

Draft

# WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS

Supplemental Environmental Impact Report

Prepared for

September 2020







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Prepared for  
Pajaro Valley Water Management Agency

September 2020

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# ACRONYMS AND ABBREVIATIONS

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2014 BMP Update PEIR	2014 Basin Management Plan Program Environmental Impact Report
2019 Basin Plan	Water Quality Control Plan for the Central Costal Basin
µg/m <sup>3</sup>	micrograms per meters cubed
AB	Assembly Bill
ADT	average daily traffic
Af	Acre-Feet
AFY	acre-foot (feet) per year
APN	Assessor Parcel Number
AQMP	Air Quality Management Plan
ARMR	Archaeological Resource Management Report
ASR	Aquifer Storage and Recovery
BAAQMD	Bay Area Air Quality Management District
BMP	Basin Management Plan
Btu	British thermal unit
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
California Register	California Register of Historical Resources
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CAS	Climate Action Strategy
cbec	cbec eco engineering, inc.
CCC	California Coastal Commission
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CDS	Coastal Distribution System
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations

cfs	cubic foot (feet) per second
CGP	Construction General Permit
CH <sub>4</sub>	methane
CHRIS	California Historical Resources Information System
CNDDDB	California Natural Diversity Data Base
CNEL	community noise equivalent level
CNPS	California Native Plant Society
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> e	carbon dioxide equivalent
CPUC	California Public Utilities Commission
CRF	California red-legged frog
CRMMP	Cultural Resources Mitigation and Monitoring Program
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
CY	cubic yards
dB	decibels
dBA	A-weighted decibels
DEIR	Draft Environmental Impact Report
DPM	diesel particulate matter
DPS	distinct population segment
DTSC	Department of Toxic Substances Control
DWR	(California) Department of Water Resources
EAP	Energy Action Plan
EC	electrical conductivity
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EMP	Emergency Management Plan
ESU	evolutionarily significant unit
ET	evapotranspiration
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FGC	Fish and Game Code
FHWA	Federal Highway Administration
FMMP	Farmland Mapping and Monitoring Program

FMP	Fisheries Management Plan
Ft	foot (feet)
g	grams
g/L	grams per liter
GHG	greenhouse gas
gpm	gallons per minute
Harkins Slough Project	proposed Harkins Slough Facilities Upgrades Project
HASP	Health and Safety Plan
HEC-RAS	Hydrologic Engineering Center's River Analysis System
HDD	horizontal directional drilling
HMBP	Hazardous Materials Business Plan
Hz	hertz
in/sec	inches per second
KEC	Kittleson Environmental Consulting
kWh	kilowatt hour
Land Trust	Land Trust of Santa Cruz County
LCP	Local Coastal Program
Ldn	day-night noise level
Leq	average equivalent sound level
L <sub>max</sub>	instantaneous maximum noise level
m	meters
MBARD	Monterey Bay Air Resources District
MBTA	Migratory Bird Treaty Act
MG	million gallons
mg/L	milligram per liter
mgd	million gallons per day
MLD	Most Likely Descendant
MND	Mitigated Negative Declaration
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MSA	Magnuson-Stevens Fishery Conservation and Management Act
N <sub>2</sub> O	nitrous oxide
NA	not applicable
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
National Register	National Register of Historic Places

NAVD88	North American Vertical Datum of 1988
NCCAB	North Central Coast Air Basin
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO	nitric oxide
NO <sub>2</sub>	nitrogen dioxide
NO <sub>3</sub>	nitrate
NOAA	National Oceanic and Atmospheric Administration
NOD	Notice of Determination
NOP	Notice of Preparation
NO <sub>x</sub>	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	non-point source
NRCS	Natural Resources Conservation Service
NTU	Nephelometric Turbidity Units
NWIC	Northwest Information Center
O <sub>3</sub>	ozone
OPR	Governor's Office of Planning and Research (California)
PEIR	Programmatic Environmental Impact Report
PFC	perfluorocarbon
PG&E	Pacific Gas and Electric
PM	Particulate matter
PM <sub>10</sub>	Inhalable particulate matter
PM <sub>2.5</sub>	Fine particulate matter
POD	Point of Diversion
POU	Place of Use
ppb	Parts per billion
ppm	Parts per million
PPV	peak particle velocity
PRC	Public Resources Code
PRMS	Precipitation Runoff Modeling System
Projects	proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects
PSMCSD	Pajaro/Sunny Mesa Community Services District
PVHM	Pajaro Valley Hydrologic Model
PVIGSM	Pajaro Valley Integrated Groundwater Surface Water Model
PV Water	Pajaro Valley Water Management Agency



Q	Quaternary alluvium
Qb	Basin deposits
QCM	quantified conceptual model
Qfl	Flood plain deposits
Qof	Holocene-aged older floodplain deposits
Qtw	Watsonville terrace deposits
Qwf	Pleistocene-aged fluvial facies
Qyf	Holocene-aged younger floodplain deposits
RCD	Resource Conservation District (Santa Cruz County)
RD 2049	Reclamation District 2049
RMS	root mean square
ROG	reactive organic gases
RWF	Recycled Water Facility (Watsonville)
RWQCB	Regional Water Quality Control Board
SAA	Streambed Alteration Agreement
SAAQS	State Ambient Air Quality Standards
Santa Cruz Land Trust	Land Trust of Santa Cruz County
SAR	sodium adsorption ratio
SC	specific constituents
S-CCC	South-central Coast California
Scoping Plan	Climate Change Scoping Plan
SCWD	Soquel Creek Water District
SDWA	Safe Drinking Water Act
SF	square foot (feet)
SF <sub>6</sub>	sulfur hexafluoride
SGMA	Sustainable Groundwater Management Act
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLF	Sacred Lands File
SLO APCD	San Luis Obispo County Air Pollution Control District
SMP	Soil Management Plan
SO <sub>2</sub>	sulfur dioxide
SR	State Route
State Water Board	State Water Resources Control Board
STLC	soluble threshold limit concentrations
SWPPP	Stormwater Pollution Prevention Plan

TACs	toxic air contaminants
TBA	tertiary butyl alcohol
TCLP	Toxic Characteristic Leaching Procedure
TDS	total dissolved solids
the Board	PV Water's Board of Directors
TMDL	total maximum daily loads
TU	turbidity units
UBC	Uniform Building Code
Unified Program	Unified Hazardous Waste and Hazardous Materials Management Regulatory Program
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USSCS	United States Soil and Conservation Service
WDR	Waste Discharge Requirements
WIN	Wireless Irrigation Network
WPT	Western pond turtle
WRDA	Water Resources Department Act
WSE	water surface elevation
WTP	Water Treatment Plant
WWTF	City of Watsonville Wastewater Treatment Facility
WY	water year
Zone 7	Santa Cruz County Flood Control and Water Conservation District Zone 7
ZVF	Zayante-Vergeles Fault

# SUMMARY

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## S.1 Introduction

This environmental impact report (EIR) has been prepared by the Pajaro Valley Water Management Agency (PV Water) in conformance with the provisions of the California Environmental Quality Act (CEQA) and the CEQA *Guidelines*. PV Water serves as the lead agency for development of the EIR for the proposed Harkins Slough Facilities Upgrades Project (Harkins Slough Project) and Struve Slough Project, collectively called the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects), with input and coordination provided by other agencies and local jurisdictions. PV Water has determined that the Projects could cause significant environmental impacts, and that preparation of an EIR is warranted. Pursuant to CEQA *Guidelines* Section 15161, this is a project-level EIR. PV Water has prepared this EIR to provide information about the Projects' potential effects on the environment to the public and responsible and trustee agencies reviewing the Projects. This EIR describes the potential environmental impacts that could result from implementation of the Projects, identifies mitigation measures for reducing impacts to less-than-significant levels where feasible, and evaluates alternatives to the Projects.

## S.2 Background

PV Water was formed in 1984 by the Pajaro Valley Water Management Agency Act, for the primary purpose of managing groundwater resources and supplemental water supplies in its service area. In the coastal areas and throughout much of the Pajaro Valley Groundwater Basin, overdraft conditions<sup>1</sup> have caused groundwater levels to drop below sea level, creating a landward pressure gradient that causes seawater to move inland. Seawater intrusion has elevated the chloride concentrations in groundwater up to two and a half miles inland from the coast, in some areas contaminating the groundwater to the point that it is unsuitable for agricultural irrigation and domestic (potable) uses without treatment. PV Water's objective is to manage local groundwater resources to reduce, and eventually halt, long-term overdraft of the groundwater basin, while ensuring sufficient water supplies for present and anticipated needs. To achieve this objective, PV Water has prepared and periodically updates a basin-wide groundwater management plan (the Basin Management Plan [BMP]), which serves as the guiding document for its major projects and programs. Most recently, PV Water approved the BMP Update and certified the *Environmental Impact Report for the Basin Management Plan Update* in 2014 (2014 BMP Update PEIR), where the Projects were analyzed as the Harkins Slough Recharge Facilities Upgrades and Watsonville Slough with Recharge Basins.

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<sup>1</sup> Overdraft occurs when the amount of groundwater withdrawn from a basin exceeds the volume of freshwater replenishing the basin.

## S.3 Project Objectives

The primary purposes of the Projects are to help balance the Pajaro Valley Groundwater Basin, prevent further seawater intrusion, and meet water supply needs in the Pajaro Valley by upgrading the existing Harkins Slough filter plant, developing Struve Slough as a new water supply source, and constructing new recharge basins and associated recovery wells and pipelines. The following objectives were included in the 2014 BMP Update PEIR:

- Prevent seawater intrusion, long-term groundwater overdraft, land subsidence, and water quality degradation;
- Manage existing and supplemental water supplies to control overdraft and provide for present and future water needs;
- Create a reliable, long-term water supply, which has been identified as an important cornerstone of the long-term economic vitality of the Pajaro Valley;
- Develop water conservation programs; and
- Recommend a program that is cost effective and environmentally sound.

In addition, the Board of Directors adopted the following project-specific objectives for the Projects:

- Design and implement reliable facilities to help achieve sustainable groundwater management of the Pajaro Valley Groundwater Subbasin by 2040, taking into account potential future hydrologic changes, including those associated with climate change.<sup>2</sup>
- Substantially contribute to the Pajaro Valley's water supply needs in a timely manner, consistent with the Basin Management Plan Update implementation goals.
- Use locally controlled surface water for agricultural purposes to offset groundwater pumping in an environmentally sound manner and in coordination with resource agencies, the public, and other stakeholders, while preserving existing habitat.
- Make efficient use of, and leverage federal, state, and local investments in, existing Agency infrastructure.
- In coordination with other agencies, develop surface water supplies in a manner that is compatible with flood risk reduction and habitat restoration planning.

## S.4 Project Description

### S.4.1 Project Location and Proposed Components

Chapter 2 of this EIR presents the Project Description. The essential function of the Projects, depicted in **Figure S-1**, is to divert water from the sloughs, and infiltrate it into a shallow aquifer through recharge basins until it is pumped out and sent to agricultural water users. The Projects

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<sup>2</sup> Sustainable groundwater management is defined under the SGMA as management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results (Water Code, § 10721, subd. (v)).

are located in unincorporated Santa Cruz County, west of the Watsonville city limits and State Route (SR) 1.

#### S.4.1.1 Harkins Slough Facilities Upgrades Project

**Figure S-2** shows the existing and proposed facilities at the Harkins Slough filter Plant. The components of the Harkins Slough Project include the following:

- **Harkins Slough Filter Plant Upgrades.** The proposed filter plant expansion and pump station upgrades would occur at the existing Harkins Slough filter plant site at the southern end of Harkins Slough, approximately 900 feet north of San Andreas Road. Upgrades to the Harkins Slough filter plant would include the installation of screens at the intake, replacement of two existing diversion pumps, replacement of three existing intermediate pumps, construction of coagulant addition facilities and the addition of new filters, and yard piping improvements.
- **Backwash and Raw Water Pipeline.** An approximately 4,600-foot-long, 14-inch diameter backwash and raw water pipeline would extend from the Harkins Slough filter plant across agricultural fields to connect with an existing 33-inch gravity sewer under West Beach Street for discharge of filter backwash and to allow diversion of raw water from the sloughs to the Watsonville Wastewater Treatment Facility and RWF, collectively known as the Water Resources Center. The proposed pipeline alignment traverses agricultural land in unincorporated Santa Cruz County.
- **Southwest and Southeast Recharge Basin, Recovery and Monitoring Wells, and Associated Pipelines.** The proposed Southwest and Southeast recharge basins would be located on farmland west of San Andreas Road and north of Dairy Road (Refer to **Figure S-3**). The Southwest recharge basin would be approximately 16.7 acres and the Southeast recharge basin would be approximately 12.7 acres. The Southwest recharge basin would have a storage capacity of approximately 77 acre-feet and the Southeast recharge basin would have a storage capacity of 128 acre-feet. Both basins would be connected via new pipelines to the existing 24-inch filtered water pipeline that connects the Harkins Slough filter plant with the existing recharge basin. Approximately ten recovery wells and ten monitoring wells would be installed for each recharge basin.

#### S.4.1.2 Struve Slough Project

**Figure S-4** shows the locations and schematic of the proposed screened intake and pump station for the Struve Slough Project. The components of the Struve Slough Project include the following:

- **Screened Intake and Pump Station.** The proposed screened intake for the Struve Slough Project would be located in Struve Slough. The pump station would be located approximately 200 feet northwest of the intake on land zoned for agriculture. A pipeline would connect the intake to the pump station.
- **Struve Slough to Filter Plant Pipeline.** The proposed Struve Slough pipeline would be an approximately 7,150-foot-long, 30-inch pipeline that would extend from the proposed pump station at Struve Slough to the filters at the Harkins Slough filter plant. The proposed alignment would traverse agricultural land in unincorporated Santa Cruz County as well as go underneath the railroad tracks at Struve and Watsonville Sloughs.



- **Filter Plant to Recharge Basins Pipeline.** A new approximately 5,500-foot-long pipeline would extend from the Harkins Slough filter plant approximately 900 feet north of San Andreas Road to the recharge basins, parallel to and approximately along the same route as the existing filtered water pipeline. The proposed alignment traverses agricultural land and existing road right-of-ways in unincorporated Santa Cruz County.
- **North Recharge Basin, Recovery and Monitoring Wells, and Associated Pipelines.** The proposed North recharge basin would be located on farmland west of San Andreas Road and north of Dairy Road in unincorporated Santa Cruz County. The North recharge basin would be approximately 3.9 acres with a storage capacity of 20 acre-feet, and would be connected via a short pipeline to the proposed filter plant to recharge basins pipeline (refer to Figure 2-3). Approximately ten recovery wells and ten monitoring wells would be installed for each recharge basin.

## S.4.2 Construction

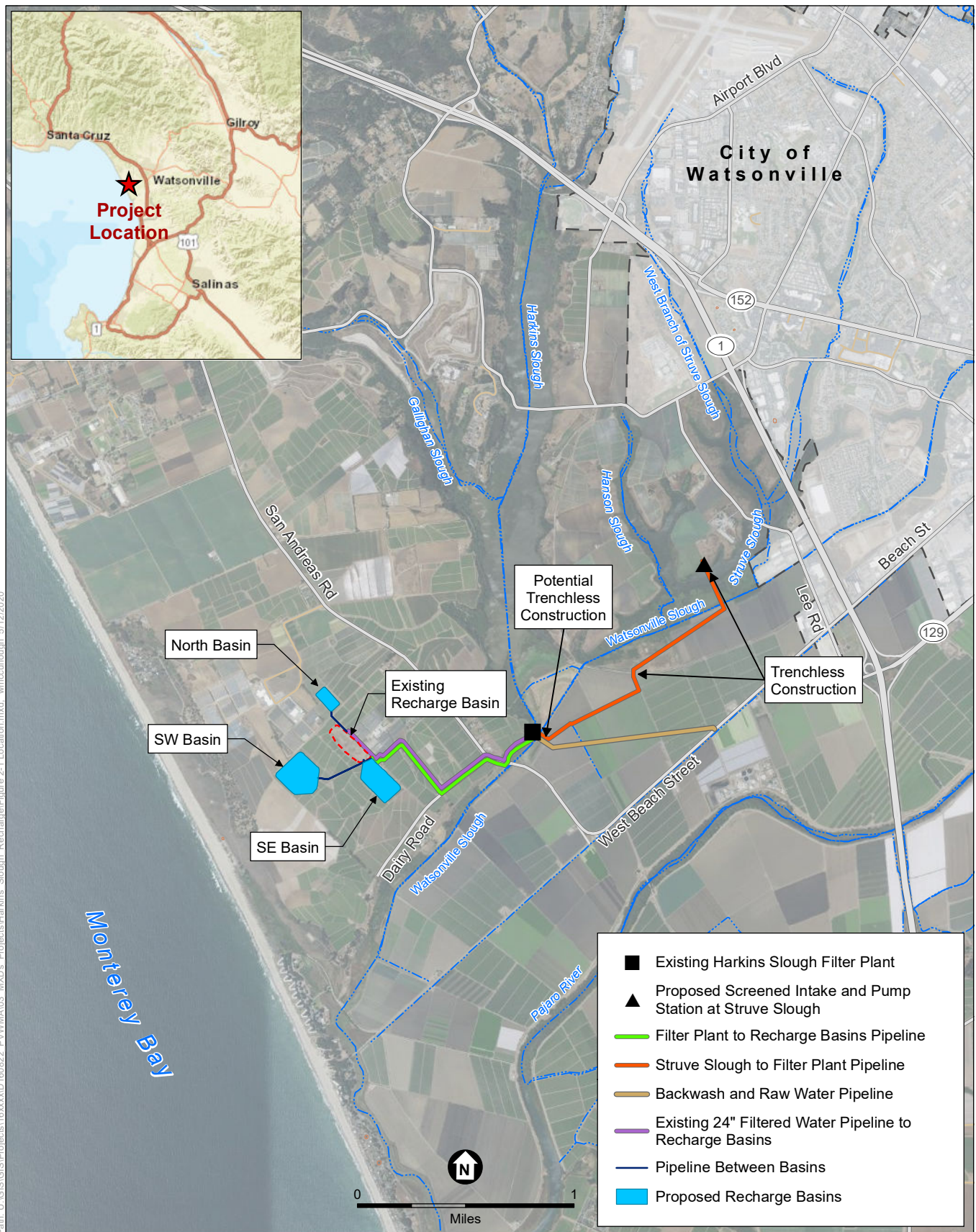
Construction would be initiated following project approval, issuance of permits, and completion of design. Construction of the Harkins Slough Project components would occur in stages with an estimated total construction time of approximately 30 months over a three-year period between 2022 and 2025 based on project needs. Construction of the Struve Slough Project is expected to last approximately one year between 2022 and 2023, with the exception of the North recharge basin, recovery and monitoring wells, and associated pipelines, the construction of which is expected to occur over nine months between 2027 and 2028. Construction details (e.g., construction techniques, hours, work force, equipment, staging areas, traffic routing) are presented in Section 2.6 of Chapter 2.

## S.4.3 Operations

On average, PV Water would divert approximately 740 acre-feet per year (AFY) from Harkins Slough and approximately 1,320 AFY from Struve Slough. The diversion facilities (intake, pump station, and filter plant) for Harkins Slough are anticipated to operate November 1 to May 31; the diversion facilities for Struve Slough could operate at any time of year. There are criteria related to volume, salinity and water surface elevation that determine whether pumping can occur at either diversion (refer to Section 2.5.3 in Chapter 2, Project Description). The maximum pump rate at either diversion would be 30 cubic feet per second (cfs). The recovery wells would be operated based on demand for irrigation water in the Coastal Distribution System and could operate at any time of day.

## S.4.4 Maintenance

Once the Projects are fully operational, PV Water staff would conduct routine inspections (e.g., for visual signs of wear and tear, obstructions or leakage) and perform scheduled maintenance of the facilities and pipelines. Should damage to facilities occur, PV Water would dispatch a crew to conduct the necessary repairs.

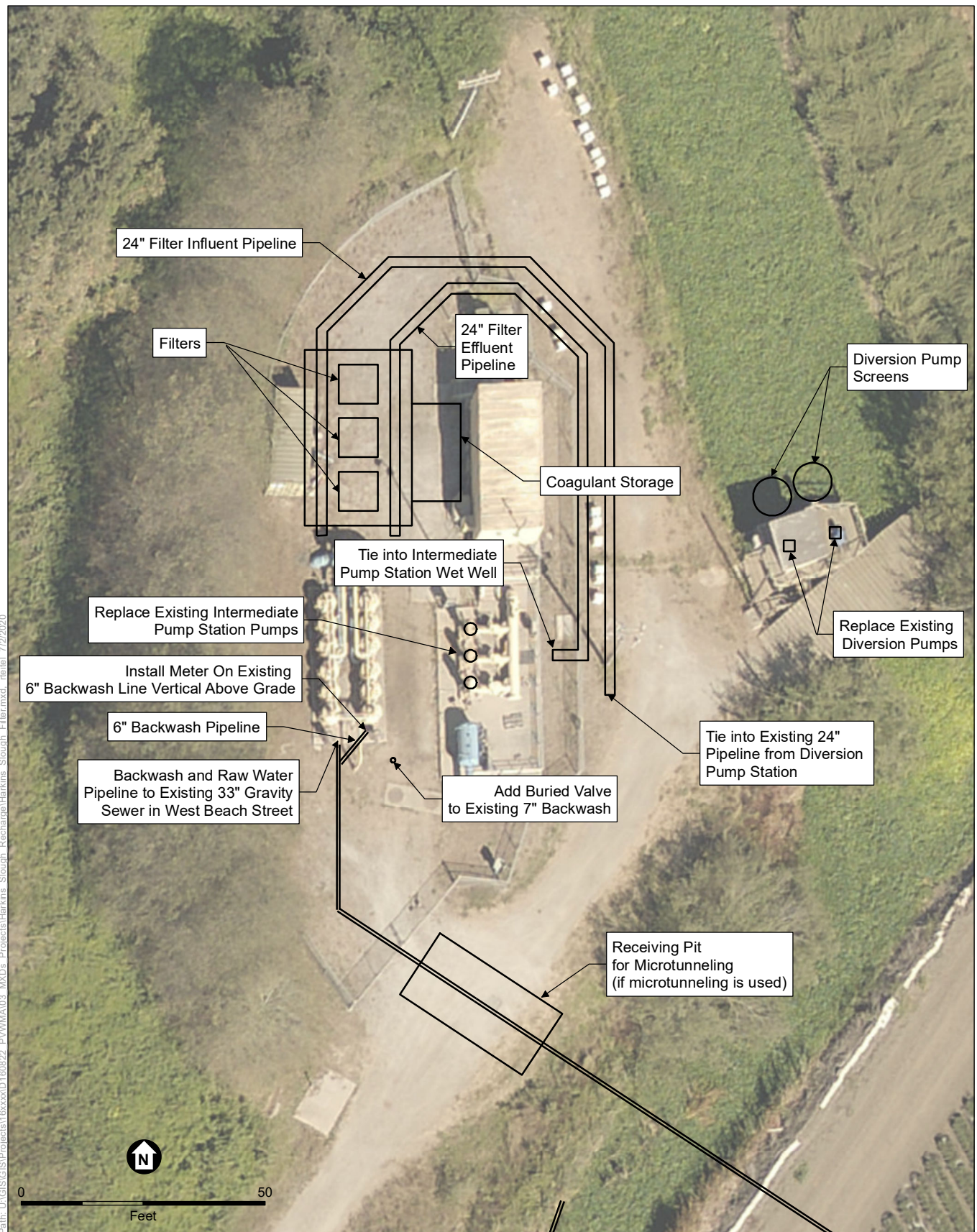


SOURCE: Carollo Engineers, 2019;  
ESRI World Imagery, 7/23/2016; ESA

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure S-1**  
Project Location Map



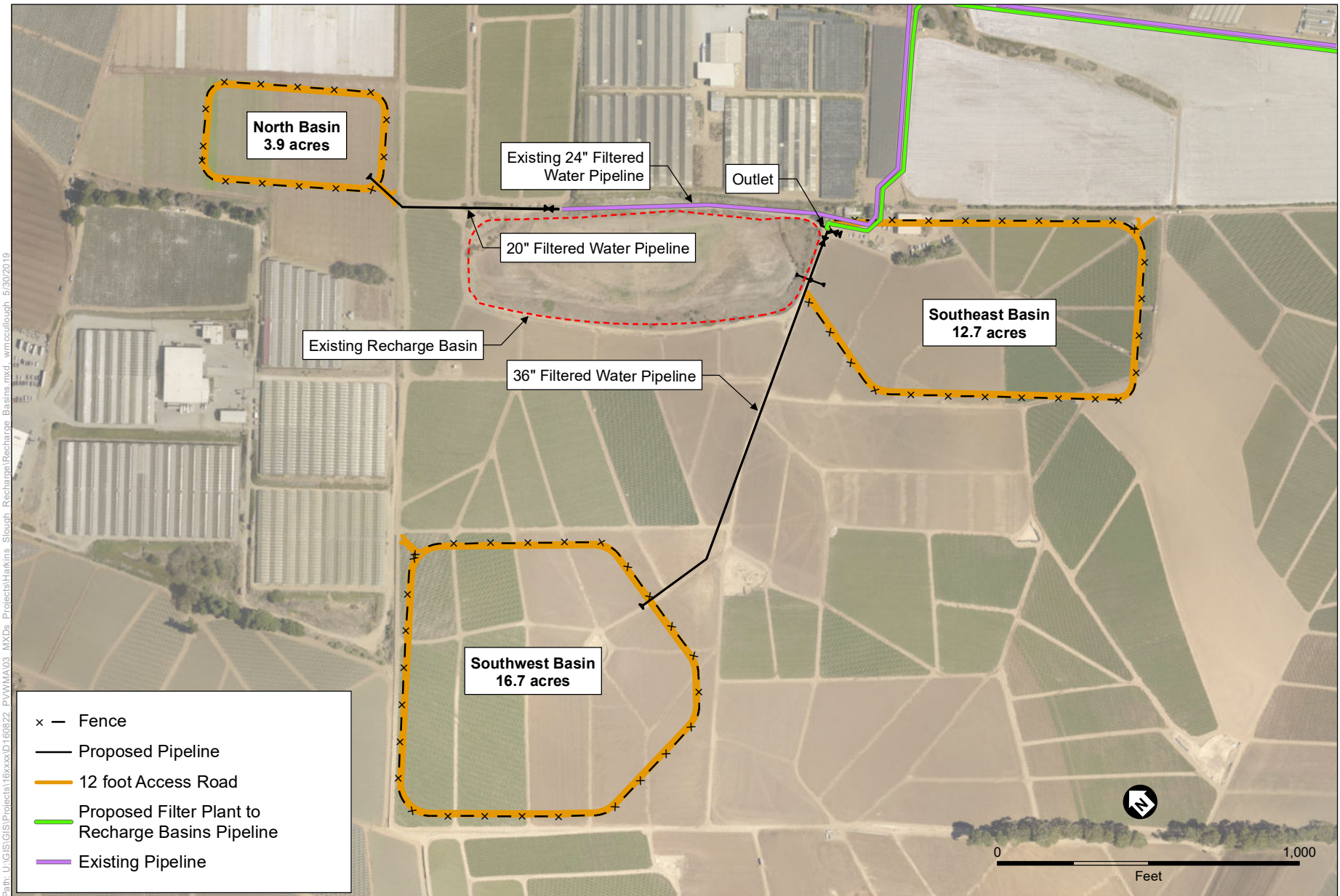


SOURCE: Carollo Engineers, 2019

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure S-2**  
Harkins Slough Filter Plant Site Plan





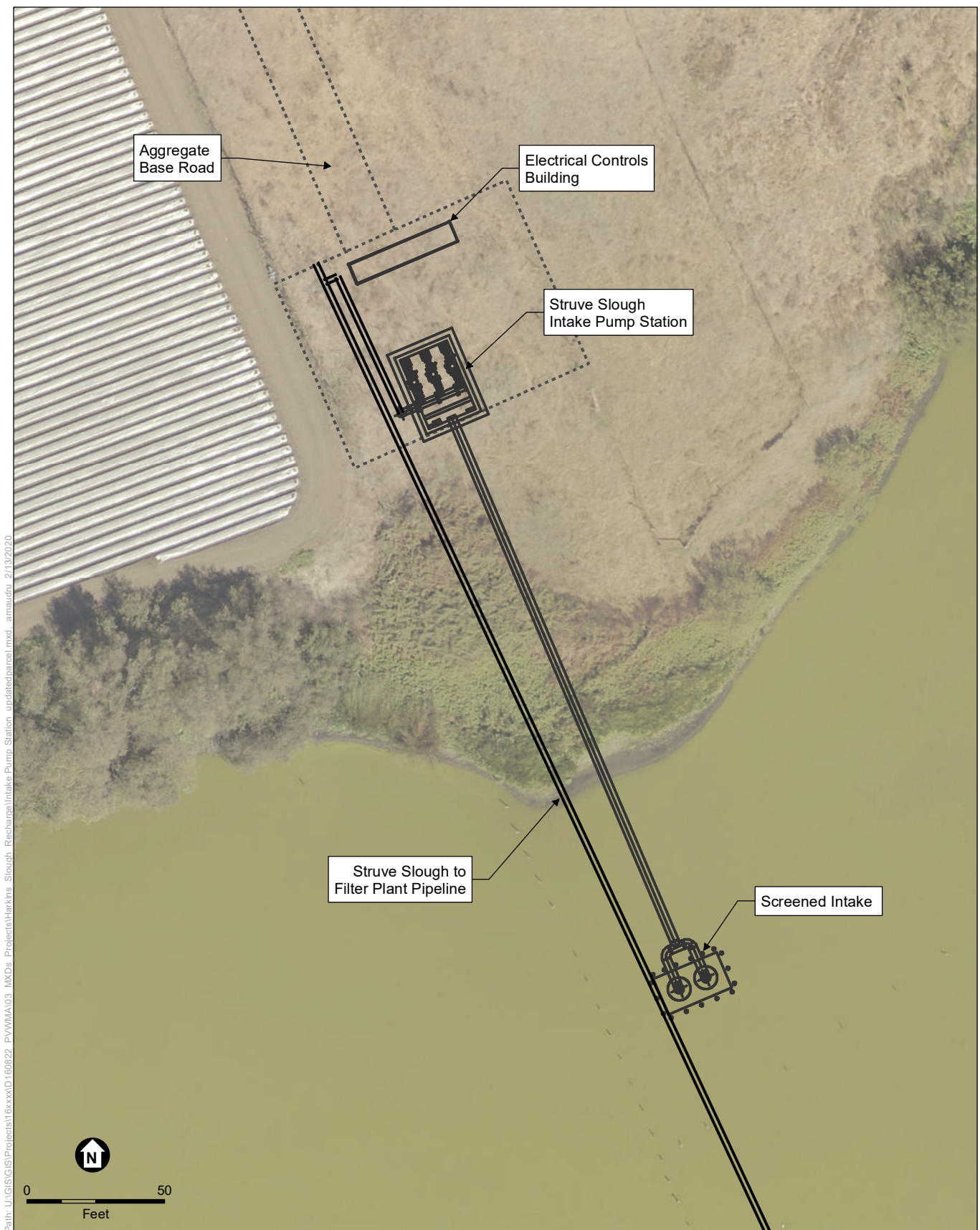
SOURCE: Carollo Engineers, 2019

Note:

1. Recovery wells would be located within 500 feet of each proposed recharge basin.
2. Not shown: connection from recovery wells to existing Coastal Distribution System pipelines.
3. A portion of the existing 24-inch filtered water pipeline located within the boundary of the proposed Southeast recharge basin would be relocated as needed.

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure S-3**  
Recharge Basins



SOURCE: Carollo Engineers, 2019

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure S-4**  
Struve Slough Screened Intake and Pump Station



## S.5 Summary of Project Impacts and Mitigation Measures

Chapter 3 of this EIR presents the environmental impacts analyses for several resource areas consistent with Appendix G of the CEQA *Guidelines*. For each resource area, the impact analysis describes the environmental and regulatory setting, identifies significance criteria used in the analysis, evaluates potential physical effects of the Projects on both a project and cumulative basis, and provides feasible mitigation measures that would reduce the severity of significant impacts.

**Table S-1** summarizes all impacts identified for the Projects in this EIR, lists the significance determination for each impact, and presents the full text of the mitigation measures identified to avoid, reduce, or otherwise lessen significant impacts. As shown in the table, although a majority of the impacts were determined to be less than significant or could be mitigated to less-than-significant levels, implementation of the Projects was determined to result in significant and unavoidable impacts in the areas of agricultural resources (conversion of Important Farmland).

## S.6 Alternatives to the Projects

Chapter 5 presents the CEQA alternatives analysis for the Projects. This chapter describes the methodology used to screen and select feasible alternatives that could avoid or substantially lessen the significant impacts identified for the Projects, while still meeting most of the Projects' objectives. The alternatives selected for evaluation in Chapter 5 include:

1. **No Project.** This alternative describes conditions that would generally be expected to occur without implementation of the Projects.
2. **Aquifer Storage and Recovery (ASR) Alternative.** This alternative involves the storage of water in an aquifer during times when water is available, and recovery of the stored water from the same aquifer when it is needed. Under the ASR Alternative, water diverted from the sloughs would be treated and injected into deep aquifers and then recovered using the same wells. This alternative would eliminate the need to develop recharge basins. The purpose of this alternative is to reduce the loss of Important Farmland associated with development of the recharge basins proposed for the Projects.
3. **Reduced Impacts to Cultural and Biological Resources Alternative.** This alternative would reduce potential impacts to cultural and biological resources by relocating the Struve Slough pump station to the south of Struve Slough, rerouting the Struve Slough to filter plant pipeline, and rerouting the filter plant to recharge basins pipeline.
4. **Struve Slough Pump Station on Land Trust Property Alternative.** This alternative involves moving the proposed Struve Slough pump station, intake, and associated pipelines (intake pipeline and Struve Slough to filter plant pipeline) from APN 052-081-38 to APN 052-081-37, which is owned by the Land Trust of Santa Cruz County (Land Trust or Santa Cruz Land Trust). All other components of the Struve Slough Project would remain the same under this alternative. Operations and maintenance activities for the Struve Slough Pump Station on Land Trust Property Alternative would be the same as the Struve Slough Project.

There are trade-offs, in terms of environmental impacts, between the Projects as proposed and the alternatives. Overall, this EIR concludes that a modified version of the ASR Alternative that incorporates the pipeline alignment in the vicinity of San Andreas and Dairy Roads associated with the Reduced Impacts to Cultural and Biological Resources Alternative is considered the environmentally superior alternative. While the ASR Alternative could feasibly meet most of the basic objectives of the Projects, the reasons that ASR was considered and rejected in the BMP Update and in prior basin management plans – cost and length of time to implement – remain valid concerns to PV Water. In addition, as discussed in Section 3.2, Land Use and Agriculture, while implementation of the Projects would result in the permanent conversion of Important Farmland, these impacts should be considered in the context of the Projects’ contribution to the long-term preservation of such farmland within the Pajaro Valley by substituting surface water for groundwater resources in Coastal areas of the Pajaro Valley. Refer to Chapter 5, *Alternatives*, for more information.

**TABLE S-1**  
**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

IMPACT	Significance Determination	Mitigation Measure*
<b>Land Use and Agricultural Resources, EIR Section 3.2</b>		
<p><b>Impact LU-1:</b> The Projects would convert Important Farmland to non-agricultural use and could involve changes in the existing environment, which, due to their location or nature, could result in conversion of Important Farmland to non-agricultural use.</p>	SUM	<p><b>Mitigation Measure LU-1a: Compensate for Conversion of Important Farmland</b></p> <p><i>Track Conversion of Important Farmland.</i> PV Water shall review California Department of Conservation's Farmland Mapping and Monitoring Program farmland designations for the recharge basins and associated recovery wells and monitoring wells annually beginning with the first year of construction and continuing for five years after construction of components located in Important Farmland is completed. PV Water shall identify Prime Farmland, Farmland of Statewide Importance, and Unique Farmland referred to herein as Important Farmland that is associated with the recharge basins and associated recovery wells and monitoring wells that converts due to implementation of the Projects.</p> <p><i>Establish Memorandum of Understanding for Agricultural Easement Fund.</i> PV Water shall enter into a Memorandum of Understanding with the Santa Cruz Land Trust or similar entity. The Memorandum of Understanding shall include details regarding an Agricultural Easement Fund to be paid by PV Water and the timing of acquisition of agricultural easements for the purpose of offsetting impacts on Important Farmland caused by the Projects. Acceptance of this fee by the Santa Cruz Land Trust or similar entity shall serve as an acknowledgment and commitment to: (1) secure agricultural easements to offset the conversion of Important Farmland caused by the Projects; and (2) provide documentation to PV Water describing the project(s) funded by the mitigation fee. If there is any remaining unspent portion of the Agricultural Easement Fund following implementation, PV Water shall be entitled to a refund in that amount. To qualify under this mitigation measure, the specific agricultural easement acquisition projects must preserve acreage of farmland of an equal or greater Farmland Mapping and Monitoring Program designation value (e.g., Prime Farmland, Farmland of Statewide Importance, or Unique Farmland) within the PV Water service area to offset the permanent conversion of Important Farmland by the Projects.</p> <p><i>Contribute to Agricultural Easement Fund.</i> PV Water shall initially designate funds to secure easements for up to the equivalent area of Important Farmland associated with development of the first recharge basin and associated recovery wells and monitoring wells.</p> <p><i>Directly Fund Agricultural Easements.</i> As an alternative approach to establishing a memorandum of understanding for, and contributing to an agricultural easement fund, PV Water could elect to directly fund the purchase of agricultural easements for Important Farmland in the Pajaro Valley.</p> <p><b>Mitigation Measure LU-1b: Replacement of Topsoil</b></p> <p>In agricultural areas, PV Water shall require contractors to stockpile topsoil at Project sites during Project grading and reapply it in situ after construction to promote vegetative growth. In agricultural areas temporarily disturbed by construction and where excavation occurs, the following measures shall apply:</p> <ul style="list-style-type: none"> <li>• Strip 18 inches of topsoil from the area excavated unless otherwise stipulated by landowner. The topsoil shall be stored separately from subsoil and other construction materials.</li> <li>• Clearly mark topsoil with signs, and store topsoil separately from other excavated and imported materials in such a manner that the topsoil is not damaged, mixed, or covered by subsoil or surface rocks, and so that it is not continually disturbed.</li> <li>• Stockpile topsoil on the same property from which it was stripped and return topsoil to same property from which it was stripped.</li> </ul>

\* Text that has been revised in adopted mitigation measures is indicated with underlining where text has been added, and ~~strike through~~ where text has been deleted.

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

<b>IMPACT</b>	<b>Significance Determination</b>	<b>Mitigation Measure*</b>
<b>Land Use and Agricultural Resources, EIR Section 3.2 (cont.)</b>		
<b>Impact LU-2:</b> The Projects could conflict with a Williamson Act contract, or conflict with an applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project adopted for the purpose of avoiding or mitigating an environmental effect.	LS	No mitigation required.
<b>Impact C-LU-1:</b> The Projects, in combination with past, present, and probable future projects in the Project area, would have a cumulatively considerable impact on the conversion of Important Farmland to non-agricultural use.	SUM	<b>Mitigation Measure LU-1a: Compensate for Conversion of Important Farmland</b> (refer to Impact LU-1) <b>Mitigation Measure LU-1b: Replacement of Topsoil</b> (refer to Impact LU-1)
<b>Surface Water, Groundwater, and Water Quality, EIR Section 3.3</b>		
<b>Impact HYD-1:</b> Project construction could violate water quality standards and/or waste discharge requirements, or otherwise substantially degrade surface or groundwater quality.	LSM	<b>Mitigation Measure BR-1a: Frac-out Contingency Plan</b> (refer to Impact BR-1)  <b>Mitigation Measure HYD-1: Implement Dewatering Best Management Practices for In-Water Construction</b> For in-water construction during pipeline and screen/intake installation activities in the sloughs, PV Water shall require its contractor(s) to prepare a Dewatering Plan. The Dewatering Plan shall identify best management practices that ensure construction activities at Harkins, Watsonville, and Struve sloughs meet water quality objectives. This work shall be timed to take place only after any instream measures to reduce downstream turbidity are in place. In addition, PV Water shall require its contractors to implement the measures below, and water quality protection measures required by the RWQCB. <ol style="list-style-type: none"> <li>1. All dewatering and diversion methods shall be installed such that natural flow is maintained upstream and downstream of the Project area and that water released into the sloughs does not increase turbidity in the sloughs such that beneficial uses are adversely affected, as determined by conditions stipulated in permits issued by the RWQCB and CDFW.</li> <li>2. Any temporary dams or diversion shall be installed such that the diversion does not cause sedimentation, siltation, or erosion upstream or downstream of the Project area.</li> <li>3. Screened pumps shall be used in accordance with the California Department of Fish and Wildlife's fish screening criteria and in accordance with the NMFS Fish Screening Criteria for Anadromous Salmonids and the Addendum for Juvenile Fish Screen Criteria for Pump Intakes.</li> <li>4. Cofferdams shall remain in place and functional throughout the in-slough construction.</li> <li>5. Disturbance of protected riparian vegetation shall be limited or avoided entirely</li> </ol>

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<b>IMPACT</b>	<b>Significance Determination</b>	<b>Mitigation Measure*</b>
<b>Surface Water, Groundwater, and Water Quality, EIR Section 3.3 (cont.)</b>		
<b>Impact HYD-2:</b> Project operations could adversely affect surface water quality.	LS	No mitigation required.
<b>Impact HYD-3:</b> The Projects could cause localized temporary or seasonal changes in shallow groundwater levels, but would not degrade groundwater quality or decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.	LS	No mitigation required.
<b>Impact HYD-4:</b> The Projects would alter drainage patterns and may change erosion and sedimentation patterns in the sloughs system.	LS	No mitigation required.
<b>Impact HYD-5:</b> The Projects would not impede or redirect flood flows such that new flooding would result.	LS	No mitigation required.
<b>Impact HYD-6:</b> The Projects could conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.	LSM	<b>Mitigation Measure BR-1a: Frac-out Contingency Plan</b> (refer to Impact BR-1) <b>Mitigation Measure HYD-1: Implement Dewatering Best Management Practices for In-Water Construction</b> (refer to Impact HYD-1)
<b>Impact C-HYD-1:</b> The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative hydrology impacts.	LS	No mitigation required.
<b>Impact C-HYD-2:</b> The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative water quality impacts.	LS	No mitigation required.

