	602	1331	2353	2400	2889	4084
	ROLD034	CCWD Old River Intake	1976	309	297	258	515	610	492	466	474	536	981	1000	834	309	297	258	516	611	493	467	474	536	983	1002	835
			1977	888	785	1006	987	790	699	662	594	627	788	805	762	890	786	1007	988	791	700	663	594	627	789	806	764
			1988	775	907	998	610	419	478	498	476	414	450	681	893	776	909	1000	611	419	478	498	476	414	451	682	894
			1990	898	840	924	1060	593	520	484	442	402	877	994	787	900	841	925	1062	593	520	484	443	402	878	996	789
			1991	1033	1036	880	923	807	687	664	508	448	812	990	976	1035	1037	881	924	808	687	664	508	448	813	991	978
			All	781	773	813	819	642	575	555	499	485	782	894	850	782	774	814	820	642	575	555	499	486	783	895	852
	CHVCT000	CCWD Middle River Intake	1976	350	376	295	454	555	547	492	501	493	597	658	528	350	376	295	454	555	547	492	501	493	598	659	529
			1977	543	521	650	765	741	691	656	595	539	531	562	505	544	522	651	766	742	691	657	596	539	531	562	505
			1988	516	569	707	656	549	529	556	525	456	343	450	533	517	570	708	656	549	529	556	525	456	343	451	534
			1990	545	553	606	815	660	598	540	468	434	523	666	536	545	554	607	816	661	599	540	468	434	524	667	537
			1991	594	705	655	785	799	752	727	569	426	505	645	609	594	705	655	785	800	752	727	569	426	506	646	609
			All	510	545	583	695	659	623	594	532	470	500	596	542	510	545	583	695	660	624	595	532	470	500	597	543

Table 4b. Average electrical conductivity for Scenario EBC2: By Month, Location, and Water Year

Year Type	Stn	Location	Water Year	without project (µS/cm)												with contribution from project (µS/cm)											
				Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Dry																											
	RSAN007	Antioch Intake	1981	1621	2042	2612	2603	310	252	293	742	1583	3723	3946	5768	1623	2047	2617	2609	310	252	293	742	1586	3730	3954	5780
			1985	786	1342	424	962	950	756	507	736	1583	3451	4258	5676	787	1345	424	963	951	757	508	736	1586	3458	4267	5688
			1987	678	935	2290	2652	1171	416	548	1397	2152	3534	4348	5861	679	936	2293	2657	1174	417	548	1399	2157	3541	4357	5874
			1989	7208	9090	6364	3521	2730	600	232	499	1568	4343	3378	6169	7224	9106	6377	3530	2737	602	232	499	1570	4351	3385	6181
			All	2573	3352	2923	2435	1290	506	395	843	1722	3763	3983	5868	2578	3358	2928	2440	1293	507	395	844	1725	3770	3991	5881
	CHCCC006	Contra Costa Pump. Plant #1	1981	261	295	331	494	466	265	350	490	342	517	806	876	261	295	331	495	467	265	350	490	342	518	807	877
			1985	337	326	279	273	297	285	370	456	334	498	789	901	337	326	279	273	296	285	370	456	334	498	790	902
			1987	258	269	295	411	505	367	428	424	342	537	828	811	258	269	295	411	505	367	428	424	342	537	829	813
			1989	1177	1028	1656	1579	767	571	425	349	269	583	998	779	1178	1029	1659	1582	768	572	425	349	269	584	1000	780
			All	508	479	640	689	509	372	393	430	322	534	855	842	509	480	641	690	509	372	393	430	322	534	857	843
	RSAN018	Jersey Point	1981	406	523	1122	1319	285	214	231	316	424	1840	1990	2683	406	523	1124	1321	285	214	231	316	425	1844	1994	2689
			1985	324	625	265	361	346	289	256	297	427	1643	2149	2649	324	626	265	361	347	289	256	297	427	1647	2154	2655
			1987	238	286	892	1096	551	262	258	413	589	1701	2074	2271	238	286	894	1099	552	262	258	413	590	1704	2078	2276
			1989	2686	4273	2989	1575	950	338	222	239	429	2313	1843	2814	2692	4281	2995	1579	952	338	222	239	429	2318	1847	2820
			All	913	1427	1317	1088	533	276	242	316	467	1874	2014	2604	915	1429	1319	1090	534	276	242	317	468	1878	2018	2610
	RSAC092	Emmaton	1981	793	889	835	800	199	193	223	412	753	1239	1382	2493	794	890	836	801	199	193	223	412	754	1241	1384	2497
			1985	411	433	217	362	363	327	282	380	757	1154	1531	2428	411	434	217	362	363	328	282	380	759	1156	1533	2432
			1987	381	483	814	923	375	239	321	626	995	1181	1622	3329	381	484	815	925	375	239	321	627	997	1183	1625	3335
			1989	4423	5087	2905	1166	1254	283	192	269	701	1475	1141	2899	4432	5095	2910	1168	1256	284	192	269	702	1477	1143	2904
			All	1502	1723	1193	813	547	261	254	422	802	1262	1419	2787	1505	1726	1195	814	548	261	255	422	803	1264	1421	2792
	ROLD034	CCWD Old River Intake	1981	294	322	368	726	454	342	475	538	370	509	687	809	294	323	368	727	454	342	475	538	370	510	688	811
			1985	350	324	271	302	345	356	480	529	368	472	713	804	350	324	271	302	344	356	481	529	368	472	714	805
			1987	296	318	314	592	483	442	554	477	367	488	706	715	296	318	314	593	483	442	555	477	367	489	707	716
			1989	938	1213	1472	1038	775	687	553	423	283	642	768	843	939	1215	1474	1040	776	688	553	423	283	643	769	845
			All	469	544	606	665	514	457	516	492	347	528	718	793	470	545	607	666	514	457	516	492	347	529	720	794
	CHVCT000	CCWD Middle River Intake	1981	381	384	342	591	578	503	581	551	422	358	459	508	381	384	342	591	578	503	581	551	422	359	459	508
			1985	395	356	307	390	493	520	575	553	430	348	469	507	395	355	307	390	493	521	576	553	430	348	470	507
			1987	382	393	334	508	541	586	635	536	414	344	468	483	382	393	334	508	542	586	635	536	414	344	469	483
			1989	600	651	951	871	752	752	646	484	325	406	528	506	600	651	952	872	752	753	646	484	325	406	529	507
			All	439	446	483	590	591	590	609	531	398	364	481	501	440	446	484	590	591	591	609	531	398	364	482	501