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**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

IMPACT	Significance Determination	Mitigation Measure*
<b>Biological Resources, EIR Section 3.4</b>		
<b>Impact BR-1:</b> Construction of Project components could result in a substantial adverse effect on special-status species.	LSM	<p><b>Mitigation Measure BR-1a: Frac-out Contingency Plan.</b></p> <p>If HDD installation is implemented, PV Water shall require the contractor to retain a licensed geotechnical engineer to develop a Frac-out Contingency Plan. PV Water would submit the Frac-out Contingency Plan to the appropriate resource agencies (CDFW and RWQCB) for review prior to the start of construction of any pipeline that would use HDD installation to avoid surface waters. The Frac-out Contingency Plan shall be implemented where HDD installation under a waterway will occur to avoid, minimize, or mitigate for potential Project impacts during HDD installation, as specified in the Frac-out Contingency Plan. The Frac-out Contingency Plan shall include, at a minimum:</p> <ol style="list-style-type: none"> <li>1) Measures describing training of construction personnel about monitoring procedures, equipment, materials and procedures in place for the prevention, containment, clean-up (such as creating a containment area and using a pump, using a vacuum truck, etc.), and disposal of released bentonite slurry, and agency notification protocols;</li> <li>2) Methods for preventing frac-out including maintaining pressure in the borehole to avoid exceeding the strength of the overlying soil.</li> <li>3) Methods for detecting an accidental release of bentonite slurry that include: (a) monitoring by a minimum of one designated monitor throughout drilling operations to ensure swift response if a frac-out occurs; (b) continuous monitoring of drilling pressures to ensure they do not exceed those needed to penetrate the formation; (c) continuous monitoring of slurry returns at the exit and entry pits to determine if slurry circulation has been lost; and (d) continuous monitoring by spotters to follow the progress of the drill bit during the pilot hole operation, and reaming and pull back operations.</li> <li>4) Protocols that the contractor would follow if there is a loss of circulation or other indicator of a release of slurry.</li> <li>5) Cleanup and disposal procedures and equipment the contractor would use if a frac-out occurs.</li> <li>6) If a frac-out occurs, the contractor shall immediately halt work, implement the measures outlined in Item 5 of the Frac-out Contingency Plan to contain, clean-up, and dispose of the bentonite slurry, and, if the frac-out occurs in the water channel, notify and consult with the staffs of the agencies listed above before HDD activities can begin again.</li> </ol> <p>PV Water shall require the contractor to implement Frac-out Contingency Plan to ensure that measures are implemented to prevent frac-out and if a frac-out occurs, implement measures to contain, clean-up, and dispose of the bentonite slurry.</p> <p><b>Mitigation Measure BR-1b: Compensate for Temporary and Permanent Impacts to CRF Critical Habitat.</b></p> <p>Where temporary impacts to vegetation in CRF critical habitat occur, revegetation measures will include the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met. Temporarily impacted areas will be restored to pre-construction conditions with equivalent or greater habitat quality. Revegetation will include a 3:1 replacement ratio of the acreage of CRF wetland habitat lost as a result of the Project to account for the reduced habitat values of smaller trees compared with mature vegetation (or an equivalent habitat replacement strategy as agreed upon by PV Water and regulatory agencies). Success criteria for replanting will be less than 20 percent mortality of individual species annually for 5 years. Replanting will be conducted each year that plantings exceed 20 percent mortality, such that 80 percent plant survival is maintained each year of the 5-year monitoring period. Cover provided by invasive, non-native plant species shall not exceed 5 percent during each year of the 5-year monitoring period. If natural recovery is a viable strategy, then a wetland plant cover exceeding 50 percent should be attained after two growing seasons.</p>

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**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

IMPACT	Significance Determination	Mitigation Measure*
<b>Biological Resources, EIR Section 3.4 (cont.)</b>		
<b>Impact BR-1 (cont.)</b>		<p>Where permanent impacts to CRF habitat occur, mitigation may occur via restoration, creation, or preservation of wetlands that support CRF breeding. Mitigation will occur at a 3:1 ratio (or an equivalent habitat replacement strategy as agreed upon by PV Water and regulatory agencies) at a site acceptable to permitting agencies and pursuant to Project permit requirements. If the compensatory mitigation includes restoration, enhancement, or creation of wetlands, a qualified biologist will monitor the designated wetland mitigation area for a minimum of five years to ascertain if the wetland mitigation is successful. Annual reports will be submitted to permitting agencies by December 31 of each monitoring year, describing the results of the monitoring and any remedial actions needed to achieve a minimum 3:1 habitat replacement ratio or equivalent for permanent impacts to wetlands and other waters.</p> <p><b>Mitigation Measure BR-1c: Avoid and Minimize Impacts on Special-status Bat Species.</b></p> <p>A qualified biologist who is experienced with bat surveying techniques, behavior, roosting habitat, and identification of local bat species shall be consulted prior to initiation of construction activities to conduct a preconstruction habitat assessment to characterize potential bat habitat and identify active roost sites. The preconstruction habitat assessment shall be conducted within 100 feet of construction activities conducted in and around riparian habitat.</p> <p>Should potential roosting habitat or potentially active bat roosts be identified during the habitat assessment in trees and/or structures to be disturbed under the Project, the following measures shall be implemented:</p> <ol style="list-style-type: none"> <li>1. Removal or disturbance of trees or structures (e.g. the existing weir and intake pump station) identified as potential bat roosting habitat or active roosts shall occur when bats are active, approximately between the periods of March 1 to April 15 and August 15 to October 15, to the extent feasible. These dates avoid bat maternity roosting season (approximately April 15 to August 31) and periods of winter torpor (approximately October 15 to February 28).</li> <li>2. If removal or disturbance of trees and structures identified as potential bat roosting habitat or active roosts during the periods when bats are active is not feasible, a qualified biologist would conduct pre-construction surveys within 14 days prior to disturbance to further evaluate bat activity within the potential habitat or roost site.             <ol style="list-style-type: none"> <li>a. If active bat roosts are not identified in potential habitat during preconstruction surveys, no further action is required prior to removal of- or disturbance to trees and structures within the preconstruction survey area.</li> <li>b. If active bat roosts or evidence of roosting is identified during pre-construction surveys, the qualified biologist shall determine, if possible, the type of roost and species.                 <ol style="list-style-type: none"> <li>i. If special-status bat species or maternity or hibernation roosts are detected during these surveys, appropriate species- and roost-specific avoidance and protection measures shall be developed by the qualified biologist in coordination with CDFW. Such measures may include postponing the removal of structures or trees, or establishing exclusionary work buffers while the roost is active. A minimum 100-foot no disturbance buffer shall be established around special-status species, maternity, or hibernation roosts until the qualified biologist determines they are no longer active. The size of the no-disturbance buffer may be adjusted by the qualified biologist, in coordination with CDFW, depending on the species present, roost type, existing screening around the roost site (such as dense vegetation or a building), as well as the type of construction activity that would occur around the roost site, and if construction would not alter the behavior of the adult or young in a way that would cause injury or death to those individuals.</li> </ol> </li> </ol> </li> </ol> <p>Under no circumstances shall active maternity roosts be disturbed until the roost disbands at the completion of the maternity roosting season or otherwise becomes inactive, as determined by the qualified biologist.</p>

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**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

IMPACT	Significance Determination	Mitigation Measure*
<b>Biological Resources, EIR Section 3.4 (cont.)</b>		
<b>Impact BR-1 (cont.)</b>		<p>ii. If a non-maternity or hibernation roost (e.g., bachelor daytime roost) is identified, disturbance to- or removal of trees or structures may occur under the supervision of a qualified biologist as described under measure 3).</p> <p>3. The qualified biologist shall be present during tree and structure disturbance or removal if active non-maternity or hibernation bat roosts or potential roosting habitat are present. Trees and structures with active non-maternity or hibernation roosts or potential habitat shall be disturbed or removed only under clear weather conditions when precipitation is not forecast for three days and when nighttime temperatures are at least 50 degrees Fahrenheit, and when wind speeds are less than 15 mph.</p> <p>a. Trimming or removal of trees with active (non-maternity or hibernation) or potentially active roost sites shall follow a two-step removal process:</p> <p>i. On the first day of tree removal and under supervision of the qualified biologist, branches and limbs not containing cavities or fissures in which bats could roost, shall be cut only using hand tools (e.g., chainsaws).</p> <p>ii. On the following day and under the supervision of the qualified biologist, the remainder of the tree may be removed, either using hand tools or other equipment (e.g. excavator or backhoe).</p> <p>iii. All felled trees shall remain on the ground for at least 24 hours prior to chipping, off-site removal, or other processing to allow any bats to escape, or be inspected once felled by the qualified biologist to ensure no bats remain within the tree and/or branches.</p> <p>b. Disturbance to or removal of structures containing or suspected to contain active bat (non-maternity or hibernation) or potentially active bat roosts shall be done in the evening and after bats have emerged from the roost to forage. Structures shall be partially dismantled to significantly change the roost conditions, causing bats to abandon and not return to the roost. Removal would be completed the subsequent day.</p> <p>4. Bat roosts that begin during construction are presumed to be unaffected as long as a similar type of construction continues, and no buffer would be necessary. Direct impacts on bat roosts or take of individual bats would be avoided.</p> <p><b>Mitigation Measure AES-1: Construction Lighting</b> (refer to Impact AES-3).</p>
<b>Impact BR-2:</b> Construction of Project components would result in a substantial adverse effect on riparian habitat or other sensitive natural community or on state or federally protected wetlands or waters through direct removal, filling, hydrological interruption, or other means.	LSM	<p><b>Mitigation Measure BIO-1c (Revised):</b></p> <p><u>During design, PV Water will realign the Struve Slough to filter plant pipeline to avoid the willow riparian forest at location SW1. Where construction impacts on mixed riparian or willow riparian forest will otherwise occur, revegetation and restoration measures will be developed as part of a revegetation plan approved by CDFW, RWQCB, and if applicable, USACE, Santa Cruz County, and/or California Coastal Commission, pursuant to regulatory agency permitting. The revegetation plan will include specific plans for the revegetation and restoration of impacted willow riparian forest, and for restoration of nearby creek riparian habitat, as appropriate. No trees will be placed above pipelines. Upon approval by Santa Cruz County and other applicable agencies, PV Water the PVWMA may choose to coordinate with the Natural Resources Conservation Service (NRCS) and the Santa Cruz County Resource Conservation District (RCD) to develop and implement the required riparian revegetation, including providing funds to the RCD for their implementation of the revegetation. Revegetation measures will include the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met. Temporarily impacted areas will be restored to pre-construction conditions with equivalent or greater habitat quality. Revegetation will include a 3:1 replacement ratio of the acreage of willow riparian forest habitat lost and for all trees lost as result of the Project to account for the</u></p>

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**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

IMPACT	Significance Determination	Mitigation Measure*
<b>Biological Resources, EIR Section 3.4 (cont.)</b>		
<b>Impact BR-2 (cont.)</b>		<p>reduced habitat values of smaller trees compared with mature vegetation. Success criteria for replanting will be less than 20 percent mortality of individual species <u>annually yearly</u> for 5 years. Replanting will be conducted each year that plantings exceed 20 <u>percent-%</u> mortality, such that 80 <u>percent-%</u> plant survival is maintained each year of the 5-year monitoring period. Cover provided by invasive, non-native plant species shall not exceed 5 <u>percent-%</u> during each year of the 5-year monitoring period. <u>Mitigation may occur via restoration, creation, or preservation of wetlands or waters. Mitigation will occur at a site acceptable to permitting agencies and pursuant to the Project's permit requirements. If the compensatory mitigation includes restoration, enhancement, or creation of wetlands or waters, a qualified biologist will monitor the designated wetland mitigation area for a minimum of five years to ascertain if the wetland mitigation is successful. Annual reports will be submitted to permitting agencies by December 31 of each monitoring year, describing the results of the monitoring and any remedial actions needed to achieve a minimum 3:1 habitat replacement ratio or equivalent for permanent impacts on willow riparian forest.</u></p> <p><b>Mitigation Measure BIO-1d (Revised):</b></p> <p>Where <u>construction or operational impacts to open water (creeks, streamssloughs, jurisdictional ditches), agricultural wetlands, or coastal freshwater marsh occurs</u>, revegetation <u>and restoration</u> measures will be developed as part of a revegetation plan approved by CDFW, RWQCB, USACE, <u>Santa Cruz County</u>, and/or California Coastal Commission, pursuant to regulatory agency permitting. Upon approval by <u>Santa Cruz County and other applicable agencies</u>, <u>PV Water the PVWMA</u> may choose to coordinate with the Natural Resources Conservation Service (NRCS) and the Santa Cruz County <u>Resource Conservation District (RCD)</u> to develop and implement the required wetland revegetation <u>and restoration</u>, including providing funds to the RCD for their implementation of the revegetation <u>and restoration</u>. The revegetation plan will include specific plans for the revegetation of impacted <u>coastal-marsh wetlands</u>, and for restoration of nearby wetland habitat, as appropriate. Revegetation measures will include the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met. <u>Temporarily impacted areas will be restored to pre-construction conditions with equivalent or greater habitat quality.</u> Revegetation will include a 3:1 replacement ratio (or an equivalent habitat replacement strategy as agreed upon by <u>PV Water PVWMA</u> and regulatory agencies) for impacted wetlands. If natural recovery is a viable strategy, then a wetland plant cover exceeding 50 <u>percent-%</u> should be attained after two growing seasons. Mitigation may occur via restoration, creation, or preservation of wetlands <u>or waters</u>. Mitigation will occur at a site acceptable to permitting agencies and pursuant to <u>the Project's</u> permit requirements. If the compensatory mitigation includes restoration, enhancement, or creation of wetlands <u>or waters</u>, a qualified biologist will monitor the designated wetland mitigation area for a minimum of five years to ascertain if the wetland mitigation is successful. Annual reports will be submitted to permitting agencies by December 31 of each monitoring year, describing the results of the monitoring and any remedial actions needed to achieve a minimum 3:1 habitat replacement ratio or equivalent for permanent impacts <u>to wetlands and other waters</u></p> <p><b>Mitigation Measure BR-1a: Frac-out Contingency Plan</b> (refer to Impact BR-1)</p>
<b>Impact BR-3:</b> Construction of Project components could interfere substantially with the movement of any native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.	LS	No mitigation required.

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

<b>IMPACT</b>	<b>Significance Determination</b>	<b>Mitigation Measure*</b>
<b>Biological Resources, EIR Section 3.4 (cont.)</b>		
<b>Impact BR-4:</b> Project operations could result in a substantial adverse effect on riparian habitat or other sensitive natural community or on state or federally protected wetlands or waters through direct removal, filling, hydrological interruption, or other means.	LSM	<b>Mitigation Measure BIO-1d (Revised)</b> (refer to Impact BR-2)
<b>Impact BR-5:</b> Project operations could result in a substantial adverse effect on terrestrial special-status species.	LSM	<b>Mitigation Measure BR-1b: Compensate for Temporary and Permanent Impacts to CRF Critical Habitat.</b> (refer to Impact BR-1)
<b>Impact BR-6:</b> Project operations could result in a substantial adverse effect on special-status fish species.	LS	No mitigation required.
<b>Impact BR-7:</b> Project operations could interfere substantially with the movement of native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.	LS	No mitigation required.
<b>Impact BR-8:</b> Implementation of the Project could conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	LS	No mitigation required.
<b>C-BR-1:</b> The Projects, in combination with past, present, and probable future projects in the Project area, could result in significant adverse impacts on special-status species, sensitive natural communities and wetlands, wildlife corridors or nursery sites, or conflicts with local plans and policies.	LSM	<b>Mitigation Measure BR-1a: Frac-out Contingency Plan and Mitigation Measure BR-1b: Compensate for Temporary and Permanent Impacts to CRF Critical Habitat</b> (Refer to Impact BR-1)  <b>Mitigation Measure AES-1: Construction Lighting</b> (refer to Section 3.13, Aesthetics)
<b>Air Quality and Greenhouse Gases, EIR Section 3.5</b>		
<b>Impact AIR-1:</b> Construction and operational activities associated with the Projects could generate criteria air pollutant emissions that would conflict with implementation of the Clean Air Plan.	LS	No mitigation required.

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**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

IMPACT	Significance Determination	Mitigation Measure*
<b>Air Quality and Greenhouse Gases, EIR Section 3.5 (cont.)</b>		
<b>Impact AIR-2:</b> The Projects could expose sensitive receptors to substantial levels of pollutants.	LS	No mitigation required.
<b>Impact AIR-3:</b> The Projects could create objectionable odors that would affect a substantial number of people.	LS	No mitigation required.
<b>Impact AIR-4:</b> The Projects could lead to an increase of GHG emissions that are associated with global climate change; however, not at a cumulatively considerable level.	LS	No mitigation required.
<b>Impact AIR-5:</b> The Projects would not conflict with the Executive Order B-30-15 Emissions Reduction Goal.	LS	No mitigation required.
<b>Impact C-AIR-1:</b> The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative air quality or greenhouse gas impacts.	LS	No mitigation required.
<b>Geology and Soils, EIR Section 3.6</b>		
<b>Impact GEO-1:</b> The Projects could directly or indirectly cause potential substantial adverse effects, including risk of loss, injury, or death involving an exacerbation of existing risks related to earthquake rupture, strong seismic ground shaking, seismic related ground failure including liquefaction, and landslides.	LS	<p><b>Mitigation Measure GS-1 (Revised).</b></p> <p>Future construction of proposed BMP Update facilities shall be designed in accordance with design recommendations of geotechnical reports and in compliance with applicable policies and appropriate engineering investigation practices necessary to reduce the potential detrimental effects of ground shaking and liquefaction. Construction shall be in accordance with applicable <u>requirements</u> <del>City and County ordinances and policies</del> regarding mitigation of seismic and geologic hazards, and appropriate geotechnical studies shall be conducted.</p> <p><b>Mitigation Measure GS-3 (Revised).</b></p> <p>All diversion and pipeline facilities shall be designed and engineered in accordance with recommendations of a geotechnical report and appropriate engineering designs to reduce the potential detrimental effects of expansive soils, corrosivity, and/or other identified soils constraints. A licensed geotechnical engineer shall prepare recommendations applicable to foundation design, earthwork, and site preparation prior to or during the project design phase. Recommendations will address mitigation of site- specific, adverse soil and bedrock conditions that could hinder development. Project engineers shall implement the recommendations. Geotechnical design and design criteria will comply with applicable codes and requirements of the California Building Code <del>with California additions</del> (CCR Title 24), <del>applicable City and County construction and grading ordinances.</del></p>

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**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

<b>IMPACT</b>	<b>Significance Determination</b>	<b>Mitigation Measure*</b>
<b>Geology and Soils, EIR Section 3.6 (cont.)</b>		
<b>Impact GEO-2:</b> The Projects could result in substantial soil erosion.	LS	<b>Mitigation Measure GS-2 (Revised).</b> Construction of future BMP Update facilities shall include preparation and implementation of erosion control plans to minimize erosion and inadvertent transport of sediments into water bodies during installation of facilities. Measures shall include, but not be limited to: limiting the area of ground disturbance and vegetation removal at any one time during construction; conducting work prior to the rainy season if possible and protecting disturbed areas during the rainy season; installing bales or other appropriate barriers adjacent to water bodies to prevent transport of sediments into sloughs and water courses; immediately revegetating disturbed areas; and other Best Management Practices during construction to protect water quality. All grading and construction shall conform to <u>applicable</u> requirements. <del>of the Santa Cruz County Grading Ordinance. To the extent possible, grading activities in non-cropped areas shall be limited to the period between April 15 and October 31.</del>
<b>Impact GEO-3:</b> The Projects could be located on a geologic unit or soil that becomes unstable as a result of the Projects or that could potentially result in landslide, lateral spreading, subsidence, liquefaction, or collapse for reasons caused or exacerbated by the Projects.	LS	<b>Mitigation Measure GS-3 (Revised)</b> (refer to Impact GEO-1)
<b>Impact GEO-4:</b> The Projects could be located on expansive soil, creating or exacerbating substantial risks to life and property.	LS	<b>Mitigation Measure GS-3 (Revised)</b> (refer to Impact GEO-1)
<b>Impact GEO-5:</b> The Projects could directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.	LSM	<b>Mitigation Measure GEO-1: Paleontological Resources Monitoring and Mitigation Program.</b> The Projects proponent shall retain a Qualified Paleontologist meeting the standards of the SVP (2010) to develop and implement a Paleontological Resources Monitoring and Mitigation Plan (PRMMP) for the Projects. The PRMMP shall include a Worker Environmental Awareness Program (WEAP) for all construction crew members involved in ground disturbing activities for the Project. The PRMMP shall include a description of when and where construction monitoring would be required; emergency discovery procedures; sampling and data recovery procedures; procedure for the preparation, identification, analysis, and curation of fossil specimens and data recovered; pre-construction coordination procedures; and procedures for reporting the results of the monitoring program. The PRMMP shall be consistent with the Society for Vertebrate Paleontology (SVP) Standard Guidelines for the mitigation of construction-related adverse impacts on paleontological resources and the requirements of the designated repository for any fossils collected. <ul style="list-style-type: none"> <li>• Full-time, part time, and/or spot check monitoring for paleontological resources, as applicable, pursuant to the PRMMP, shall be conducted for ground disturbing activities occurring in previously undisturbed Pleistocene deposits, as well as excavations that exceed 10 feet in Holocene-age deposits.</li> <li>• In the event that paleontological resources are encountered during ground disturbance, all activity in the vicinity of the find shall cease (within 50 feet), and the protocols and procedures outlined in the PRMMP shall be implemented.</li> </ul>

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**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

<b>IMPACT</b>	<b>Significance Determination</b>	<b>Mitigation Measure*</b>
<b>Geology and Soils, EIR Section 3.6 (cont.)</b>		
<b>Impact C-GEO-1:</b> The Projects, in combination with past, present, and probable future projects in the Project area, could have cumulatively considerable impacts on a unique paleontological resource.	LSM	<b>Mitigation Measure GS-2 (Revised)</b> (refer to Impact GEO-2) <b>Mitigation Measure GEO-1: Paleontological Resources Monitoring and Mitigation Program.</b> (refer to Impact GEO-5)
<b>Hazards and Hazardous Materials, EIR Section 3.7</b>		
<b>Impact HAZ-1:</b> Project construction and operation could result in a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	LS	No mitigation required.
<b>Impact HAZ-2:</b> Project construction and operation could result in reasonably foreseeable conditions involving the release of hazardous materials to the environment.	LSM	<b>Mitigation Measure HAZ-1a: Health and Safety Plan (HASP)</b> Prior to demolition of any existing structures, PV Water shall require that structures to be demolished be surveyed to determine if hazardous materials are present. Using information from the survey and the soil testing performed as part of adopted Mitigation Measure HM-1, PV Water shall require the construction contractor(s) to prepare and implement a site-specific HASP in accordance with 29 Code of Federal Regulations 1910.12 0 to protect construction workers and the public during all excavation, grading, and demolition activities. The HASP shall include, but is not limited to, the following elements: <ol style="list-style-type: none"> <li>1. Designation of a trained, experienced site safety and health supervisor who has the responsibility and authority to develop and implement the site HASP;</li> <li>2. A summary of all potential risks to construction workers and maximum exposure limits for all known and reasonably foreseeable site chemicals based on the most recent data collection and reporting;</li> <li>3. Specified personal protective equipment and decontamination procedures, if needed;</li> <li>4. Emergency procedures, including route to the nearest hospital; and</li> <li>5. Procedures to be followed in the event that evidence of potential soil or groundwater contamination (such as soil staining, noxious odors, debris or buried storage containers) is encountered.</li> </ol> These procedures shall be in accordance with hazardous waste operations regulations and will specifically include, but are not limited to, the following: immediately stopping work in the vicinity of unknown discovered or suspected hazardous materials release and notifying the Santa Cruz County CUPA (415-473-7085).
<b>Impact HAZ-3:</b> Project construction and operation could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	LSM	<b>Mitigation Measure TRA-1b: Construction Traffic Control/Traffic Management Plan</b> (Refer to Impact TRA-1)

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**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

<b>IMPACT</b>	<b>Significance Determination</b>	<b>Mitigation Measure*</b>
<b>Hazards and Hazardous Materials, EIR Section 3.7 (cont.)</b>		
<b>Impact C-HAZ-1:</b> The Projects, in combination with past, present, and probable future projects in the Project area, could result in significant adverse cumulative hazards and hazardous materials impacts.	LS	No mitigation required.
<b>Noise and Vibration, EIR Section 3.8</b>		
<b>Impact NOI-1:</b> Construction of the Projects would result in a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plans or noise ordinances.	LSM	<p><b>Mitigation Measure NOI-1a: Construction Noise Reduction Plan</b></p> <p>PV Water shall develop and implement a Construction Noise Reduction Plan prior to initiating construction activities. A disturbance coordinator shall be designated for the Project to implement the provisions of the plan. At a minimum, the Construction Noise Reduction Plan shall implement the following measures:</p> <ul style="list-style-type: none"> <li>• Distribute to the potentially affected residences and other sensitive receptors within 200 feet of the Project construction site boundaries notice including a "hotline" telephone number, which shall be attended during active construction working hours, for use by the public to register complaints. The notice shall identify the noise disturbance coordinator who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator would determine the reason for the noise complaints and institute actions warranted to correct the problem, if any. All complaints shall be logged noting date, time, complainant's name, nature of complaint, and any corrective action taken. The notice shall also include the construction schedule.</li> <li>• Equipment and trucks used for construction activities shall utilize the best available noise control techniques (including mufflers, use of intake silencers, ducts, engine enclosures and acoustically attenuating shields or shrouds) in order to minimize construction noise impacts.</li> <li>• Impact equipment (e.g., jack hammers, pavement breakers, and rock drills) used for construction activities shall be hydraulically- or electrically-powered whenever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatically powered tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used where feasible, and this could achieve a reduction of 5 dBA. Quieter procedures shall be used (such as drilling rather than impact equipment) whenever feasible.</li> <li>• Maintain maximum physical separation, as far as practicable, between noise sources (construction equipment) and sensitive noise receptors. Separation may be achieved by locating stationary equipment (such as generators) in areas that would minimize noise impacts on the community. If they must be located near existing receptors, they shall be adequately muffled.</li> <li>• When construction activities take place within 50 feet of receptors, use construction noise barriers such as paneled noise shields, blankets, and/or enclosures adjacent to noisy stationary and off-road equipment. Noise control shields, blankets and/or enclosures shall be made featuring a solid panel and a weather-protected, sound-absorptive material on the construction-activity side of the noise shield.</li> </ul> <p><b>Mitigation Measure NOI-1b: Location of Recovery and Monitoring Wells</b></p> <p>PV Water shall locate recovery and monitoring wells at a distance of at least 200 feet from existing residences to avoid noise impacts to the residences. If this is found to be not feasible, PV Water shall implement Mitigation Measure NOI-1c for residences located less than 200 feet from well sites where 24-hour construction is required.</p>

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**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

<b>IMPACT</b>	<b>Significance Determination</b>	<b>Mitigation Measure*</b>
<b>Noise and Vibration, EIR Section 3.8 (cont.)</b>		
<b>Impact NOI-1 (cont.)</b>		<b>Mitigation Measure NOI-1c: Off-site Accommodations for Substantially Affected Nighttime Receptors</b> To reduce nighttime impacts to receptors, PV Water shall offer to provide temporary hotel accommodations for all residents within 200 feet of where recovery well drilling (if Mitigation Measure NOI-1b is not feasible) and trenchless pipeline construction activities would occur. The accommodations shall be provided for the duration of nighttime drilling activities. PV Water shall provide accommodations reasonably similar to those of the impacted residents (e.g., in terms of number of beds).
<b>Impact NOI-2:</b> Operation of the Projects could result in a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance.	LSM	<b>Mitigation Measure NOI-2: Acoustical Enclosures for Stationary Equipment</b> Enclose all blowers, if installed, within acoustical enclosures to reduce noise impacts to nearby uses. Enclosures shall be rated for a noise reduction sufficient to ensure that the attenuated noise level at nearby receptors would be below the County standards of 45 dBA.
<b>Impact NOI-3:</b> Project construction would generate excessive ground borne vibration.	LS	No mitigation required.
<b>Impact C-NOI-1:</b> The Projects, in combination with past, present, and probable future projects in the site vicinity, would have a cumulatively considerable impact associated with construction noise.	LSM	<b>Mitigation Measure NOI-1a: Construction Noise Management Plan</b> (refer to Impact NOI-1) <b>Mitigation Measure NOI-1b: Location of Recovery and Monitoring Wells</b> (refer to Impact NOI-1) <b>Mitigation Measure NOI-1c: Off-site Accommodations for Substantially affected Nighttime receptors</b> (refer to Impact NOI-1) <b>Mitigation Measure NOI-2: Acoustical Enclosures for Stationary Equipment</b> (refer to Impact NOI-2)
<b>Transportation and Traffic, EIR Section 3.9</b>		
<b>Impact TRA-1:</b> Construction of the Projects would have temporary and intermittent effects on traffic and transportation conditions in the Project area.	LSM	<b>Mitigation Measure TRA-1a: Encroachment Permits</b> PV Water shall require the construction contractor to obtain any necessary road encroachment permits from Santa Cruz County prior to constructing each Project component and shall comply with the conditions of approval attached to all Project permits and approvals.  <b>Mitigation Measure TRA-1b: Construction Traffic Control/Traffic Management Plan</b> PV Water shall require the construction contractor to prepare a Construction Traffic Control/Traffic Management Plan and submit it to Santa Cruz County for review and approval prior to construction. The plan shall be prepared in accordance with professional engineering standards and may include, but not be limited to, the following elements as appropriate: <ul style="list-style-type: none"> <li>• Identify hours of construction for each Project component.</li> <li>• Schedule truck trips outside of peak morning and evening commute hours when feasible to minimize adverse impacts on traffic flow if agencies with jurisdiction over the affected roads identify highly congested roadway segments during their review of the encroachment permit applications. Haul routes that minimize truck traffic on local roadways and residential streets shall be used.</li> <li>• Develop circulation and detour plans to minimize impacts on local street circulation. This may include the use of signing and flagging to guide vehicles, bicyclists, and pedestrians through and/or around the construction zone.</li> </ul>

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IMPACT	Significance Determination	Mitigation Measure*
<b>Transportation and Traffic, EIR Section 3.9 (cont.)</b>		
<b>Impact TRA-1 (cont.)</b>		<ul style="list-style-type: none"> <li>Control and monitor construction vehicle movements by enforcing current standard construction specifications as defined by Santa Cruz County through periodic onsite inspections by the construction contractor.</li> <li>Install traffic control devices where traffic conditions warrant, as specified in the Santa Cruz County's standards (e.g., the <i>California Manual of Uniform Traffic Controls for Construction and Maintenance Work Zones</i>).</li> <li>Perform construction that crosses on-street and off-street bikeways, sidewalks, and other walkways in a manner that allows for safe access for bicyclists and pedestrians. Alternatively, provide safe detours to reroute affected bicycle/pedestrian traffic.</li> <li>Comply with roadside safety protocols to reduce the risk of accidents, as defined in the <i>Caltrans Division of Construction Code of Safe Practices and the California Manual of Uniform Traffic Controls for Construction and Maintenance Work Zones</i>. Provide "Road Work Ahead" warning signs and speed control (including signs informing drivers of state-legislated double fines for speed infractions in a construction zone) to achieve required speed reductions for safe traffic flow through the work zone.</li> <li>Store all equipment and materials in designated contractor staging areas.</li> <li>Encourage construction crews to park at staging areas to limit lane closures in the public rights-of-way.</li> <li>Include a plan and implementation process for notifications and a process for communication with affected residents and businesses prior to the start of construction. Advance public notification shall include posting of notices and appropriate signage of construction activities at least one week in advance. The written notification shall include the construction schedule, the exact location and duration of activities within each street (i.e., which lanes and access point/driveways would be blocked on which days and for how long), and a toll-free telephone number for receiving questions or complaints.</li> <li>Include a plan and implementation process to coordinate all construction activities with emergency service providers in the area at least one month in advance. Emergency service providers shall be notified of the timing, location, and duration of construction activities. All roads shall remain passable to emergency service vehicles at all times.</li> <li>Identify all roadway locations where special construction techniques (e.g., trenchless pipeline installation or night construction) will be used to minimize impacts on traffic flow. Require all open trenches and pits be covered with metal plates at the end of each workday to accommodate traffic and access</li> </ul>
<b>Impact TRA-2:</b> Construction of the Projects would temporarily disrupt circulation patterns near sensitive land uses (schools, hospitals, fire stations, police stations, and other emergency providers).	LSM	<b>Mitigation Measure TRA-1b: Construction Traffic Control/Traffic Management Plan</b> (refer to Impact TRA-1)
<b>Impact TRA-3:</b> Construction of the Projects would have temporary effects on alternative transportation or alternative transportation facilities in the Project area.	LSM	<b>Mitigation Measure TRA-1b: Construction Traffic Control/Traffic Management Plan</b> (refer to Impact TRA-1)

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<b>Transportation and Traffic, EIR Section 3.9 (cont.)</b>		
<b>Impact TRA-4:</b> Construction of the Projects could temporarily increase the potential for accidents on Project area roadways.	LSM	<b>Mitigation Measure TRA-1b: Construction Traffic Control/Traffic Management Plan</b> (refer to Impact TRA-1)
<b>Impact TRA-5:</b> Construction of the Projects could increase wear-and-tear on the designated haul routes used by construction vehicles to access the Project sites.	LS	No mitigation required.
<b>Impact C-TRA-1:</b> The Projects, in combination with past, present, and probable future projects in the Project area, would have cumulatively considerable impacts on transportation and traffic.	LSM	<b>Mitigation Measure TRA-1a: Encroachment Permits</b> (refer to Impact TRA-1) <b>Mitigation Measure TRA-1b: Construction Traffic Control/Traffic Management Plan</b> (refer to Impact TRA-1)
<b>Cultural Resources, EIR Section 3.10</b>		
<b>Impact CUL-1:</b> The Projects could cause a substantial adverse change in the significance of a historical resource pursuant to CEQA <i>Guidelines</i> Section 15064.5.	NI	No mitigation required.
<b>Impact CUL-2:</b> The Projects could cause a substantial adverse change in the significance of an archaeological resource, including those determined to be a historical resource defined in Section 15064.5 or a unique archaeological resource defined in Public Resources Code 21083.2.	LSM	<p><b>Mitigation Measure CUL-1a: Retention of a Qualified Archaeologist</b></p> <p>Prior to start of ground-disturbing activities (i.e., demolition, pavement removal, pot-holing or auguring, boring, drilling, grubbing, vegetation removal, brush clearance, weed abatement, grading, excavation, trenching, or any other activity that has potential to disturb soil), PV Water shall retain a qualified archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archaeology (codified in 36 CFR Part 61; 48 FR 44738-44739) to oversee and ensure that all mitigation related to archaeological resources is carried out.</p> <p><b>Mitigation Measure CUL-1b: Pre-Construction Phase I Cultural Resources Survey</b></p> <p>Prior to the start of ground-disturbing activity, a qualified archaeologist shall conduct a pre-construction Phase I Cultural Resources Survey of all areas that were not surveyed as part of the 2020 field effort. The survey shall document archaeological resources potentially qualifying as historical resources, unique archaeological resources, and/or tribal cultural resources under CEQA. The qualified archaeologist shall document the results of the survey in a Phase I Cultural Resources Survey Report that follows Archaeological Resource Management Reports (ARMR): Recommended Contents and Format. The qualified archaeologist shall also prepare Department of Parks and Recreation 523 forms for resources encountered during the survey, which shall be appended to the report. If built environment resources are encountered that could potentially be impacted by the Projects, the qualified archaeologist shall consult with a Qualified Architectural Historian meeting the Secretary of the Interior's Professional Qualifications Standards for architectural history (codified in 36 CFR Part 61; 48 FR 44738-44739). The qualified archaeologist shall submit the draft Phase I Cultural Resources Survey Report to PV Water within 30 days of completion of the survey. The final report shall be approved by PV Water no later than 360 days prior to the start of ground disturbance. The qualified archaeologist shall submit the final Phase I Cultural Resources Survey Report to the Northwest Information Center.</p>

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IMPACT	Significance Determination	Mitigation Measure*
<b>Cultural Resources, EIR Section 3.10 (cont.)</b>		
Impact CUL-2 (cont.)		<p><b>Mitigation Measure CUL-1c: Pre-Construction Phase II Archaeological Testing and Evaluation</b></p> <p>Prior to start of ground ground-disturbing activity, the qualified archaeologist shall develop and implement an archaeological testing and evaluation program for resources CA-SCR-155 and CA-SCR-156, and any other potentially significant archaeological resources that are identified during the pre-construction survey. The testing program shall be aimed at determining the presence/absence of subsurface cultural deposits in the Area of Direct Impact, and if present, the horizontal and vertical extents and significance of those deposits. The qualified archaeologist shall prepare a work plan outlining the objectives, goals, research questions, and methods of the testing program and shall submit the work plan to PV Water for review and comment. The final approved work plan shall be prepared and implemented by the qualified archaeologist. Upon completion of testing, the qualified archaeologist shall prepare a Phase II Archaeological Testing and Evaluation Report for submittal to PV Water. The draft report shall be submitted within 30 days of completion of testing. The final report shall be approved by PV Water no later than 270 days prior to the start of ground disturbance. The qualified archaeologist shall also submit the final Phase II Archaeological Testing and Evaluation Report to the Northwest Information Center.</p> <p>If potentially significant subsurface cultural deposits are identified in the Area of Direct Impact, the qualified archaeologist shall evaluate the resource(s) for significance to determine if it qualifies as a historical resource as defined in CEQA Guidelines Section 15064.5(a). This would include evaluation under all four National Register/California Register Criteria (A/1-D/4). If a resource does not meet the criteria under subdivision(a), then it shall be assessed to determine if it meets the definition of unique archaeological resource as provided in Public Resources Code Section 21083.2(g)). When assessing significance for resources that are Native American in origin, the qualified archaeologist and PV Water shall consult with one or more Native American representatives listed on the California Native American Heritage Commission's contact list for the Projects to ensure that cultural values ascribed to the resource, beyond those that are scientifically important, are considered to determine if it qualifies as a tribal cultural resource pursuant to Public Resources Code section 21074.</p> <p><b>Mitigation Measure CUL-1d: Avoidance and Preservation in Place of Archaeological Resources</b></p> <p>PV Water shall make every effort to avoid and preserve in place archaeological sites that are determined to be historical resources, unique archaeological resources, and/or tribal cultural resources as a result of testing and evaluation efforts conducted under Mitigation Measure CUL-1c. Avoidance and preservation in place is the preferred manner of mitigating impacts to archaeological resources. Preservation in place maintains the important relationship between artifacts and their archaeological context and also serves to avoid conflict with traditional and religious values of groups who may ascribe meaning to the resource. Preservation in place may be accomplished by, but is not limited to, avoidance, incorporating the resource into open space, capping, or deeding the site into a permanent conservation easement. In the event that avoidance and preservation in place of a resource is determined by PV Water, in consultation with the qualified archaeologist, to be infeasible in light of factors such as Project design, costs, and other considerations, then Mitigation Measures CUL-1e shall be implemented for that resource. If avoidance and preservation in place of a resource is determined by PV Water to be feasible, then Mitigation Measures CUL-1h shall be implemented for that resource.</p> <p><b>Mitigation Measure CUL-1e: Development of a Phase III Archaeological Resources Data Recovery and Treatment Plan</b></p> <p>The qualified archaeologist shall prepare a Phase III Archaeological Resources Data Recovery and Treatment Plan for all significant resources that will be impacted by the proposed Project, including those that qualify as historical resources, unique archaeological resources, and/or tribal cultural resources. When determining if data recovery is necessary, the qualified archaeologist shall first consider if the data potential of the impacted portion of the site has been exhausted through previous testing. The plan shall be submitted to PV Water for review and approval prior to the start of field work for data recovery efforts for resources that are eligible under Criterion D/4 (data</p>

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

IMPACT	Significance Determination	Mitigation Measure*
<b>Cultural Resources, EIR Section 3.10 (cont.)</b>		
<b>Impact CUL-2 (cont.)</b>		<p>potential). Data recovery field work shall be completed prior to the start of any Project-related ground-disturbing activity. Treatment for resources that are eligible under Criteria A/1 (events), B/2 (persons), and/or C/3 design/workmanship) shall be completed within 3 years of completion of the Projects. The Phase III Archaeological Resources Data Recovery and Treatment Plan shall include:</p> <ul style="list-style-type: none"> <li>• <i>Research Design.</i> The plan shall outline the applicable cultural context(s) for the region, identify research goals and questions that are applicable to each resource or class of resources, and list the data needs (types, quantities, quality) required to answer each research question. The research design shall address all four National Register/California Register Criteria (A/1-D/4) and identify the methods that will be required to inform treatment, such as subsurface investigation, documentary/archival research, and/or oral history, depending on the nature of the resource.</li> <li>• <i>Data Recovery for Resources Eligible under Criterion D/4.</i> The plan shall outline the field and laboratory methods to be employed, and any specialized studies that will be conducted, as part of the data recovery effort for resources that are eligible under National Register/California Register Criterion D/4 (data potential). If a resource is eligible under additional criteria, treatment beyond data recovery shall be implemented.</li> <li>• <i>Treatment for Resources Eligible under Criteria A/1, B/2, and/or C/3.</i> In the event a resource is eligible under National Register/California Register Criteria A/1 (events), B/2 (persons), or C/3 (design/workmanship), then resource-specific treatment shall be developed to mitigate Project-related impacts to the degree feasible. That could include forms of documentation, interpretation, public outreach, ethnographic and language studies, publications, and educational programs, depending on the nature of the resource, and may require the retention of additional technical specialists. Treatment measures shall be generally outlined in the plan based on existing information on the resource. Once data recovery is completed and the results are available to better inform resource-specific treatment, the treatment measures shall be formalized and implemented. Treatment shall be developed by the qualified archaeologist in consultation with PV Water and one or more Native American Tribal representatives listed on the California Native American Heritage Commission's contact list for the Projects for resources that are Native American in origin.</li> <li>• <i>Security Measures.</i> The plan shall include recommended security measures to protect archaeological resources from vandalism, looting, and non-intentionally damaging activities during field work.</li> <li>• <i>Procedures for Discovery of Human Remains and Associated Funerary Objects.</i> The plan shall outline the protocols and procedures to be followed in the event that human remains and associated funerary objects are encountered during field work. These shall include stop-work and protective measures, notification protocols, and compliance with California Health and Safety Code section 7050.5 and PRC section 5097.98. See also CUL-2.</li> <li>• <i>Reporting Requirements.</i> Upon completion of data recovery for resources eligible under Criterion D/4, the qualified archaeologist shall document the findings in a Phase III Archaeological Data Recovery Report. The draft Archaeological Data Recovery Report shall be submitted to PV Water within 360 days after completion of data recovery, and the final Phase III Archaeological Data Recovery Report shall be submitted to PV Water within 60 days after the receipt of PV Water comments. The qualified archaeologist shall also submit the final Phase III Archaeological Data Recovery Report to the Northwest Information Center. Upon completion of all other treatment for resources eligible under Criteria A/1, B/2, and C/3, the qualified archaeologist shall document the resource-specific treatment that was implemented for each resource and verification that treatment has been completed in a technical document (report or memorandum). The document shall be provided to PV Water within 30 days after completion of treatment.</li> <li>• <i>Curation Requirements.</i> The plan shall stipulate curation of cultural materials in accordance with Mitigation Measure CUL-11.</li> </ul>

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**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

IMPACT	Significance Determination	Mitigation Measure*
<b>Cultural Resources, EIR Section 3.10 (cont.)</b>		
Impact CUL-2 (cont.)		<ul style="list-style-type: none"> <li>• <i>Protocols for Native American Monitoring and Input.</i> The plan shall outline the role and responsibilities of Native American Tribal representatives. It shall include communication protocols and an opportunity and timelines for review of cultural resources documents. The plan shall include provisions for full-time Native American monitoring during field work (see Mitigation Measure CUL-1j).</li> </ul> <p><b>Mitigation Measure CUL-1f: Development of a Cultural Resources Monitoring and Mitigation Program</b></p> <p>The qualified archaeologist shall prepare a Cultural Resources Mitigation and Monitoring Program (CRMMP) based on the final approved Project design plans. The CRMMP shall be submitted to PV Water at least 60 days prior to the start of any ground-disturbing activities. The CRMMP shall include:</p> <ul style="list-style-type: none"> <li>• <i>Provisions for Archaeological Monitoring.</i> The CRMMP shall outline the archaeological monitor(s) responsibilities and requirements (refer to Mitigation Measure CUL-1i).</li> <li>• <i>Procedures for Discovery of Archaeological Resources.</i> Procedures to be implemented in the event of an archaeological discovery shall be fully defined in the CRMMP, and shall include stop-work and protective measures, notification protocols, procedures for significance assessments, and appropriate treatment measures. The CRMMP shall state avoidance or preservation in place is the preferred manner of mitigating impacts to historical resources, unique archaeological resources, and tribal cultural resources, but shall provide procedures to follow should PV Water determine that avoidance is infeasible in light of factors such as the nature of the find, Project design, costs, and other considerations. See also Mitigation Measure CUL-1k.</li> </ul> <p>If, based on the recommendation of the qualified archaeologist, it is determined that a discovered archaeological resource constitutes a historical resource, unique archaeological resource, and/or tribal cultural resource pursuant to CEQA and data recovery through excavation is the only feasible mitigation available, a Phase III Archaeological Resources Data Recovery and Treatment Plan shall be prepared and implemented by the qualified archaeologist in coordination with PV Water that provides for the adequate recovery of the scientifically consequential information contained in the archaeological resource (see Mitigation Measure CUL-1e). PV Water, or its designee, shall consult with one or more Native American representatives listed on the California Native American Heritage Commission's contact list for the Projects in determining treatment of resources that are Native American in origin to ensure that cultural values ascribed to the resource, beyond those that are scientifically important, are considered.</p> <ul style="list-style-type: none"> <li>• <i>Procedures for Discovery of Human Remains and Associated Funerary Objects.</i> The CRMMP shall outline the protocols and procedures to be followed in the event that human remains and associated funerary objects are encountered during construction. These shall include stop-work and protective measures, notification protocols, and compliance with California Health and Safety Code Section 7050.5 and Public Resources Code Section 5097.98 (refer to Mitigation Measure CUL-2).</li> <li>• <i>Reporting Requirements.</i> The CRMMP shall outline provisions for weekly and final reporting. The qualified archaeologist shall prepare weekly status reports detailing activities and locations observed (including maps) and summarizing any discoveries for the duration of monitoring to be submitted to PV Water via e-mail for each week in which monitoring activities occur. Upon completion of ground disturbance, the qualified archaeologist shall prepare a draft Archaeological Resources Monitoring Report and submit it to PV Water within 60 days after completion of the monitoring program or of treatment for significant discoveries should treatment extend beyond the cessation of monitoring. The final Archaeological Resources Monitoring Report shall be submitted to PV Water within 30 days of receipt of PV Water comments. The qualified archaeologist shall also submit the final Archaeological Resources Monitoring Report to the Northwest Information Center. If human remains are encountered, a confidential report documenting all activities shall be submitted to the California Native American Heritage Commission within 90 days after completion of any treatment (refer to Mitigation Measure CUL-2).</li> <li>• <i>Curation Requirements.</i> The CRMMP shall stipulate curation of cultural materials in accordance with Mitigation Measure CUL-1l.</li> </ul>

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**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

IMPACT	Significance Determination	Mitigation Measure*
<b>Cultural Resources, EIR Section 3.10 (cont.)</b>		
Impact CUL-2 (cont.)		<ul style="list-style-type: none"> <li>• <i>Protocols for Native American Monitoring and Input.</i> The CRMMP shall outline the role and responsibilities of Native American Tribal representatives. It shall include communication protocols, an opportunity and timelines for review of cultural resources documents related to discoveries that are Native American in origin, and provisions for Native American monitoring. The CRMMP shall include provisions for Native American monitoring of ground disturbance, as well as during any subsurface investigation and data recovery for discovered resources that are Native American in origin (refer to Mitigation Measures CUL-1j).</li> </ul> <p><b>Mitigation Measure CUL-1g: Construction Worker Cultural Resources Sensitivity Training Program</b></p> <p>A worker cultural resources sensitivity training program shall be implemented for the Projects. Prior to any ground-disturbing activity, an initial sensitivity training session shall be provided by the qualified archaeologist to all project employees, contractors, subcontractors, and other professionals prior to their involvement in any ground-disturbing activities, with subsequent training sessions occurring on a monthly basis to accommodate new personnel becoming involved in the Projects (subsequent sessions can be coordinated with other Worker Environmental Awareness Program or safety training that may be required). Construction personnel shall be informed of the sensitivity of the Project sites and given a tutorial providing information on how to identify the types of resources that may be encountered. They shall be instructed on the proper procedures to be enacted in the event of an inadvertent discovery of archaeological resources or human remains, confidentiality of discoveries, and safety precautions to be taken when working with cultural resources monitors. PV Water shall make it a requirement that construction personnel are made available for and attend training sessions and retain documentation demonstrating attendance.</p> <p><b>Mitigation Measure CUL-1h: Designation of Environmentally Sensitive Areas</b></p> <p>Prior to the start of ground disturbance, the portion of any avoided archaeological resources nearest Project-related activities shall be marked as Environmentally Sensitive Areas (this includes archaeological resources that qualify as historical resources, unique archaeological resources and/or tribal cultural resources, or those that have not been evaluated). These areas shall not be marked as archaeological resources, but shall be designated as “exclusion zones” on Project plans and protective fencing in order to discourage unauthorized disturbance or collection of artifacts. The qualified archaeologist, or their designee, shall periodically inspect these areas for the duration of Project activities in the vicinity to ensure that protective fencing remains intact and no incursions into the exclusion zones have occurred. Upon completion of all Project-related activities in the vicinity, all protective fencing and signage shall be removed.</p> <p><b>Mitigation Measure CUL-1i: Archaeological Monitoring</b></p> <p>All Project-related ground disturbance that produces visible soils shall be subject to archaeological monitoring (i.e., horizontal directional drilling need not be monitored if the archaeologist would not be able to view soils or spoils piles). The archaeological monitor(s) shall be familiar with the types of resources that could be encountered and shall work under the direct supervision of the qualified archaeologist. The archaeological monitor(s) shall keep daily logs detailing the types of activities and soils observed, and any discoveries.</p> <p>Archaeological monitor(s) shall have the authority to halt and re-direct ground disturbing activities in the event of a discovery until it has been assessed for significance and treatment implemented, if necessary. In the event of a discovery, the archaeological monitor shall follow the notification protocols outlined in the CRMMP (refer to Mitigation Measures CUL-1f), including notifying the Construction Manager and qualified archaeologist. The qualified archaeologist shall determine if the discovery is significant, and if so, develop appropriate treatment (refer to Mitigation Measures CUL-1c, CUL-1d, and CUL-1e). PV Water and the qualified archaeologist shall consult with one or more Native American representatives listed on the California Native American Heritage Commission’s contact list for the Projects for resources that are Native American in origin, and in accordance with the protocols and procedures outlined in the CRMMP (refer to Mitigation Measure CUL-1f).</p>

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**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

IMPACT	Significance Determination	Mitigation Measure*
<b>Cultural Resources, EIR Section 3.10 (cont.)</b>		
<b>Impact CUL-2 (cont.)</b>		<p><b>Mitigation Measure CUL-1j: Native American Monitoring</b>  Prior to the start of any ground-disturbing activity, PV Water shall contact one or more of the Native American tribes listed on the California Native American Heritage Commission's contact list for the Projects and offer to retain a monitor if the tribe wishes to participate in monitoring efforts. If resources of Native American origin are discovered, the retained Native American monitor shall provide monitoring services in accordance with protocols and procedures outlined in the CRMMP (refer to Mitigation Measure CUL-1f).</p> <p><b>Mitigation Measure CUL-1k: Inadvertent Discovery of Archaeological Resources</b>  In the event that archaeological resources are encountered during ground disturbance, all activity in the vicinity of the find shall cease (within 100 feet), and the protocols and procedures for discoveries outlined in the CRMMP shall be implemented (refer to Mitigation Measure CUL-1f). The discovery shall be evaluated for potential significance by the qualified archaeologist. If the qualified archaeologist determines that the resource may be significant, the qualified archaeologist shall develop an appropriate treatment plan for the resource in accordance with the CRMMP (refer to Mitigation Measure CUL-1f). When assessing significance and developing treatment for resources that are Native American in origin, the qualified archaeologist and PV Water shall consult with one or more Native American representatives listed on the California Native American Heritage Commission's contact list for the Projects to determine if it qualifies as a tribal cultural resource pursuant to Public Resources Code section 21074. The qualified archaeologist shall also determine if work may proceed in other parts of the Project areas while treatment (e.g., data recovery) for cultural resources is being carried out.</p> <p><b>Mitigation Measure CUL-1l: Curation</b>  Disposition of Native American archaeological materials shall be determined through consultation between one or more Native American representatives listed on the California Native American Heritage Commission's contact list for the Projects, the qualified archaeologist, and PV Water. Disposition of human remains and associated funerary objects shall be determined through consultation between the Most Likely Descendant, landowner, and PV Water (refer to Mitigation Measure CUL 2).</p> <p>Any significant historic-period archaeological materials that are not Native American in origin shall be curated at a repository accredited by the American Association of Museums that meets the standards outlined in 36 CFR 79.9. If no accredited repository accepts the collection, then it may be curated at a non-accredited repository as long as it meets the minimum standards set forth by 36 CFR 79.9. If neither an accredited nor a non-accredited repository accepts the collection, then it may be offered to a public, non-profit institution with a research interest in the materials, or donated to a local school or historical society in the area for educational purposes, to be determined by the qualified archaeologist in consultation with PV Water.</p>
<b>Impact CUL-3:</b> The Projects could disturb human remains, including those interred outside of formal cemeteries.	LSM	<p><b>Mitigation Measure CUL-1a: Retention of a Qualified Archaeologist</b> (refer to Impact CUL-2)</p> <p><b>Mitigation Measure CUL-1f: Development of a Cultural Resources Monitoring Mitigation Program</b> (refer to Impact CUL-2)</p> <p><b>Mitigation Measure CUL-1g: Construction Worker Cultural Resources Sensitivity Training Program</b> (refer to Impact CUL-2)</p> <p><b>Mitigation Measure CUL-1i: Archaeological Monitoring</b> (refer to Impact CUL-2)</p> <p><b>Mitigation Measure CUL-1j: Native American Monitoring</b> (refer to Impact CUL-2)</p>

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**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

IMPACT	Significance Determination	Mitigation Measure*
<b>Cultural Resources, EIR Section 3.10 (cont.)</b>		
<b>Impact CUL-3 (cont.)</b>		<b>Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains</b> If human remains are encountered, then PV Water shall halt work in the vicinity (within 100 feet) of the discovery and contact the County Coroner in accordance with Public Resources Code Section 5097.98 and Health and Safety Code Section 7050.5. If the County Coroner determines the remains are Native American, then the Coroner shall notify the California Native American Heritage Commission in accordance with Health and Safety Code subdivision 7050.5(c), and Public Resources Code Section 5097.98. The California Native American Heritage Commission shall designate a Most Likely Descendant for the remains pursuant to Public Resources Code Section 5097.98. Until the landowner has conferred with the Most Likely Descendant, the contractor shall ensure the immediate vicinity where the discovery occurred is not disturbed by further activity, is adequately protected according to generally accepted cultural or archaeological standards or practices, and that further activities take into account the possibility of multiple burials. If human remains are encountered, the qualified archaeologist, in consultation with the Most Likely Descendant shall prepare a confidential report documenting all activities and it shall be submitted to the California Native American Heritage Commission within 90 days after completion of any treatment.
<b>Impact C-CUL-1:</b> The Projects, in combination with past, present, and probable future projects in the area, could have cumulatively considerable impacts on cultural resources.	LSM	<b>Mitigation Measure CUL-1a: Retention of a Qualified Archaeologist</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1b: Pre-Construction Phase I Cultural Resources Survey</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1c: Pre-Construction Phase II Archaeological Testing and Evaluation</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1d: Avoidance and Preservation in Place of Archaeological Resources</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1e: Development of a Phase III Archaeological Resources Data Recovery and Treatment Plan</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1f: Development of a Cultural Resources Monitoring and Mitigation Program</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1g: Construction Worker Cultural Resources Sensitivity Training Program</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1h: Designation of Environmentally Sensitive Areas</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1i: Archaeological Monitoring</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1j: Native American Monitoring</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1k: Inadvertent Discovery of Archaeological Resources</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1l: Curation</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains</b> (refer to Impact CUL-3)
<b>Tribal Cultural Resources, EIR Section 3.11</b>		
<b>Impact TCR-1:</b> The Projects could cause a substantial adverse change in the significance of a tribal cultural resource that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k).	NI	No mitigation required.

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**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

<b>IMPACT</b>	<b>Significance Determination</b>	<b>Mitigation Measure*</b>
<b>Tribal Cultural Resources, EIR Section 3.11 (cont.)</b>		
<b>Impact TCR-2:</b> The Projects could cause a substantial adverse change in the significance of a tribal cultural resource that has been determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1.	LSM	<b>Mitigation Measure CUL-1a: Retention of a Qualified Archaeologist</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1b: Pre-Construction Phase I Cultural Resources Survey</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1c: Pre-Construction Phase II Archaeological Testing and Evaluation</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1d: Avoidance and Preservation in Place of Archaeological Resources</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1e: Development of a Phase III Archaeological Resources Data Recovery and Treatment Plan</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1f: Development of a Cultural Resources Monitoring and Mitigation Program</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1g: Construction Worker Cultural Resources Sensitivity Training Program</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1h: Designation of Environmentally Sensitive Areas</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1i: Archaeological Monitoring</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1j: Native American Monitoring</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1k: Inadvertent Discovery of Archaeological Resources</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1l: Curation</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains</b> (refer to Impact CUL-3)
<b>Impact C-TCR-1:</b> The Projects, in combination with past, present, and probable future projects in the Project area, could result in significant adverse cumulative tribal cultural resources impacts.	LSM	<b>Mitigation Measure CUL-1a: Retention of a Qualified Archaeologist</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1b: Pre-Construction Phase I Cultural Resources Survey</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1c: Pre-Construction Phase II Archaeological Testing and Evaluation</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1d: Avoidance and Preservation in Place of Archaeological Resources</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1e: Development of a Phase III Archaeological Resources Data Recovery and Treatment Plan</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1f: Development of a Cultural Resources Monitoring and Mitigation Program</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1g: Construction Worker Cultural Resources Sensitivity Training Program</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1h: Designation of Environmentally Sensitive Areas</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1i: Archaeological Monitoring</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1j: Native American Monitoring</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1k: Inadvertent Discovery of Archaeological Resources</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-1l: Curation</b> (refer to Impact CUL-2) <b>Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains</b> (refer to Impact CUL-3)

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**SUMMARY OF IMPACTS AND MITIGATION MEASURES**

<b>IMPACT</b>	<b>Significance Determination</b>	<b>Mitigation Measure*</b>
<b>Energy, Utilities, Public Services, and Recreation, EIR Section 3.12</b>		
<b>Impact EUP-1:</b> Implementation of the Projects could result in wasteful, inefficient, or unnecessary consumption of energy during Project construction or operation, or conflict with or obstruct a state or local plan for renewable energy or energy efficiency.	LS	No mitigation required.
<b>Impact EUP-2:</b> Project construction and operation could result in a substantial adverse effect related to generating solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impairing the attainment of solid waste reduction goals.	LS	No mitigation required.
<b>Impact EUP-3:</b> The Projects would comply with federal, state, and local management and reduction statutes and regulations related to solid waste.	LS	No mitigation required.
<b>Impact EUP-4:</b> The Projects could result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or increase the demand for new or increased staff and/or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for public services including, fire protection, police protection, schools, or other public facilities.	LS	No mitigation required.
<b>Impact EUP-5:</b> The Projects could increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.	LS	No mitigation required.
<b>Impact C-EUP-1:</b> The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative energy impacts.	LS	No mitigation required.

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IMPACT	Significance Determination	Mitigation Measure*
<b>Energy, Utilities, Public Services, and Recreation, EIR Section 3.12 (cont.)</b>		
<b>Impact C-EUP-2:</b> The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative utilities impacts.	LS	No mitigation required.
<b>Impact C-EUP-3:</b> The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative public services impacts.	LS	No mitigation required.
<b>Impact C-EUP-4:</b> The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative recreational impacts.	LS	No mitigation required.
<b>Aesthetics Resources, EIR Section 3.13</b>		
<b>Impact AES-1:</b> Implementation of the Projects could have a substantial adverse effect on scenic vistas or substantially damage scenic resources.	LS	No mitigation required.
<b>Impact AES-2:</b> Implementation of the Projects could degrade the existing visual character or quality of public views of the sites in non-urbanized areas.	LS	No mitigation required.
<b>Impact AES-3:</b> Project components could introduce significant new sources of light or glare.	LSM	<b>Mitigation Measure AES-1: Construction Lighting</b> PV Water shall require contractors to direct nighttime lighting used during construction away from residential areas; use the minimum amount of night lighting necessary for construction and safety, and shield and hood outdoor lighting to prevent light spillover effects during Project construction.
<b>Impact C-AES-1:</b> The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative aesthetic impacts.	LS	No mitigation required.

\* Text that has been revised in adopted mitigation measures is indicated with underlining where text has been added, and ~~strike through~~ where text has been deleted.

SUM = Significant and Unavoidable with Mitigation

LSM = Less than Significant with Mitigation

LS = Less than Significant

NI = No Impact

# CHAPTER 1

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## Introduction

### 1.1 Purpose of this Environmental Impact Report

This supplemental environmental impact report (EIR) has been prepared by the Pajaro Valley Water Management Agency (PV Water) in conformance with the provisions of the California Environmental Quality Act<sup>1</sup> (CEQA) and the CEQA *Guidelines*.<sup>2</sup> PV Water serves as the lead agency for development of the EIR for the proposed Harkins Slough Facilities Upgrades Project (Harkins Slough Project) and the proposed Struve Slough Project (collectively called the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects, or Projects), with input and coordination provided by other agencies and local jurisdictions. The lead agency is the public agency that has principal responsibility for carrying out or approving a project. CEQA requires the preparation of an EIR when a project could have significant impacts on the physical environment. PV Water determined that the Projects, for which PV Water is the project sponsor, could cause significant environmental impacts, and that preparation of an EIR was warranted.

CEQA requires that all state and local government agencies consider the environmental consequences over which they have discretionary authority before taking an action that has the potential to affect the environment. Because the Projects have changed since certification of the 2014 BMP Update PEIR, some environmental impacts disclosed in the 2014 BMP Update PEIR have changed. Consequently, consistent with the CEQA *Guidelines*, PV Water has prepared this EIR to inform agencies and the public about the proposed modifications to the Projects, to evaluate the environmental impacts associated with the modifications, and to identify measures to reduce such impacts.

This document supplements the analysis presented in the 2014 BMP Update PEIR by describing the proposed modifications to the Projects and evaluating their potential (a) to generate significant impacts not disclosed in the 2014 BMP Update PEIR and (b) to change the severity of significant impacts disclosed in the 2014 BMP Update PEIR. Portions of the 2014 BMP Update PEIR have been incorporated by reference and are summarized in this EIR. Appendix PD-2 identifies mitigation measures that apply to the Projects that were adopted by the Board on April 16, 2014 as part of the mitigation monitoring and reporting program for the 2014 BMP Update PEIR. For the purposes of this EIR, the mitigation measures in Appendix PD-2 are considered parts of the Projects. As indicated in Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*, in some cases mitigation measures in Appendix PD-2 have been revised, replaced, or augmented to

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<sup>1</sup> Public Resources Code Sections 21000 *et seq.*

<sup>2</sup> California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000 *et seq.*

reflect current conditions and to address project-specific and site-specific impacts. The 2014 BMP Update PEIR is available for review at <https://www.pvwater.org/bmp-update>.

## 1.2 Environmental Review Process

The environmental review process for the Projects includes multiple steps: publication of a Notice of Preparation (NOP), public scoping period, publication of a Draft EIR, public and agency review of the Draft EIR, publication of responses to public and agency comments on the Draft EIR, and certification of the Final EIR. Each of these steps involves public outreach, as described below. Additional public outreach for the Projects is described in Section 1.3.

### 1.2.1 Notice of Preparation

In accordance with Sections 15063 and 15082 of the CEQA *Guidelines*, on May 31, 2019, PV Water distributed a NOP to responsible and other public agencies and interested parties to begin the formal CEQA scoping process for the Projects. The NOP informed agencies and the public about the Projects and PV Water's decision to prepare an EIR, and included a request for comments on environmental issues that should be addressed in the EIR. PV Water also distributed a Public Notice of the Availability of the NOP and Notice of Public Scoping Meeting to additional public agencies, interested parties, and landowners/occupants located near the Project, which was posted on PV Water's website, placed in the legal classified sections of the *Register-Pajaronian* on June 7, 2019, the *Santa Cruz Sentinel* on June 5, 2019, and in the weekly Spanish language paper, *La Especial Ganga*, June 7 to June 13, 2019 edition.

PV Water held a public scoping meeting at 4:00 p.m. on Wednesday, June 12, 2019, in the Community Room at the City of Watsonville Civic Plaza (275 Main Street, Fourth Floor, Watsonville) to receive comments on the scope of the EIR. The public comment period started on May 31, 2019 and ended on July 1, 2019. **Appendix NOP** presents the NOP and written comments received during the scoping period. PV Water has considered all comments pertaining to the scope and content of the EIR made by the public and agencies in preparing this EIR.

### 1.2.2 Draft Supplemental EIR

As described above, this Draft EIR has been prepared in accordance with CEQA and the CEQA *Guidelines*. It provides an analysis of the Project-specific physical environmental impacts of construction and operation of the Projects, and the Projects' contribution to the environmental impacts of foreseeable cumulative development.

The CEQA *Guidelines* encourage public participation in the planning and environmental review process. Publication of this Draft EIR marks the beginning of a comment period, during which the Draft EIR will be available to local, state and federal agencies, interested organizations and individuals for review. The Draft EIR is available for public review on PV Water's web page (<https://www.pvwater.org/wss-marr>). CDs and paper copies are also available to review by appointment at PV Water's offices at 36 Brennan Street, Watsonville.

PV Water will hold a public meeting during the Draft EIR public comment period. Written comments on the Draft EIR may be submitted by 5:00 p.m. on October 19, 2020 via electronic mail to [eir@pvwater.org](mailto:eir@pvwater.org), or sent to:

Pajaro Valley Water Management Agency  
ATTN: Brian Lockwood, General Manager  
36 Brennan Street  
Watsonville, CA 95076

### 1.2.3 Final EIR

Following the close of the Draft EIR public comment period, PV Water will prepare and publish a document entitled “Responses to Comments,” which will contain a copy of all comments received on this Draft EIR and written responses to all substantive comments. The document may also contain specific changes and revisions to the Draft EIR. This Draft EIR, together with the Responses to Comments document, will constitute the Final EIR. In an advertised public meeting, the Board of Directors will consider whether to certify the Final EIR as adequate and in compliance with CEQA.

### 1.2.4 Mitigation Monitoring and Reporting Program

PV Water will use the information in the certified Final EIR in its deliberations on whether to approve, modify, or deny the Projects or aspects of the Projects. If PV Water approves the Projects, it will adopt CEQA findings that identify the Project-related impacts and the mitigation measures or alternatives that have been adopted to reduce significant impacts. A Mitigation Monitoring and Reporting Program must be adopted by PV Water as part of the adoption of the CEQA findings. The Mitigation Monitoring and Reporting Program lists the mitigation measures included in the Projects as identified in the Final EIR, entities responsible for carrying out the measures, timing of implementation of the measures, and associated reporting requirements. If significant and unavoidable impacts would occur even with implementation of all identified mitigation measures, PV Water must adopt as a condition of approval of the Projects a Statement of Overriding Considerations documenting how the benefits of Projects implementation outweigh its significant and unavoidable impacts on the environment.

## 1.3 Other Public Outreach

In addition to the EIR public scoping meeting held on June 12, 2019, PV Water hosted a public meeting to inform community members about BMP Update projects, including the Harkins Slough and Struve Slough Projects on July 10, 2017. The Board of Directors meets monthly in meetings that are open for the public to attend. Staff provide monthly updates to the Board on the progress of Basin Management Plan implementation, including activities associated with the Projects. PV Water also has a Projects and Facility Operations Committee that meets monthly to receive updates; all are welcome to attend the meetings. In addition, staff have provided regular updates to groups such as the Santa Cruz County Farm Bureau, the Community Water Dialogue, Rotary, and others. Staff have also organized meetings, or been invited to present at meetings, to

provide updates to the California Water Commission, the Santa Cruz County Zone 7 Flood Control and Water Conservation District, the City of Watsonville, the Pajaro Valley Unified School District, the Pajaro Valley Public Cemetery District, Reclamation District 2049, the Santa Cruz Mid-County Groundwater Agency, the Salinas Valley Basin Groundwater Sustainability Agency, and individual stakeholders. Additionally, PV Water staff met with representatives from the State Water Resources Control Board, California Department of Fish and Wildlife, and National Marine Fisheries Service.

## 1.4 Organization of the Supplemental EIR

This EIR is organized as follows:

- **Chapter S, *Summary*.** This chapter summarizes the Projects, identifies potential significant environmental impacts and mitigation measures, and describes the alternatives considered in this EIR. It also identifies areas of controversy and issues to be resolved.
- **Chapter 1, *Introduction*.** This chapter describes the purpose and organization of the EIR, as well as the environmental review process and additional public outreach efforts.
- **Chapter 2, *Project Description*.** This chapter describes the Projects (including background and objectives), summarizes the Projects' components, and provides information about Project construction and operation. The chapter also lists permits and approvals relevant to the construction and operation of the Projects.
- **Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*.** This chapter is subdivided into sections for each environmental resource topic analyzed. Each section describes the environmental and regulatory setting, the criteria used to determine impact significance, and the approach to the analysis for that resource topic. It then presents analyses of potential environmental impacts as well as mitigation measures that have been developed to address significant and potentially significant impacts. Each section also includes an evaluation of cumulative impacts with respect to that resource topic.
- **Chapter 4, *Other CEQA Considerations*.** This chapter identifies the significant environmental effects that cannot be avoided if the Projects are implemented, and describes significant irreversible impacts.
- **Chapter 5, *Alternatives*.** This chapter describes the alternatives to the Projects and compares their impacts to those of the Projects. This chapter also summarizes the alternatives that were considered but eliminated from further analysis.
- **Chapter 6, *Report Preparers*.** This chapter lists the authors of this EIR.

Technical and supporting information for the EIR are included as appendices to the EIR.

# CHAPTER 2

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## Projects Description

### 2.1 Project Background

#### 2.1.1 Pajaro Valley Water Management Agency

Pajaro Valley Water Management Agency (PV Water) was formed in 1984 by the Pajaro Valley Water Management Agency Act, for the primary purpose of managing groundwater resources and supplemental water supplies in its service area. The 2014 Sustainable Groundwater Management Act granted authority to PV Water to be the exclusive Groundwater Sustainability Agency within its service area (Water Code Section 10723), and in 2015 the Board of Directors (the Board) elected to become a Groundwater Sustainability Agency. PV Water's service area encompasses approximately 70,000 acres in the Pajaro Valley, located in southern Santa Cruz County, northern Monterey County, and a small portion of San Benito County. Seawater intrusion in the Pajaro Valley Groundwater Basin was first documented in 1953. In the coastal areas and throughout much of the Pajaro Valley Groundwater Basin, overdraft conditions<sup>1</sup> have caused groundwater levels to drop below sea level, creating a landward pressure gradient that causes seawater to move inland. Seawater intrusion has elevated the chloride concentrations in groundwater up to two and a half miles inland from the coast, in some areas contaminating the groundwater to the point that it is unsuitable for agricultural irrigation and domestic (potable) uses without treatment. Section 2.3, Need for the Projects, describes overdraft and seawater intrusion conditions in the basin in greater detail.

PV Water's objective is to achieve a sustainable groundwater basin by managing local groundwater resources to reduce, and eventually halt, long-term seawater intrusion and overdraft of the groundwater basin while ensuring sufficient water supplies for present and anticipated needs. To achieve this objective, PV Water has prepared and periodically updates a basin-wide groundwater management plan, the Basin Management Plan (BMP), which serves as the guiding document for its major projects and programs. Preparation of the BMP includes engaging the public, forming a stakeholder committee, reviewing existing groundwater basin conditions, evaluating the results of implemented projects to reduce overdraft and seawater intrusion, as well as identifying additional projects and management strategies to achieve its stated goals and testing the strategies with the Pajaro Valley Hydrologic Model (PVHM). The Department of Water Resources (DWR) approved the BMP, PVHM and associated documents as an Alternative to a Groundwater Sustainability Plan in 2019.

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<sup>1</sup> Overdraft occurs when the amount of groundwater withdrawn from a basin exceeds the volume of freshwater replenishing the basin.

## 2.1.2 Basin Management Planning

### 2.1.2.1 Previous Basin Management Planning Efforts

PV Water prepared its first BMP in the early 1990s. The “1993 BMP” identified a preferred alternative that called for importing surface water via pipeline to the region from the federal Central Valley Project to substantially augment the local water supplies. A program environmental impact report (1993 BMP PEIR) was prepared for the 1993 BMP to analyze, at a program-level, this concept.<sup>2</sup>

A redraft of the BMP was prepared in 2000 but its completion was delayed to allow additional analyses of local water supply options, which were then incorporated into the 2002 Revised BMP. The 2002 Revised BMP EIR provided a program-level analysis of the environmental impacts of two alternatives, and a project-level analysis of local projects. The final strategy of the 2002 Revised BMP adopted by the Board was called the Modified BMP 2000 Alternative and included the following major projects and programs: Harkins Slough Managed Aquifer Recharge and Recovery Facility (Harkins Slough Facility; comprised of the Harkins Slough filter plant, recharge basin, and associated recovery wells, monitoring wells, and pipelines), Coastal Distribution System (CDS), 54-Inch Import Water Project with Out-of-Basin Banking, Recycled Water Project, and Conservation and Watershed Management Programs. Subsequently, PV Water constructed the Harkins Slough Facility, a significant portion of the CDS, supplemental wells, and, in cooperation with the City of Watsonville, the Watsonville Area Recycled Water Facility (RWF). Section 2.1.3, below, briefly describes these facilities.

While the implementation of the Harkins Slough Facility, the RWF, supplemental wells, and the CDS has helped to reduce the magnitude of the groundwater overdraft and resulting seawater intrusion problems; these problems persist. In 2005, PV Water contracted with the United States Geological Survey to cooperatively develop a robust, regional hydrologic model to simulate the use and movement of water within the groundwater basin. Based on the hydrologic modeling results, PV Water has established a target of reducing groundwater pumping in the Pajaro Valley Groundwater Basin by 12,100 acre-feet per year (AFY).<sup>3</sup>

### 2.1.2.2 Basin Management Plan Update

In 2010, PV Water formed a 21-member Ad Hoc BMP Committee as a means for the Pajaro Valley community to help guide the Board in the development of an updated BMP (BMP Update) focused on implementing locally controlled solutions (e.g., additional recycled water use, conservation, and surface water supplies). The BMP Update planning process began with the development of a comprehensive list of supplemental water supply projects, including some identified in previous BMPs, that could help meet the goals of stopping seawater intrusion and eliminating basin overdraft. Potential projects (44 in total) were identified, screened, ranked, and prioritized for feasibility, cost, and other factors. Based on this analysis, seven projects were

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<sup>2</sup> In early 2010, the Board removed the Import Pipeline Project from further consideration for a variety of reasons, including feasibility, cost, and a decision to focus on locally controlled projects.

<sup>3</sup> One acre-foot equals approximately 326,000 gallons, or enough water to cover an acre of land one foot deep.



recommended by the Ad Hoc BMP Committee, and ultimately selected by the Board for inclusion in the BMP Update portfolio. These projects are:

- Conservation;
- Increased Recycled Water Storage at the RWF;
- Increased Recycled Water Deliveries;
- Harkins Slough Recharge Facilities Upgrades (this project was subsequently renamed the Harkins Slough Facilities Upgrades Project, referred to as the Harkins Slough Project in this document);
- Watsonville Slough with Recharge Basins (this project was subsequently renamed the Struve Slough Project to reflect the location of the proposed intake);
- College Lake with Inland Pipeline to Coastal Distribution System (this project was subsequently renamed the College Lake Integrated Resources Management Project); and
- Murphy Crossing with Recharge Basins.

### 2.1.2.3 2014 Program Environmental Impact Report

To address the potential environmental impacts of the BMP Update components, PV Water prepared the *Final Environmental Impact Report for the Basin Management Plan Update* (State Clearinghouse #2000062030, referred to herein as 2014 BMP Update PEIR), which evaluated the environmental impacts of the seven components at a program level of detail.<sup>4</sup> A program EIR is prepared for a group of potential actions that can be characterized as one large project, such as the BMP Update (California Environmental Quality Act [CEQA] *Guidelines* Section 15168). A program EIR is a first-tier environmental document that assesses and documents the broad environmental impacts of a program with the understanding that a more detailed site-specific review may be required to assess future projects implemented under the program. The 2014 BMP Update PEIR evaluated the BMP Update components based on conceptual information available at that time, and established a framework for “tiered” or project-level environmental documents that would be prepared in accordance with the overall program.

The Board certified the 2014 BMP Update PEIR on April 16, 2014 (Resolution 2014-04). The Board then approved the BMP Update and made findings pursuant to CEQA, including a statement of overriding considerations, and adopted a mitigation monitoring and reporting program for the BMP Update (Resolution 2014-05).

<sup>4</sup> The *Final Environmental Impact Report for the Basin Management Plan Update* is available online at <https://www.pvwater.org/bmp-update>. (PV Water, *Final Environmental Impact Report for the Basin Management Plan Update*, February 2014.)

#### **2.1.2.4 Sustainable Groundwater Management Act (SGMA)<sup>5</sup>**

The Sustainable Groundwater Management Act (SGMA) was signed into law in September 2014, after the 2014 BMP Update PEIR was certified.<sup>6</sup> SGMA defines sustainable groundwater management as the “management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.”<sup>7</sup> “Undesirable Results” are defined in SGMA and may be summarized as any of the following effects caused by groundwater conditions occurring throughout the basin:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply;
- Significant and unreasonable reduction of groundwater storage;
- Significant and unreasonable seawater intrusion;
- Significant and unreasonable degraded water quality;
- Significant and unreasonable land subsidence; and/or
- Surface water depletions that have significant and unreasonable adverse impacts on the beneficial uses of surface water.<sup>8</sup>

SGMA requires critically overdrafted, high priority basins like the Pajaro Valley Groundwater Basin<sup>9</sup> to be managed under a Groundwater Sustainability Plan by January 31, 2020, and to achieve sustainability by 2040. The BMP and other documents were approved as an Alternative to a Groundwater Sustainability Plan in 2019. SGMA also:

- Empowers local agencies to manage groundwater basins sustainably;
- Establishes basic requirements for Groundwater Sustainability Plans; and
- Provides for a review, evaluation and assessment of Groundwater Sustainability Plans by DWR (See Water Code sections 10733-10733.8) and intervention by the State Water Resources Control Board (State Water Board) if the applicable requirements of SGMA have not been met (see Water Code sections 10735-10735.8).

SGMA places the responsibility of sustainable groundwater management on Groundwater Sustainability Agencies, which can be any local agency that has water supply, water management, or land use responsibilities within a groundwater basin, or a combination of such agencies overlying a basin. SGMA granted authority for PV Water to become the exclusive local agency to manage groundwater within its statutory boundaries (Water Code Section 10723) and the Board

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<sup>5</sup> Cal. Water Code § 10720, et seq.

<sup>6</sup> California Department of Water Resources, Sustainable Groundwater Management Act and Related Statutory Provisions from SB1168 (Payley), AB1739 (Dickinson), and SB1319 (Payley) as Chaptered., effective January 1, 2016.

<sup>7</sup> Cal. Water Code § 10721(v).

<sup>8</sup> California Department of Water Resources, Sustainable Groundwater Management Act and Related Statutory Provisions from SB1168 (Payley), AB1739 (Dickinson), and SB1319 (Payley) as Chaptered], effective January 1, 2016.

<sup>9</sup> Officially, the basin is referred to as the Pajaro Valley Groundwater Subbasin 3-002.01 (Corralitos Basin, Pajaro Valley Subbasin).

voted to become the Groundwater Sustainability Agency for the Pajaro Valley Groundwater Basin in August 2015. In September 2015, PV Water formally elected to become a GSA, submitted a formation notice to DWR, and DWR posted this notice.<sup>10,11</sup> In 2016, PV Water submitted the BMP Update and associated documents as an Alternative to a Groundwater Sustainability Plan, which was accepted by DWR on July 17, 2019 and is currently being implemented.<sup>12</sup>

### 2.1.3 Existing PV Water Facilities and Operations

PV Water currently operates several facilities to help manage the Pajaro Valley Groundwater Basin, including the following:

- ***Coastal Distribution System.*** The CDS is a distribution system used to deliver supplemental water supplies (described below) to farms in coastal areas in portions of Santa Cruz and Monterey counties within the PV Water service area. The area served by the CDS is referred to as the Delivered Water Zone. Water delivered through the CDS replaces groundwater that would otherwise be pumped from coastal wells. In this sense, this delivered water provides “in-lieu-recharge” to the groundwater basin.
- ***Harkins Slough Facility.*** PV Water uses the Harkins Slough Facility described in Section 2.1.2.1 to divert wet-weather flows from Harkins Slough to storage in the surficial aquifers of the San Andreas Terrace, located near the coast. PV Water uses various wells to monitor (groundwater elevations and quality) and recover this stored water for delivery to coastal farms through the CDS.
- ***Watsonville Area Recycled Water Facility.*** The RWF was constructed and is operated in partnership with the City of Watsonville. Located at the Watsonville Water Resources Center, the RWF was designed to produce and distribute approximately 4,000 AFY of tertiary treated, disinfected, recycled water through the CDS.<sup>13,14</sup> The recycled water is mixed with “blend”<sup>15</sup> water from the Harkins Slough Facility, water from supplemental wells operated by PV Water, and water from the City of Watsonville’s potable water system in order to meet the demand for delivered water and to dilute the concentrations of salts naturally occurring in recycled water. PV Water takes these actions with the goal of achieving the water quality objectives established by the Projects and Facility Operations Committee, and to increase the quantity of the CDS supply.

<sup>10</sup> PV Water, Sustainable Groundwater Management, 2019. Available online at <https://www.pvwater.org/sgm>. Accessed on April 10, 2019.

<sup>11</sup> California Department of Water Resources, All posted Groundwater Sustainability Agency Notices, last modified October 8, 2015. Available online at <http://sgma.water.ca.gov/portal/gsa/all>. Accessed on April 10, 2019.

<sup>12</sup> California Department of Water Resources, SGMA Portal, Alternatives. Pajaro Valley Water Management Agency, last modified October 8, 2015. Available online at <https://sgma.water.ca.gov/portal/alternative/print/22>. Accessed on April 10, 2019.

<sup>13</sup> The Watsonville Wastewater Treatment Facility and RWF are now collectively referred to as the Water Resources Center.

<sup>14</sup> The recycled water is treated to meet requirements for agricultural irrigation use in Title 22 of the California Government Code.

<sup>15</sup> This blending of water improves the overall quality of the delivered water by reducing the concentrations of salts.

- **Supplemental Wells.** In addition to the wells associated with the Harkins Slough Facility, PV Water operates supplemental water supply wells to dilute the concentrations of salts naturally occurring in the recycled water and to increase the quantity of the delivered water supply.

## 2.1.4 Current Operations

### 2.1.4.1 Local Hydrology and Hydraulics<sup>16</sup>

The Watsonville Slough system consists of six major branch sloughs: Watsonville, Harkins, Hanson, Struve, West Branch of Struve, and Gallighan. The slough system is a network of approximately 800 acres of coastal salt marsh, seasonal wetlands, brackish and freshwater emergent marsh and riparian communities that receives runoff from an approximately 13,000-acre watershed area.<sup>17</sup>

### 2.1.4.2 Harkins Slough

#### **Current Pumping Operations**

The Harkins Slough Facility began construction in 2000 and commenced operations in 2002 to divert, filter, convey, and seasonally store wet weather flows from Harkins Slough in the shallow aquifers of the San Andreas Terrace. Slough water is diverted via a Santa Cruz County-owned pump station that is operated by PV Water. The water is pumped through pressure sand filters to the existing recharge basin where the water percolates into the ground, recharging the surficial aquifer. . Stored recharge water is pumped by a series of recovery wells for delivery through the CDS to coastal farms during the irrigation season.

#### **Water Right Permit**

On June 8, 2000, the State Water Board issued water-right Permit 21039 (Application 30522) to PV Water. The State Water Board issued amended water-right Permit 21039 to PV Water on October 3, 2012. This permit authorizes PV Water to divert up to 2,000 AFY from Harkins and Watsonville Slough between November 1 and May 31. PV Water has diverted approximately 9,980 AF (an average of 525 AFY) from Harkins Slough from 2002 through 2020, with a maximum annual diversion of 1,280 AF in 2020. The average annual yield from the extraction wells to the CDS was estimated to be 1,100 AFY at the time the project was constructed. The project has delivered an average of 196 AFY of water from the recovery wells to the CDS from 2002 through 2018, with a maximum of 338 AF in 2017.

#### **Pumping Issues**

There are constraints on existing diversion and recovery operations that adversely affect the yield of the existing Harkins Slough facilities. Historically, PV Water has not been able to divert more than 1,280 AFY to the recharge basin. Water quality is the primary reason for these diversion rates, and in years when water supply and quality are good, infiltration and recovery become the

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<sup>16</sup> Information in Sections 2.1.4.1 through 2.1.4.3 is derived from PV Water, *Final Basin Management Plan Update*, February 2014 and ESA, Harkins and Struve Sloughs Hydrologic Analysis of Diversion Alternatives Memorandum, prepared for PV Water, July 2020.

<sup>17</sup> PV Water, *Final Environmental Impact Report for the Basin Management Plan Update*, February 2014.

limiting factors. As stated above, at the time of construction, the Harkins Slough Facility was designed to recover an average of 1,100 AFY from the recovery wells, but PV Water has recovered an average of 196 AFY.

Diversions from the slough are periodically constrained by water quality, including high total dissolved solids and high turbidity. Water supplied to the CDS from the extraction wells has been limited by low yields from the wells. The low yields are due to the presence of fine-grained sediment lenses (silt and clay) located above the screened interval of several recovery wells, which restricts the vertical flow of water in the subsurface. In early 2001, when the facility was still under construction, ten extraction wells were installed around the recharge basin. These ten wells were constructed with a 40-foot perforated interval, with perforations averaging 36 feet above sea level to about 5 feet below sea level. As noted above, yield from the wells have been much lower than anticipated. With upgrades and new facilities implemented as part of the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects)<sup>18</sup>, PV Water would be able to increase these diversion rates, potentially up to the 2,000 AFY maximum authorized by PV Water's water-right Permit 21039 for the Harkins Slough Project, as well as increase recovery rates.

### **Water Quality and Yield**

The goal of the upgrades proposed in the Harkins Slough Project is to increase the Project's yield of recovered water by approximately 1,000 AFY on average, above the current recovered water yield of approximately 200 AFY. The average projected yield is lower than the maximum authorized diversion of 2,000 AFY because, in some years, the maximum authorized diversion is not possible due to variability in available water in the slough, high salinity, high suspended solids affecting filtration and percolation rates, and losses such as evaporation.

Separate from the Harkins Slough diversion, PV Water is proposing a new diversion from the Watsonville Slough System: the Struve Slough Project, which is described in the following section.

Diversions from Harkins Slough are permitted from November 1 through May 31. Typically, diversions begin no earlier than December, when the quality of slough water becomes suitable for recharge. Diversions typically occur when the turbidity level is less than 50 Nephelometric Turbidity Units (NTU), but occasionally occur when turbidity levels are higher than 50 NTU. Some years the filters are not used. Elevated salinity concentrations from periodic backflows of brackish water from the Pajaro River Lagoon, often during King Tide events, have limited or prevented diversion operations in many years since 2012. These events could become a greater problem in the future due to rising sea levels and the changing precipitation patterns that may occur with climate change.

The Natural Resources Conservation Service constructed a wetland between Harkins Slough and Watsonville Slough in 2016, upstream of the existing Harkins Slough diversion. The new channel routes water at increased discharge stages from the present alignment of the sloughs into the

<sup>18</sup> The Harkins Slough Project and the Struve Slough Project are collectively referred to as the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects).

constructed wetlands, and Watsonville Slough joins with Harkins Slough upstream of the Harkins Slough filter plant. The wetland construction by the Natural Resources Conservation Service may improve the water quality at the diversion point, although improvements have not yet been observed. The improvements could occur through: (1) bringing higher quality water from Watsonville Slough to Harkins Slough, (2) reducing turbidity by settling and filtering solids in the wetland, and (3) improving water quality through natural vegetation filtration (anticipated to reduce nutrient concentrations) as the water flows through the constructed wetland.

#### 2.1.4.3 Struve Slough

Struve Slough is one of the six major branch sloughs contributing to Watsonville Slough, and is the most upstream branch of the slough complex. The Struve Slough Project is designed to utilize the available fresh water from the slough, with an approach and design similar to those of the existing facilities, including diversion, treatment, and recharge facilities. Permitting for the Struve Slough Project would be similar to the permitting for the Harkins Slough Project, with the addition of a new water-right permit from the State Water Board.

#### ***Current Pumping Operations***

Struve Slough is not used by PV Water for any purposes. Around the banks and upland areas above the sloughs are agricultural, commercial, and residential land uses and recreational trails.

## 2.2 Project Location

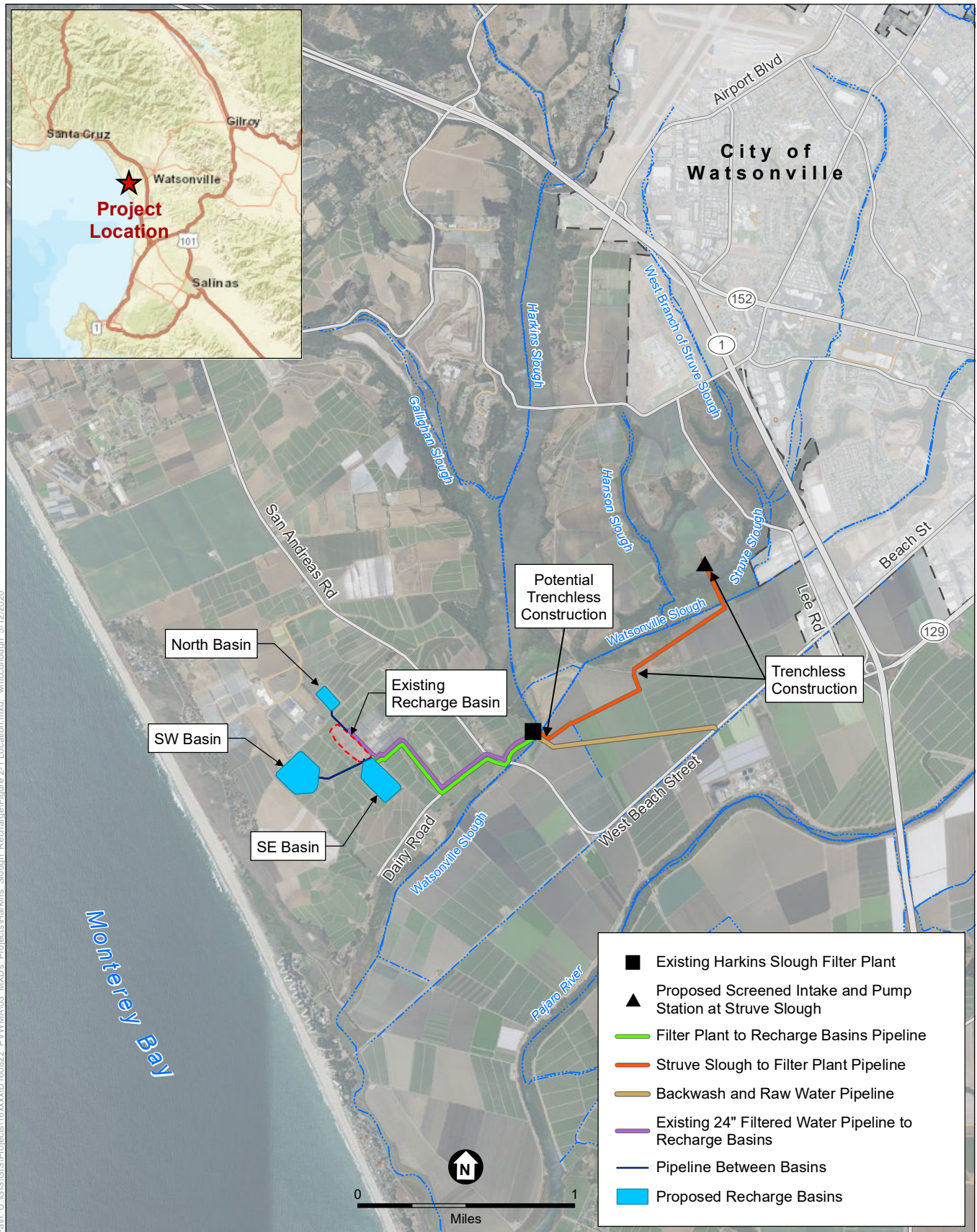
The Projects include the following components, which would be located in unincorporated Santa Cruz County (refer to **Figure 2-1**). The locations of the Project components and related construction staging areas are collectively referred to as the “Project sites.” **Appendix PD-1** lists by Assessor Parcel Number (APN) the properties that are associated with the Projects. Refer to Section 2.5 for descriptions of the Project components.