Table 4c. Average electrical conductivity for Scenario EBC2: By Month, Location, and Water Year

Year			Water	without project (µS/cm)												with contribution from project (µS/cm)											
Type	Stn	Location	Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Normal																											
	RSAN007	Antioch Intake	1978	7761	7416	6138	813	262	259	275	247	352	1332	3258	2464	7778	7432	6151	814	262	259	275	247	352	1333	3264	2469
			1979	2017	2042	2875	2360	442	254	264	292	704	2468	3550	6324	2022	2047	2880	2365	442	254	264	292	704	2472	3557	6336
			1980	7384	5868	3584	533	284	246	227	270	423	1081	3210	2197	7399	5880	3591	534	284	246	227	270	422	1082	3217	2202
			All	5721	5109	4199	1235	329	253	255	269	493	1627	3339	3661	5733	5120	4207	1238	329	253	255	269	493	1629	3346	3669
	CHCCC006	Contra Costa Pump. Plant #1	1978	1020	1151	1206	1019	512	492	497	447	315	265	407	549	1022	1153	1208	1020	512	492	497	447	315	265	408	550
			1979	285	301	298	496	510	436	388	496	347	343	557	776	285	302	298	496	510	436	388	496	347	344	557	777
			1980	1048	1084	1257	1284	1109	906	442	472	359	266	315	423	1049	1086	1260	1287	1111	907	442	472	359	266	315	423
			All	784	845	920	933	715	611	442	472	340	292	426	583	786	847	922	935	716	611	442	472	340	292	427	583
	RSAN018	Jersey Point	1978	2924	2803	3084	612	274	268	285	246	234	465	1382	1120	2931	2809	3091	613	274	268	285	246	234	465	1385	1122
			1979	539	519	1173	1159	337	248	242	265	288	1066	1627	2913	540	520	1176	1162	337	248	242	265	288	1068	1630	2919
			1980	3120	3426	2125	448	282	241	232	259	257	319	1020	659	3127	3433	2130	448	282	241	232	259	257	319	1022	660
			All	2194	2249	2128	740	298	252	253	257	260	617	1343	1564	2199	2254	2132	741	298	252	253	257	260	617	1346	1567
	RSAC092	Emmaton	1978	4812	4237	2366	267	200	193	195	197	240	460	1192	684	4821	4245	2370	268	200	193	195	197	240	460	1194	685
			1979	883	933	1006	777	269	198	214	220	400	778	1265	2847	885	934	1007	778	269	198	214	220	400	779	1267	2852
			1980	3637	1940	1037	202	190	185	195	212	278	464	1409	1024	3644	1944	1038	202	190	185	195	212	278	464	1411	1026
			All	3111	2370	1469	416	219	192	201	210	306	567	1289	1518	3117	2374	1472	416	219	192	201	210	306	568	1291	1521
	ROLD034	CCWD Old River Intake	1978	915	997	1208	942	526	479	330	269	317	282	382	477	917	999	1210	943	526	479	330	269	317	282	382	478
			1979	297	326	337	749	473	360	378	356	329	345	503	791	297	326	337	750	473	360	378	356	329	345	504	792
			1980	915	1162	1123	627	416	246	351	378	362	294	312	394	916	1164	1125	627	416	246	351	378	362	294	312	394
			All	709	828	889	772	471	362	353	335	336	307	399	554	710	829	891	773	471	362	353	335	336	307	399	555
	CHVCT000	CCWD Middle River Intake	1978	557	623	776	890	646	584	364	265	369	348	311	371	558	623	777	890	646	584	364	265	369	348	311	371
			1979	339	389	328	594	564	367	373	360	359	296	363	462	339	389	328	594	564	367	373	360	359	296	364	463
			1980	510	621	822	593	396	244	343	371	398	391	311	354	510	622	823	593	396	244	343	371	398	391	311	354
			All	469	544	642	692	534	398	360	332	375	345	328	396	469	544	643	693	534	398	360	332	375	345	329	396