### 2.2.1 Harkins Slough Facilities Upgrades Project

**Figure 2-2** shows a site plan of the Harkins Slough filter plant and proposed upgrades. The existing Harkins Slough filter plant is approximately one mile southwest of the Watsonville city limits, north of San Andreas Road and west of State Route (SR) 1 (refer to **Figure 2-1**).

- **Harkins Slough Filter Plant and Pump Station Upgrades.** The proposed filter plant expansion and pump station upgrades would occur at the existing Harkins Slough filter plant and pump stations at the southern end of Harkins Slough, approximately 900 feet north of San Andreas Road (**Figure 2-2**). The filter plant expansion, pump station upgrades, and associated pipeline are within APN 052-211-29.
- **Backwash and Raw Water Pipeline.** A backwash and raw water pipeline would extend from the Harkins Slough filter plant across agricultural fields to connect with an existing 33-inch gravity sewer in West Beach Street (**Figure 2-1**). The proposed pipeline alignment follows existing developed road rights-of-way and traverses agricultural land in unincorporated Santa Cruz County.



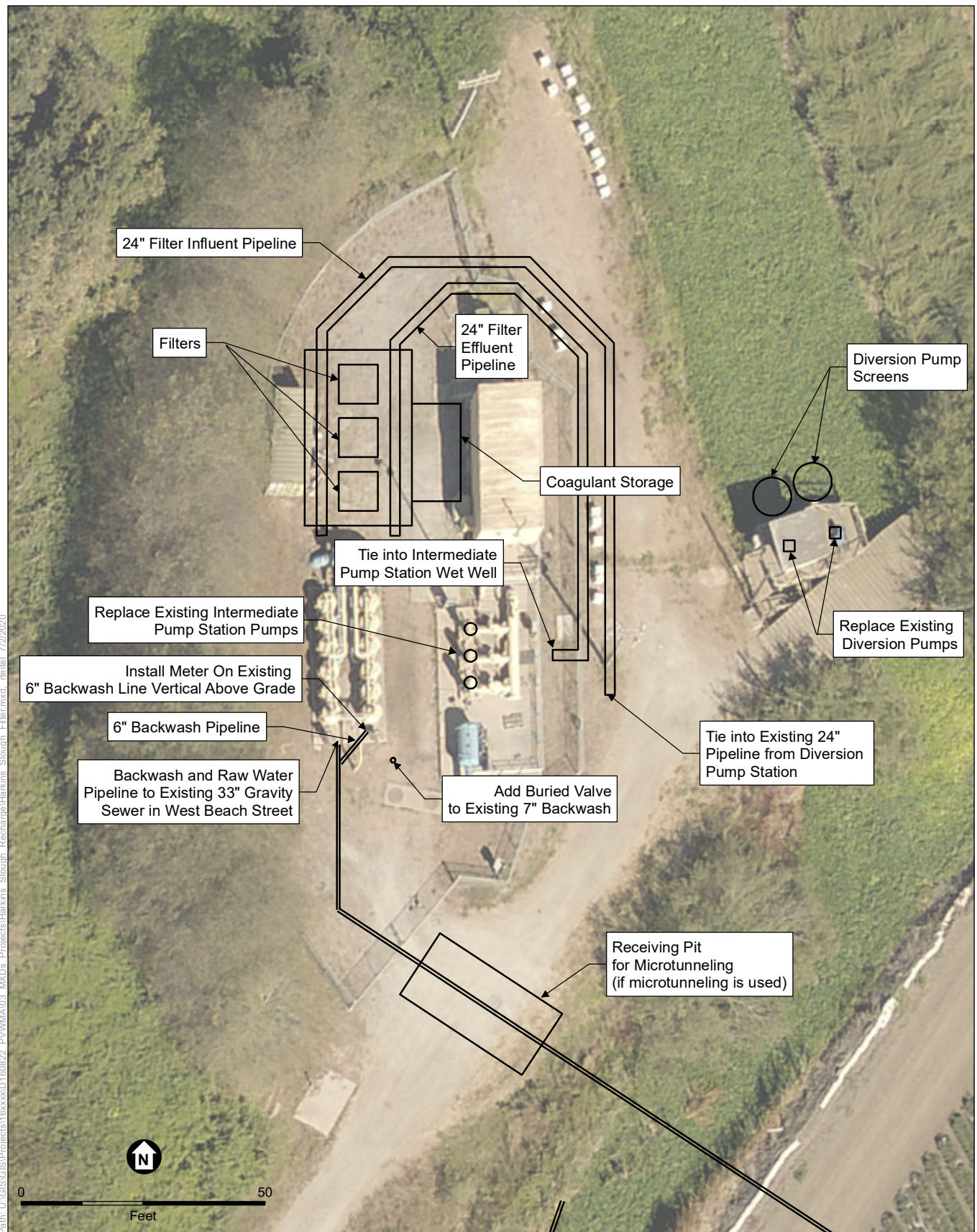


SOURCE: Carollo Engineers, 2019;  
ESRI World Imagery, 7/23/2016; ESA

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 2-1**  
Project Location Map





SOURCE: Carollo Engineers, 2019

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 2-2**  
Harkins Slough Filter Plant Site Plan



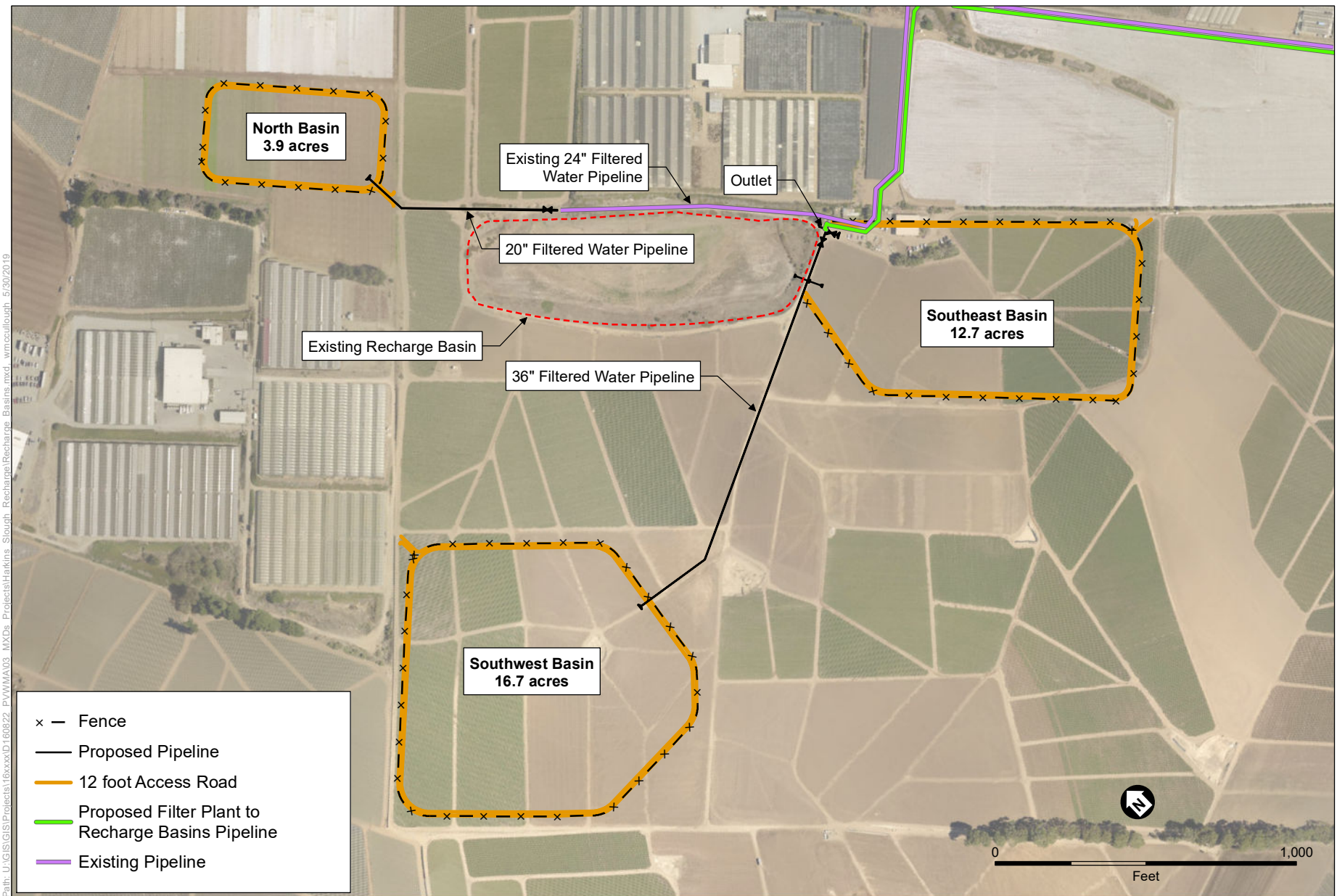
- Southwest and Southeast Recharge Basins, Recovery Wells, Monitoring Wells, and Associated Pipelines.** The proposed Southwest and Southeast recharge basins would be located on farmland west of San Andreas Road and north of Dairy Road in unincorporated Santa Cruz County. The Southwest basin site is approximately 850 feet southwest of the existing recharge basin, while the Southeast basin site is adjacent to the southeast side of the existing recharge basin (refer to **Figure 2-3**). Both basins would be connected via new pipelines to the existing 24-inch pipeline that connects the Harkins Slough filter plant with the existing recharge basin. Approximately ten recovery wells and ten monitoring wells would be installed per recharge basin. The recovery and monitoring wells may be constructed independently from the recharge basins. The proposed sites for the Southwest recharge basin, recovery wells, monitoring wells, and associated pipelines are within portions of APNs 052-181-20, 052-181-17, 052-541-02, and 046-151-24. The proposed sites for the Southeast recharge basin, recovery wells, monitoring wells, and associated pipelines are within portions of APNs 052-181-18 and 052-181-20. (With respect to potential adverse effects on agricultural land associated with development and operation of the Projects, refer to the discussion under Section 3.2, Land Use and Agricultural Resources.)
- Point of Diversion and Place of Use.**<sup>19</sup> Water would continue to be diverted at the existing point of diversion on Harkins Slough pursuant to PV Water's water-right Permit 21039. The place of use (PV Water's service area) would not change with implementation of the Project.

## 2.2.2 Struve Slough Project

**Figure 2-4** shows the locations and schematic of the proposed screened intake and pump station for the Struve Slough Project. Struve Slough is west of the Watsonville city limits.

- Screened Intake and Pump Station.** The proposed screened intake for the Struve Slough Project would be located in Struve Slough. The pump station would be located approximately 200 feet northwest of the intake on land zoned for agriculture. A pipeline would connect the intake to the pump station (refer to **Figure 2-4**). The proposed sites for the intake and pump station are within portions of APN 052-081-38.
- Struve Slough to Filter Plant Pipeline.** The proposed Struve Slough pipeline would extend from the proposed pump station to the Harkins Slough filter plant. The proposed alignment would traverse agricultural land in unincorporated Santa Cruz County (refer to **Figure 2-1**) and go beneath (via trenchless construction techniques) Struve Slough and the railroad tracks.
- Filter Plant to Recharge Basins Pipeline.** A new approximately one-mile-long pipeline would extend from the Harkins Slough filter plant approximately 900 feet north of San Andreas Road to the recharge basins, parallel to and approximately along the same route as the existing filtered water pipeline. The proposed alignment traverses agricultural land and existing road rights-of-way in unincorporated Santa Cruz County (**Figure 2-1**).

<sup>19</sup> The place of use consists of the areas where the appropriated water is to be used.



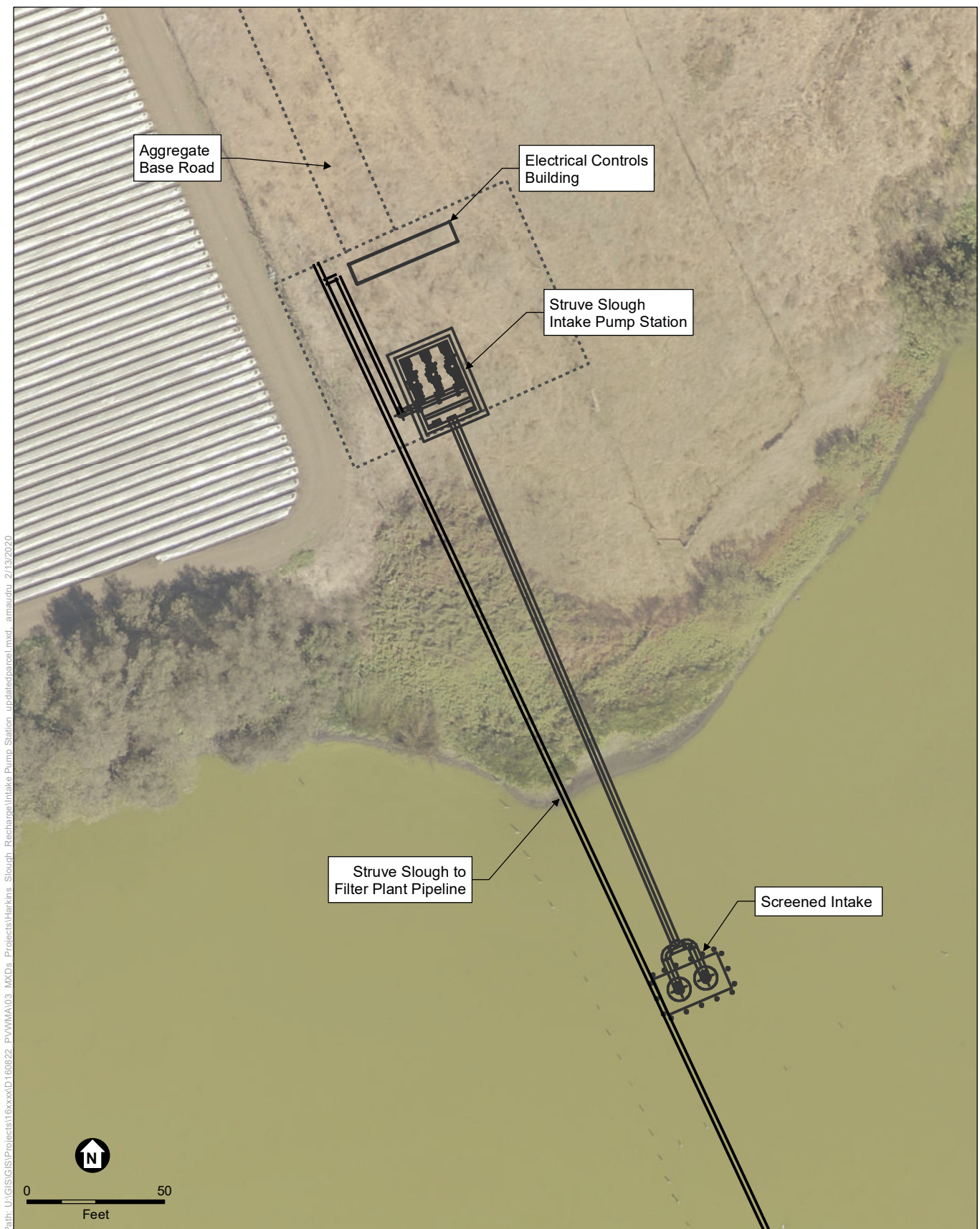
SOURCE: Carollo Engineers, 2019

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

Note:

1. Recovery wells would be located within 500 feet of each proposed recharge basin.
2. Not shown: connection from recovery wells to existing Coastal Distribution System pipelines.
3. A portion of the existing 24-inch filtered water pipeline located within the boundary of the proposed Southeast recharge basin would be relocated as needed.

**Figure 2-3**  
Recharge Basins



SOURCE: Carollo Engineers, 2019

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 2-4**  
Struve Slough Screened Intake and Pump Station



- **North Recharge Basin, Recovery Wells, Monitoring Wells, and Associated Pipelines.** The proposed North recharge basin would be located on farmland west of San Andreas Road and north of Dairy Road in unincorporated Santa Cruz County. The North recharge basin site is located about 375 feet northwest of the existing recharge basin, and would be connected via a short pipeline to the proposed filter plant to recharge basins pipeline (refer to Figure 2-3). Approximately ten recovery wells and ten monitoring wells would be constructed around the recharge basin. The recovery and monitoring wells may be constructed independently from the recharge basin. The proposed sites for the North recharge basin, recovery wells, monitoring wells, and associated pipelines are within portions of APNs 046-151-37, 052-311-01, and 052-181-19.
- **Point of Diversion and Place of Use.** As part of the Struve Slough Project, PV Water will file an application with the State Water Board for a new water-right permit. The proposed point of diversion would be located in Struve Slough, as depicted in Figure 2-4. **Figure 2-5** depicts the proposed place of use, which would include the areas where agricultural water users served by PV Water's CDS would use Project water.

As part of the Projects, PV Water intends to negotiate with potentially affected property owners to obtain property rights to access and use the Project sites.

## 2.3 Need for the Projects

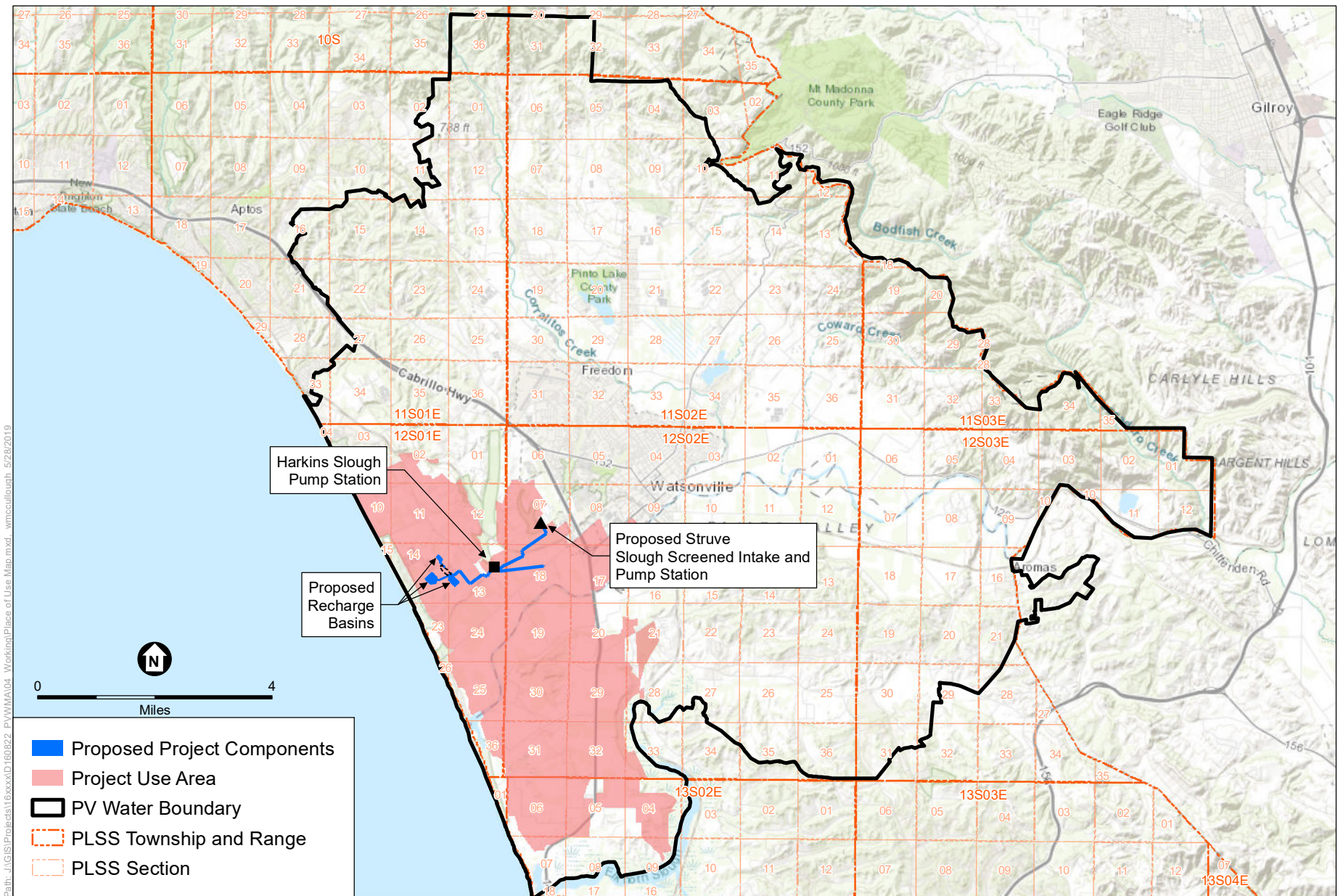
Land use within the Pajaro Valley is primarily agricultural, with crop values estimated at approximately \$900,000,000 annually based on the Santa Cruz County Ag Commissioner's 2012 crop report.<sup>20</sup> More recent estimates of crop values exceed \$1 billion. Approximately 92 percent of the water used in the Pajaro Valley is pumped groundwater. In the Pajaro Valley Groundwater Basin, groundwater levels have declined as a result of long-term groundwater overdraft. These overdraft conditions have caused groundwater levels within the basin to drop below sea level (refer to **Figure 2-6**), creating a landward pressure gradient that causes seawater to flow inland and mix with fresh groundwater. As seawater encroaches into the fresh groundwater basin, water quality degrades, limiting its use for irrigation and domestic purposes. Intrusion into freshwater aquifers also results in a loss of freshwater storage capacity. Seawater intrusion creates progressive increases in the concentrations of chloride, boron, magnesium, and other constituents in groundwater; chloride is used as an indicator constituent of seawater intrusion.

As shown on **Figure 2-7**, the extent of seawater intrusion has increased over time in the coastal region of the basin. Numerous wells in the coastal area have had substantial increases in chloride concentrations over the last few decades, indicating that the volume of freshwater displaced in the intruded area continues to increase. **Figure 2-8** depicts water demands in Pajaro Valley between 2000 and 2019, as well as rainfall totals by calendar year. Although total demands and agricultural groundwater pumping amounts were lower in 2016 to 2019 than in previous years, long-term total amounts of groundwater pumping continue to exceed total recharge, so the cumulative groundwater overdraft and seawater intrusion continues to occur. These conditions are not expected to improve without reductions in groundwater pumping<sup>21</sup> and development and delivery of supplemental water supplies.

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<sup>20</sup> PV Water, *Final Basin Management Plan Update*, February 2014.

<sup>21</sup> Elimination of groundwater pumping within PV Water's Delivered Water Zone (i.e., the areas currently served by the CDS) is considered the most effective method of reducing seawater intrusion as described in the PVHM.



SOURCE: Carollo Engineers, 2017; ESA, 2019

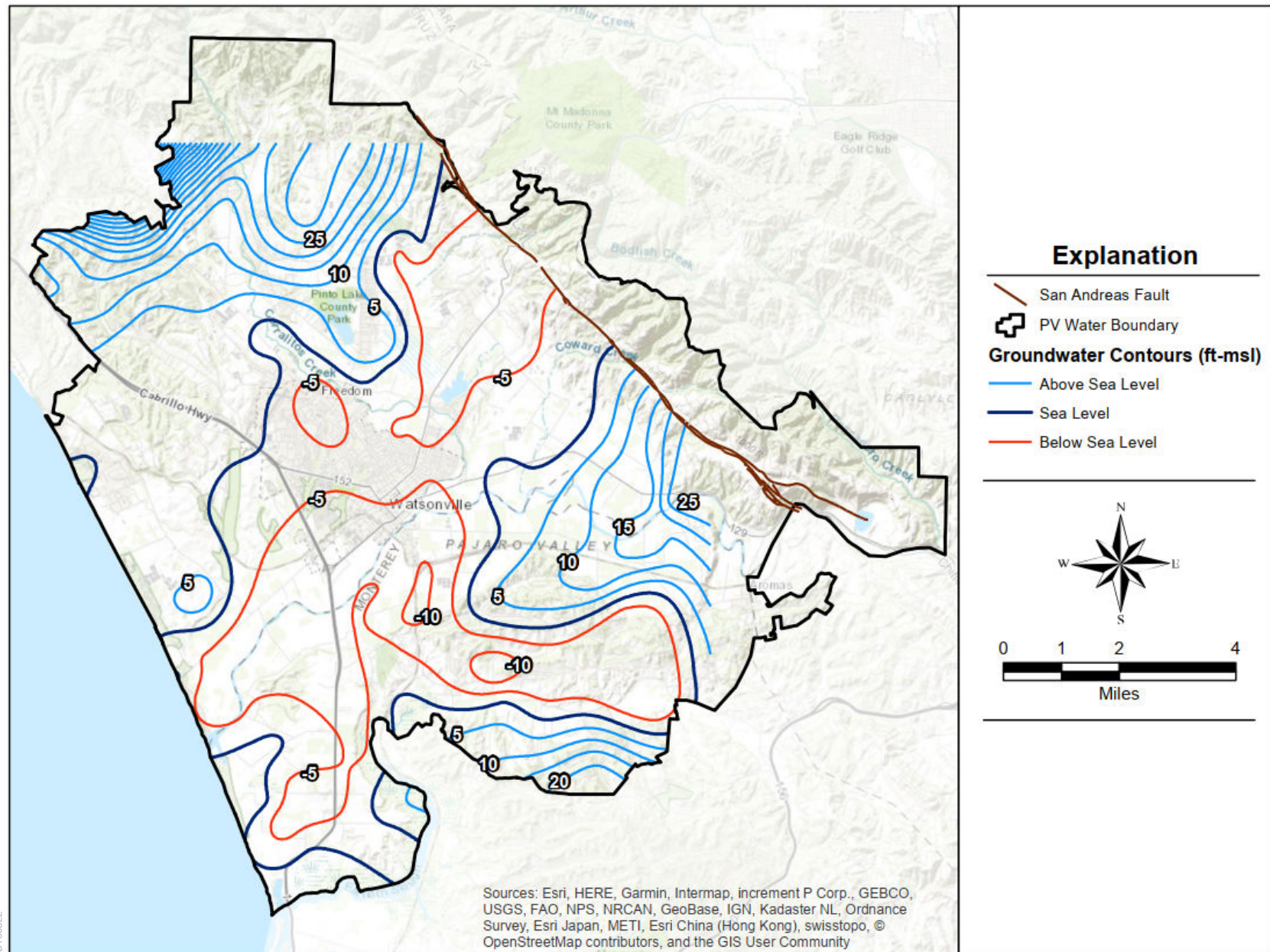
Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 2-5**  
Place of Use

**Notes:**

1. The proposed place of use includes parcels served by the existing Coastal Distribution System (CDS) and parcels that may be served by an expanded CDS.
2. PLSS = Public Land Survey System

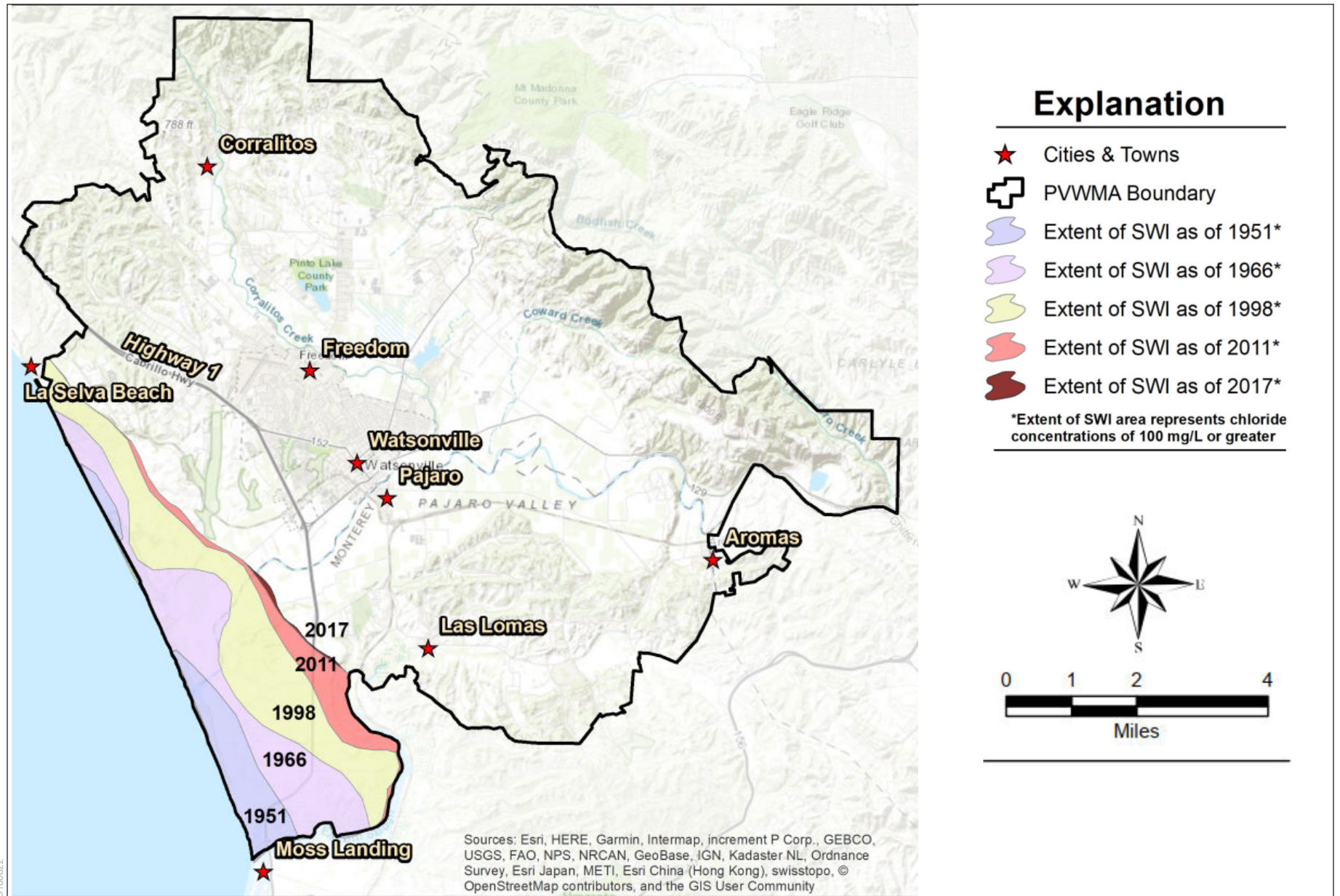




SOURCE: PV Water, February 2019.

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 2-6**  
Pajaro Valley Basin Groundwater Elevation (Fall 2018)

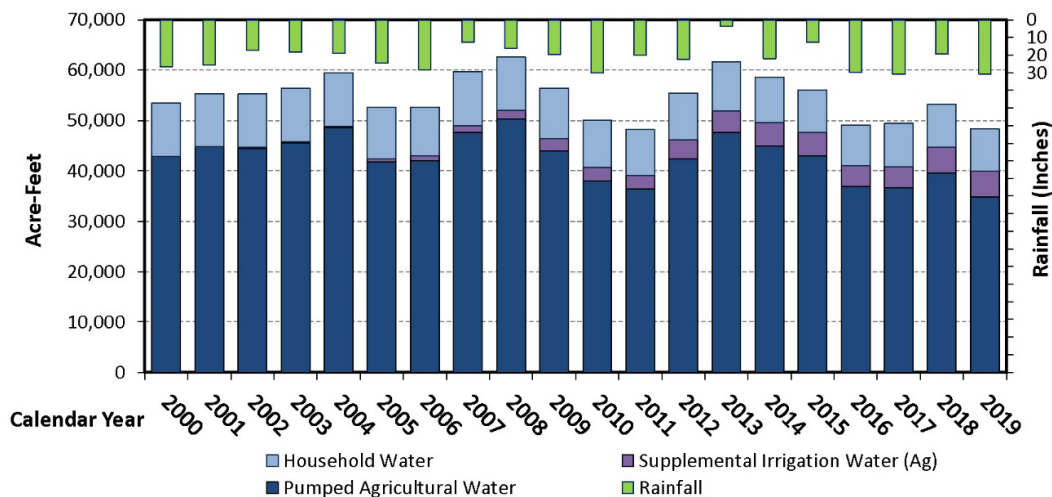


SOURCE: PV Water 2017

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 2-7**  
Seawater Intrusion within the Pajaro Valley



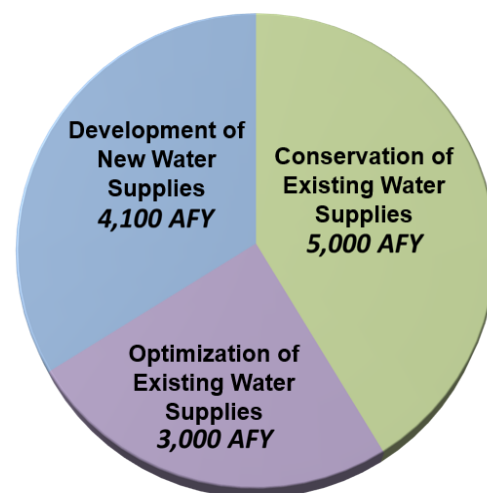


SOURCE: Email correspondence between C.Meusel (PV Water) and A.Maudru (ESA) regarding 2000-2019 precipitation trends, April 22, 2020.

**Figure 2-8**  
Pajaro Valley Water Use and  
Precipitation Trends (2000-2019)

Historical, existing, and future conditions of the groundwater basin within PV Water’s service area were modeled utilizing the Pajaro Valley Hydrologic Model.<sup>22</sup> The modeling confirms that projects built and implemented by PV Water to date have reduced, but have not eliminated, the seawater intrusion and the groundwater overdraft problems. The basin 30-year average annual deficit is estimated to be approximately 12,100 AFY.<sup>23</sup>

In 2014, the PV Water Board adopted the BMP Update. The BMP Update consists of three primary components to eliminate the estimated 12,100 AFY deficit. These three elements are shown on **Figure 2-9**.



**Figure 2-9**  
BMP Update Primary Components

The State Water Board issued PV Water’s existing appropriative water-right Permit 21039 for the Harkins Slough diversion in 2000 and issued an amended permit in 2012. An appropriative water right is perfected by diverting water under the permit and applying the diverted water to beneficial use. The State Water Board then may issue a water-right license, which confirms the appropriative water right for the maximum amount diverted and applied to beneficial use (see Water Code Section 1610). The water-right license then supersedes the water-right permit, and specifies the

<sup>22</sup> Hanson, R. T., Wolfgang Schmid, Claudia C. Faunt, Jonathan Lear, and Brian Lockwood. USGS Scientific Investigations Report 2014-5111, Integrated Hydrologic Model of the Pajaro Valley, Santa Cruz and Monterey Counties, California, 2014.

<sup>23</sup> Hanson, R. T., B. Lockwood, W. Schmid, Journal of Hydrology 519 (2014) 131-147, *Analysis of Projected Water Availability with current Basin Management Plan*, 2014.



maximum annual and instantaneous diversion rates that occurred under the permit period. These rates then are the maximum authorized rates for future diversions and use under the license. PV Water's current deadline for diverting water and applying it to beneficial use under water-right Permit 21039 is December 31, 2021. If PV Water has not diverted water for beneficial use at the full annual or instantaneous diversion rate specified in this permit by this deadline, then PV Water may apply to the State Water Board to extend this deadline.

Facility improvements are needed to accomplish three goals: (1) maximize diversions from the sloughs, (2) maximize infiltration of diverted water, and (3) maximize water extracted from the recovery wells and supplied to the CDS. The Projects are designed to accomplish these goals through the construction of new infrastructure and upgrades to existing infrastructure.

## 2.4 Project Objectives

The primary purposes of the Projects are to help balance the groundwater basin, prevent further seawater intrusion, and meet water supply needs in PV Water's service area by upgrading the existing Harkins Slough filter plant, developing Struve Slough as a new water supply source, and constructing new recharge basins and associated recovery wells, monitoring wells, and pipelines. The following objectives were included in the 2014 BMP Update PEIR:

- Prevent seawater intrusion, long-term groundwater overdraft, land subsidence, and water quality degradation;
- Manage existing and supplemental water supplies to control overdraft and provide for present and future water needs;
- Create a reliable, long-term water supply, which has been identified as an important cornerstone of the long-term economic vitality of the Pajaro Valley;
- Develop water conservation programs; and
- To recommend a program that is cost effective and environmentally sound.

PV Water anticipates that the Projects would advance all of these objectives with the exception of development of water conservation programs.<sup>24</sup>

As discussed in Section 2.1.2.4, SGMA was signed into law after PV Water's approval of the 2014 BMP Update. In light of the BMP objectives, the requirements of SGMA, and the mitigation measures adopted as part of its approval of the BMP Update, the Board adopted the following project-specific objectives for the Projects in April 2020:

- Design and implement reliable facilities to help achieve sustainable groundwater management of the Pajaro Valley Groundwater Subbasin by 2040, taking into account potential future hydrologic changes, including those associated with climate change.<sup>25</sup>

<sup>24</sup> PV Water's water conservation programs are designed to reduce water use in the Pajaro Valley. Information on PV Water's water conservation programs is available at <https://www.pvwater.org/>.

<sup>25</sup> Sustainable groundwater management is defined under the SGMA as management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results (Water Code, § 10721, subd. (v)).

- Substantially contribute to the Pajaro Valley’s water supply needs in a timely manner, consistent with the Basin Management Plan Update implementation goals.
- Use locally controlled surface water for agricultural purposes to offset groundwater pumping in an environmentally sound manner and in coordination with resource agencies, the public, and other stakeholders, while preserving existing habitat.
- Make efficient use of, and leverage federal, state, and local investments in, existing Agency infrastructure.
- In coordination with other agencies, develop surface water supplies in a manner that is compatible with flood risk reduction and habitat restoration planning.

## 2.5 Project Components

### 2.5.1 Overview

**Figure 2-10** presents the overall estimated schedule and the general steps involved in implementing the Projects. (Table 2-4A and 2-4B, below, present details on the proposed construction schedule.) **Table 2-1** summarizes key features of the Projects. PV Water is currently studying the hydrogeology of the San Andreas Terrace in the area of the existing and proposed recharge basins. The study includes data collection and analyses, improvements to an existing groundwater flow model, and simulations of that model in order to better understand the dynamics of recharge and recovery of infiltrated water. Once the study is completed, PV Water will estimate the yield for the Projects.

Component	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>Harkins Slough Facilities Upgrades Project</b>									
Southeast Recharge Basin, Recovery and Monitoring Wells, and Pipelines									
Filter Plant Upgrades									
Southwest Recharge Basin, Recovery and Monitoring Wells, and Pipelines									
<b>Struve Slough Project</b>									
Screened Intake and Pump Station									
Struve Slough to Filter Plant Pipeline									
Filter Plant to Recharge Basins Pipeline									
North Recharge Basin, Recovery and Monitoring Wells, and Pipelines									

NOTE:  
<sup>a</sup> Blue represents the design and bid period, while black represents the construction period.

SOURCE: Carollo Engineers, 2019.

**Figure 2-10**  
Proposed Project Implementation Schedule

**TABLE 2-1**  
**KEY FEATURES OF WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS**

Key Feature		Summary Description of Harkins Slough Project	Summary Description of Struve Slough Project
Annual Diversion	Average	Approximately 740 AFY	Approximately 1,320 AFY
	Maximum	2,000 AFY	4,000 AFY
Components	Facility Construction/Expansion	<ul style="list-style-type: none"> <li>Construction of coagulant addition facilities and additional filters to reduce the amount of solids sent to the recharge basins.</li> <li>Replacement of two existing diversion pumps and three existing intermediate pumps to allow PV Water to better control the flow sent to filters and recharge basin.</li> <li>Addition of two diversion pump screens.</li> </ul>	<ul style="list-style-type: none"> <li>Construction of a screened intake that would divert water from Struve Slough via a pipeline to the proposed pump station.</li> <li>Construction of a pump station that would transport water to the Harkins Slough filter plant via a new pipeline (Struve Slough to filter plant pipeline).</li> </ul>
	Recharge Basins and Recovery Wells	<b>Southwest and Southeast Recharge Basins</b> <ul style="list-style-type: none"> <li>Would receive water pumped from Harkins or Struve Sloughs.</li> <li>Southwest recharge basin: 16.7 acres with a capacity of 77 acre-feet.</li> <li>Southeast recharge basin: approximately 12.7 acres, with a capacity of 128 acre-feet.</li> <li>Estimated 10 recovery wells installed within 500 feet of each recharge basin to recover water from the aquifers.</li> <li>Estimated 10 monitoring wells installed at each recharge basin to monitor underground water level fluctuations.</li> </ul>	<b>North Recharge Basin</b> <ul style="list-style-type: none"> <li>Would receive water pumped from Harkins or Struve Sloughs.</li> <li>Approximately 3.9 acres, with a capacity of 20 acre-feet.</li> <li>Estimated 10 recovery wells to be installed within 500 feet of recharge basin to recover water from the aquifers.</li> <li>Estimated 10 monitoring wells installed to monitor groundwater level fluctuations.</li> </ul>
	Pipelines	<ul style="list-style-type: none"> <li>1,500-foot, 36-inch diameter pipeline to connect Southwest recharge basin to filter plant to recharge basins pipeline.</li> <li>200-foot, 36-inch diameter pipeline to connect Southeast recharge basin to filter plant to recharge basins pipeline.</li> <li>4,600-foot backwash and raw water pipeline from filter plant to existing sewer pipeline under West Beach Street.</li> </ul>	<ul style="list-style-type: none"> <li>250-foot, 36-inch diameter pipeline from screened intake to proposed pump station.</li> <li>7,150-foot, 30-inch diameter pipeline to connect proposed pump station to filter plant.</li> <li>5,500-foot-long, 24-inch diameter pipeline to connect filter plant to recharge basins.</li> <li>700-foot long 24-inch diameter pipeline to connect North recharge basin to existing recharge basin pipeline.</li> </ul>
Operations and Maintenance	Water Supply Diversions	<ul style="list-style-type: none"> <li>November 1 through May 31, consistent with existing permit conditions.</li> <li>Diversions up to 30 cfs and 2,000 AFY consistent with existing permit conditions.</li> </ul>	<ul style="list-style-type: none"> <li>Year-round, subject to seasonal constraints on minimum water depth.</li> <li>From November 1 to March 31 diversions up to 30 cfs; from April 1 to October 31 diversions up to 3 cfs. Total diversions up to 4,000 AFY.</li> </ul>
	Maintenance	<ul style="list-style-type: none"> <li>Periodic inspections and maintenance of Project components.</li> </ul>	<ul style="list-style-type: none"> <li>Periodic inspections and maintenance of Project components.</li> </ul>

## NOTES:

AFY = acre-feet per year

AF = acre-feet

cfs = cubic feet per second

## 2.5.2 Environmental Commitments Proposed as Part of the Project

**Appendix PD-2** identifies mitigation measures that apply to the Projects and were adopted by the Board on April 16, 2014 as part of the mitigation monitoring and reporting program for the 2014 BMP Update PEIR. For the purposes of this EIR, the mitigation measures in Appendix PD-2 are considered parts of the Projects, except that, as indicated in Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*, in some cases mitigation measures in Appendix PD-2 have been revised, replaced, or augmented to reflect current conditions and to address project-specific and site-specific impacts.

## 2.5.3 Water Diversions

PV Water has developed strategies for operating the pumps at the slough facilities based on past experience, potential effects on habitat and special-status species, and hydrologic and hydraulic modeling. The Harkins and Struve slough pumps would be controlled according to a set of rules (**Table 2-2**) designed through iterations to balance diversion volumes with protecting habitat for California red-legged frog (RLF) and other species. Pump rates and minimum water surface elevations vary by months, with particular attention given to RLF breeding season (assumed to be January 1 through March 31) and the start of the spring drawdown (starting on April 1).

**TABLE 2-2**  
**CALENDAR OF PUMP RULES**

Scenario	Struve Pump Limit (AFY)	Harkins Pump Limit (AFY)	Spring Drawdown <sup>a</sup>	Pump	Nov - Dec	Jan – March (RLF breeding season)	April – May	June – Oct
Baseline	0	as observed	No	Harkins	Pump as recorded at Harkins Slough			
				Struve	No pumping			
Project	4,000	2,000	Yes	Harkins	Pump at 30 cfs if WSE > 5' and SC meets criteria	Pump at 30 cfs if WSE > 5' and SC meets criteria	Pump at 3 cfs if WSE > 4.5' and SC meets criteria	No pumping
				Struve	Pump at 30 cfs if WSE > 6' and SC meets criteria	Pump at 30 cfs if WSE > 6' and SC meets criteria	Pump at 3 cfs if WSE > 4.5' and SC meets criteria	

**NOTES:**

<sup>a</sup> Under “spring drawdown” conditions, PV Water may pump to a lower elevation than during RLF breeding season, but at a slower rate during April and May. The purpose of spring drawdown is to reduce open water for predatory fish while minimizing stranding risk.

AFY – acre-feet per year      cfs = cubic feet per second      SC = specific conductivity  
uS/cm = microsiemens per centimeter      WSE = water surface elevation

SOURCE: ESA, Harkins and Struve Sloughs Hydrologic Analysis of Diversion Alternatives, prepared for PV Water, July 2020.

The Projects make use of both the existing Harkins Slough diversion point and the proposed new point of diversion at Struve Slough. There are three criteria that determine whether pumping at either diversion can occur:<sup>26</sup>

- **Volume:** The cumulative pumped volume in any water year must be below the permitted (2,000 AFY on Harkins Slough) or proposed (4,000 AFY on Struve Slough) water right.
- **Salinity:** The average electrical conductivity must be below the level of the receiving aquifer.
- **Water surface elevation:** Diversions must not occur if the water surface elevation in each slough falls below the threshold set for the given month.

Diversions can commence or continue only while these three criteria are met. The pump rates vary by month to avoid rapid drawdown during periods of low water level.

The proposed pumps at Struve Slough would have a maximum pump rate of 30 cfs, as specified on the water right application; the existing Harkins Slough water right has a maximum diversion rate of 30 cfs. In order to both maximize diversion volumes and to stabilize water surface elevations during RLF breeding season, the pump rate is up to 30 cfs from November through the end of RLF breeding season while paired with a relatively high water surface elevation threshold. In order to not draw down the slough water surface elevations (WSEs) too rapidly during the drier months, the pump rates are reduced to a maximum of 3 cfs during April and May on Harkins Slough and April to October on Struve Slough (note that the existing Harkins Slough water right does not allow pumping past the end of May).

## 2.5.4 Harkins Slough Facilities Upgrades Project Components

The components proposed to be constructed and operated as part of the Harkins Slough Project include upgrades at the Harkins Slough filter plant and pump stations; construction of the Southwest and Southeast recharge basins and associated recovery wells, monitoring wells, and pipelines; and a backwash and raw water pipeline, each of which is described below. PV Water may choose to implement a combination of components associated with the Harkins Slough Project and Struve Slough Project. **Table 2-3** presents the estimated dimensions of the Projects' components.

### 2.5.4.1 Filter Plant Upgrades

Upgrades to the Harkins Slough filter plant would include construction of coagulant addition facilities and the addition of new filters, replacement of three existing intermediate pumps with new pumps, replacement of two existing diversion pumps, addition of 1.75 millimeter diversion pump screens, and pipeline improvements as described below in detail. The additional filters would stand approximately 16 feet tall and would use a synthetic medium or sand to reduce the amount of solids sent to the recharge basins. The pump station upgrades may also include upgrades to the pump controls to improve facility reliability. The filter plant upgrades would be designed to meet Santa Cruz County noise standards. The filter plant would use polyaluminum chloride or similar coagulant for filtration with up to 5,000 gallons of storage.

<sup>26</sup> ESA, Harkins and Struve Sloughs Hydrologic Analysis of Diversion Alternatives, prepared for PV Water, July 2020.

**TABLE 2-3**  
**ESTIMATED DIMENSIONS OF PROJECT COMPONENTS**

	<b>Project Component</b>	<b>Approximate Area, square feet (acres)</b>	<b>Maximum Depth of Excavation for Component (feet)</b>	<b>Height Above Finished Grade (feet)</b>
<b>Harkins Slough Project</b>	<b>Filter Plant and Pump Station Upgrades</b>			
	Filters	790 (0.02)	5	16
	Diversion Pump Screens	300	2	8 <sup>a</sup>
	Coagulant Storage Structure	200 (0.005)	5	12
	<b>Southeast Recharge Basin</b>			
	Recharge basin	553,210 (12.7)	13	Below grade
	Recovery Wells <sup>b</sup>	1,200 (0.005)	200	3
	Monitoring Wells <sup>b</sup>	16 (<0.001)	200	0.5
	Equalization Structure	150 (0.003)	10	Below grade
	<b>Southwest Recharge Basin</b>			
	Recharge Basin	727,450 (16.7)	12	Below grade
<b>Struve Slough Project</b>	<b>Pump Station</b>			
	Pump Station (Top Slab/Equipment)	660 (0.02)	N/A	10
	Pump Station (Base Slab)	880 (0.02)	35	Below grade
	Electrical & Controls Building	450 (0.01)	5	8
	<b>Screened Intake</b>			
	Base Slab	350 (0.01)	1	Below grade
	<b>North Recharge Basin</b>			
	Recharge Basin	169,880 (3.9)	6	Below grade

## NOTES:

<sup>a</sup> The wet well for the diversion pump screens would be approximately 8 feet above the bottom of Harkins Slough.

<sup>b</sup> There would be approximately 10 recovery wells and 10 monitoring wells per recharge basin (approximately 30 total recovery wells, and approximately 30 total monitoring wells). The recovery and monitoring wells may be constructed independently from the recharge basins. The dimensions would be the same for all recovery wells and monitoring wells.

SOURCE: Carollo Engineers, Request for Information, email from R. Gutierrez, February 10, 2019; Carollo Engineers, email from R. Gutierrez, February 12, 2019.

The pipeline improvements would include approximately 350 feet of new 24-inch diameter pipelines, one of which would convey raw (untreated) water to the filters. The other would convey filtered water from the filters to the pump station. In addition to the proposed backwash and raw water pipeline described below, a new meter would be installed on the existing backwash pipeline. Refer to Figure 2-2 for a site plan of the Harkins Slough filter plant.

#### 2.5.4.2 Southwest and Southeast Recharge Basins, Recovery Wells, and Pipelines

The Southwest recharge basin would be approximately 16.7 acres and the Southeast recharge basin would be approximately 12.7 acres. The Southwest recharge basin would have a storage capacity of approximately 77 acre-feet and the Southeast recharge basin would have a storage capacity of 128 acre-feet. Construction of the Southeast recharge basin may require the demolition of an existing structure, removal of several trees, and the construction of an approximately 15-foot by 10-foot equalization structure<sup>27</sup> that would be approximately 10 feet deep. A chain-link fence would surround the boundary of each recharge basin, as shown on Figure 2-3. Approximately ten recovery wells would be constructed within 500 feet of each recharge basin to extract water during the irrigation season. The recovery and monitoring wells may be constructed independently from the recharge basins. Each of the recovery wells would be constructed on an approximately 1,200 square foot area of packed dirt that would be conformed to the existing grade. The wells would be approximately 200 feet deep and resemble existing wells, as shown on **Figure 2-11**. A 20-inch to 36-inch diameter pipeline would convey water from the existing filter plant via the recharge basins pipeline to the new recharge basins, and from recovery wells to the existing CDS. Approximately ten monitoring wells would be constructed per recharge basin to monitor groundwater level fluctuations.



SOURCE Photo taken by A. Maudru, ESA, June 12, 2019.

**Figure 2-11**  
Existing Recovery Well

<sup>27</sup> The equalization structure is a concrete box with gates to allow operators to move water between the existing basin and the Southeast basin and vice versa.

The pipelines connecting to the Southeast and Southwest recharge basins would be approximately 200 and 1,500 feet long, respectively. Refer to Figure 2-3 for a map of the proposed recharge basins and pipelines.

#### **2.5.4.3 Backwash and Raw Water Pipeline**

An approximately 4,600-foot-long, 14-inch diameter backwash and raw water pipeline would be constructed between the Harkins Slough filter plant and the existing gravity sewer line under West Beach Street for discharge of filter backwash and to allow diversion of raw water from the sloughs to the Water Resources Center. Water from Harkins and Struve Slough would be directly diverted to the existing sewer pipeline without recharge and recovery so excess wastewater and recycled water treatment capacity could be used during the permitted diversion period when irrigation demand is sufficient.

### **2.5.5 Struve Slough Project Components**

The Struve Slough Project would divert Struve Slough water from November 1 to March 31 with diversions up to 30 cfs and from April 1 to October 31 with diversions up to 3 cfs. The water would be pumped from Struve Slough to the Harkins Slough filter plant via a proposed new pipeline, then pumped to the proposed recharge basins to be percolated into storage in the surficial groundwater aquifer. The components proposed to be constructed and operated as part of the Struve Slough Project include the screened intake, pump station, Struve Slough to filter plant pipeline, filter plant to recharge basins pipeline, and North recharge basin and associated wells and pipeline, each of which is described below. The Struve Slough Project also includes a new diversion point in the slough system. As noted above in Section 2.5.4, PV Water may choose to implement a combination of components associated with the Struve Slough Project and Harkins Slough Project. Refer to Table 2-3 for estimated dimensions of the Struve Slough Project components.

#### **2.5.5.1 Screened Intake**

The screened intake at the diversion point in Struve Slough would be installed on an approximately 25 feet by 15 feet pile-supported slab. An approximately 250-foot-long 36-inch diameter high-density polyethylene pipeline would convey water from the intake to the pump station. **Figure 2-12** shows examples of screened intakes.

#### **2.5.5.2 Pump Station**

A pump station at the diversion point in Struve Slough would divert the water to the Harkins Slough filter plant. The pump station would have two duty and one standby 200-horsepower pumps, which would be designed to maintain noise levels at nearby residences at or below applicable local noise limits. The pump station would be approximately 30 feet by 22 feet wide, and 35 feet deep. Included on the pump station site would be the pump station and an electrical controls building that would be 10 feet wide by 45 feet long (refer to Figure 2-4). As mentioned above, a 36-inch diameter pipeline would connect the intake in Struve Slough to the proposed pump station on the northern shore of the slough. An aggregate base road would provide access to the pump station from adjacent farm roads.





SOURCE: Intake Screen, Inc. via Carollo Engineers, Harkins and Watsonville Slough Intakes and Diversion Structures Conceptual Design, Figures 10 and 11, June 2017.

**Figure 2-12**  
Example of Screened Intake

### 2.5.5.3 Struve Slough to Filter Plant Pipeline

An approximately 7,150-foot long, 30-inch polyvinyl chloride or high-density polyethylene pipeline would be constructed to convey water from the proposed pump station at Struve Slough to the Harkins Slough filter plant. At the filter plant, the water would be filtered as needed, pumped to the recharge basins through the existing pipeline or a new pipeline, and percolated into storage in the surficial aquifer.

### 2.5.5.4 Filter Plant to Recharge Basins Pipeline

PV Water would construct an approximately 5,500-foot-long, 24-inch diameter polyvinyl chloride or high-density polyethylene water pipeline from the Harkins Slough filter plant to an existing pipeline adjacent to the existing recharge basin. The new filter plant to recharge basins pipeline would run parallel to, and along approximately the same route as, an existing 24-inch filtered water pipeline. The proposed pipeline would be used for diversions from both Harkins and Struve Sloughs in addition to the existing pipeline to accommodate the increased diversions associated with

operation of the Projects. Approximately 4,800 feet of the pipeline would traverse agricultural land, while 700 feet would be adjacent to Dairy Road, a private farm road. The proposed pipeline would cross San Andreas Road southeast of Dairy Road.

### 2.5.5.5 North Recharge Basin, Recovery Wells, and Pipelines

The North recharge basin would be approximately 3.9 acres with a storage capacity of 20 acre-feet, and would be connected to the proposed or existing 24-inch filtered water pipeline that delivers water from the Harkins Slough filter plant by a 20-inch filtered water pipeline. A chain-link fence would surround the boundary of the recharge basin, as shown on Figure 2-3.

Approximately ten recovery wells would be placed near the recharge basin, and would extract water to meet irrigation needs in-lieu of groundwater pumping. Approximately ten monitoring wells would be constructed for each recharge basin. The recovery and monitoring wells may be constructed independently from the recharge basins. Refer to Section 2.5.4.2 for more information about the proposed recovery wells and monitoring wells.

## 2.6 Construction

### 2.6.1 Construction Schedule, Hours, and Work Force

#### 2.6.1.1 Construction Schedule

Construction would be initiated following project approval, issuance of permits, and completion of design. Construction of the Harkins Slough Project components would occur in stages with an estimated total construction timeline of approximately 30 months over a three-year period between 2022 and 2025 based on project needs. Construction of the Struve Slough Project is expected to last approximately one year between 2022 and 2023, with the exception of the North recharge basin, recovery wells, and associated pipelines, the construction of which is expected to occur over nine months between 2027 and 2028. **Tables 2-4A and 2-4B** show the currently anticipated construction schedule and duration of each activity for the Projects.

#### 2.6.1.2 Construction Hours

Standard hours for construction activities generating noise would be 8:00 a.m. to 6:00 p.m., Monday through Saturday. Truck trips would generally be scheduled outside of peak commute hours when feasible (i.e., avoiding weekdays from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m.). PV Water would require contractors to comply with all local sound control and noise levels rules and regulations. Exceptions to standard construction hours would include:

- **Well construction.** Well installation requires continuous drilling. Consequently, well construction could occur for up to 24 hours per day and several days in a row.
- **Trenchless Pipeline Construction.** Trenchless pipeline construction requires continuous tunneling. Consequently, pipeline constructions at the locations indicated in Table 2-7, below, could occur for up to 24 hours per day and (for longer tunneling) several days in a row.

**TABLE 2-4A**  
**APPROXIMATE CONSTRUCTION SCHEDULE FOR HARKINS SLOUGH PROJECT**

Project Component/Construction Phase <sup>a</sup>	Expected Duration	Estimated Schedule
<b>Harkins Slough Filter Plant Upgrades</b>		
Mobilization	3 months	July 2024 - September 2024
Excavation/Backfill	3 months	October 2024 – December 2024
Concrete Work	2 months	January 2025 – February 2025
Mechanical Equipment Installation	3 months	March 2025 - May 2025
Commissioning	1 month	June 2025
Demobilization	1 month	June 2025
<b>Backwash and Raw Water Pipeline</b>		
Mobilization	1 month	July 2024
Pipeline Construction	4 months	August 2024 – November 2024
Demobilization	1 month	December 2024
<b>Southwest Recharge Basin, Recovery Wells, Monitoring Wells, and Pipelines</b>		
Mobilization	3 months	July 2024 – September 2024
Dewatering, Grading and Excavation	9 months	October 2024 – June 2025
Demobilization	1 month	June 2025
<b>Southeast Recharge Basin, Recovery Wells, Monitoring Wells, and Pipelines</b>		
Mobilization	3 months	July 2022 – September 2022
Dewatering, Demolition, Grading, and Excavation	9 months	October 2022 – June 2023
Concrete Work	3 months	April 2023 – June 2023
Demobilization	1 month	June 2023

## NOTES:

<sup>a</sup> Assume excavation, fill, and paving occurs as pipeline installation progresses.

SOURCE: Carollo Engineers, Request for Information, email from R. Gutierrez, Received over February 10-14, 2019.

**TABLE 2-4B**  
**APPROXIMATE CONSTRUCTION SCHEDULE FOR STRUVE SLOUGH PROJECT**

Project Component/Construction Phase <sup>a</sup>	Expected Duration	Estimated Schedule
<b>Screened Intake and Pump Station</b>		
Mobilization	2 months	June 2022 – July 2022
Cofferdam/shoring/excavation	1 month	September 2022
Concrete Work – Foundation	1 month	October 2022
Concrete Work – Walls	2 months	November 2022 – December 2022
Concrete Work – Elevated Slab	1 month	January 2023
Install Electrical Building and Equipment	4 months	January 2023 - April 2023
Install Mechanical Equipment	3 months	February 2023 – April 2023
Intake Screens and Piping to Filter Plant	2 months	April 2023 – May 2023
Conduit and Wiring	2 months	April 2023 – May 2023
Commissioning	1 month	June 2023
Demobilization	1 month	June 2023

**TABLE 2-4B (CONTINUED)**  
**APPROXIMATE CONSTRUCTION SCHEDULE FOR STRUVE SLOUGH PROJECT**

Project Component/Construction Phase <sup>a</sup>	Expected Duration	Estimated Schedule
<b>Struve Slough to Filter Plant Pipeline</b>		
Mobilization	1 month	August 2022
Pipeline Installation <sup>a</sup>	6 months	September 2022 – June 2023
Demobilization	1 month	June 2023
<b>Filter Plant to Recharge Basins Pipeline</b>		
Mobilization	1 month	January 2023
Pipeline Construction	4 months	February 2023 – May 2023
Demobilization	1 month	June 2023
<b>North Recharge Basin, Recovery Wells, Monitoring Wells, and Pipelines</b>		
Mobilization	3 months	July 2027 - September 2027
Dewatering, Grading, and Excavation	6 months	October 2027 – March 2028
Concrete Work	3 months	January 2028 – March 2028
Demobilization	1 month	March 2028

## NOTES:

<sup>a</sup> Assume that excavation, fill, and paving would occur as pipeline installation progresses.

<sup>b</sup> Installation of the Struve Slough to filter plant pipeline would occur over a six months between September 2022 and June 2023. The time of construction and use of open trench or trenchless technology to cross under Struve Slough would be determined based on water levels in Struve Slough.

SOURCE: Carollo Engineers, Request for Information, emails from R. Gutierrez, received over February 10-14, 2019.

### 2.6.1.3 Construction Workforce and Equipment

**Table 2-5** identifies the workforce as well as the construction equipment associated with the various Projects' components. Generally, between 6 to 12 workers would be working at a construction site at any given time.

### 2.6.1.4 Staging and Laydown Areas

Construction equipment and materials would be stored within the construction work areas to the extent feasible, though additional offsite laydown areas may be required. If required, the additional laydown area(s) would be located near the Project sites. Construction staging and laydown for the proposed Harkins Slough Facility improvements would use the existing PV Water property for storage/staging of equipment and materials. Construction staging and laydown for the proposed facilities at Struve Slough would require a one-acre staging area close to and upland of the footprint of the Struve Slough pump station. Staging and laydown for pipeline construction would occur primarily within the width of the temporary construction easement and along the pipeline easement.

## 2.6.2 Soils Management and Disposal

**Table 2-6** presents the estimated volume of excess soil and rock material (spoils) that would be generated during construction of each of the Project's components. Excess excavated material generated during the construction of each component would be off-hauled to Buena Vista Landfill or appropriate recycling facility.

**TABLE 2-5  
CONSTRUCTION WORKFORCE AND EQUIPMENT**

Project Component	Approximate Average Daily Work Force	Construction Equipment		
Harkins Slough Project				
Filter Plant and Pump Station Upgrades	12	<ul style="list-style-type: none"><li>• Excavator (2)</li><li>• Back Hoe/Track Hoe (1)</li><li>• Air Compressor (1)</li></ul>	<ul style="list-style-type: none"><li>• Fork Lifts (2)</li><li>• Crane (1)</li><li>• Pumps (4)</li></ul>	<ul style="list-style-type: none"><li>• Generator Set (1)</li><li>• Wiring Pulling Machine (1)</li></ul>
Backwash and Raw Water Pipeline	11	<ul style="list-style-type: none"><li>• Excavator (1)</li><li>• Plate Compactor (2)</li><li>• Skip Loader (1)</li><li>• Sweepers/Scrubbers (1)</li></ul>	<ul style="list-style-type: none"><li>• Back Hoe/Track Hoe (1)</li><li>• Fork Lifts (1)</li><li>• Pumps (2)</li><li>• Air Compressor (1)</li></ul>	<ul style="list-style-type: none"><li>• Water Truck (1)</li><li>• Generator Sets (1)</li><li>• Asphalt/Paver Truck (1)</li></ul>
Southwest Recharge Basin, Recovery Wells, Monitoring Wells, and Pipelines	11	<ul style="list-style-type: none"><li>• Excavator (4)</li><li>• Skip Loader (1)</li><li>• Scraper (2)</li><li>• Fork Lifts (1)</li><li>• Scissor Lift (1)</li></ul>	<ul style="list-style-type: none"><li>• Pump (1)</li><li>• Air Compressor (4)</li><li>• Water Truck (2)</li><li>• Generator Set (2)</li><li>• Rotary drill rig (1)</li></ul>	<ul style="list-style-type: none"><li>• Wiring Pulling Machine (2)</li><li>• Drilling Fluid Cleaning/Recycling System (1)</li><li>• Pipe Trailer (1)</li></ul>
Southeast Recharge Basin, Recovery Wells, Monitoring Wells, and Pipelines	11	<ul style="list-style-type: none"><li>• Excavator (4)</li><li>• Skip Loader (1)</li><li>• Scraper (2)</li><li>• Fork Lifts (1)</li><li>• Scissor Lift (1)</li></ul>	<ul style="list-style-type: none"><li>• Pump (1)</li><li>• Air Compressor (4)</li><li>• Water Truck (2)</li><li>• Generator Set (2)</li><li>• Rotary drill rig (1)</li></ul>	<ul style="list-style-type: none"><li>• Wiring Pulling Machine (2)</li><li>• Drilling Fluid Cleaning/Recycling System (1)</li><li>• Pipe Trailer (1)</li></ul>
Struve Slough Project				
Screened Intake	6	<ul style="list-style-type: none"><li>• Excavator (1)</li><li>• Skip Loader (1)</li><li>• Crane (1)</li></ul>	<ul style="list-style-type: none"><li>• Pumps (2)</li><li>• Air Compressor (1)</li></ul>	<ul style="list-style-type: none"><li>• HDPE Fusion Welding Machine (1)</li><li>• Generator Set (1)</li></ul>
Struve Slough Pump Station	10	<ul style="list-style-type: none"><li>• Excavator (1)</li><li>• Concrete delivery trucks (144)</li><li>• Dozers or Scrapers (2)</li><li>• Back Hoe/Track Hoe (1)</li></ul>	<ul style="list-style-type: none"><li>• Fork Lifts (1)</li><li>• Crane (1)</li><li>• Scissor Lift (1)</li><li>• Pumps (2)</li><li>• Air Compressor (1)</li></ul>	<ul style="list-style-type: none"><li>• Water Truck (1)</li><li>• Generator Set (1)</li><li>• Asphalt/Paver Truck (1)</li><li>• Wiring Pulling Machine (1)</li></ul>
Struve Slough to Filter Plant Pipeline	9	<ul style="list-style-type: none"><li>• Excavator (1)</li><li>• Skip Loader (1)</li><li>• Back Hoe/Track Hoe (2)</li></ul>	<ul style="list-style-type: none"><li>• Fork Lifts (1)</li><li>• Pumps (2)</li><li>• Water Truck (1)</li></ul>	<ul style="list-style-type: none"><li>• Generator Set (1)</li><li>• HDD Crane (1)</li><li>• HDD Mud Pumps (2)</li></ul>
Filter Plant to Recharge Basins Pipeline	11	<ul style="list-style-type: none"><li>• Sweepers/Scrubbers (1)</li><li>• Back Hoe/Track Hoe (1)</li><li>• Excavator (1)</li><li>• Asphalt/Paver Truck (1)</li></ul>	<ul style="list-style-type: none"><li>• Skip Loader (1)</li><li>• Fork Lifts (1)</li><li>• Generator Sets (1)</li><li>• Water Truck (1)</li></ul>	<ul style="list-style-type: none"><li>• Plate Compactor (2)</li><li>• Pumps (2)</li><li>• Air Compressor (1)</li></ul>
North Recharge Basin, Recovery Wells, Monitoring Wells, and Pipelines	11	<ul style="list-style-type: none"><li>• Excavator (4)</li><li>• Skip Loader (1)</li><li>• Scraper (2)</li><li>• Fork Lifts (1)</li><li>• Scissor Lift (1)</li></ul>	<ul style="list-style-type: none"><li>• Pump (1)</li><li>• Air Compressor (4)</li><li>• Water Truck (2)</li><li>• Generator Set (2)</li><li>• Rotary drill rig (1)</li></ul>	<ul style="list-style-type: none"><li>• Wiring Pulling Machine (2)</li><li>• Drilling Fluid Cleaning/Recycling System (1)</li><li>• Pipe Trailer (1)</li></ul>

SOURCE: Carollo Engineers, Request for Information, emails from R. Gutierrez, received over February 10-14, 2019.

**TABLE 2-6  
EXCAVATION SOIL VOLUMES**

Project Component	Excavation Soil Volume (cubic yards)	Bulking Factor <sup>a</sup>	Excavated Soil to be Reused as Fill (cubic yards)	Excess Spoils to be Hauled Away (cubic yards)
Harkins Slough Project				
Filter Plant Expansion - Filters	190	30%	0	250
Filter Plant Expansion – 24" Raw Water and Filtered Water Pipeline	320		170	160
Filter Plant Expansion – Coagulant Storage Structure	50		0	60
Pump Station Upgrades – Diversion Pump Screens	20		0	20
Southwest Recharge Basin, Recovery Wells, and Monitoring Wells	110,000		3,300	138,710
Pipeline to Southwest Recharge Basin	3,390		2,280	1,110
Southeast Recharge Basin, Recovery Wells, and Monitoring Wells	36,000		11,880	31,360
Pipeline to Southeast Recharge Basin	450		300	150
Backwash Pipeline to Sewer Pipeline (unpaved segment)	4,260		3,240	1,020
Harkins Slough Total Excess Soils <sup>b</sup>				172,840
Struve Slough Project				
Pump Station	2,090	30%	0	2,720
Screened Intake	20		0	20
Intake Pipeline	1,200		700	600
Struve Slough to Filter Plant Pipeline	4,120		410	3,710
Filter Plant to Recharge Basins Pipeline (unpaved segment)	7,290		5,160	2,130
Filter Plant to Recharge Basins Pipeline (paved segment)	1,060		750	310
North Recharge Basin, Recovery Wells, and Monitoring Wells	6,500		6,180	420
Pipeline to North Recharge Basin	1,060		750	310
Struve Slough Components Total Excess Soils <sup>b</sup>				10,220
Grand Total Excess Soils <sup>b</sup>				183,060

## NOTES:

<sup>a</sup> The measure of change in volume of a material from when it is excavated to when it is deposited is the bulking factor.<sup>b</sup> Totals may not add due to rounding.

SOURCE: Carollo Engineers, Request for Information, email from R. Gutierrez, received over February 10-14, 2019.

Construction of the Struve Slough pump station and the new filters and coagulant storage structure at the Harkins Slough filter plant would require importing up to five feet of imported aggregate base coarse soil to install under the base slab for each structure. Clean fill and other materials (e.g., pipe bedding) would also be required for other Project components.

### 2.6.3 Construction Traffic Routing

The construction work force would likely come from Santa Cruz, Monterey, and San Benito County areas via SR 1 and/or SR 152. Vehicle trips would originate from a variety of locations and distances, but the primary vehicle access route for construction haul trucks and deliveries to the recharge basins and Harkins Slough Facility would be via San Andreas Road and Dairy Road. Trucks are anticipated to travel to and from San Andreas and Dairy Road to SR 1 using West Beach Street. Access to the Struve Slough pump station site would be via Lee Road. Trucks are anticipated to travel to and from Lee Road to SR 1 using Harkins Slough Road. Delivery trucks would use streets in the immediate area of the Project pipeline installations to access the construction corridor in unincorporated Santa Cruz County.

Construction debris would be transported from the Project sites to Buena Vista Landfill. Trucks leaving the recharge basins or Harkins Slough filter plant would travel north on San Andreas Road and turn right on Buena Vista Drive to arrive at the landfill. Trucks leaving the Struve Slough pump station site would travel north on Lee Road, turn right on Harkins Slough Road, continue on to Green Valley Road, turn left on Main Street, merge onto State Route 1 North, exit at Buena Vista Drive, and then turn left on Buena Vista Drive to arrive at the landfill.

### 2.6.4 Demolition of Existing Structures

Construction activities for the Harkins Slough Project may include demolition of an existing 70-foot by 70-foot storage building in the footprint of the Southeast recharge basin. No above ground structures would be demolished as part of the construction activities for the Struve Slough project. Demolition and removal of unknown subterranean structures (such as irrigation infrastructure) may occur during construction of the recharge basins and associated recovery wells, monitoring wells, and pipelines.

### 2.6.5 Construction Activities

In general, construction of the proposed screened intake, pump station at Struve Slough, recharge basins and associated recovery wells and monitoring wells, and upgrades to the Harkins Slough filter plant and pump stations would involve dewatering; grading and excavation; pile-driving; erecting concrete structures; installing piping, pumps, electrical and mechanical equipment; testing and commissioning facilities; finish work such as erecting enclosures; installing flooring, and fencing; and painting and paving. Table 2-5 identifies the equipment that would be required for construction of these components. Installation of the intake in Struve Slough and the pipeline connecting the intake to the pump station would likely require a cofferdam or shoring to create a construction work area. Installation of the Harkins Slough diversion pump screens would likely not require dewatering. Dust control measures would be taken to reduce fugitive dust emissions during construction, including implementation of adopted Mitigation Measure AQ-1 (refer to **Appendix PD-2**) which includes a dust control program.

## 2.6.6 Pipeline Installation

The construction method for installation of the pipelines would depend on location. A typical pipeline trench would be up to approximately 6.5 feet wide and would typically be no more than 8 feet deep (additional depth might be necessary in some locations to avoid conflict with existing utilities). Conventional cut and cover construction techniques would be used for installation of pipelines in existing roadways and agricultural fields. Crossings of Struve Slough and the railroad tracks would require trenchless construction techniques; these locations are identified in **Table 2-7** and on Figure 2-1. Pipeline construction is estimated to occur at installation rates of approximately 100 linear feet per day for urban areas and up to 250 linear feet per day in undeveloped areas such as agricultural fields. Each trenchless crossing would take one week to complete.

The width of construction corridors would vary depending on whether the pipeline is installed in roadways or agricultural land, and if the pipeline is near or within potentially jurisdictional wetlands or water (refer to Section 3.4, Biological Resources, and Figures BIO-1a through BIO-1h in Appendix BIO for more information regarding locations and impacts related to pipeline installation). Pipelines proposed as part of the Project's would be installed as follows:

- ***Backwash and Raw Water Pipeline.*** Most of this pipeline would be installed in farm fields, with a 60-foot-wide construction corridor. The pipeline would cross under Watsonville Slough. If the slough is wet and dewatering is not feasible, the pipeline would be installed via trenchless pipeline techniques. If the slough is dry or dewatering is feasible, PV Water proposes to install the pipeline via open-trench construction with a 20-foot-wide construction corridor. The construction corridor would also be narrowed to 20 feet at two other locations where the pipeline crosses agricultural drainage ditches (adjacent to West Beach Street and between West Beach Street and Watsonville Slough; refer to Figures BIO-1b and BIO-1c in Appendix BIO).
- ***Struve Slough Intake Pipeline.*** Assuming conditions are wet, this pipeline would be installed via open-trench construction within a coffer dam in Struve Slough (refer to Figure BIO-1h in Appendix BIO).
- ***Struve Slough to Filter Plant Pipeline.*** PV Water would install this pipeline beneath Struve Slough using trenchless pipeline techniques. South of Struve Slough and adjacent Watsonville Slough, the pipeline would be installed using open-trench construction with a 60-foot-wide construction corridor with following exceptions: the pipeline would be installed via trenchless pipeline techniques beneath the railroad tracks and have a 20-foot-wide corridor across drainage ditches and riparian forest in select locations. The pipeline would cross under Watsonville Slough. If the slough is wet and dewatering is not feasible, the pipeline would be installed via trenchless pipeline techniques. If the slough is dry or dewatering is feasible, PV Water proposes to install the pipeline via open-trench construction with a 20-foot-wide construction corridor (refer to Figures BIO-1b and BIO-1d through BIO-1h in Appendix BIO).
- ***Filter Plant to Recharge Basins Pipeline.*** The segment of this pipeline within the access road to the Harkins Slough filter plant would have a 20-foot-wide construction corridor. The pipeline would be installed parallel to and west of San Andreas Road within a 60-foot-wide construction easement. The construction corridor would be 20-feet-wide on the northern side of the pipeline adjacent to the ditch, and 40-feet-wide south of the pipeline (refer to Figure BIO-1a in Appendix BIO).
- ***Pipelines to Connect Proposed Recharge Basins to Filter Plant to Recharge Basins Pipeline.*** The proposed pipelines that would connect the Southwest, Southeast, and North recharge basins to the filter plant to recharge basins pipeline would have a 60-foot-wide construction corridor.



TABLE 2-7  
PIPELINE CONSTRUCTION DETAILS

Pipeline Name <sup>a</sup>	General Location	Location in Public Streets	From	To	Length (ft.)	Width (in.)/Material	Construction Method <sup>b</sup>	Estimated Average Production Rate (linear ft./day) <sup>c</sup>
Harkins Slough Project								
Filter Plant Upgrades Pipeline	Unincorporated Santa Cruz County – Located within existing Harkins Slough Filter Plant	N/A	Filter plant at Harkins Slough Facility	Intermediate pump station wet well and pipeline from diversion pump station at Harkins Slough Facility	350	24, raw water and filtered water	Open Trench	100
Pipeline to Southwest Recharge Basin	Unincorporated Santa Cruz County – Located within agricultural fields	N/A	Existing pipeline to recharge basins	Southwest recharge basin	1,500	36, steel, PVC, or HDPE	Open Trench	100-250
Pipeline to Southeast Recharge Basin	Unincorporated Santa Cruz County – Located within agricultural fields	N/A	Existing pipeline to recharge basins	Southeast recharge basin	200	36, steel, PVC, or HDPE	Open Trench	100-250
Backwash and Raw Water Pipeline	Unincorporated Santa Cruz County – Located within agricultural fields	West Beach Street <sup>d</sup>	Filter plant at Harkins Slough Facility	Sewer pipeline along West Beach Street	4,600	14, steel, PVC or HDPE	Open trench, potentially trenchless at Watsonville Slough crossing	100-250
Struve Slough Project								
Struve Slough to Filter Plant Pipeline	Unincorporated Santa Cruz County – Located within agricultural fields	N/A	Pump station north of Struve Slough	Filter Plant at Harkins Slough Facility	7,150	30, PVC or HDPE	Open trench, trenchless at Struve Slough crossing and railroad crossing, potentially trenchless at Watsonville Slough crossing	100-250
Intake Pipeline	Unincorporated Santa Cruz County – Located within Watsonville/Struve Slough and agricultural fields	N/A	Intake Screen in Struve Slough	Pump Station north of Watsonville/ Struve Slough	215	36, HDPE	Open trench, potentially trenchless at Struve Slough crossing	100-250
Filter Plant to Recharge Basins Pipeline (unpaved)	Unincorporated Santa Cruz County – Located within agricultural fields	N/A	Filter Plant at Harkins Slough	Recharge Basins	4,800	24, PVC or HDPE	Open Trench	100-250
Filter Plant to Recharge Basins Pipeline (paved)	Unincorporated Santa Cruz County – Located within public right of way	San Andreas Road <sup>e</sup>	Unpaved portion of pipeline	Unpaved portion of pipeline	700	24, PVC or HDPE	Open Trench	100
Pipeline to North Recharge Basin	Unincorporated Santa Cruz County – Located within agricultural fields	N/A	Existing pipeline to recharge basins	North recharge basin	700	20	Open Trench	100-250
Flushing, Pressure Testing	All Pipelines						N/A	N/A
Final Paving	Filter Plant Upgrades Pipeline, Filter Plant to Recharge Basins Pipeline (paved)						Paving	700
Total					19,425			

NOTES:

<sup>a</sup> Please refer to Figure 2-1 for pipeline locations.

<sup>b</sup> The time of construction and use of open trench or trenchless technology to cross under Struve Slough would be determined based on water levels in Struve Slough.

<sup>c</sup> The production rate is subject to variation due to site conditions (access, existing utilities, and traffic control requirements).

<sup>d</sup> One travel lane would be closed, with one-way traffic control, during the connection of the proposed backwash pipeline with the existing gravity sewer line in West Beach Street.

<sup>e</sup> One travel lane of San Andreas Road would be closed, with one-way traffic control, during construction of the portion of the Filter Plant to Recharge Basins pipeline that crosses San Andreas Road.

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Refer to Tables 2-4A and 2-4B for the approximate schedule of pipeline construction, and Table 2-5 for equipment and workforce during pipeline construction.

### 2.6.6.1 Open Trench Installation

The overall construction sequence for installation of pipelines would involve: clearing and grading the ground surface along the pipeline alignment; excavating the trench; dewatering of the excavation if necessary; installing pipe bedding material (sand or aggregate); preparing and installing pipeline sections; backfilling the trench; regrading the ground surface; and revegetating or paving as appropriate. Construction of pipeline segments within agricultural land would temporarily remove topsoil and disrupt farming activities; this issue is addressed in Section 3.2, Land Use and Agricultural Resources.

The traditional open-trench construction method involves using a conventional backhoe, excavator, or other mechanized excavation equipment. The pipeline trench would be stabilized with trench boxes or by shoring, or (in farm fields) laying back and benching slopes to prevent the walls from collapsing during construction. The contractor would line the trench bottom with pipe bedding that would be shaped to support the pipeline. Installers would then place sections of the new pipelines in the trench, and then backfill the trench with native or imported fill material. The minimum depth of cover above the pipeline in agricultural fields would be 5 feet, which is expected to provide sufficient cover to avoid conflicts with typical farming operations, such as tilling and ripping. However, the pipeline easements would preclude certain farming practices (e.g., deep excavation, tree planting) to prevent damage to the pipeline. The pipelines would be pressure-tested prior to being placed in operation.

### 2.6.6.2 Trenchless Pipeline Installation

One of the following three trenchless pipeline installation techniques would be used:

- **Horizontal Directional Drilling.** This is a type of trenchless pipeline installation that involves drilling a pilot bore using a surface-mounted drill rig with tracking and steering capabilities. The pilot bore is launched from the surface at an angle, transitions to horizontal as the required depth is reached, and finally angles back up to the surface at the exit location. Following enlargement of the pilot hole to the appropriate diameter, the pipe is pulled through the drill path to the exit pit. Drilling fluids (typically containing bentonite, an inert clay) are used to lubricate the cutting head, transport drill cuttings to the surface in a slurry, and stabilize the bore path, especially in loose or soft soils. After use, the drilling fluids would undergo treatment on site prior to disposal. Construction at the entry site would require an approximately 150-foot-wide and 250-foot-long area, and the exit site would need an approximately 100-foot-wide by 250-foot-long area.
- **Jack and Bore.** This method requires the use of a horizontal boring machine or auger to drill a hole, and a hydraulic jack to push a casing through the hole under the crossing. As the boring proceeds, a steel casing pipe is jacked into the hole and the pipeline is installed in the casing. This process requires the excavation of pits typically 10 feet by 35 feet (depth varies) at opposite ends of the crossing.

- **Microtunneling.** This trenchless method uses a remotely controlled microtunnel boring machine combined with the pipe jacking technique to directly install pipelines underground in a single pass. Excavated tunnel spoils are removed and the exterior of the pipeline is lubricated as construction progresses.

Groundwater levels in excavation areas would be measured prior to construction to determine the extent of dewatering required. Refer to Section 2.6.7.1 for additional information on construction dewatering. Soil removed from pits would either be stockpiled and reused, or loaded directly into dump trucks and hauled away for disposal at Buena Vista Landfill. If existing soil is not adequate for backfilling, then new material would be imported.

## 2.6.7 General Construction Activities

### 2.6.7.1 Construction Dewatering, Pipe Cleaning

During project construction, dewatering of groundwater and rainwater in open excavations may be required. Following completion of pipeline construction, newly installed pipes must be cleaned before they are connected.

Dewatering of excavated areas would be temporary and necessary when surface water or subsurface water is encountered. Water from excavated areas would be discharged to agricultural lands, storm drains, or other waterways, and would be discharged in accordance with applicable regulatory requirements (refer to Section 3.3, Surface Water, Groundwater, and Water Quality). The contractor would treat water from excavated areas as necessary prior to discharge. The treatment could include settling tanks or filter bags to allow sediment to settle out. The need for a cofferdam and dewatering at the Struve Slough intake and where pipelines cross sloughs would be determined based on the amount of water in the sloughs during construction.

After pipeline installation, the construction contractor would clean the newly installed pipelines by removing materials and debris before bringing the pipe into service. The water at the outlet end of the pipeline would be discharged in accordance with applicable regulatory requirements.

### ***Site Cleanup and Restoration***

Refer to **Table 2-8** for information regarding ground disturbance resulting from Project construction activities. After construction, undeveloped areas and agricultural fields used temporarily during construction would generally be restored to pre-project conditions consistent with applicable permit conditions.

**TABLE 2-8  
ANTICIPATED GROUND DISTURBANCE**

Project Component		Approximate Area <sup>a</sup>	
		(square feet)	(acres)
Harkins Slough Project	Filter plant Upgrades	3,000	0.07
	Diversion Pump Screens	300	<0.01
	Backwash Pipeline to Sewer Pipeline	184,000	4.2
	Southwest Recharge Basin, Recovery Wells, and Monitoring Wells	740,330	17.0
	Pipeline to Southwest Recharge Basin	60,000	1.38
	Southeast Recharge Basin, Recovery Wells, and Monitoring Wells	566,090	13.0
	Pipeline to Southeast Recharge Basin	8,000	0.18
<b>Total Disturbance Area for Harkins Slough Project</b>		<b>1,561,720</b>	<b>35.8</b>
Struve Slough Project	Pump Station	4,900	0.11
	Access Road to Pump Station	15,800	0.36
	Screened Intake	400	0.01
	Intake Pipeline	10,000	0.23
	Struve Slough to Filter Plant Pipeline	254,400	5.80
	Filter Plant to Recharge Basins Pipeline (unpaved segment)	192,000	4.41
	Filter Plant to Recharge Basins Pipeline (paved segment)	14,000	0.32
	North Recharge Basin, Recovery Wells, and Monitoring Wells	182,760	4.20
	Pipeline to North Recharge Basin	28,000	0.64
<b>Total Disturbance Area for Struve Slough Project</b>		<b>702,260</b>	<b>16.1</b>
<b>Total Disturbance Area<sup>b</sup></b>		<b>2,263,980</b>	<b>51.9</b>

## NOTES:

<sup>a</sup> Anticipated ground disturbance area for the recharge basins includes the area for the recharge basins as well as the estimated ten recovery wells (assuming approximately 1,280 square feet of disturbance per recovery well) and estimated ten monitoring wells (assuming approximately 16 square feet of disturbance per recovery well). Anticipated ground disturbance areas for the pipelines are equal to a 20-foot-wide permanent easement plus a 40-foot-wide temporary construction easement along the pipeline in agricultural fields, and a 20-foot-wide corridor in urban areas.

<sup>b</sup> Totals may not add due to rounding.

SOURCE: Carollo Engineers, Request for Information, email from R. Gutierrez, February 10, 2019.

## 2.7 Operations and Maintenance

### 2.7.1 Operations

#### 2.7.1.1 Harkins Slough and Struve Slough Facilities

Table 2-1 identifies anticipated diversion quantities and proposed periods of diversion for the Projects. With regard to water diversion operations for the Harkins Slough and Struve Slough intake and pumps, please refer to Section 2.5.3. The diversion facilities (intake, pump station, and filter plant) for Harkins Slough are anticipated to operate November 1 to May 31; the diversion facilities for Struve Slough could operate at any time of year, consistent with the pumping restrictions described in Section 2.5.3. Diversion, pumping and treatment operations could occur

at any time of day. The recovery wells would be operated based on demand for irrigation water in the CDS and could operate at any time of day.

### 2.7.1.2 Lighting

Exterior security lighting exists at the Harkins Slough filter plant, and would be upgraded and remain in use after the Harkins Slough filter plant upgrades are complete. Additional exterior lighting would be included with the new filters that are proposed at the Harkins Slough filter plant. Exterior security lighting proposed at the Struve Slough screened intake and pump station would be limited to nighttime security lighting. Permanent exterior security lighting is not proposed at the recharge basins, recovery wells, or monitoring wells. Lighting for the Project components would be required to comply with the California Green Building Standards Code to reduce the amount of light that would extend beyond property boundaries.

### 2.7.2 Maintenance

Once the Projects are fully operational, PV Water staff would conduct routine inspections (e.g., for visual signs of wear and tear, obstructions or leakage) and perform scheduled maintenance of the facilities and pipelines. While operation of the Projects is not expected to add any new employees, existing employees would conduct routine inspections, coordinate deliveries of water treatment chemicals, and perform scheduled maintenance of the facilities and pipelines, which would generate approximately four new one-way trips (2 round trips) per week (208 annual one-way trips). Should damage to facilities occur, PV Water would dispatch a crew to conduct the necessary repairs<sup>28</sup>. Standby equipment (e.g., standby pumps) would be periodically tested.

## 2.8 Intended Uses of the EIR

This EIR is intended to provide the information and describe the environmental impacts of the Projects in accordance with CEQA requirements for public disclosure, and to assist public agency decision-makers in considering the approvals necessary for implementing the project. If the Board certifies this EIR as adequate and approves implementation of the Projects, PV Water would then proceed with design and carry out the following actions:

- **Permits and Approvals.** PV Water would conduct the necessary studies and consultations to obtain the permits and approvals shown in **Table 2-9**. PV Water would also obtain any other regulatory approvals required by law.
- **Acquisition of Property, Easements and Rights-of-Way.** PV Water would obtain rights to access and use the Project sites (as described in Section 2.2) and a water-right permit. The decision about what type of property rights to obtain would depend on, among other things, characteristics of the proposed use and negotiations with landowners. Property right procurement would begin after completion of CEQA. After the types of property rights are

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<sup>28</sup> During the life of the Project, emergencies could occur that could affect the environment. A situation is considered an “emergency” if it is a sudden, unexpected occurrence involving a clear and imminent danger that demands immediate action to prevent or mitigate loss of or damage to life, health, property, or essential public services (Public Resource Code Section 21060.3). Because emergency situations by their nature cannot be foreseen, they are not covered in this EIR.

determined, PV Water would work with landowners to develop and execute agreements to secure those rights, including developing legal descriptions and appraisals. PV Water would meet with the affected property owners and their representatives to attempt to reach agreements on the terms under which the Agency would procure the property rights.