Table 4d. Average electrical conductivity for Scenario EBC2: By Month, Location, and Water Year

Year			Water	without project (µS/cm)												with contribution from project (µS/cm)											
Type	Stn	Location	Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Wet																											
	RSAN007	Antioch Intake	1982	7016	5593	328	233	222	240	213	188	220	905	3256	1286	7031	5604	328	233	222	240	213	188	220	906	3263	1289
			1983	344	218	218	292	277	250	214	194	202	217	252	199	344	218	218	292	277	250	214	194	202	217	252	199
			1984	427	341	207	223	218	198	232	368	939	1680	2847	1642	427	341	207	223	218	198	232	368	940	1684	2853	1646
			1986	6850	7838	3569	1672	260	274	250	260	595	1879	3071	1576	6864	7853	3576	1676	260	274	250	260	595	1883	3077	1580
			All	3659	3498	1080	605	244	241	227	253	489	1170	2357	1176	3666	3504	1082	606	244	241	227	253	489	1172	2361	1178
	CHCCC006	Contra Costa Pump. Plant #1	1982	977	959	551	498	367	488	578	328	257	275	336	482	979	960	552	498	367	488	578	328	257	275	337	483
			1983	307	306	421	922	890	587	675	361	287	309	271	215	307	306	421	922	890	587	675	361	287	309	271	215
			1984	210	251	340	453	322	305	359	493	358	317	362	625	210	251	340	453	322	305	359	493	358	317	362	625
			1986	964	1030	1267	835	590	911	536	393	316	314	395	411	966	1032	1269	837	590	911	536	393	316	315	396	411
			All	615	636	645	677	540	573	537	394	304	304	341	433	616	637	646	677	540	573	537	394	304	304	341	434
	RSAN018	Jersey Point	1982	2703	3315	303	234	222	241	209	186	198	309	1146	506	2709	3322	303	234	222	241	209	186	198	309	1148	507
			1983	207	202	221	292	273	246	210	193	202	220	203	187	207	202	221	292	273	246	210	193	202	220	203	187
			1984	226	215	208	228	222	200	228	270	307	693	1163	1204	226	215	208	228	222	200	228	270	307	694	1166	1207
			1986	2948	3796	2089	834	255	269	250	244	257	738	1129	574	2954	3804	2093	835	255	269	250	244	257	739	1131	575
			All	1521	1882	705	397	243	239	224	223	241	490	910	618	1524	1886	706	398	243	239	224	223	241	490	912	619
	RSAC092	Emmaton	1982	3775	1885	183	192	182	190	179	180	191	438	1331	430	3782	1888	183	192	182	190	179	180	191	438	1333	431
			1983	201	185	183	198	184	181	181	178	179	187	199	180	201	185	183	198	184	181	181	178	179	187	199	180
			1984	224	206	179	184	186	181	199	251	498	519	1089	439	224	206	179	184	186	181	199	251	499	520	1091	440
			1986	3153	3665	1053	548	186	183	202	214	358	609	1301	659	3158	3672	1055	548	186	183	202	214	358	610	1304	660
			All	1838	1485	399	280	185	184	191	206	307	438	980	427	1841	1488	400	280	185	184	191	206	307	439	982	428
	ROLD034	CCWD Old River Intake	1982	837	1278	481	432	365	429	262	184	261	297	332	322	838	1281	482	432	365	429	262	184	261	297	332	322
			1983	216	236	290	318	295	253	203	202	213	239	231	216	216	236	290	318	295	253	203	202	213	239	231	216
			1984	225	244	236	342	306	269	368	392	356	297	355	555	225	244	236	342	306	269	368	392	356	297	355	556
			1986	872	1014	1113	753	490	331	269	266	313	312	368	390	873	1015	1115	754	490	331	269	266	313	313	368	391
			All	538	693	530	461	364	321	275	261	286	286	321	371	538	694	531	461	364	321	275	261	286	286	321	371
	CHVCT000	CCWD Middle River Intake	1982	518	727	531	513	423	406	233	181	316	376	304	277	518	728	532	513	423	406	233	181	316	376	304	277
			1983	228	236	278	329	294	253	197	200	211	236	232	231	228	236	278	329	294	253	197	200	211	236	232	231
			1984	277	226	232	332	310	314	370	379	399	298	292	412	277	226	232	332	310	314	370	379	399	298	292	412
			1986	513	556	752	674	589	335	264	261	363	329	320	364	513	556	753	674	589	335	264	261	363	329	320	364
			All	384	436	448	462	403	327	266	255	322	310	287	321	384	437	449	462	403	327	266	255	322	310	287	321