- **Final Design, Bid, and Project Construction.** Refer to Tables 2-4A and 2-4B in Section 2.6 regarding the schedule for Project construction.

**TABLE 2-9  
REQUIRED PERMITS AND APPROVALS**

Agency or Organization	Action Requiring Permit or Consultation	Permit or Approval	
		Harkins Slough Project	Struve Slough Project
Federal			
U.S. Army Corps of Engineers	Impacts to wetlands/waters of the U.S.	Clean Water Act Section 404 Permit <sup>a</sup>	Clean Water Act Section 404 Permit
U.S. Fish and Wildlife Service	Impacts to biological resources and federal nexus	Endangered Species Act Section 7 compliance	
U.S. Fish and Wildlife Service: National Marine Fisheries Service	Construction in wetland and upland areas where federally listed species may be present	Endangered Species Act Section 7 compliance <sup>b</sup>	Endangered Species Act Section 7 compliance
State			
State Historic Preservation Officer	Construction in or near cultural resources	National Historic Preservation Act Section 106 compliance	
State Water Resources Control Board: Division of Water Rights	Diversion and beneficial use of surface water	None (Water Right Permit 21039 already has been issued).	Water Rights Permit
California Department of Fish and Wildlife	Alteration of streambeds during construction	Section 1602 Lake and Streambed Alteration Agreement	
	If state-listed species are present, or may be present, & project may adversely affect such species	California Endangered Species Act Section 2081 Incidental Take Permit	
Regional Water Quality Control Board	Potential for surface water quality impairment from pollutant discharge	401 Certification and NPDES for Construction	
Local			
PV Water	Certification of the Final EIR and project approval	PV Water Board of Directors Approval of EIR	
Santa Cruz County - Coastal Development Permitting	Construction in unincorporated Santa Cruz County	Minor Coastal Development Permit	
Santa Cruz County	Pipeline construction in unincorporated Santa Cruz County	Encroachment Permit	

**NOTES**

<sup>a</sup> If PV Water pursues the Clean Water State Revolving Fund, a federal nexus for the Federal Endangered Species Act and National Historic Preservation Act would not be necessary.

<sup>b</sup> National Marine Fisheries Service consultation would only be required for the existing intake screen; informal consultation would be needed for other facility upgrades.

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## CHAPTER 3

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# Environmental Setting, Impacts, and Mitigation Measures

### 3.1 Overview

This chapter provides an analysis of the physical environmental effects of implementing the proposed Harkins Slough Facilities Upgrades Project (Harkins Slough Project) and the proposed Struve Slough Project (collectively called the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects, or Projects) as described in Chapter 2, *Project Description*. This chapter describes the environmental setting, assesses impacts, and identifies mitigation measures for significant impacts.

The Projects were analyzed under their former names—the Harkins Slough Recharge Facilities Upgrades and Watsonville Slough with Recharge Basins—at a program level of detail in the *2014 Basin Management Plan Update Program Environmental Impact Report* (2014 BMP Update PEIR) as two of seven components under the BMP Update described in Section 2.1.<sup>1</sup> This EIR provides detailed, project-level analysis of the Projects based on site-specific and up-to-date information developed subsequent to the preparation of the 2014 BMP Update PEIR. While information from the 2014 BMP Update PEIR is incorporated into parts of this chapter, this EIR provides an independent analysis of the Project's significant impacts.

The 2014 BMP Update PEIR identified mitigation measures that were adopted by the Board of Directors under Resolution No. 2014-05. The adopted mitigation measures are applicable to the BMP Update projects, including the Projects. As indicated in Section 2.5.2 of Chapter 2, *Project Description*, for the purposes of this EIR, those mitigation measures (presented in Appendix PD-2) are considered part of the Project.

#### 3.1.1 Scope of Analysis

##### 3.1.1.1 Topics/Impacts Scoped out in the Notice of Preparation

As indicated in Chapter 1, *Introduction*, PV Water distributed a Notice of Preparation (NOP) to responsible and other public agencies and interested parties on May 31, 2019. The NOP included a discussion of several environmental issues that will not be addressed in this EIR, as the Projects are not likely to result in potentially significant environmental effects with respect to those

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<sup>1</sup> The 2014 BMP Update PEIR is available for review at the PV Water offices (36 Brennan Street, Watsonville, CA 95076) and on PV Water's website at <https://www.pvwater.org/bmp-update> (PV Water, *Final Environmental Impact Report for the Basin Management Plan Update*, February 2014).

environmental issue areas. Refer to Appendix NOP for topics from Appendix G of the CEQA *Guidelines* that will not be further addressed in this EIR.

### 3.1.1.2 Environmental Effects to be Analyzed

This chapter is organized by environmental resource topics, as follows:

Chapter 3 Sections	
3.1 Overview	3.8 Noise and Vibration (NOI)
3.2 Land Use and Agricultural Resources (LU)	3.9 Transportation and Traffic (TRA)
3.3 Surface Water, Groundwater, and Water Quality (HYD)	3.10 Cultural Resources (CUL)
3.4 Biological Resources (BR)	3.11 Tribal Cultural Resources (TCR)
3.5 Air Quality and Greenhouse Gases(AIR)	3.12 Energy, Utilities, Public Services, and Recreation (EUP)
3.6 Geology and Soils (GEO)	3.13 Aesthetic Resources (AES)
3.7 Hazards and Hazardous Materials (HAZ)	

Each section of Chapter 3 contains the following elements, based on the requirements of the California Environmental Quality Act (CEQA):

- **Setting.** This subsection describes the existing physical environmental conditions in the Project area with respect to each resource topic, at an appropriate level of detail to allow the reader to understand the impact analysis.
- **Regulatory Framework.** This subsection describes the relevant laws and regulations that apply to protecting the environmental resources within the Project area, and the governmental agencies responsible for enforcing those laws and regulations.
- **Impacts and Mitigation Measures.** This subsection evaluates the potential for the Projects to result in adverse effects on the physical environment described in the setting. Each impact analysis section defines significance criteria for evaluating environmental impacts, and the Methodology explains how the significance criteria are applied in evaluating the Project's impacts. The conclusion of each impact analysis is expressed in terms of the impact significance under CEQA, which is discussed further below. The analysis documents whether the adopted measures adequately avoid or mitigate significant impacts. Each impact subsection identifies mitigation measures for all of the impacts considered significant, consistent with CEQA *Guidelines* Section 15126.4. If needed, additional mitigation is included in the form of (1) modifications to update the adopted mitigation measures or (2) new mitigation measures to replace or augment an adopted mitigation measure. If additional impacts could result from implementation of a mitigation measure, those impacts are identified, consistent with CEQA *Guidelines* Section 15126.4.<sup>2</sup>
- **Cumulative Impacts.** This subsection discusses cumulative impacts, if applicable, following the description of the project-specific impacts and identified mitigation measures. The cumulative impacts consider the potential impacts of the Projects in combination with the impacts of other past, present, and probable future projects.

<sup>2</sup> CEQA *Guidelines* Section 15126.4 states that "if a mitigation measure would cause one or more significant effects in addition to those that would be caused by the project as proposed, the effects of the mitigation measure shall be discussed but in less detail than the significant effects of the project as proposed."

### 3.1.2 Significance Determinations

The significance criteria used in this EIR were developed by Pajaro Valley Water Management Agency (PV Water) and are largely based on CEQA *Guidelines* Appendix G. Each section of this chapter presents, before the discussion of impacts, the significance criteria used to analyze each resource topic. The categories used to designate impact significance are as follows:

- **No Impact (NI).** This determination applies if there is no potential for impacts or the environmental resource does not occur within the Project area or the area of potential effect.
- **Less than Significant (LS).** This determination applies if there is a potential for some limited impact but not a substantial, adverse effect that qualifies under the significance criteria as a significant impact. No mitigation is required for impacts determined to be less than significant.
- **Less than Significant with Mitigation (LSM).** This determination applies if there is a potential for the Projects to result in an adverse effect that would or could meet or exceed the significance criteria, but feasible mitigation is available that would reduce the impact to a less-than-significant level.
- **Significant and Unavoidable with Mitigation (SUM).** This determination applies if the Projects would result in an adverse effect that would or could meet or exceed the significance criteria and there is feasible mitigation available to lessen the severity of the impact, but either the residual effect after implementation of the measure would remain significant or there is some uncertainty as to the effectiveness of the mitigation measure (e.g., implementation of the measures relies on an agreement with a third party).
- **Significant and Unavoidable (SU).** This determination applies if the Projects would result in an adverse effect that would or could meet or exceed the significance criteria and for which there is no feasible mitigation available.

### 3.1.3 Approach to Cumulative Impacts Analysis and Cumulative Projects

#### 3.1.3.1 CEQA Provisions Regarding Cumulative Impacts

Cumulative impacts, as defined in Section 15355 of the CEQA *Guidelines*, refer to two or more individual effects that, when taken together, are “considerable” or that compound or increase other environmental impacts. A cumulative impact from several projects is the change in the environment that would result from the incremental impact of each project when added to those of other closely related past, present, or probable future projects. Section 15130 of the CEQA *Guidelines* provides the following pertinent guidance for cumulative impact analysis:

- An EIR shall discuss cumulative impacts of a project when the project’s incremental effect is “cumulatively considerable” (i.e., the incremental effects of an individual project are considerable when viewed in connection with the effects of past, current, and probable future projects, including those outside the control of the agency, if necessary).
- An EIR should not discuss impacts that do not result in part from the project evaluated in the EIR.

- A project's contribution is less than cumulatively considerable, and thus not significant, if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact.
- The discussion of impact severity and likelihood of occurrence need not be as detailed as for effects attributable to the project alone.
- The focus of analysis should be on the cumulative impact to which the identified other projects contribute, rather than on attributes of the other projects that do not contribute to the cumulative impact.

CEQA *Guidelines* Section 15130(b)(1) provides two approaches to a cumulative impact analysis. The analysis can be based (a) on a list of past, present, and probable future projects producing related or cumulative impacts; and/or (b) a summary of projections contained in a general plan or related planning document. Both approaches are used in this EIR.

### **3.1.3.2 Approach to Cumulative Impact Analysis in this EIR**

The cumulative impact analysis considers the effects of the Projects together with those of other past, present, or probable future projects proposed by PV Water or others. In Sections 3.2 through 3.13 of this chapter, the cumulative impact analysis for each resource topic follows the analysis of the project-specific impacts. Additional mitigation measures are identified if the cumulative impact analysis determines that a significant cumulative impact could occur and the Projects' contribution to a significant cumulative impact would be considerable, even with project-level mitigation. As permitted in CEQA *Guidelines* Section 15130(b)(1), the analysis in this EIR employs the list-based approach for defining projects to be considered in the cumulative impact analysis — that is, the analysis is based on a list of past, present, and probable future projects that could result in related or cumulative impacts. A probable future project is defined as one that is “reasonably foreseeable,” which is generally a project for which an application has been filed with the approving agency or that has approved funding. The probable future projects are subject to independent environmental review and consideration by approving agencies. Consequently, it is possible that some of the projects will not be approved or will be modified prior to approval (e.g., as a result of the CEQA process). Projects that are relevant to the cumulative analyses include those that could contribute incremental effects on the same environmental resources and would have similar environmental impacts as those identified for the Projects in this EIR.

The cumulative analyses presented in Sections 3.2 through 3.13 first consider whether there is an impact of the Projects that could result in adverse physical effects on the environment. If so, the cumulative analysis considers whether any of the relevant projects would result in related impacts or affect the same environmental resources as the Projects, resulting in a cumulative impact. If the cumulative impact is considered significant based on the identified significance criteria, the analysis considers whether the Projects' contribution would be cumulatively considerable (significant) or not cumulatively considerable (less than significant). If the Projects' contribution would be cumulatively considerable, mitigation measures are identified to reduce the Projects' contribution to a less-than-cumulatively-considerable level (less than significant with mitigation). If there is no feasible mitigation to reduce the Projects' contribution to a less-than-significant level, the Projects' contribution to the cumulative impact is considered significant and unavoidable.

**Table 3.1-1** describes the past, present, and probable future projects that are considered in the cumulative analyses (based on the factors described above), and their locations are shown on **Figure 3.1-1**. The list includes projects that have overlapping construction schedules with the Projects (or would be completed prior to or following construction of the Projects) and that could be constructed in the general vicinity of the Projects, with the potential to result in cumulative impacts during construction. The list also includes projects that could be in operation concurrently with the Projects and that could have similar environmental impacts as the Projects' operations, with the potential to result in cumulative operational impacts.

As discussed in Section 2.5.2 of Chapter 2, *Project Description*, the Board of Directors has adopted mitigation measures for all of the projects evaluated in the 2014 BMP Update PEIR. The cumulative impact analysis assumes that, like the Projects, the other BMP Update projects would implement adopted mitigation measures.

**TABLE 3.1-1**  
**PROJECTS CONSIDERED IN CUMULATIVE IMPACT ANALYSIS**

Project No. on Map	Project Name (Project Sponsor or Jurisdiction)	Project Description	Construction Dates
1	College Lake Integrated Resources Management Project <sup>a</sup> (PV Water)	This project is included in PV Water's BMP Update. This Project includes a weir structure and intake pump station, a water treatment plant, and an approximately 5.5-mile-long pipeline to convey water from the water treatment plant to the City of Watsonville Recycled Water Facility and to PV Water's Coastal Distribution System. On average, the Project would generally supply approximately 1,800 to 2,300 acre-feet per year of water to growers in the Pajaro Valley. Project construction is estimated to occur over approximately 18 months beginning in 2022.	2022-2023
2	Murphy Crossing with Recharge Basins <sup>b</sup> (PV Water)	This project is included in PV Water's BMP Update. This project would divert water from the Pajaro River between December and May, when the Pajaro River water quality is within an acceptable range and stream flows are above the required minimum necessary to maintain steelhead habitat. The project includes the construction of an infiltration gallery, pump station, monitoring wells, recharge basins, and a connector pipeline from pump station to recharge basins. An infiltration gallery located upstream of the Murphy Crossing bridge would capture water and transport it to four recharge basins. The recharge basins would be located just north of the intersection of State Route 129 and Murphy Road.	After 2025
3	Pajaro Valley Recharge Net Metering Pilot Program (PV Water, Resource Conservation District of Santa Cruz County, University of California at Santa Cruz, and Private Landowners) <sup>c</sup>	The Resource Conservation District of Santa Cruz County proposes to construct a one-acre sediment basin (base elevation of 44.5-feet) and an adjacent four-acre groundwater recharge basin (base elevation of 30-feet and berm elevation of 53-feet) on parcel number 051-241-34. The project involves up to 80,000 cubic yards of grading. The goal of this managed aquifer recharge project is to collect and infiltrate an estimated 350 acre-feet per year of runoff into the Pajaro Valley Groundwater Basin. The intent of the Program is to add 1 to 2 new sites each year, achieving the total program goal by the end of the 5th year.	Undetermined
4	Pajaro River Flood Risk Management Study (U.S. Army Corps of Engineers) <sup>d</sup>	The project, located in Santa Cruz and Monterey Counties, consists of levees and channel improvements on the Pajaro River and Corralitos and Salsipuedes Creeks to increase the level of flood protection afforded by existing flood protection infrastructure. The Tentatively Selected Plan includes measures to improve existing levees, measures to construct new levees, and measures to construct flood walls on Salsipuedes Creek, Corralitos Creek, and Pajaro River. Specific components include constructing new setback levees and rebuilding an existing levee on Reach 2 (on Pajaro River), rebuilding existing levees and floodwalls on Reach 3 (on Pajaro River), constructing a new setback levee along the southern bank of Reach 4 (on Pajaro River), constructing a new setback levee and floodwalls and rebuilding an existing levee along Reach 5 (on Lower Salsipuedes Creek), and constructing new setback levees along Reach 6 (on Corralitos Creek). The Tentatively Selected Plan features are intended to provide 1 percent annual chance of exceedance level of protection for the City of Watsonville (including adjacent agricultural areas) and 4 percent annual chance of exceedance level of protection for the Orchard Park and Interlaken neighborhoods (including adjacent agricultural areas).	2021-2025
5	Lee Road Trail Connector (City of Watsonville) <sup>e</sup>	The California Coastal Conservancy has recommended that the City of Watsonville prepare plans, designs, environmental analyses, and permit applications for the Lee Road Connector Trail, a 1.4-mile bicycle and pedestrian trail planned for the west side of the City of Watsonville. The Lee Road Connector Trail would be part of the Watsonville Area Scenic Trails Network, a trail system that currently offers approximately 10 miles of bicycle and pedestrian trails that follow the Watsonville Sloughs. The southern terminus of the Lee Road Connector Trail would connect to a planned trail along the Santa Cruz Branch Line railroad tracks, known as the Rail Trail, which, in this area, would run northwest to a junction with the Monterey Bay National Sanctuary Scenic Trail, at which point the Rail Trail would head north along the coast and form part of the Monterey Bay National Sanctuary Scenic Trail. The trail would also include a bridge across Struve Slough.	2021
6	Pajaro Valley High School Athletic Field Project <sup>f</sup>	This project would update the existing athletic facilities at Pajaro Valley High School by replacing the existing grass turf with synthetic turf and adding a regulation track, bleachers, a ticket booth, an announcer's booth, a scorekeeper's booth, a concessions building, and restrooms. The athletic fields would consist of two softball fields and football field.	2019-2020
7	State Route 152 Improvements (Caltrans) <sup>g</sup>	This project includes drainage improvements and transportation systems elements at various locations of State Route 152 in Santa Cruz County. The project extends from the State Route 152/Main Street intersection to the State Route 152/Bella Vista Lane intersection.	2024-2025
8	Rail Trail - Pedestrian Trail (City of Watsonville) <sup>h</sup>	This project would install a 4000-foot-long by 12-foot wide pedestrian trail within the railroad corridor between Lee Road and Watsonville Slough Trail as part of the Rail Trail.	2020-2022

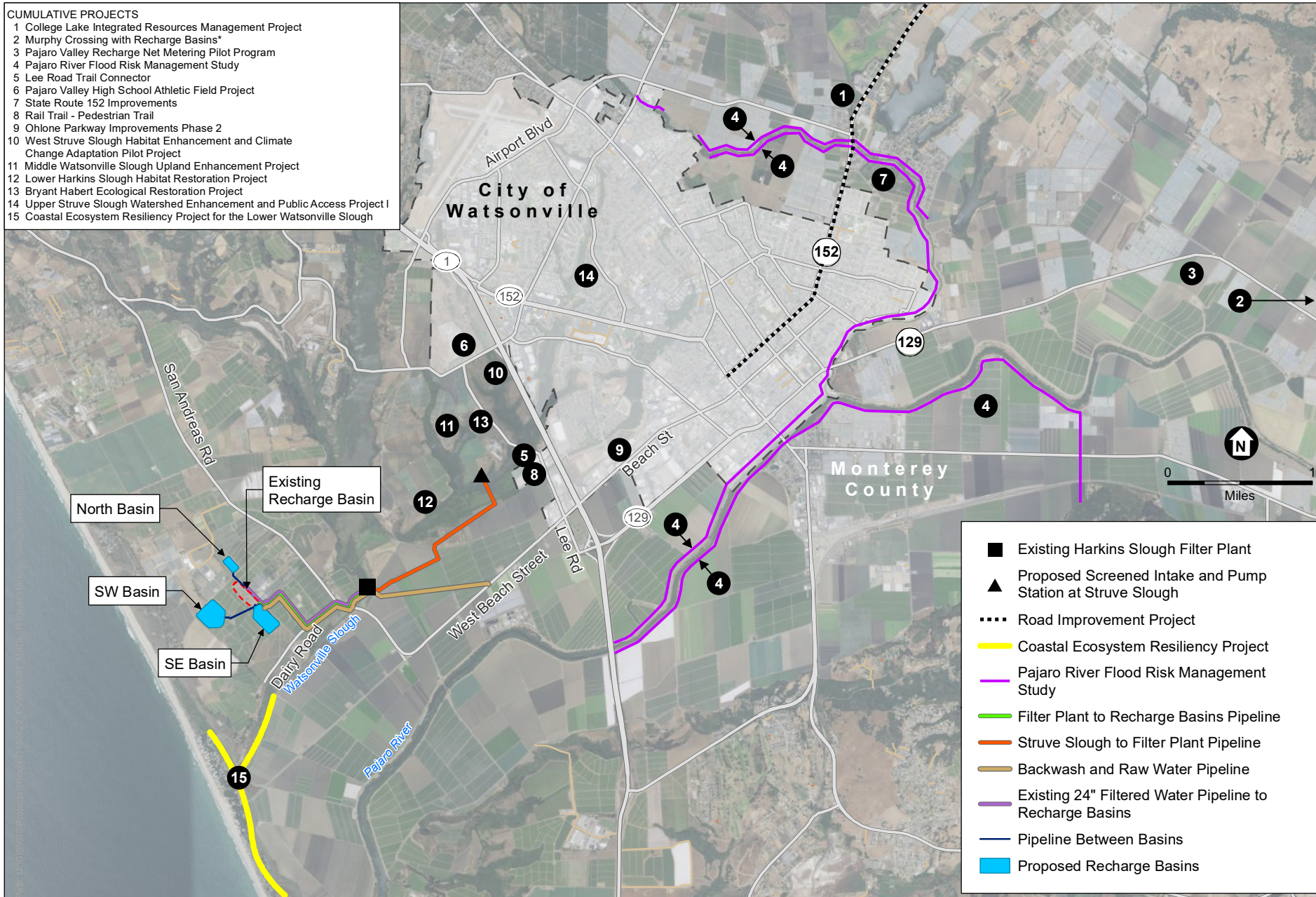
**TABLE 3.1-1 (CONTINUED)**  
**PROJECTS CONSIDERED IN CUMULATIVE IMPACT ANALYSIS**

Project No. on Map	Project Name (Project Sponsor or Jurisdiction)	Project Description	Construction Dates
9	Ohlone Parkway Improvements Phase 2 (City of Watsonville) <sup>h</sup>	This project includes repaving roadway; providing bike lanes; repairing, replacing, and installing curbs, gutters, sidewalks, and curb ramps; and replacing and upgrading signage and striping from the Union Pacific Railroad to West Beach Street in Watsonville.	2021-2022
10	West Struve Slough Habitat Enhancement and Climate Change Adaptation Pilot Project (Watsonville Wetlands Watch) <sup>i</sup>	This purpose of this project is to enhance native habitat along West Struve Slough and pilot climate change adaptation methods for habitat restoration. This would support further integration of climate change related planning and adaptive management in the Watsonville Slough System. This project is located at Watsonville Sloughs Ecological Reserve. Watsonville Wetlands Watch is partnering with the California Department of Fish and Wildlife.	2017-2022
11	Middle Watsonville Slough Upland Enhancement Project (Watsonville Wetlands Watch) <sup>i</sup>	This project is a 7-acre native grassland habitat restoration project adjacent to Watsonville Slough on the Land Trust of Santa Cruz County's land. Watsonville Wetlands Watch is partnering with the Land Trust of Santa Cruz County, Resource Conservation District of Santa Cruz County, and US Fish and Wildlife Service.	2013-2019
12	Lower Harkins Slough Habitat Restoration Project (Watsonville Wetlands Watch) <sup>i</sup>	This project is a 22-acre wetland habitat restoration project adjacent to Harkins and Watsonville Slough between Lee Road and San Andreas Road. Watsonville Wetlands Watch is partnering with the Natural Resources Conservation Service.	2016-2020
13	Bryant Habert Ecological Restoration Project (Watsonville Wetlands Watch) <sup>i</sup>	This project is a 20-acre wetland restoration and native habitat restoration project along Watsonville Slough on the Land Trust of Santa Cruz County's land.	Phase I complete in 2016, Phase II unfunded
14	Upper Struve Slough Watershed Enhancement and Public Access Project (City of Watsonville) <sup>j</sup>	This project will include the following: 1. Features to capture urban run-off directly from culvert outfalls and re-direct it to retention ponds or bioswales; 2. Bank stabilization to reduce flooding and eroding of slough bank; 3. Removal of invasive trees and restoration of riparian habitat; 4. Flood risk reduction measures to alleviate flooding within adjacent residential areas; and 5. Creation of a pedestrian and bicycle trail along the slough corridor. The project would be located within the portion of Upper Struve Slough that is between Green Valley Road and Crescent Avenue (upstream of the proposed Struve Slough intake), and includes the storm drain outlets at Green Valley Road and Davis Road.	Spring 2020 -2022
15	Coastal Ecosystem Resiliency Project for the Lower Watsonville Slough (Pajaro Storm Drain Maintenance District) <sup>k</sup>	This project includes the creation and enhancement of wetland habitat in the lower Watsonville Slough and improvements to local roadways and drainage facilities, which would provide additional hydraulic accommodation by reducing inundation depths in the lower slough and eliminating roadway flooding. The project includes "nature-based" strategies as well as infrastructure improvements, including raising roadbed elevations for several hundred feet of County roads, improving culverts beneath slough overcrossings, improving agricultural drainage ditches, improving the Shell Road pump station, and installing high water signage and emergency real-time slough gages. Among other things, the project is expected to reduce the need to conduct mechanical breaching of the Pajaro Lagoon.	After 2022

## SOURCES:

<sup>a</sup> PV Water, *Final College Lake Integrated Resources Management Project Final Environmental Impact Report*, October 2020.<sup>b</sup> PV Water, *Final Environmental Impact Report for the Basin Management Plan Update*, February 2014.<sup>c</sup> Resource Conservation District of Santa Cruz County, *Pajaro Valley Groundwater Recharge Project*, Initial Study/Environmental Checklist, March 9, 2017.<sup>d</sup> U.S. Army Corps of Engineers, *Pajaro River Flood Risk Management General Reevaluation Report & Integrated Environmental Assessment Updated Draft FONSI and Executive Summary*, November 2017.<sup>e</sup> California Coastal Conservancy, Staff Recommendation for the Lee Road Trail Connector, Project No. 17-045-01, March 22, 2018. Accessed on April 27, 2018. Available online at [http://scc.ca.gov/webmaster/ftp/pdf/scabb/2018/1803/20180322Board12\\_Lee\\_Road\\_Watsonville\\_Slough.pdf](http://scc.ca.gov/webmaster/ftp/pdf/scabb/2018/1803/20180322Board12_Lee_Road_Watsonville_Slough.pdf).<sup>f</sup> Pajaro Valley Unified School District, *Draft Subsequent Environmental Impact Report for Pajaro Valley High School Athletic Field Project*, State Clearinghouse No. 1996032052, April 2017.<sup>g</sup> Personal communications between C. Bjornstad, Caltrans District 5, and A. Maudru, Environmental Science Associates, regarding cumulative projects, May 4, 2018.<sup>h</sup> Personal communications between M. Fontes, City of Watsonville, and A. Maudru, Environmental Science Associates, regarding cumulative projects, May 15, 2018.<sup>i</sup> Personal communications between J. Pilch, Watsonville Wetlands Watch, and A. Maudru, Environmental Science Associates, regarding cumulative projects, June 8, 2018.<sup>j</sup> Santa Cruz Integrated Regional Water Management, Proposition 1 Implementation Solicitation Preliminary Project Information Form for the City of Watsonville's Upper Struve Slough Watershed Enhancement and Public Access Project, no date.<sup>k</sup> System for Online Application Review (SOAR), Printed Application for OPC Proposition 1 Grant Program – Round 3, Pajaro Storm Drain Maintenance District Coastal Ecosystem Resiliency Program for the Lower Watsonville Slough. Accessed April 22, 2019.





SOURCE: ESRI World Imagery, 2018; ESA data developed for the Harkins Slough and Struve Slough Projects

\* Located east of map extent

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.1-1**  
Cumulative Projects



## 3.2 Land Use and Agricultural Resources

This section presents an analysis of potential impacts related to land use and agricultural that would result from implementation of the proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects). Information from the 2014 Basin Management Plan Update Program Environmental Impact Report (2014 BMP Update PEIR) that remains relevant and accurate for the purposes of describing the physical or regulatory setting of land use and agricultural resources has been incorporated as appropriate.

### 3.2.1 Setting

#### 3.2.1.1 Existing Land Use in Project Vicinity

##### ***Regional***

All Project components are located in unincorporated Santa Cruz County (refer to Figure 2-1 in Chapter 2, *Project Description*). **Appendix PD-1** lists by Assessor Parcel Number (APN) the properties associated with Project components. As shown on **Figure 3.2-1**, agriculture is the predominant land use in the Project area. A variety of crops are grown in the Pajaro Valley, including strawberries, raspberries and blackberries, apples, flowers, lettuces, artichokes, and other fruits and vegetables. While homes are scattered throughout the Pajaro Valley, residential areas within the Project area are primarily located near urban centers, including the City of Watsonville and the neighboring community of Freedom. Commercial uses, schools, and parks are also concentrated in the City of Watsonville.

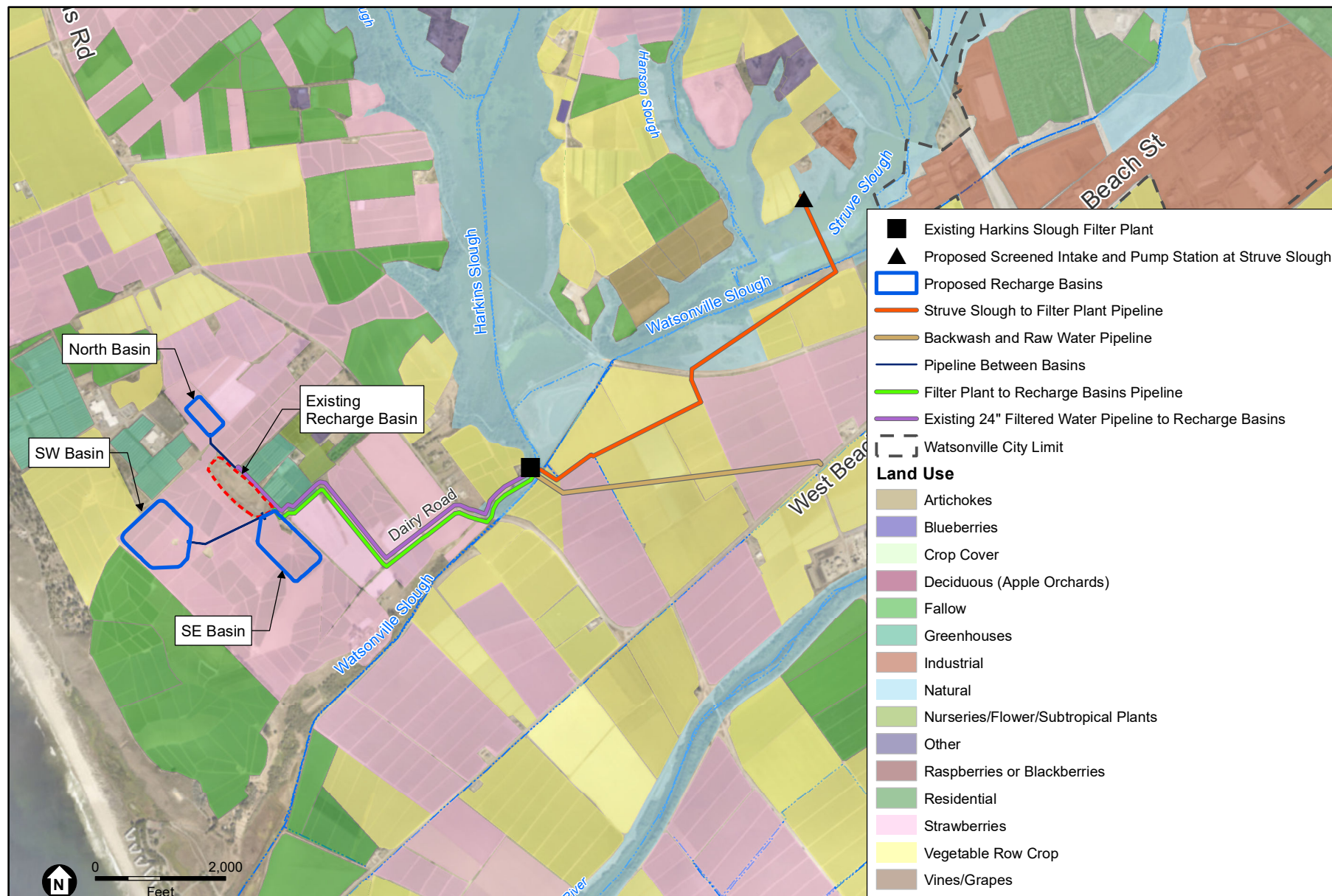
##### ***Project Components***

All Project components are on land that is designated by the Santa Cruz County 1994 General Plan/Local Coastal Program as “Agriculture” and zoned as “CA-Commercial Agriculture” and “CA-P - Commercial Agriculture-Agricultural Preserve”. The proposed pipeline alignments traverse agricultural land with the exception of a 700-foot portion that would be constructed along Dairy Road.

As shown on Figure 3.2-1, crops grown in the immediate Project area presently include strawberries and vegetables (e.g., romaine and iceberg lettuce, broccoli, and kales).<sup>1</sup>

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<sup>1</sup> E-mail communication between A. Maudru (ESA) and M. Mendiola (PV Water) regarding crops grown in the Project area, December 12, 2019.



SOURCE: PV Water, Land use data, 2018.

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.2-1**  
Land Use in the Project Area (2018)

## 3.2.2 Regulatory Framework

### 3.2.2.1 Federal and State

#### ***Farmland Protection and Policy Act***

The Farmland Protection and Policy Act requires an evaluation of the relative value of farmland that could be affected by decisions sponsored in whole or part by the federal government.<sup>2</sup> High value farmland categories defined in the Farmland Protection and Policy Act include the following:

- ***Prime Farmland*** is land that has the best combination of physical and chemical characteristics for long-term production of food, feed, forage, fiber, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable erosion. It has the soil quality, growing season, and moisture supply needed to sustain high crop yields when appropriately treated and managed. Prime farmland may be cropland, pastureland, rangeland, forestland, or other land, but not urban built-up land or water storage. In addition, the land must have been used for irrigated agricultural production during the four years prior to the mapping date to qualify under this category.
- ***Unique Farmland*** is land that does not meet the criteria for Prime Farmland but has been used for the production of specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. This land is usually irrigated, but may include the types of non-irrigated orchards or vineyards that are found in some climatic zones of California. Unique Farmland must have been in agricultural production at some time during the four years prior to the mapping date.
- ***Farmland of Statewide Importance*** is land, in addition to Prime and Unique Farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. This land is similar to Prime Farmland, but with minor shortcomings such as greater slopes and less ability to store moisture. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.
- ***Farmland of Local Importance*** applies to land of importance to the local agricultural economy as determined by appropriate unit of local government agency or agencies. This land is either currently producing crops or has the capability of production, but does not meet the criteria of the preceding categories.

Several activities are not subject to the Farmland Protection Policy Act, including projects on land already in urban development or used for water storage.<sup>3</sup>

#### ***State Designated Farmland***

The California Department of Conservation, Division of Land Resource Protection maps important farmlands throughout California. Important farmlands include Prime Farmland,

<sup>2</sup> NRCS, Farmland Protection Policy Act, No date. Available online at <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/fppa/>. Accessed on March 12, 2019.

<sup>3</sup> NRCS, Farmland Protection Policy Act, No date. Available online at <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/fppa/>. Accessed on March 12, 2019.

Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance (consistent with the definitions identified above), as well as Grazing Land. The first three types of important farmland have been incorporated into Appendix G of the California Environmental Quality Act (CEQA) *Guidelines* (refer to Section 3.2.3.1). For ease of reference, Prime Farmland, Farmland of Statewide Importance, and Unique Farmland, are collectively referred to in this environmental impact report (EIR) as “Important Farmland.”<sup>4</sup> **Figures 3.2-2** depicts Important Farmland at and in the vicinity of the Project sites. All three proposed recharge basins are wholly within land that is designated as Important Farmland; portions of all of the proposed pipelines traverse land that is Important Farmland. The existing Harkins Slough Filter Plant and the proposed intake and pump station at Struve Slough are on land designated as “Other Land”.

### ***Coastal Zone Management Act and California Coastal Act***

The California Coastal Commission administers the federal Coastal Zone Management Act along California’s coastline by regulating the use of land and water within the coastal zone. Santa Cruz County has authority to approve coastal development permits within its jurisdiction pursuant to the provisions of its Local Coastal Program certified by the California Coastal Commission. The County’s approved Local Coastal Program is integrated into the General Plan.

All Project components are within the Coastal Zone as defined in the California Coastal Commission’s Coastal Zone Boundary maps.<sup>5</sup> As indicated in Table 2-10 in Chapter 2, construction of the Projects within the Coastal Zone would require a coastal development permit from the County.

### ***California Land Conservation Act of 1965***

The California Land Conservation Act of 1965 (commonly referred to as the Williamson Act) is the state’s primary program for the conservation of private land for agricultural and open space uses. The Williamson Act provides a mechanism through which private landowners can contract with counties and cities to voluntarily restrict their land to agricultural and compatible open space uses. In return, Williamson Act contracts offer tax incentives by ensuring that land is assessed for its agricultural productivity rather than its highest and best use. Contracts typically restrict land use for a minimum of 10 years. Contracts are automatically renewed unless the landowner or local government files for non-renewal or petitions for cancellation.<sup>6</sup>

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<sup>4</sup> None of the Project components are on land that is designated by the California Department of Conservation as “Farmland of Local Importance”.

<sup>5</sup> Santa Cruz County, *1994 General Plan and Local Coastal Program for the County of Santa Cruz, California*, 1994.

<sup>6</sup> Under the non-renewal process, the remaining contract term is allowed to lapse, with the contract null and void at the end of the term. During the nonrenewal process, the annual tax assessment continually increases each year until it is equivalent to current tax rates at the end of the nonrenewal period. Under limited circumstances, cancellation of Williamson Act contracts is allowed, but the landowner is required to pay a cancellation fee and the process can take up to ten years to complete as contract cancellation involves a comprehensive review and approval process.





SOURCE: California Department of Conservation, California Important Farmland Finder, 2016.

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.2-2**  
Important Farmland in the Project Area

The California Department of Conservation prepares countywide maps of lands enrolled in Williamson Act contracts. Three parcels (APN 052-181-17, 052-181-18, and 052-181-20) on which the Southwest and Southeast recharge basins and associated recovery wells, monitoring wells, and pipelines are sited are enrolled in a Williamson Act Contract and designated as Mixed Enrollment Agricultural Land, defined by the California Department of Conservation as enrolled lands containing a combination of Prime, Non-Prime, Open Space Easement, or other contracted or enrolled lands not yet delineated by the County.<sup>7</sup>

The initial term of the Williamson Act contract for these parcels was for 10 years commencing in 1980 and automatically renewing thereafter for an additional year. During the term of the agreement, the property is to be "used for commercial production of agricultural commodities and/or those compatible uses allowed in the A (Agricultural) and P (Agricultural Preserve) Combining District of the County Zoning Ordinance." Section 5 of the agreement indicates that if the parcel is acquired for a public improvement, the agreement becomes null and void.<sup>8</sup>

### **3.2.2.2 Local**

General plan and zoning designations for Project component locations as well as relevant general plan policies are described below. California Government Code Section 53091 exempts agencies like Pajaro Valley Water Management Agency (PV Water) from complying with local building and zoning ordinances when locating or constructing facilities for the production, generation, storage, treatment, or transmission of water. California Government Code Section 65402(c) requires that PV Water notify cities and counties of its plans to construct projects or to acquire or dispose of property. The planning agency then has 40 days to determine project consistency with its general plan. If the planning agency disapproves (i.e., determines that the project is inconsistent with its general plan), the disapproval may be overruled by PV Water. In some cases, local policies are used in this EIR as criteria to determine the significance of physical effects on the environment (e.g., Impact NOI-1 in Section 3.8, Noise and Vibration).

#### ***General Plan and Zoning Designations***

As noted above, all of the Project components would be constructed on land that is designated as "Agricultural" in the Santa Cruz County General Plan, and zoned as "CA - Commercial Agriculture" or "CA-P - Commercial Agriculture-Agricultural Preserve" in the Santa Cruz County Zoning Ordinance. The principal permitted land uses within the "CA- Commercial Agricultural" zone are agricultural pursuits for the commercial cultivation of plant crops and the commercial raising of animals. In addition, dams, canals, and aqueducts of any public water project are principal permitted uses.<sup>9</sup>

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<sup>7</sup> California Department of Conservation, Division of Land Resources Protection, Santa Cruz County Williamson Act FY 2015/2016, 2015.

<sup>8</sup> County of Santa Cruz, Land Conservation Contract Application #79-1374-AP, APNs 052-181-17, 052-181-18, and 052-181-20, February 28, 1980.

<sup>9</sup> Section 13.10.312 (b) of the Santa Cruz County Code.

Parcels zoned “Commercial Agricultural – Preserve” indicate that the owner has executed an Agricultural Preserve or Farmland Security contract with the County to maintain the land in its natural state for 10 years. **Table 3.2-1** presents pertinent local plans and policies regarding land use and agricultural resources to support County of Project consistency with general plan policies.

**TABLE 3.2-1**  
**SANTA CRUZ COUNTY PLANS AND POLICIES RELEVANT TO THE PROJECT**

<b><i>Santa Cruz County General Plan/Local Coastal Program</i></b>
<p><b>Objective 5.5a:</b> Watershed Protection. To protect and manage the watersheds of existing and future surface water supplies to preserve the quality and quantity of water produced and stored in these areas to meet the needs of County residents, local industry, agriculture, and the natural environment.</p>
<p><b>Objective 5.8b, Overdrafted Groundwater Basins:</b> To act directly and coordinate and work with relevant water purveyors and agencies to eliminate long-term groundwater overdraft in all water basins where overdraft has been documented.</p> <p><i>Program c) ([Local Coastal Program] LCP).</i> Work with water purveyors and water management agencies to augment natural groundwater recharge where it is environmentally and fiscally acceptable. (Responsibility: Flood Control, Water Purveyors, PV Water)</p> <p><i>Program h) (LCP).</i> Continue to work with [PV Water] to eliminate overdraft and salt water intrusion through implementation of their Basin Management Plan.</p>
<p><b>Objective 5.13 Commercial Agricultural Land.</b> a) To maintain for exclusive agricultural use those lands identified on the County Agricultural Resources Map as best suited to the commercial production of food, fiber and ornamental crops and livestock and to prevent conversion of commercial agricultural land to non-agricultural uses. To recognize that agriculture is a priority land use and to resolve policy conflicts in favor of preserving and promoting agriculture on designated commercial agricultural lands.</p>
<p><b>Policy 5.13.1 Designation of Commercial Agriculture Land.</b> Designate on the General Plan and LCP Resources and Constraints Maps as Agricultural Resource all land which meets the criteria (as defined in the General Plan Glossary) for commercial agricultural land.</p>
<p><b>Policy 5.13.2 Types of Agriculture Land.</b> Maintain by County ordinance specific agricultural land type designations for parcels identified as commercial agricultural land based on the criteria set forth in the General Plan and LCP Land Use Plan and maintain Agricultural Resources Maps, by County ordinance to identify the distribution of the following types of Commercial Agricultural Land in the County: Type 1A - Viable Agricultural Land. Type 1A agricultural lands comprise areas of known high productivity which are not located in any utility assessment district for which bonded indebtedness has been incurred. These lands essentially meet the U.S. Department of Agriculture Soil Conservation Service and the California Department of Food and Agriculture criteria for “prime” and “unique” farmland and “prime” rangeland. Type 1B - Viable Agricultural Land in Utility Assessment Districts. This type includes viable agricultural lands, as defined above, which are within a utility assessment district for which bonded indebtedness has been incurred, except Agricultural Preserves. Type 2C – Limited Agricultural Land in Utility Assessment Districts. This type includes agricultural lands with limiting factors which are in a utility assessment district, as of 1979, which has incurred bonded indebtedness. Type 3 - Viable Agricultural Land within the Coastal Zone. This category includes all of the following lands outside the Urban Services Line and the Urban Rural Boundary, and within the Coastal Zone in Santa Cruz County:</p> <ul style="list-style-type: none"> <li>• Land which meets the U.S. Department of Agriculture Soil Conservation or California Department of Food and Agriculture Service criteria for prime farmland or rangeland soils and which is physically available for agricultural use.</li> <li>• Land which meets the California Department of Food and Agriculture criteria for unique farmland of statewide importance and which is physically available for agricultural use.</li> </ul>
<p><b>General Agricultural Policies Program F.</b> Ensure a continued sustainable supply of water for agricultural use through conservation, protection and development of surface and groundwater, utilization of excess domestic water, utilization of recycled wastewater, or importation of water from outside the County.</p>
<p>SOURCE: Santa Cruz County, 1994 General Plan and Local Coastal Program for the County of Santa Cruz, California, 1994.</p>

### 3.2.2.3 Agricultural Conservation Easements

Some parcels in the Pajaro Valley have agricultural conservation easements. An agricultural conservation easement is a legal agreement between a landowner and a conservation organization or government agency that permanently protects land from development while keeping land in

productive use.<sup>10</sup> Three agencies involved in the issuance of agricultural easements in Santa Cruz County and their respective roles include the following:

- The National Resources Conservation Service (NRCS) provides financial and technical assistance to help conserve agricultural lands and their related benefits.<sup>11</sup>
- The Land Trust of Santa Cruz County (Santa Cruz Land Trust) administers the agricultural conservation easement program within the Pajaro Valley.<sup>12</sup>
- The Resource Conservation District of Santa Cruz County partners with the NRCS and Santa Cruz Land Trust to provide technical assistance, site assessments, and conservation planning for landowners.<sup>13</sup>

None of the parcels directly affected by the Project is known to have an agricultural conservation easement.<sup>14</sup>

### 3.2.3 Impacts and Mitigation Measures

#### 3.2.3.1 Significance Criteria

In accordance with the CEQA, State CEQA *Guidelines* (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project could have a significant impact if it were to:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (referred to herein as Important Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use;
- Conflict with existing zoning for agricultural use, or a Williamson Act contract;
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use;
- Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.

The following topics are not analyzed further in this section for the reasons described below:

- ***Conflict with existing zoning for agricultural use.*** As indicated in Section 3.2.2.2, California Government Code Section 53091 exempts PV Water from complying with local zoning ordinances for the Project (i.e., a project used for the production, generation, storage,

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<sup>10</sup> Santa Cruz Land Trust, What's a Conservation Easement, No date. Available online at <https://www.landtrustsantacruz.org/for-landowners/whats-a-conservation-easement/>. Accessed on March 4, 2019.

<sup>11</sup> NRCS, Agricultural Conservation Easement Program, No date. Available online at <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/acep/>. Accessed on March 4, 2019.

<sup>12</sup> Santa Cruz Land Trust, What's a Conservation Easement, No date. Available online at <https://www.landtrustsantacruz.org/for-landowners/whats-a-conservation-easement/>. Accessed on March 4, 2019.

<sup>13</sup> Resource Conservation District of Santa Cruz County, Technical Assistance, 2019. Available online at <http://www.recdsantacruz.org/technical-assistance>. Accessed on March 4, 2019.

<sup>14</sup> National Conservation Easement Database, NCED Mapping Application, 2019. Available online at <https://www.conservationeasement.us/interactivemap/>. Accessed on December 17, 2019.



treatment, or transmission of water). The potential for the Project to conflict with state laws intended to protect agricultural land are addressed below under Impacts LU-1 (conversion of farmland designated by the State of California as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) and LU-2 (conflict with a Williamson Act contract).

### 3.2.3.2 Methodology

As described in Section 3.1, Overview, this EIR provides an independent analysis of the Projects' potential environmental impacts. Potential impacts are evaluated in the following section. If warranted, mitigation measures are included. The analyses below assess whether and how Project construction and operation might alter existing land uses in such a way that it would trigger one or more of the environmental impacts identified in Section 3.2.3.1.

Consistent with CEQA, this analysis focuses on significant impacts on the physical environment. Economic effects, such as loss of revenue due to disruption of farming, are not evaluated as significant impacts under CEQA, unless such effects would result in a significant impact on the physical environment. For information on acquisition of property, easements, and rights-of-way proposed as part of the Projects, refer to Section 2.8 in Chapter 2, *Project Description*.

Additional information on methodology is provided below under each impact statement.

### 3.2.3.3 Impacts and Mitigation Measures

**Impact LU-1: The Projects would convert Important Farmland to non-agricultural use and could involve changes in the existing environment which, due to their location or nature, could result in conversion of Important Farmland to non-agricultural use. (*Significant and Unavoidable with Mitigation*)**

This impact combines the first and third bullets listed in Section 3.2.3.1, Significance Criteria: conversion of Important Farmland (i.e., farmland designated by the State as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance), and changes to the existing environment that could result in the conversion of farmland to non-agricultural use.<sup>15</sup>

Project components are located wholly or partially on Important Farmland (see Figures 3.2-2). The Projects have the potential to adversely affect Important Farmland in multiple ways including the following:

- **Direct permanent conversion of Important Farmland.** For example, construction of the recharge basins would result in the permanent conversion of Important Farmland.
- **Temporary disruption of agricultural use during Project construction.** For example, open trenching for pipeline construction would disrupt farming within the pipeline construction corridor.

**Table 3.2-2** summarizes direct impacts and other changes that could result in the permanent conversion of Important Farmland. The purpose of the Projects is to help balance the Pajaro Valley

<sup>15</sup> As noted in Section 3.2.2.1, there is no land designated by the California Department of Conservation as "Farmland of Local Importance" within the Project area.

Groundwater Basin, prevent further seawater intrusion, and meet water supply needs in PV Water’s service area by replacing groundwater supplies with surface water supplies for agricultural irrigation. Consequently, while the Projects would adversely affect Important Farmland, they would also promote the long-term preservation of such farmland within the Pajaro Valley into the future by substituting surface water for groundwater resources in the areas shown on Figure 2-5 in Chapter 2, *Project Description*.

**TABLE 3.2-2  
ANTICIPATED CONVERSION OF IMPORTANT FARMLAND<sup>a</sup>**

Project Component		Area (Acres)	
		Total	Important Farmland Anticipated to be Converted
<b>Harkins Slough Project</b>	Southwest Recharge Basin	16.7	16.7
	Southwest Recovery Wells and Monitoring Wells	0.3	0.3
	Southeast Recharge Basin	12.7	12.7
	Southeast Recovery Wells and Monitoring Wells	0.3	0.3
<b>Struve Slough Project</b>	North Recharge Basin	3.9	3.9
	North Recovery Wells and Monitoring Wells	0.3	0.3
<b>Total</b>			<b>34.2</b>

NOTES:

<sup>a</sup> Important Farmland refers to Prime Farmland, Farmland of Statewide Importance, and Unique Farmland as mapped by the California Department of Conservation, Farmland Mapping and Monitoring Program.

SOURCE: California Department of Conservation, California Important Farmland Finder, 2016.

### Direct Permanent Conversion of Important Farmland

As stated above, there would be no direct permanent conversion of Important Farmland at the existing Harkins Slough filter plant or proposed screened intake and pump station at Struve Slough because the land is designated as “Other Land”. As shown in Table 3.2-2, construction and operation of the Southwest, Southeast, and North recharge basins and associated recovery wells and monitoring wells could permanently remove approximately 34.2 acres of Important Farmland from cultivation, resulting in the permanent conversion of Important Farmland to another use. Implementation of **Mitigation Measures LU-1a** would help reduce the magnitude of this impact.

While there would be temporary disruption of farming operations during construction of the proposed pipelines, and PV Water would occasionally access the pipeline for maintenance purposes, which could also temporarily disrupt farming operations, there would be no permanent conversion of Important Farmland associated with the proposed pipelines.

### Temporary Disruption of Agricultural Use During Project Construction

As indicated in Section 2.6 in Chapter 2, *Project Description*, construction equipment and materials would be stored within the construction work areas to the extent feasible, though

additional offsite laydown areas may be required. If required, the additional laydown area(s) would be located near the Project sites. Construction staging and laydown for the proposed Harkins Slough Facility improvements would use the existing PV Water property for storage/staging of equipment and materials. Construction staging and laydown for the proposed Struve Slough intake and pump station would require a one-acre staging area near the 1,600 square-foot footprint of the Struve Slough pump station. General construction activities (e.g., trucks traveling on farm roads to the recharge basins, noise, and dust) could disrupt farming practices on neighboring properties. Disruption of farming due to construction would not constitute a significant impact on Important Farmland because it would not result in the permanent conversion of Important Farmland. Refer to Table 3.5-5 in Section 3.5, Air Quality and Greenhouse Gases, for measures adopted by PV Water to control dust from construction.

Pipeline construction through agricultural fields would result in a temporary loss of crop production. Pipeline construction would occur during several months of the overall four-year construction schedule, and construction through agricultural fields would require up to a 40-foot-wide temporary construction easement to facilitate construction and movement of equipment. Staging and laydown for pipeline construction would occur primarily within the width of the temporary construction easement and along the pipeline easement. In agricultural fields, pipeline installation is estimated to occur at rates of up to 250 linear feet per day. Following cessation of pipeline construction activities, farming could resume within the construction corridor; however, trees with roots extending more than three feet deep would be prohibited above the pipeline because deep roots could damage the pipeline and its cover. There are currently no orchards along the pipeline routes.

During pipeline construction in farm fields, excavated material would likely be side-cast adjacent to pipeline trenches. If top soil is not replaced following construction, long-term impacts on the productivity of Important Farmland could occur. Implementation of **Mitigation Measure LU-1b** would prevent a long-term adverse effect on Important Farmland resulting from pipeline construction.

### Impact Summary

Although implementation of the Projects would result in the permanent conversion of Important Farmland through direct changes in the environment, and pipeline construction could result in long-term adverse impacts on Important Farmland, these impacts would be partially mitigated by the Project's contribution to the long-term preservation of such farmland within the Pajaro Valley by substituting surface water for groundwater resources in the areas shown on Figure 2-5 in Chapter 2, which are otherwise threatened by long-term conversion to non-agricultural use due to seawater intrusion. While implementation of Mitigation Measures LU-1a and LU-1b could reduce these impacts, the loss of Important Farmland remains *significant and unavoidable* for the following reasons. First, implementation of Mitigation Measure LU-1a relies on agreements with third parties (Santa Cruz Land Trust or similar entity and private property owners). In addition, the implementation of agricultural easements under Mitigation Measure LU-1a restricts future land uses; consequently, land owners may be unwilling to put agricultural easements on their property. Moreover, the cost of implementing Mitigation Measure LU-1a is not known and cannot be known with certainty at this time. Due to the need to negotiate acquisition of each

individual agricultural easement with a willing property owner, there is some uncertainty as to the timing by which Mitigation Measure LU-1a could be implemented. Lastly, while acquiring agricultural easements would ensure that the parcels over which they are acquired are preserved for agricultural uses, the Projects would not reduce the number of acres lost to agricultural production. A conservation easement would not ‘replace or provide a substitute resource’ (CEQA *Guidelines* Section 153701(e)) for the permanent loss of farmland acreage. For all of the foregoing reasons, implementation of Mitigation Measure LU-1a may be infeasible. Thus, the DEIR concludes that impacts to the loss of Important Farmland remain significant and unavoidable. Nevertheless, while the Projects would adversely affect Important Farmland in and around the proposed recharge basins, their implementation would nevertheless in and of itself mitigate this impact to some extent, by also promoting the long-term preservation of such farmland within the Pajaro Valley into the future by substituting surface water for groundwater resources within a critically overdrafted groundwater basin.<sup>16</sup>

**Mitigation Measure LU-1a: Compensate for Conversion of Important Farmland.**

***Track Conversion of Important Farmland.*** PV Water shall review California Department of Conservation’s Farmland Mapping and Monitoring Program farmland designations for the recharge basins and associated recovery wells and monitoring wells annually beginning with the first year of construction and continuing for five years after construction of components located in Important Farmland is completed. PV Water shall identify Prime Farmland, Farmland of Statewide Importance, and Unique Farmland referred to herein as Important Farmland that is associated with the recharge basins and associated recovery wells and monitoring wells that converts due to implementation of the Projects.

***Establish Memorandum of Understanding for Agricultural Easement Fund.*** PV Water shall enter into a Memorandum of Understanding with the Santa Cruz Land Trust or similar entity. The Memorandum of Understanding shall include details regarding an Agricultural Easement Fund to be paid by PV Water and the timing of acquisition of agricultural easements for the purpose of offsetting impacts on Important Farmland caused by the Projects. Acceptance of this fee by the Santa Cruz Land Trust or similar entity shall serve as an acknowledgment and commitment to: (1) secure agricultural easements to offset the conversion of Important Farmland caused by the Projects; and (2) provide documentation to PV Water describing the project(s) funded by the mitigation fee. If there is any remaining unspent portion of the Agricultural Easement Fund following implementation, PV Water shall be entitled to a refund in that amount. To qualify under this mitigation measure, the specific agricultural easement acquisition projects must preserve acreage of farmland of an equal or greater Farmland Mapping and Monitoring Program designation value (e.g., Prime Farmland, Farmland of Statewide Importance, or Unique Farmland) within the PV Water service area to offset the permanent conversion of Important Farmland by the Projects.

***Contribute to Agricultural Easement Fund.*** PV Water shall initially designate funds to secure easements for up to the equivalent area of Important Farmland associated with development of the first recharge basin and associated recovery wells and monitoring wells.

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<sup>16</sup> Department of Water Resources, Bulletin 118. Available online at <https://water.ca.gov/Programs/Groundwater-Management/Bulletin-118>. Accessed on March 22, 2019.

***Directly Fund Agricultural Easements.*** As an alternative approach to establishing a memorandum of understanding for, and contributing to an agricultural easement fund, PV Water could elect to directly fund the purchase of agricultural easements for Important Farmland in the Pajaro Valley.

#### **Mitigation Measure LU-1b: Replacement of Topsoil.**

In agricultural areas, PV Water shall require contractors to stockpile topsoil at Project sites during Project grading and reapply it in situ after construction to promote vegetative growth. In agricultural areas temporarily disturbed by construction and where excavation occurs, the following measures shall apply:

- Strip 18 inches of topsoil from the area excavated unless otherwise stipulated by landowner. The topsoil shall be stored separately from subsoil and other construction materials.
- Clearly mark topsoil with signs, and store topsoil separately from other excavated and imported materials in such a manner that the topsoil is not damaged, mixed, or covered by subsoil or surface rocks, and so that it is not continually disturbed.
- Stockpile topsoil on the same property from which it was stripped and return topsoil to same property from which it was stripped.

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#### **Impact LU-2. The Projects could conflict with a Williamson Act contract, or conflict with an applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project adopted for the purpose of avoiding or mitigating an environmental effect. (*Less than Significant*)**

As indicated in Section 3.2.2.1, there are three parcels under Williamson Act contract that would be affected by the Project. In addition, the Local Coastal Plan applies to the entire Project area as well, as all Project components are within the Coastal Zone (i.e., west of State Route 1).

#### **Williamson Act**

As indicated in Section 3.2.2.1, APNs 052-181-17, 052-181-18, and 052-181-20 within the boundaries of the Southwest and Southeast recharge basins and associated recovery wells, monitoring wells, and pipelines are enrolled in a Williamson Act Contract. In the event that the parcels are acquired for a public improvement, the Williamson Act contract becomes null and void.<sup>17</sup> As part of the Projects, PV Water proposes to acquire or otherwise control use of portions of these parcels. Implementation of the Projects would cause portions of these parcels to be turned into recharge basins (refer to Figure 2-3), and farming could not continue. Because the Projects would be a public improvement, acquisition of these parcels would render the Williamson Act contract null and void, thus eliminating any conflict. Consequently, there would be no impact related to cancellation of a Williamson Act contract.

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<sup>17</sup> County of Santa Cruz, Land Conservation Contract Application #79-1374-AP, APNs 052-181-17, 052-181-18, and 052-181-20, February 28, 1980.

### **Coastal Development Plan**

As described in Section 3.2.2, Santa Cruz County has authority to approve coastal development permits for the portion of the state-designated Coastal Zone within its jurisdiction. All proposed Project components are within the Coastal Zone. Chapter 13.20 of the Santa Cruz County Code establishes the Coastal Zone review and permit processes for the purpose of implementing the California Coastal Act. Pursuant to Section 13.20.050 of the Santa Cruz County Code, PV Water would need to obtain a coastal development permit.

Table 3.2-1 presents objectives and policies from the Santa Cruz County General Plan/Local Coastal Program. The County would make a formal determination of consistency with the Local Coastal Plan through issuance of the Coastal Development Permit. A review of Santa Cruz County General Plan/Local Coastal Program policies conducted for this EIR did not identify any apparent inconsistencies associated with the Projects.

Although implementation of the Projects would preclude farming within the proposed recharge basins (refer to Impact LU-1), they would help preserve agricultural lands in the Coastal Zone over the long term by reducing pumping and overdraft which has led to sea water intrusion in the Pajaro Valley. Implementation of the Projects would be consistent with several General Plan/Local Coastal Programs goals and policies including those related to fostering the continuation of agriculture in the Pajaro Valley, protecting and managing watersheds and surface water supplies, eliminating long-term groundwater overdraft, and ensuring a continued sustainable supply of water for agricultural use through protection and development of surface and groundwater, and the impact would be *less than significant*.

**Mitigation:** None required.

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### **Cumulative Impacts**

**Impact C-LU-1: The Projects, in combination with past, present, and probable future projects in the Project area, would have a cumulatively considerable impact on the conversion of Important Farmland to non-agricultural use. (*Significant and Unavoidable with Mitigation*)**

The geographic scope for cumulative impacts on land use and agriculture is the Pajaro Valley. The focus of the analysis of cumulative impacts on land use and agricultural resources is the permanent conversion of Important Farmland. This analysis uses a list-based approach. The projects described in Table 3.1-1 in Section 3.1, Overview, were reviewed to determine whether any could result in the permanent conversion of Important Farmland.<sup>18</sup> Based on available information, the following projects could result in the conversion of Important Farmland:

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<sup>18</sup> No acreages for conversion of Important Farmland were available for projects 10-12 in Table 3.1-1 of Section 3.1. Therefore, these projects are not discussed.

- ***College Lake Integrated Resources Management Project.*** Components of this project, including the lake storage area, could result in the conversion of up to approximately 198.5 acres of Important Farmland.<sup>19</sup>
- ***Murphy Crossing with Recharge Basins.*** The recharge basins associated with the Murphy Crossing project would result in the permanent conversion of approximately 21 acres of Important Farmland.<sup>20</sup>
- ***Pajaro Valley Recharge Net Metering Pilot Program.*** Components of this project, specifically the recharge basins, could result in the conversion of five or more acres of Important Farmland.<sup>21</sup>
- ***Pajaro River Flood Risk Management Study.*** This project involves implementing flood protection measures and would result in the loss of up to 130.6 acres of Important Farmland adjacent to the Pajaro River.<sup>22</sup>

The projects listed above, in addition to the Harkins Slough and Struve Slough Projects, could account for the conversion of approximately 389.3 acres of Important Farmland to non-agricultural use. This would be a significant impact, and the project's contribution to this impact would be cumulatively considerable. Implementation of Mitigation Measures LU-1a and LU-1b could reduce the project's contribution to this cumulative impact to less-than-cumulatively considerable. However, for reasons stated under Impact LU-1, this impact is still considered significant and unavoidable and thus its contribution to this cumulative impact is considered cumulatively considerable. Those cumulative projects proposed by PV Water have been (in the case of the College Lake Integrated Resources Management Project) or will be subject to project-specific CEQA, at which point PV Water will evaluate impacts on Important Farmland based on (then) current design information and will, in accordance with CEQA, adopt measures to mitigate impacts on Important Farmland.

**Mitigation Measure LU-1a: Compensate for Conversion of Important Farmland**  
(refer to Impact LU-1)

**Mitigation Measure LU-1b: Replacement of Topsoil** (refer to Impact LU-1)

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<sup>19</sup> PV Water, *College Lake Integrated Resources Management Project Final Environmental Impact Report*, October 2019.

<sup>20</sup> PV Water, *2014 Basin Management Plan Update, Final EIR*, February 2014.

<sup>21</sup> Resource Conservation District of Santa Cruz County, *Pajaro Valley Groundwater Recharge Project*, Initial Study/Environmental Checklist, March 9, 2017.

<sup>22</sup> U.S. Army Corps of Engineers, *Pajaro River Flood Risk Management General Reevaluation Report & Integrated Environmental Assessment Updated Draft FONSI and Executive Summary*, November 2017.

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## 3.3 Surface Water, Groundwater, and Water Quality

This section presents an analysis of potential impacts related to surface water, groundwater, and water quality that would result from implementation of the proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects). Information from the 2014 Basin Management Plan Update Program Environmental Impact Report (2014 BMP Update PEIR) that remains relevant and accurate for the purposes of describing the physical or regulatory setting of surface water, groundwater, and water quality has been incorporated as appropriate. The Projects include mitigation measures adopted by the Board of Directors to reduce the severity and magnitude of potential environmental effects.

### 3.3.1 Setting

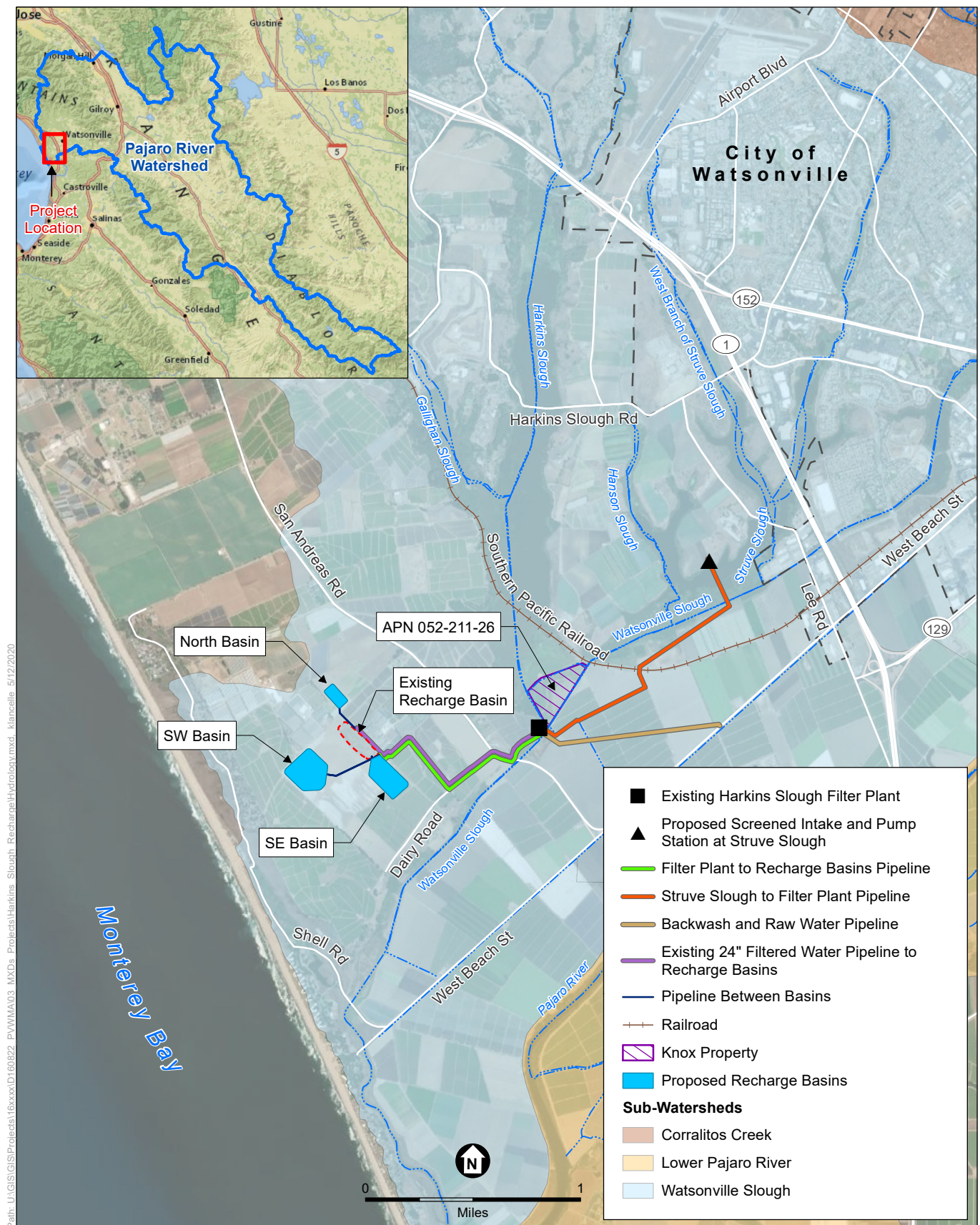
The 2014 BMP Update PEIR Section 3.9.1 describes existing hydrology and water quality conditions in the Project region. Regional environmental setting information from the 2014 BMP Update PEIR is summarized here. This section also describes hydrologic and water quality information specific to the Project area.

#### 3.3.1.1 Regional Physiography, Climate, Hydrology, and Geomorphology

The Projects are located in the Pajaro River watershed, an approximately 1,300-square-mile drainage unit constituting most of San Benito County and portions of Santa Clara, Santa Cruz, and Monterey counties, shown on **Figure 3.3-1**. The Pajaro River watershed is part of the Central Coast Hydrologic Region that extends from southern San Mateo County to southern Santa Barbara County.<sup>1</sup> Topographic features along the central coast are dominated by the rugged sea coast and west- to northwest-trending mountain ranges; long valleys run parallel to the mountains. The Pajaro Valley is located in the lower Pajaro River watershed, and it is bounded by the Santa Cruz Mountains to the north and east, the Los Carneros Hills to the south, and Monterey Bay (the Pacific Ocean) to the west. The northwest-trending San Andreas and the Zayante-Vergeles fault zones cross the eastern side of the basin. The basin is filled with alluvial, aeolian, and marine sediment that together are over 3,500 feet thick in the deepest parts of the Pajaro Valley. Section 3.6, Geology and Soils, further discusses Pajaro Valley geology.

The Pajaro Valley is in a Mediterranean climate typical of central coastal California. This climate zone is characterized by cool, wet winters and warm, dry summers. Over 90 percent of annual precipitation falls from November through April, and coastal fog is common in the summer and fall months. The mean annual temperature is 57 degrees Fahrenheit; the mean monthly maximum temperature is 74 degrees Fahrenheit in September; and the mean monthly minimum temperature is 39 degrees Fahrenheit in January. The long-term mean annual rainfall at Watsonville is 21.8 inches, averaged for the period of record from water years 1908 to 2019, while the 30-year

<sup>1</sup> RWQCB, Central Coast Regional, Water Quality Control Plan for the Central Coastal Basin, September 2017.



SOURCE: Carollo Engineers, 2019;  
ESRI World Imagery, 7/23/2016; ESA; USGS, 2016

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.3-1**  
Hydrology and Watersheds in the Project Vicinity

average (1990 to 2019) is 22.5 inches. The mean precipitation for the Pajaro Valley ranges from 16 inches near the coast to more than 40 inches in the foothills of the Santa Cruz Mountains.<sup>2</sup> Annual precipitation is highly variable, ranging from less than 40 percent to more than 200 percent of the mean of data collected for over 100 years.<sup>3</sup> The long-term precipitation and streamflow records suggest that most of the variation in precipitation and streamflow occurs due to longer climate cycles.<sup>4</sup>

Precipitation that falls in Pajaro Valley and that does not reenter the atmosphere via evapotranspiration may infiltrate into the ground and percolate into the groundwater system or run off into streams and eventually flow into the Pacific Ocean. In some areas of the Pajaro Valley, particularly in the foothill areas north and east of the Pajaro River, water from the streams at times infiltrates into the groundwater system. Much of the streamflow in the Pajaro Valley originates as runoff from outside the Pajaro Valley (to the east, in San Benito County) and enters through the Pajaro River. Changes in natural streamflow within the Pajaro Valley include the construction and operation of water diversion structures for urban and agricultural supplies and for artificial recharge.<sup>5</sup> Under developed conditions, decades of groundwater withdrawals in excess of recharge have led to groundwater storage depletion, which has lowered groundwater levels and altered the movement of groundwater, causing onshore migration of seawater and the formation of regional cones of depression in the center of the Pajaro Valley.<sup>6</sup>

Regional topography, geology, climate, and hydrology influence patterns of erosion and sedimentation in the basin.<sup>7</sup> The terrain in the Santa Cruz Mountains consists of shallow, erodible soils overlying highly fractured sedimentary rock. Intense precipitation combined with erodible material results in high erosion rates of the mountain slopes. The relief between the Santa Cruz Mountains and the Pajaro Valley drives sediment deposition in the Pajaro Valley, as available stream power declines in areas of reduced channel gradient. Streams in these areas form incised channels cut into extensive alluvial deposits. Prior to agriculture becoming the dominant land use, little runoff occurred from land adjacent to these lowland stream channels; instead, these stream channels conveyed water from the mountainous reaches to the ocean.<sup>8</sup> Under increasingly

<sup>2</sup> Hanson, R.T., Schmid, Wolfgang, Faunt, C.C., Lear, Jonathan, and Lockwood, Brian, 2014, Integrated hydrologic model of Pajaro Valley, Santa Cruz and Monterey Counties, California: U.S. Geological Survey Scientific Investigations Report 2014-5111, <http://dx.doi.org/10.3133/sir20145111>.

<sup>3</sup> Hanson, Geohydrologic Framework of Recharge and Seawater Intrusion in the Pajaro Valley, Santa Cruz and Monterey Counties, California. USGS Water-Resources Investigations Report 03-4096, 2003.

<sup>4</sup> Hanson, R.T., Schmid, Wolfgang, Faunt, C.C., Lear, Jonathan, and Lockwood, Brian, 2014, Integrated hydrologic model of Pajaro Valley, Santa Cruz and Monterey Counties, California: U.S. Geological Survey Scientific Investigations Report 2014-5111, <http://dx.doi.org/10.3133/sir20145111>.

<sup>5</sup> Hanson, R.T., Schmid, Wolfgang, Faunt, C.C., Lear, Jonathan, and Lockwood, Brian, 2014, Integrated hydrologic model of Pajaro Valley, Santa Cruz and Monterey Counties, California: U.S. Geological Survey Scientific Investigations Report 2014-5111, <http://dx.doi.org/10.3133/sir20145111>.

<sup>6</sup> Hanson, R.T., Schmid, Wolfgang, Faunt, C.C., Lear, Jonathan, and Lockwood, Brian, 2014, Integrated hydrologic model of Pajaro Valley, Santa Cruz and Monterey Counties, California: U.S. Geological Survey Scientific Investigations Report 2014-5111, <http://dx.doi.org/10.3133/sir20145111>.

<sup>7</sup> Information in this description derived from Fall Creek Engineering, Lower Pajaro River Enhancement Plan for Green Valley, Casserly, Hughes, Tynan, Coward and Thompson Creeks, Santa Cruz County, California, December 2002.

<sup>8</sup> Fall Creek Engineering, Lower Pajaro River Enhancement Plan for Green Valley, Casserly, Hughes, Tynan, Coward and Thompson Creeks, Santa Cruz County, California, December 2002.

developed conditions, erosion and sedimentation patterns have been influenced by land uses that increase impervious area in the watershed. When impervious areas reduce infiltration and cause precipitation to flow into stream channels, the increased flow in channels causes new patterns of channel incision and bank erosion.<sup>9</sup> Studies of sediment transport within the Pajaro River watershed have indicated that the lower Pajaro River, downstream of the Chittenden stream flow gage,<sup>10</sup> is degrading (eroding). Ongoing channel adjustments resulting from land use changes appear to be in progress, and they affect current and projected future drainage patterns in the watershed.

### **3.3.1.2 Surface Water Hydrology of Watsonville, Harkins, and Struve Sloughs**

The overall Watsonville Slough watershed (shown on Figure 3.3-1) has an area of 11,867 acres (18.5 square miles). Land use varies across the watershed, with the eastern portion (including roughly two-thirds of the City of Watsonville) accounting for almost all of the highly urbanized areas (refer to Figure 3.2-1 for a map of land uses in the projects vicinity). However, in the watershed as a whole, land use is almost equally divided between agricultural lands (3,715 acres or 33 percent), developed areas (3,619 acres or 32 percent), and open space (3,984 acres or 35 percent).<sup>11</sup> In the project vicinity, from State Route 1 to Shell Road, the channel slope of Watsonville Slough is relatively uniform and low (0.04 percent, or 2.3 feet/mile).

The overall watershed can be divided into three distinct drainage areas based on water flow: 1) the Harkins Slough Branch, 2) the Watsonville-Struve Slough Branch, and 3) the Lower Watsonville Slough Area. These areas are not necessarily distinct from a land use or geologic perspective, but are important in understanding movement of water through the system.

#### ***Harkins Slough Branch Drainage Area***

Harkins Slough Branch is the largest of the drainage areas. With a total drainage area of 6,967 acres (10.9 square miles), the Harkins Slough branch comprises roughly 59 percent of the entire watershed, but produces about 26 percent of total watershed runoff on average.<sup>12</sup> The Harkins Slough branch receives runoff almost exclusively from coastal terrace areas that are predominantly agricultural and open space land uses. Outflow from Harkins Slough, even absent recharge diversion pumping, is of relatively short duration in the context of the entire water year. Coupled with the observation that some 500 acre-feet of the outflow actually originates in the

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<sup>9</sup> Fall Creek Engineering, Lower Pajaro River Enhancement Plan for Green Valley, Casserly, Hughes, Tynan, Coward and Thompson Creeks, Santa Cruz County, California, December 2002.

<sup>10</sup> The Chittenden gage (USGS Gage 11159200) measures stream flow on the Pajaro River. River data has been collected at this gage since 1956. The gage is located at the crossing of Chittenden Road.

<sup>11</sup> Balance Hydrologics, Inc. in collaboration with Environmental Data Solutions, *Watsonville Sloughs Hydrology Study, Prepared for Santa Cruz Resource Conservation District*, February 14, 2014. The open space designation is used for lands that are not classified in the other two categories and does not imply a formal designation. Totals cited above do not include the 548 acres (4.6 percent of the watershed area) of the Sloughs proper which were perennially ponded in 2012-2013.

<sup>12</sup> Balance Hydrologics, Inc. in collaboration with Environmental Data Solutions, *Watsonville Sloughs Hydrology Study, Prepared for Santa Cruz Resource Conservation District*, February 14, 2014.

Watsonville-Struve branch of the system as overflow to Harkins, the data are strong evidence of low overall winter runoff rates and low dry season baseflows from the sub-watersheds that drain directly into Harkins Slough.<sup>13</sup>

Pajaro Valley Water Management Agency (PV Water) has operated the Harkins Slough Managed Aquifer Recharge and Recovery Facility (Harkins Slough Facility, which includes the Harkins Slough filter plant, recharge basin, recovery wells, monitoring wells, and pipelines), since December 2001, with diversions starting in January 2002. The Harkins Slough Facility diverts surface water from Harkins Slough just upstream of the confluence with Watsonville Slough. Water is pumped from the slough to the filter plant for treatment, then pumped to the recharge basin, and then later recovered via the recovery wells and conveyed to the Coastal Distribution System for irrigation use.

PV Water has a water-right permit to divert up to 2,000 acre-feet from Harkins Slough and Watsonville Slough from November 1 through May 31 each year (the diversion season).<sup>14</sup> Permit restrictions and other factors such as turbidity and salinity of the water in Harkins Slough, as well as infiltration rates at the recharge basin, have limited the overall pumping rates. Historically, PV Water has not been able to divert more than 1,280 acre-feet per year to the existing recharge basin, and on average has diverted 485 and recovered 200 acre-feet per year.<sup>15</sup> Diversions have typically been limited to four or five months beginning in January, though no pumping occurred in operational water years 2012, 2014, 2018, and 2019 due to salinity impacts from large beach overtopping events (in 2012 and 2014) and a combination of summer baseflows, early season storms, and lagoon stage.<sup>16</sup>

### ***Watsonville-Struve Slough Branch Drainage Area***

Watsonville-Struve Branch drainage area includes 3,732 acres (5.8 square miles) or roughly 34 percent of the system total. The Watsonville-Struve branch receives runoff from the coastal terrace and from valley bottom areas. The most salient characteristic is the much higher level of urbanization as contrasted with Harkins Slough, with essentially all urbanized lands lying within this drainage area. Watsonville Slough receives flow from the Hansen, Struve, and West Branch Sloughs.

### ***Lower Watsonville Slough Drainage Area***

The Harkins and Watsonville-Struve branches join at a point approximately 1,000 feet upstream of San Andreas Road. The very end of the Harkins Slough channel is separated from the Watsonville Slough channel by a segmented block weir structure. Immediately upstream (on the Harkins side) of this structure, PV Water operates a pumping facility. The last drainage area includes those portions of the watershed that drain to the Watsonville Slough channel downstream of the confluence with Harkins Slough. Much smaller than the upper branches, this

<sup>13</sup> Balance Hydrologics, Inc. in collaboration with Environmental Data Solutions, *Watsonville Sloughs Hydrology Study, Prepared for Santa Cruz Resource Conservation District*, February 14, 2014.

<sup>14</sup> Carollo Engineers, Harkins Slough Filter Plant Water Quality Study, August 2017.

<sup>15</sup> Carollo Engineers, Harkins Slough Filter Plant Water Quality Study, August 2017.

<sup>16</sup> Carollo Engineers, Harkins Slough Filter Plant Water Quality Study, August 2017.



area is approximately 923 acres in size (1.5 square miles) or roughly 8 percent of the total area. Runoff in this drainage area originates from coastal terraces and valley bottom areas, including the areas where recharge basins are proposed, almost all of which are dedicated to agricultural uses.

The most important drainage control features in the watershed are located at the Shell Road crossing, which is in the Lower Watsonville Slough drainage area. The crossing includes a pump station operated by the County of Santa Cruz, an array of eight 48-inch diameter reinforced concrete pipe culverts passing under the road, and an old flow control weir that is no longer functional or pertinent to current drainage conditions. Two pumps are also operated in this location, with a combined discharge capacity of 5,300 gallons per minute (or 11.8 cubic feet per second).<sup>17</sup> The culverts at this location are equipped with vented flap gates on their downstream ends to prevent up-channel flow of ocean water, and the pumps operated to move water in the downstream direction, as Shell Road is intended to be the demarcation point between the freshwater channels and sloughs upstream and the tidally-influenced environment that characterizes the remaining run of the system to its ultimate terminus at the mouth of the Pajaro River.

Downstream of Shell Road, a tidal channel runs roughly 7,800 feet in an east south-easterly direction immediately behind the Pajaro dune field to join the Pajaro Lagoon directly upstream of the barrier beach. The tidal channel is crossed by Beach Road approximately 0.25 mile downstream of Shell Road; the Beach Road crossing includes an array of six 48-inch diameter reinforced concrete pipe culverts that do not have flap gates. Field observations and modeling show that this crossing rarely, if ever, controls flow rates in the system and in fact, is frequently inundated during periods of extended rainfall or high winter tides.<sup>18</sup>

### ***Pajaro River and Lagoon***

The Pajaro River is the largest coastal stream between San Francisco Bay and the Salinas River, and it contributes substantial surface water inflow to the Pajaro Valley Groundwater Basin.<sup>19</sup> The Slough system ends at the Pajaro Lagoon, which can be open or closed to tidal action depending on the configuration of its barrier beach and river flow.<sup>20</sup> Brackish water from the Pajaro River mouth flows upstream into Lower Watsonville Slough in the reach downstream of Shell Road. Water then surges through the approximately elevation 7.5 feet NAVD88 vents above the flap gates at Shell Road, pushing upstream into the Slough system.<sup>21</sup>

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<sup>17</sup> Balance Hydrologics, Inc. in collaboration with Environmental Data Solutions, *Watsonville Sloughs Hydrology Study, Prepared for Santa Cruz Resource Conservation District*, February 14, 2014.

<sup>18</sup> Balance Hydrologics, Inc. in collaboration with Environmental Data Solutions, *Watsonville Sloughs Hydrology Study, Prepared for Santa Cruz Resource Conservation District*, February 14, 2014.

<sup>19</sup> Carollo Engineers, Harkins Slough Filter Plant Water Quality Study, August 2017.

<sup>20</sup> Balance Hydrologics, Inc. in collaboration with Environmental Data Solutions, *Watsonville Sloughs Hydrology Study, Prepared for Santa Cruz Resource Conservation District*, February 14, 2014.

<sup>21</sup> Balance Hydrologics, Inc. in collaboration with Environmental Data Solutions, *Watsonville Sloughs Hydrology Study, Prepared for Santa Cruz Resource Conservation District*, February 14, 2014.

### **Slough System Recent Geomorphology**

There have been relatively dramatic changes over the last several decades in the extent and duration of ponding within the Slough system. As recently as the 1990s, summer water levels were contained within relatively small channels along the bottomland areas and both Lee Road and Harkins Slough Road were passable for much of the year. Monitoring data collected in 2012 to 2013 confirms that hundreds of acres of bottomland are now flooded even at the end of the summer season following relatively dry years. Several factors have been postulated as contributing to these changed conditions, including increased runoff, channel blockages, channel accretion, land subsidence, and the increased use of plastic ground cover in agriculture, which leads to increased runoff and decreased infiltration.

The main Watsonville Slough channel from Shell Road up to State Route 1 is frequently obstructed by sediment “dams” and dense aquatic vegetation that create major barriers to flow (refer to **Figure 3.3-2**). The dams appear to form from sediment brought into the main channel by side drains or bank failures. The dams typically represent localized sediment aprons at inflow points draining off-channel erosion-prone areas and/or areas particularly encroached by aquatic vegetation. The lower Slough system is segmented into a series of pools controlled by the elevation of the sediment dams. The obstructions have contributed to the expanding inundation of the bottomlands in the Slough system and have likely persisted due to the curtailment of regular channel maintenance activities. In multiple locations the channel obstructions have led to an increase in upstream water surface elevations of two to three feet.<sup>22</sup> This condition markedly reduces the carrying capacity of the channel for a given water surface elevation, with the impact starting only shortly upstream of Shell Road.<sup>23</sup>

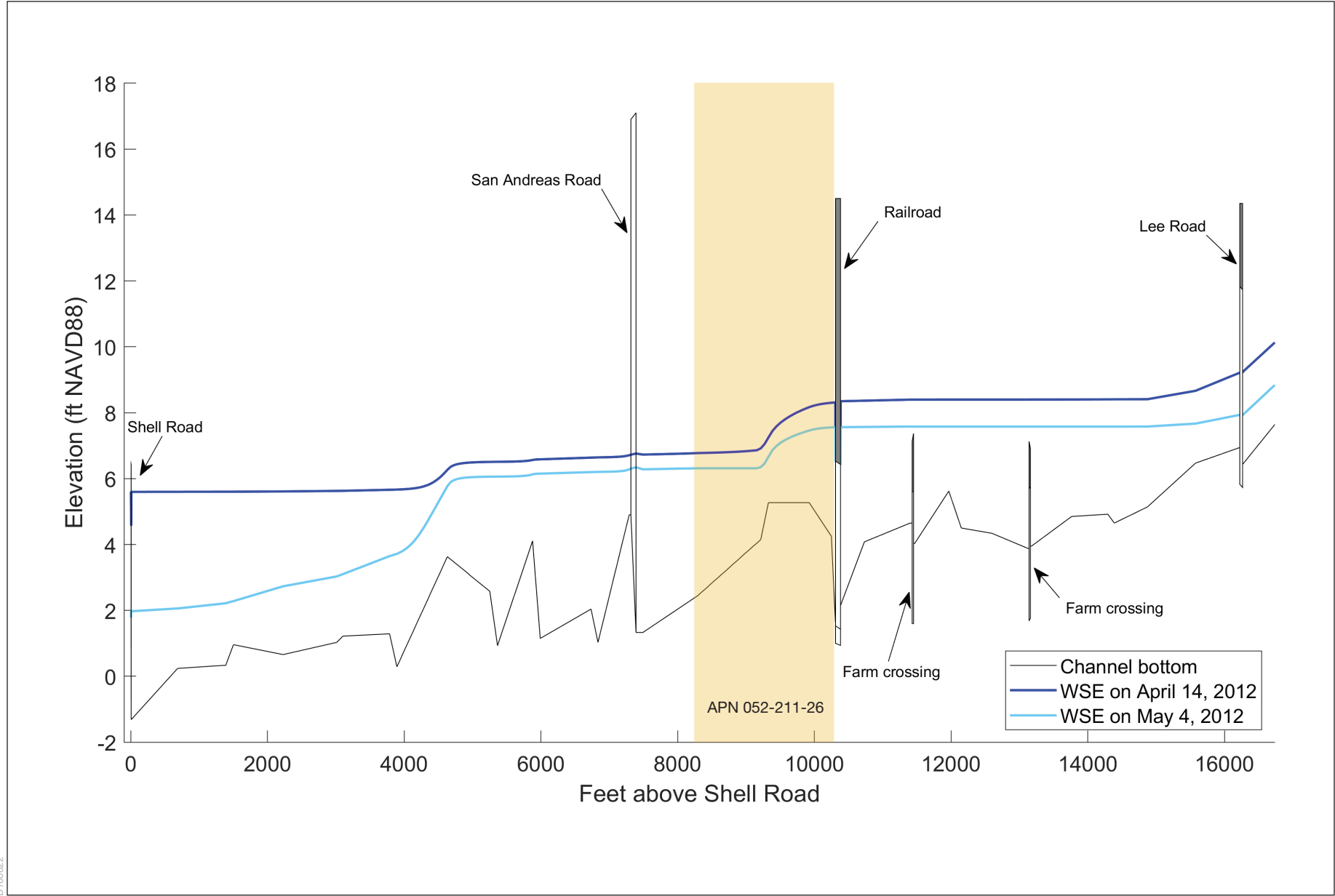
Encroachment into the Slough channel network by aquatic vegetation has also occurred, particularly the spread of marsh pennywort in dense mats throughout the lower Slough system. The mats have been observed to be dense enough that they impede water flow in a significant manner, especially at low- to mid-flow ranges.

In 2012 to 2013, water surface elevations were almost always higher in the Watsonville Slough channel than in Harkins Slough, leading to persistent inflow to Harkins from leaking through and/or overtopping of the weir located at the confluence. Additionally, sediment dams and vegetation in the channel downstream of the railroad crossing led to frequent and persistent overflow from the channel across the northwestern most portion of Assessor Parcel Number (APN) 052-211-26 (the triangular portion of the parcel between Harkins and Watsonville Sloughs just upstream of the confluence, as shown on Figures 3.3-1 and 3.3-4) and into Harkins Slough. The latter flow path accounted for as much as 500 acre-feet of runoff into Harkins from the Watsonville-Struve branch of the system.<sup>24</sup>

<sup>22</sup> Balance Hydrologics, Inc. in collaboration with Environmental Data Solutions, *Watsonville Sloughs Hydrology Study, Prepared for Santa Cruz Resource Conservation District*, February 14, 2014.

<sup>23</sup> PV Water staff observations, 2019.

<sup>24</sup> Balance Hydrologics, Inc. in collaboration with Environmental Data Solutions, *Watsonville Sloughs Hydrology Study, Prepared for Santa Cruz Resource Conservation District*, February 14, 2014.



SOURCE: ESA 2020

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.3-2**  
Watsonville Slough Longitudinal Profile





In 2016, an excavated channel and adjacent wetland benches were created in the APN 052-211-26, which channelized this flow path between the sloughs. Coupled with the restricted capacity of the downstream main slough channel, flow through the connector channel into Harkins Slough begins whenever flow rates at the railroad crossing over Watsonville Slough exceed just a few cubic feet per second.<sup>25</sup>

### 3.3.1.3 Pajaro Lagoon Hydrology

Seasonally a lagoon forms at the mouth of the Pajaro River where it reaches the Pacific Ocean. The lagoon forms when wave energy causes a sand bar to form across the river mouth, and opens when either the river or waves overtop the sand bar and cause the river to cut a new opening. The lagoon's status as open or closed affects water quality and local flooding, and is in part influenced by the amount of water passing down the Pajaro River. The lagoon is also mechanically opened<sup>26</sup> by either the Santa Cruz County Flood Control and Water Conservation District Zone 7 or the Pajaro Storm Drain Maintenance District when appropriate to protect public safety, and in accordance with requirements issued by the United States Army Corps of Engineers (USACE), Central Coast Regional Water Quality Control Board (RWQCB), California Department of Fish and Wildlife, California Coastal Commission, California State Parks, California State Lands Commission, and occasionally the National Marine Fisheries Service and United States Fish and Wildlife Service.

In the relatively dry water years of 2014 and 2015, during the few winter storm events, the mouth opened for several months before closing due to wave action in early spring.<sup>27</sup> In both years, low base flows were eventually overmatched by beach seepage<sup>28</sup> and evaporative losses, visible as seasonal low points in water levels in early fall. In the wetter water years of 2016 and 2017, winter flows scoured a deeper mouth, causing the lagoon to remain open to tides until fall. Powerful waves during the El Nino winter of 2015-2016 created a beach bar that partially blocked outflows from the lagoon, leading to high water levels in the open lagoon. Although waves in the fall of 2016 were powerful enough to close the mouth, high base flows at the time caused the lagoon to fill rapidly and breach (erode a new mouth after overtopping the beach).

<sup>25</sup> Balance Hydrologics, Draft Hydraulic Modeling of Alternative Flow Diversion Scenarios in the Watsonville Slough System, March 18, 2019.

<sup>26</sup> Historically there has been at least one year (2015) during which the lagoon closed during the spring, prior to April when Reclamation District 2049 (which operates the weir and pump station at College Lake) pumped College Lake, and when the lagoon did not open by itself, resulting in flooding at Pajaro Dunes. The County Flood Control District breached the lagoon to release the water pumped from College Lake. The existing breaching patterns may thus be somewhat artificial (disconnected from precipitation and seasonal hydrology).

<sup>27</sup> ESA, *Lagoon Quantified Conceptual Model Memorandum for Pajaro River Lagoon*, April 12, 2019. Unless otherwise noted, content describing Pajaro Lagoon is from this source.

<sup>28</sup> Beach seepage refers to the draining of Pajaro Lagoon to the ocean through the beach sand.

### 3.3.1.4 Groundwater

#### ***Regional Groundwater***

As described in the 2014 BMP Update PEIR, the Pajaro Valley is underlain by Tertiary and Quaternary age sediment and sedimentary rocks overlying Cretaceous granitic rocks. The thickness of the sedimentary rocks and sediment ranges from 500 feet to over 3,000 feet.<sup>29</sup>

In 2014, Pajaro Valley Water Management Agency (PV Water) and the United States Geological Survey completed development of an integrated hydrologic model of Pajaro Valley, called the Pajaro Valley Hydrologic Model (PVHM), to support groundwater basin management planning.<sup>30,31</sup> This conceptual model identified inflows and outflows to the Pajaro Valley groundwater system that include movement and use of water from natural and human components. As described in the associated report, a hydrogeologic framework was developed for modeling purposes. The hydrogeologic framework grouped the more than 90 separate mapped layers of geologic units in Pajaro Valley into aquifers and confining units. The hydrogeologic layers are:

- Two layers of alluvial deposits representing an alluvial deposit aquifer layer<sup>32</sup> and basal fine-grained confining unit.<sup>33</sup> These are of variable spatial extent and range in thickness from about 15 to 380 feet (alluvial deposits) and 15 to 55 feet (basal fine-grained confining layer).
- Three layers of Aromas Sand of late Quaternary age representing the upper Aromas aquifer, an upper Aromas basal fine-grained confining unit, and a lower Aromas aquifer unit. The upper Aromas aquifer constitutes predominantly terrestrial sedimentary deposits (fluvial and aeolian) and ranges in thickness from about 15 to 500 feet. The thickness of the upper Aromas basal fine-grained confining unit ranges from about 15 to 115 feet. The lower Aromas consists predominantly of marine sediment and ranges in thickness from about 15 to 1,000 feet.
- One layer representing a combination of the Purisima Formation and other minor pre-Pliocene bedrock units. These units consist predominantly of marine deposits of Pliocene age (Purisima Formation), continental deposits, and the Butano Sandstone.

The Aromas Sand is considered the primary aquifer (water-bearing) unit of the Pajaro Valley; however, some older and shallower wells are developed in the alluvial aquifer layer.<sup>34</sup> Under

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<sup>29</sup> Hanson, Geohydrologic Framework of Recharge and Seawater Intrusion in the Pajaro Valley, Santa Cruz and Monterey Counties, California. USGS Water-Resources Investigations Report 03-4096, 2003.

<sup>30</sup> While the PVHM report was published in 2014, the model development was completed and approved by a technical advisory committee in 2010 and subsequently used to support groundwater planning efforts.

<sup>31</sup> The PVHM is a six-layer hydrologic flow model that comprises 9,570 15-acre active model cells. Information regarding the PVHM derived or quoted from Hanson, R.T., Schmid, Wolfgang, Faunt, C.C., Lear, Jonathan, and Lockwood, Brian, 2014, Integrated hydrologic model of Pajaro Valley, Santa Cruz and Monterey Counties, California: U.S. Geological Survey Scientific Investigations Report 2014-5111, <http://dx.doi.org/10.3133/sir20145111>.

<sup>32</sup> Geologic deposits grouped into this first unit include Older Alluvium, Landslide Deposits, Undivided Terrace Deposits, Marine Terrace Deposits, Watsonville Terrace Deposits, Beach Sands, Basin Deposits, Older Dune Sands, and Alluvial Fan Deposits.

<sup>33</sup> The fine-grained basal confining unit may comprise deposits from one or more periods of sea-level high stand during the Pleistocene, or may represent flood deposits.

<sup>34</sup> PV Water, *Salt and Nutrient Management Plan*, Final, October 2016.

predevelopment conditions, groundwater flowed from the foothills of the Santa Cruz Mountains to the Pacific Ocean. Under developed conditions, decades of withdrawals in excess of recharge has altered the movement of groundwater to onshore flow of seawater and the formation of regional cones of depression in the center of Pajaro Valley.<sup>35</sup>

The PVHM simulated inflows to and outflows from the Pajaro Valley groundwater system. Groundwater inflows include recharge from infiltration of precipitation, streamflow, and applied water from irrigation. Along with deep percolation of precipitation, streamflow infiltration is the other major source of natural recharge in Pajaro Valley. More than 80 percent of the recharge occurs within the Alluvial aquifer, owing to the distribution of outcrops and confining layers, and significant portions of recharge occur within outcrop areas of the Purisima Formation (10 percent) and the upper Aromas (7 percent). Recharge is driven by climate variations; simulated recharge during wet periods can be more than double the simulated recharge from dry periods. Groundwater flow downwards across geologic layer boundaries is driven by recharge along with pumpage (most pumpage occurs in the upper Aromas aquifer).

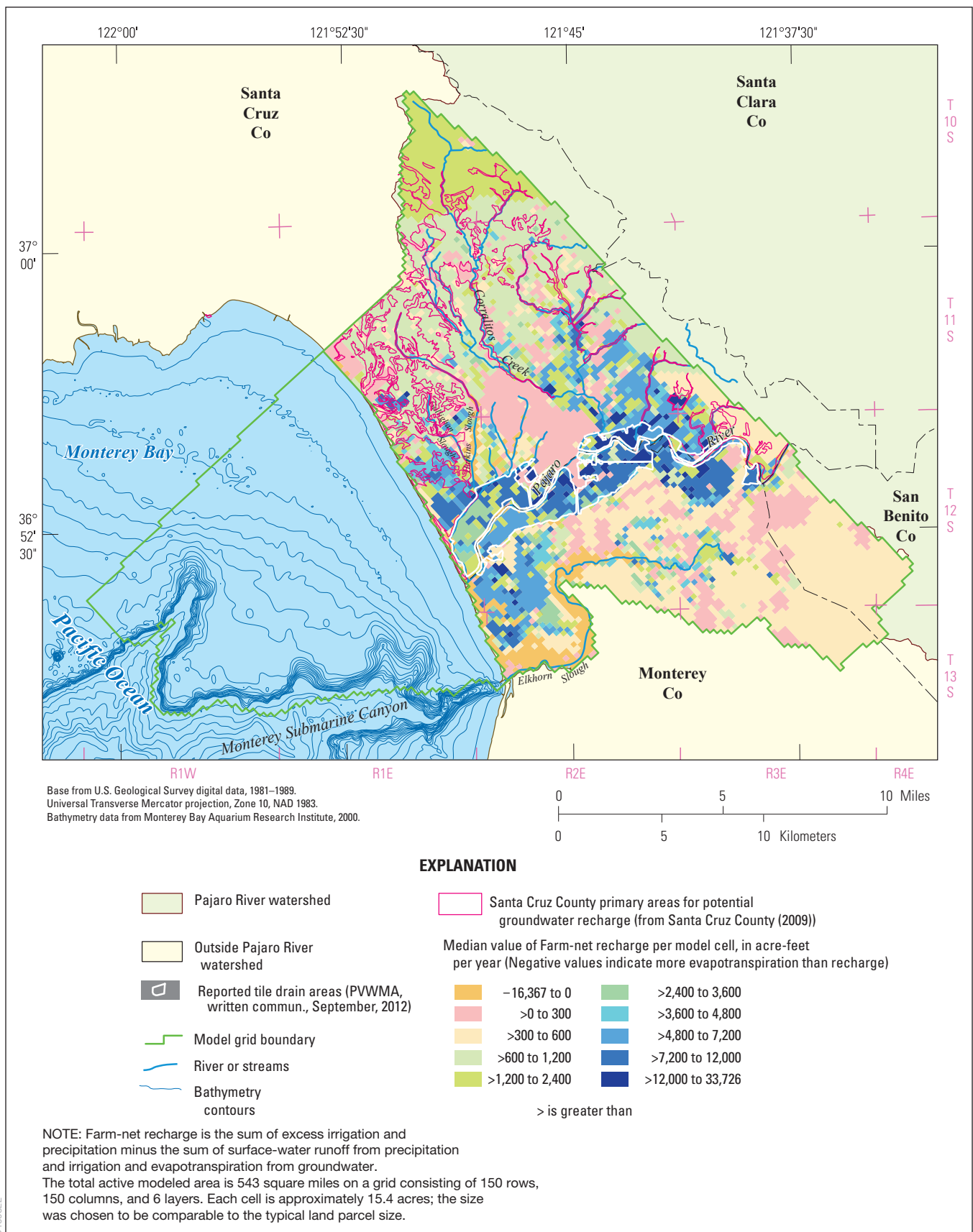
Overall net recharge to the groundwater system<sup>36</sup> ranges from less than 30,000 acre-feet per year during most dry years to more than 40,000 acre-feet during many wet years. The median distribution of net recharge is largely coincident with the alluvial channels of the streamflow network, the regions of tile drains, and the inland and coastal regions representing outcrops of the Aromas, as shown on **Figure 3.3-3**. Much of the intensive artificial recharge related to irrigation in the central region of the Pajaro Valley is intercepted by tile drains and becomes engineered runoff. The proposed recharge basins to the west of San Andreas Road are considered to have a high potential for groundwater recharge, based on multiple regional groundwater recharge mapping efforts.<sup>37</sup>

Groundwater outflow includes pumpage from wells and tile drains, base flow or rejected recharge along streams, evapotranspiration, subsurface underflow to the offshore portions of the aquifer systems and discharge to the ocean along submarine rock outcrops. As noted in Chapter 2, *Project Description*, groundwater levels in the Pajaro Valley Groundwater Basin have declined as a result of long-term groundwater overdraft, which has resulted in seawater intrusion, groundwater quality degradation, and groundwater storage depletion. Most of the groundwater storage depletion has occurred in the Alluvial aquifer, with substantial amounts of storage depletion also occurring in the upper Aromas and Purisima Formation aquifers. Seawater has intruded into the Alluvial aquifer and the upper Aromas aquifer through submarine rock outcrops to replace the depleted fresh groundwater. While it has varied annually and with changing climate, overdraft is currently estimated to have averaged about 12,100 acre-feet per year over the past 30 years.

<sup>35</sup> Hanson, R.T., Schmid, Wolfgang, Faunt, C.C., Lear, Jonathan, and Lockwood, Brian, 2014, Integrated hydrologic model of Pajaro Valley, Santa Cruz and Monterey Counties, California: U.S. Geological Survey Scientific Investigations Report 2014-5111, <http://dx.doi.org/10.3133/sir20145111>

<sup>36</sup> Net recharge to groundwater is the portion of irrigation and precipitation not consumptively used by plants reduced by losses to surface-water runoff and evapotranspiration from groundwater.

<sup>37</sup> PV Water, *Salt and Nutrient Management Plan*, Final, October 2016.



SOURCE: Hanson, R.T., Schmid, Wolfgang, Faunt, C.C., Lear, Jonathan, and Lockwood, Brian, 2014, Integrated hydrologic model of Pajaro Valley, Santa Cruz and Monterey Counties, California: U.S. Geological Survey Scientific Investigations Report 2014 -5111, 166 p., <http://dx.doi.org/10.3133/sir20145111>.

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.3-3**  
 Pajaro Valley Modeled Groundwater Recharge

### **Shallow Groundwater Near Harkins, Watsonville, and Struve Sloughs**

In 2012-2013, PV Water compiled shallow groundwater level records from the four piezometers installed as part of the Watsonville Sloughs Hydrology Study.<sup>38</sup> Measured levels were consistent with a shallow groundwater gradient toward the Sloughs in the Pajaro River floodplain. Signals associated with rain events were clear and drawdown during the dry season was generally steady, although increased groundwater levels from local irrigation applications were observed.<sup>39</sup>

Shallow groundwater is present in the areas surrounding and including the Project sites. Groundwater has been encountered in a boring at a depth of approximately 4 feet at the Harkins Slough facility.<sup>40</sup> Groundwater levels at the Projects sites near Watsonville, Harkins, and Struve sloughs can be as high as the water level in the sloughs, which are approximately 3 to 10 feet below ground surface at the project sites during the wet season.

#### **3.3.1.5 Flooding**

The Pajaro River within the Pajaro Valley is a managed floodway. The USACE constructed a continuous levee system along the Pajaro River from the mouth to the Murphy Road Crossing<sup>41</sup> in 1949.<sup>42</sup>

The Pajaro River and its tributaries have a long history of flooding. The flood of 1955 was the most extensive in recorded history, breaching and overtopping the 1949 levees. Other Pajaro River flooding in the recent past occurred in 1958, 1995, and 1998. During these floods, the primary levee failure mode has been overtopping.<sup>43</sup>

### **Watsonville, Harkins, and Struve Sloughs**

The existing one percent annual chance floodplain<sup>44</sup> mapped by the Federal Emergency Management Agency (FEMA) roughly corresponds to basin deposits in the area (mapped as Qb; refer to Figure 3.6-1, in Section 3.6, Geology and Soils), and includes lowland areas between Watsonville Slough and the Pajaro River, and the areas of Harkins and Struve Sloughs. The area west of San Andreas Road and North of Watsonville Slough, where the proposed recharge basin

<sup>38</sup> Balance Hydrologics, Inc. in collaboration with Environmental Data Solutions, *Watsonville Sloughs Hydrology Study, Prepared for Santa Cruz Resource Conservation District*, February 14, 2014.

<sup>39</sup> Balance Hydrologics, Inc. in collaboration with Environmental Data Solutions, *Watsonville Sloughs Hydrology Study, Prepared for Santa Cruz Resource Conservation District*, February 14, 2014.

<sup>40</sup> Fugro, *Preliminary Geotechnical and Geologic Site Assessments Phases 1 & 2 Pajaro Valley Water Management Agency 2017-2019 BMP Program Management Services for College Lake Integrated Resources Management Project, Harkins Slough Recharge Facility Upgrades, and Watsonville Slough with Recharge Basins*, April 2018.

<sup>41</sup> Located upstream of the confluence of Pajaro River and Salsipuedes Creek, approximately four miles southeast of the proposed weir location.

<sup>42</sup> USACE, Pajaro River Flood Risk Management Study Monterey and Santa Cruz Counties, CA, Draft General Reevaluation and Environmental Assessment, October 2017. Unless otherwise noted, content in Section 3.3.1.6 is derived from this source.

<sup>43</sup> USACE, San Francisco District, *Pajaro River Flood Risk Management General Reevaluation Report and Integrated Environmental Assessment*, February 2019.

<sup>44</sup> These are areas subject to flooding by the flood event with a one percent chance of occurring in any individual year, commonly referred to as the 100-year flood.

would be located, are mapped as an area of minimal flood hazard (as shown on **Figure 3.3-4**).<sup>45</sup> Base flood elevation is defined by FEMA as between 16.5 and 17 feet NAVD88 south of Watsonville Slough to the Pajaro River, and east to the location of the proposed Struve Slough facilities.<sup>46</sup>

### ***Pajaro River***

The one percent annual chance flood hazard area along the Pajaro River downstream of the confluence with Salsipuedes Creek extends on either side of the river; in Watsonville the one percent annual chance flood hazard area extends north to West Beach Street, then connects with Watsonville Slough to the west of Watsonville.

### ***Pajaro Dunes***

The Pajaro Dunes community is located along the coastline northwest of Pajaro Lagoon. The southern and western areas of the Pajaro Dunes community are located within the FEMA one percent annual chance flood hazard area;<sup>47</sup> eastern portions of the community are also within the one percent annual chance floodway.<sup>48</sup> The base fluvial flood elevations along the eastern side of the Pajaro Dunes area range from 13 feet NAVD88 nearest the current mouth of the Pajaro River (in the south) to nearly 16 feet NAVD88 in the north. In addition to flooding due to extreme precipitation events, flooding may occur in the Pajaro Dunes area when the lagoon mouth is closed (that is, a berm of beach sand prevents water from draining to the ocean) and pulses of stream flow fill the lagoon without breaching the beach berm.

## **3.3.1.6 Water Quality**

### ***Surface Water***

PV Water established a surface water quality monitoring program in 2000. The result of 20 years of data collection are extensive datasets related to water quality (and levels) at important assessment points in the slough system.<sup>49</sup>

### ***Sloughs System***

#### ***Salinity***

Under certain conditions, large quantities of seawater are swept into the lagoon but the barrier beach remains in place, trapping seawater in Pajaro Lagoon. The Slough system and adjacent lands are characterized by relatively low elevations far inland, which sets the stage for potential

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<sup>45</sup> FEMA, National Flood Hazard Layer, Santa Cruz County, 06087C0403E (effective May 15, 2012) and 06087C0411E (effective May 16, 2012).

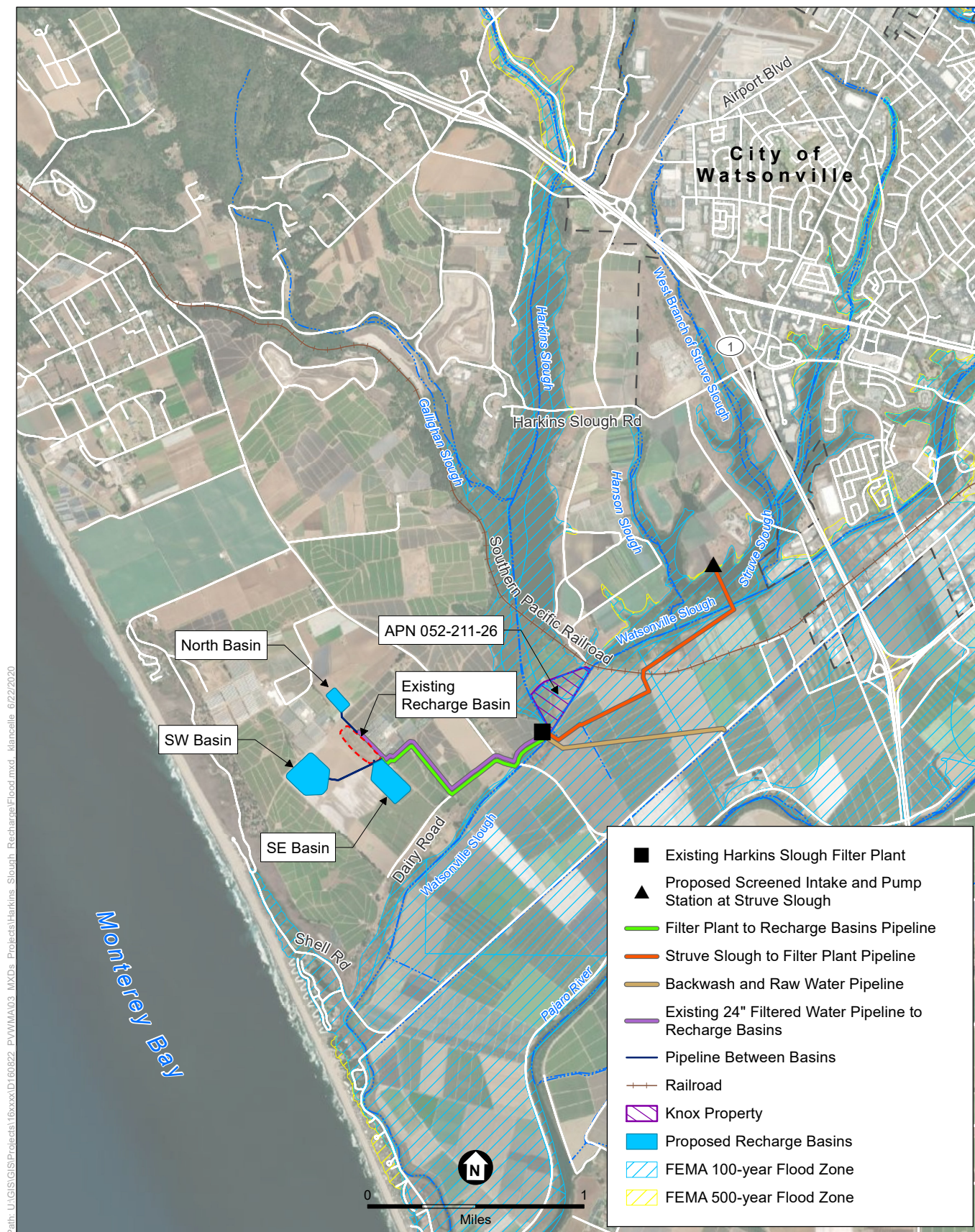
<sup>46</sup> FEMA, National Flood Hazard Layer, Santa Cruz County, 06087C0411E, effective May 16, 2012.

<sup>47</sup> These are areas subject to flooding by the 1 percent annual chance flood.

<sup>48</sup> FEMA defines a floodway as the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1 percent annual chance flood can be carried without substantial increases in flood heights.

<sup>49</sup> Balance Hydrologics, Draft Hydraulic Modeling of Alternative Flow Diversion Scenarios in the Watsonville Slough System, March 18, 2019.





SOURCE: Carollo Engineers, 2019;  
ESRI World Imagery, 7/23/2016; ESA; FEMA, 2017

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.3-4**  
Existing Flood Hazard Areas in Project Vicinity



seawater incursions that can impact much of the Slough system.<sup>50</sup> For the latter to happen, lagoon levels have to rise to 7.5 feet NAVD88 at which point there is uncontrolled inflow upstream through the vent slots on the flap gates at the Shell Road culvert array. If lagoon levels rise above 8.4 feet NAVD88, then Shell Road is overtopped and very large up-channel flows of highly saline water can occur, as documented by the event in early January 2012.<sup>51</sup> In fact, that incursion was so massive and prolonged that seawater flowed up-channel into Harkins Slough and was detected at Harkins Slough Road.

Specific conductance is an indicator of dissolved salt content in water. Coastal ocean water has a specific conductance of about 52,000 microsiemens/centimeter ( $\mu\text{S}/\text{cm}$ ) at 25 degrees Celsius.<sup>52</sup> During pump operation at Harkins Slough (which is permitted to operate between November and May, but is usually limited to between January and May each year), specific conductance has ranged from approximately 200 to nearly 3,000  $\mu\text{S}/\text{cm}$ , or about 1/250 to 1/15 the specific conductance of ocean water, between 2003 and 2016.<sup>53</sup> Data collected from Watsonville Slough upstream of the Harkins Slough confluence over a similar period of years, but throughout the year, shows an even wider range of specific conductance in the sloughs system. **Table 3.3-1** summarizes this and other key water quality parameters affecting water diversion from the sloughs. Typically, PV Water does not pump water from Harkins Slough unless the specific conductance is less than 1,000-1,200  $\mu\text{S}/\text{cm}$  in order to avoid making the shallow groundwater more saline.<sup>54</sup> Though there are noticeable differences from year to year, slough salinity exhibits a pattern of starting each water year at levels on the order of 1,500  $\mu\text{S}/\text{cm}$ , with a relatively rapid decline once runoff from the upland watersheds begins in earnest.<sup>55</sup>

### Other Water Quality Parameters

Two beneficial uses, water contact recreation (REC-1) and non-contact water recreation (REC-2), are not supported in Watsonville Slough due to fecal coliform concentrations. The same is true for Harkins and Struve sloughs.<sup>56</sup> Controllable sources of fecal coliform bacteria in Watsonville Slough and its tributaries include humans, pets, livestock, and land-applied non-sterile manure in irrigated agriculture.<sup>57</sup> Genetic data indicate that the major sources of fecal coliform causing

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<sup>50</sup> Balance Hydrologics, Draft Hydraulic Modeling of Alternative Flow Diversion Scenarios in the Watsonville Slough System, March 18, 2019. For example, the channel elevation upstream of San Andreas Road at the main confluence, 3.5 miles from the river mouth, is only on the order of 2.5 feet NAVD, which is less than the mean tide elevation in Monterey Bay.

<sup>51</sup> Balance Hydrologics, Draft Hydraulic Modeling of Alternative Flow Diversion Scenarios in the Watsonville Slough System, March 18, 2019.

<sup>52</sup> U.S. Geological Survey, 2017. Record-High Specific Conductance and Water Temperature in San Francisco Bay during Water Year 2015, Open File Report 2017-1022.

<sup>53</sup> Carollo Engineers, Harkins Slough Filter Plant Water Quality Study, August 2017. High chloride concentrations prohibited operation of the Harkins Slough Diversion Facilities in the 2012 and 2014 operations seasons all together. Since the facility was not in operation in 2012 and 2014 due to high chlorides, this range does not include concentrations for those two diversion seasons.

<sup>54</sup> ESA, *Harkins and Struve Sloughs Hydrologic Analysis of Diversion Alternatives*, July 2020.

<sup>55</sup> Balance Hydrologics, Draft Hydraulic Modeling of Alternative Flow Diversion Scenarios in the Watsonville Slough System, March 18, 2019.

<sup>56</sup> RWQCB, 2019. *Water Quality Control Plan for the Central Coast Basin, June 2019 Edition*. California Environmental Protection Agency (CalEPA), June 14, 2019.

<sup>57</sup> RWQCB, 2019. *Water Quality Control Plan for the Central Coast Basin, June 2019 Edition*. California Environmental Protection Agency (CalEPA), June 14, 2019.

**TABLE 3.3-1  
SLOUGHS SYSTEM WATER QUALITY**

Parameter	Value <sup>a</sup>		Period of record <sup>b</sup>
Watsonville Slough Near Harkins Slough Confluence			
Specific Conductance (salinity)	Low	28.3 uS/cm	November 2004-August 2015
	High	6,122 uS/cm	
Harkins Slough During Pump Operations			
Specific Conductance (salinity)	Low	200 uS/cm	2003-2016
	High	3,000 uS/cm	
Total Suspended Solids	January	45 mg/L	
	February	52 mg/L	
	March	35 mg/L	
	April	38 mg/L	
	May	29 mg/L	
pH	Low	6.1	
	High	8.6	

## NOTES:

<sup>a</sup> uS/cm - microsiemens/centimeter; mg/L – milligrams per liter.<sup>b</sup> High chloride concentrations prohibited operation of the Harkins Slough Diversion Facilities in the 2012 and 2014 operations seasons all together. Since the facility was not in operation in 2012 and 2014 due to high chlorides, this range does not include concentrations for those two diversion seasons.SOURCE: Carollo Engineers, Harkins Slough Filter Plant Water Quality Study, August 2017; CCRWQCB, Central Coast Ambient Water Quality Monitoring Program, Basic Water Quality parameters for Watsonville Slough (Site 305WSA), available online at [http://rdc-omega.mlml.calstate.edu/ca/view\\_data.php?org\\_id=rb3](http://rdc-omega.mlml.calstate.edu/ca/view_data.php?org_id=rb3), accessed July 24, 2020.

exceedance of the REC-1 standard are natural avian populations. Genetic analysis of Watsonville Slough water samples from both winter and summer periods confirmed birds, cows, and dogs (with birds contributing the most and dogs the least); human fecal coliform bacteria was confirmed in Harkins and Struve Sloughs, but in lower amounts than cow, bird and dog fecal coliform.

As described in Chapter 2, *Project Description*, under current conditions PV Water is permitted to pump water from Harkins Slough between the months of November and May, and allows the water to percolate into groundwater storage. Prior to startup of pumping operations when the filters are being used, samples of Harkins Slough water are collected and analyzed for pH, temperature, color, turbidity, and dissolved oxygen.<sup>58</sup> Observations of Harkins Slough prior to startup also record the presence or absence of: floating or suspended matter in the water; discoloration of the water; bottom deposits; visible films, sheens, or coatings; fungi, slimes, or objectionable growths; or potential nuisance conditions. The same sampling and observations are conducted annually or quarterly, respectively, after startup.

<sup>58</sup> This data and other water quality data collection described in the subsequent sentences are collected pursuant to requirements of the Central Coast Regional Water Quality Control Board Order No. R3-2017-0042, NPDES No. CAG993001 Waste Discharge Requirements National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges with Low Threat to Water Quality, effective March 7, 2018.

Under existing conditions, total suspended solids generally decrease as the diversion season (November to May) progresses.<sup>59</sup> As the frequency of winter rains decreases, solids in the slough settle. Runoff in the Harkins Slough watershed also carries sediment and rains mix up settled sediment, increasing the turbidity in the slough. As the rains subside in March, April, and May, solids concentrations drop.<sup>60</sup>

Data from Harkins Slough indicates the pH remains in the range of 6.5 and 8.5 in nearly all of the recorded samples;<sup>61</sup> the low and high listed in Table 3.3-1 exceed this range, but are outlier events.

### **Pajaro Lagoon**

Like other coastal lagoons in California, water quality in the Pajaro Lagoon system (including parts of Watsonville Slough that experience backwater effects) is likely to be strongly influenced by the presence of trapped saltwater. As discussed above, saltwater enters the lagoon during incoming ocean tides and during wave overtopping events. Saltwater in the lagoon is denser than freshwater, so it sinks to the bottom. When the mouth of the lagoon is open (i.e., when ocean tides are able to move in and out of the estuary), the strong currents generated by the tidal motions can cause vertical mixing, meaning that the intruding saltwater can create brackish or salty conditions at the top of the water column in some areas. When wave-driven sand blocks the mouth (i.e., preventing ocean tides from entering the lagoon), the lack of tidal motions often means that currents are too weak to cause vertical mixing, and trapped saltwater settles, creating a vertically-stratified system with a freshwater layer overtopping a bottom salty layer. This settling also encourages trapped saltwater near the mouth to potentially spread upstream in both the Pajaro River and Watsonville Slough, as discussed above. Wherever the saltwater is present, the density difference between the bottom salty and surface fresh layers can be strong enough to prevent vertical mixing.

The following processes have been observed in other California coastal lagoons with lower layers of salt water:<sup>62</sup>

- Over time, the natural breakdown of detritus in the lower layer draws oxygen out of the water column, reducing the dissolved oxygen content of the lower layer.
- The surface fresh layer maintains high dissolved oxygen levels due to interaction with the atmosphere.
- The lack of vertical mixing creates a condition where the upper layer has dissolved oxygen levels appropriate for salmonid survival (greater than 3 milligrams per liter [mg/L]), whereas the lower layer often becomes hypoxic, or anoxic (about 0 mg/L) over time.
- Absorption of solar radiation at the interface between the lower and upper layers sometimes causes water to warm in the lower layer. This effect tends to become weaker as freshwater accumulates in the upper layer over time, and more energy is absorbed above the bottom layer.

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<sup>59</sup> Carollo Engineers, Harkins Slough Filter Plant Water Quality Study, August 2017.

<sup>60</sup> Carollo Engineers, Harkins Slough Filter Plant Water Quality Study, August 2017.

<sup>61</sup> Carollo Engineers, Harkins Slough Filter Plant Water Quality Study, August 2017.

<sup>62</sup> ESA, *Lagoon Quantified Conceptual Model Memorandum for Pajaro River Lagoon*, April 12, 2019.

These conditions demonstrate that the amount of trapped saltwater in the lagoon during mouth closure events is an important determinant of water quality conditions, as it effectively controls the extent and amount of low dissolved-oxygen water, and sometimes the extent and amount of warm water in the estuary.<sup>63</sup>

### **Groundwater Quality**

Salts and nutrients are constituents of concern in the Pajaro Valley. For purposes of assessing quality of the Pajaro Valley Groundwater Basin, total dissolved solids (TDS) is used as a water quality indicator of the salinity of water and nitrate is used as the proxy for nutrients including nitrogen and phosphorous. The three primary pathways for salts and nutrients to enter groundwater are via surface water infiltration primarily from applied irrigation water (at times injected with fertilizer), streamflow infiltration, and seawater intrusion (in addition to TDS, chloride concentration and specific conductance are useful metrics to characterize the extent of seawater intrusion).

The total salt loading potential to groundwater in the Basin as a result of these pathways is highest along the coast where the seawater intrusion potential is high. Approximately 92 percent of the water used in the Pajaro Valley is pumped groundwater. In the Pajaro Valley Groundwater Basin, groundwater levels have declined as a result of long-term groundwater overdraft, causing groundwater levels to drop below sea level throughout much of the basin and creating conditions that allow for the inland migration of the freshwater/seawater interface. As discussed in Section 3.3.1.4, most of the groundwater storage depletion has occurred in the Alluvial aquifer, with substantial amounts of storage depletion also occurring in the upper Aromas and Purisima Formation layers. Seawater has intruded into the Alluvial aquifer and the upper Aromas aquifer through submarine rock outcrops to replace the depleted fresh groundwater. Based on chloride concentrations in wells in the coastal area of Pajaro Valley Groundwater Basin, the extent of landward seawater intrusion has increased along the coastal region over the last decades (refer to Figure 2-6 in Chapter 2, *Project Description*). Seawater intrusion rates accelerate in response to growing cumulative overdraft. The Pajaro Valley Groundwater Basin 30-year average annual deficit is estimated to be approximately 12,100 acre-feet per year. Areas of moderate salt loading potential are also located in the upper Pajaro River above Murphy Crossing where surface water salt concentration and recharge potential is elevated.

Nitrogen loading potential in the Pajaro Valley is primarily from agricultural fertilizer and irrigation runoff, streamflow recharge, and sewer and septic systems. Potential loading sites from streamflow nitrate recharge are similar to those with salt loading potential associated with inherited poor water quality from the upper Pajaro River watershed.<sup>64</sup>

The RWQCB's *Water Quality Control Plan for the Central Coastal Basin* (2019 Basin Plan), described below in Section 3.3.2.1, does not list specific groundwater quality objectives for the Pajaro Valley Groundwater Basin.<sup>65</sup> PV Water monitors groundwater quality throughout the

<sup>63</sup> ESA, *Lagoon Quantified Conceptual Model Memorandum for Pajaro River Lagoon*, April 12, 2019.

<sup>64</sup> PV Water, *Salt and Nutrient Management Plan*, October 2016.

<sup>65</sup> RWQCB, *Water Quality Control Plan for the Central Coast Basin, June 2019 Edition*. CalEPA. June 14, 2019.

groundwater basin, including quality of the shallow groundwater to which diverted water would be recharged by the Projects. The water quality of the shallow groundwater varies seasonally as shown on **Figure 3.3-5**. Figure 3.3-5 charts the quality of six constituents of concern in source waters for PV Water’s delivered water distribution system, including the shallow groundwater (charted as “Avg. of recovery wells”). During the past three years of monitoring, when combined with other distribution source waters the shallow groundwater at the recharge basin sites has met PV Water’s delivered water quality objectives, which are listed in **Table 3.3-2**, with the exception of sodium which has at times exceeded 100 mg/L.<sup>66</sup>

**TABLE 3.3-2  
PV WATER DELIVERED WATER QUALITY OBJECTIVES**

Parameter	Value <sup>a</sup>
Sodium Adsorption Ratio (SAR)	Less than 4
Chloride	Less than 150 mg/L
Sodium	Less than 100 mg/L
Nitrate	Less than 10 mg/L (as NO3-N)

NOTES:

<sup>a</sup> mg/L – milligrams per liter

SOURCE: PV Water, Water Quality Objectives established by the Projects and Facility Operations Committee, amended January 30, 2019.

## 3.3.2 Regulatory Framework

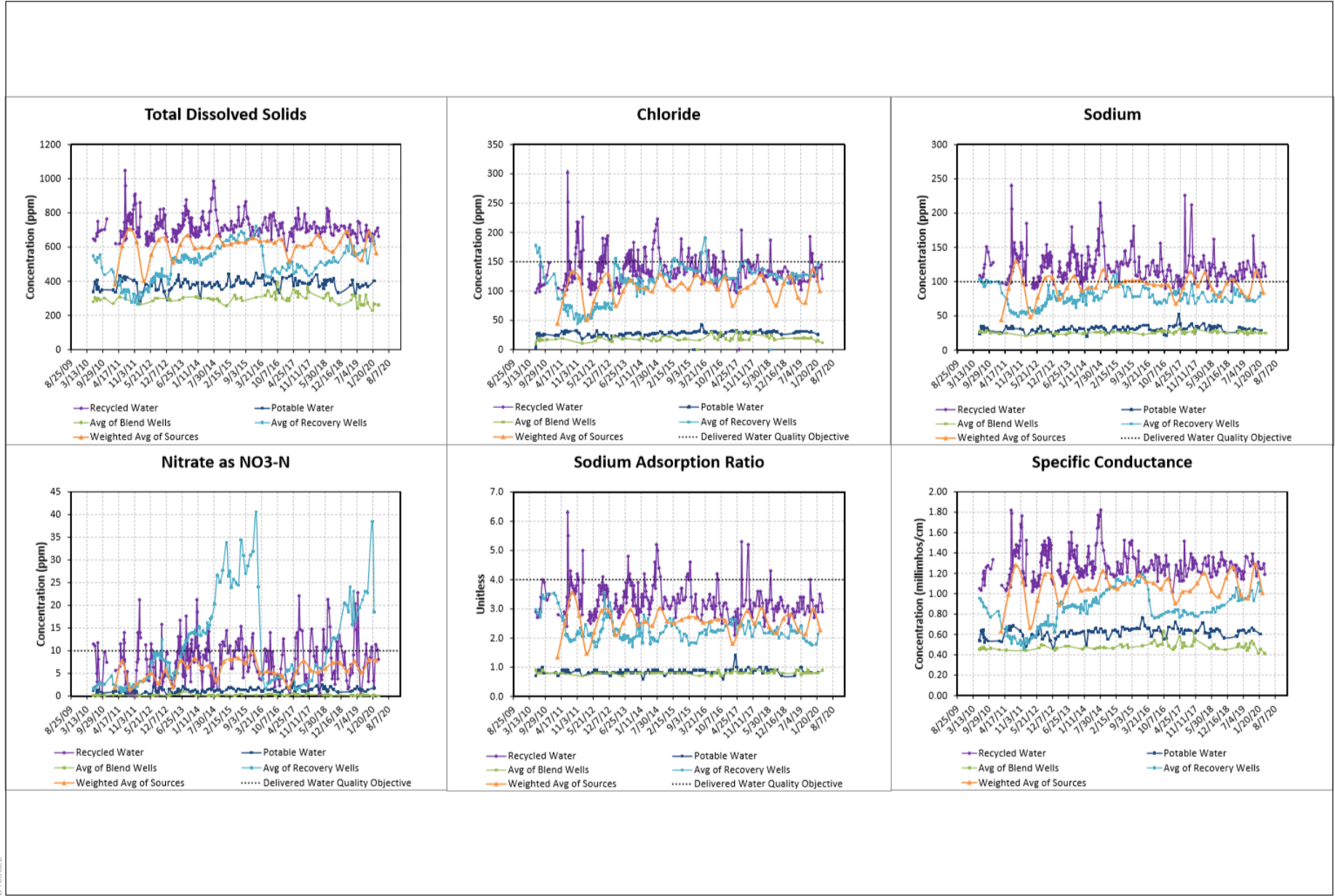
### 3.3.2.1 Federal and State

#### ***National Flood Insurance Program***

The National Flood Insurance Program is a voluntary Federal program that enables property owners in participating communities to purchase insurance protection against losses from flooding. Participation in the National Flood Insurance Program is based on an agreement between local communities and the Federal government. If a community adopts and enforces floodplain management regulations to reduce future flood risks to new construction and substantially improved structures in Special Flood Hazard Areas, the Federal government will make flood insurance available within the community as a financial protection against flood losses.<sup>67</sup> Santa Cruz County has adopted floodplain management regulations. As noted in Section 3.3.1, Setting, some of the Project components are within special flood hazard areas mapped by FEMA. These are denoted as flood insurance rate zones that correspond to certain conditions. “Zone AE” refers to the flood insurance rate zone that corresponds to 1 percent annual chance floodplains where base flood elevations are shown. “Zone AH” refers to areas of the 1 percent chance shallow flooding (usually

<sup>66</sup> The delivered water quality objectives were set as a target for the average delivered water quality received by customers with the understanding that there is variation in the specific quality of the supply sources.

<sup>67</sup> FEMA, *Flood Insurance Study Santa Cruz County, California and Incorporated Areas*, Volume 1 of 3, Flood Insurance Study Number 06087CV001C, Revised September 29, 2017.



SOURCE: PV Water

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.3-5**  
Coastal Distribution System Source Water Quality

areas of ponding) where average depths are between 1 and 3 feet. “Zone AO” refers to areas of the 1 percent annual chance shallow flooding (usually sheet flow on sloping terrain) with average inundation depths between 1 and 3 feet.

The community’s floodplain management regulations must meet or exceed criteria established in accordance with Title 44 Code of Federal Regulations Part 60, Section 60.3, *Flood plain management criteria for flood-prone areas*. Minimum standards for communities where the Federal Insurance Administrator has provided a notice of final flood elevations for one or more special flood hazard areas on the community’s flood insurance rate map (FIRM) and, if appropriate, has designated other special flood hazard areas without base flood elevations on the community’s FIRM, but has not identified a regulatory floodway or coastal high hazard area require:

- All new construction and substantial improvements of non-residential structures to elevate the lowest floor to or above the base flood level or, together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight (with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy).
- A registered professional engineer or architect shall develop and/or review structural design, specifications, and plans for the construction, and certify the design and methods of construction for watertight non-residential structures.
- Development within the flood zone must demonstrate that the cumulative effect of the proposed development, when combined with other existing and anticipated development, will not increase the WSE of the base flood more than one foot.
- Notwithstanding any other provisions of Title 44 Code of Federal Regulations Part 60, Section 60.3, *Flood plain management criteria for flood-prone areas*, a community may approve certain development in Zones AI-30, AE and AH on the community’s FIRM that increases the base flood elevation by more than one foot in the flood hazard zone after receiving approval of a revised FIRM.

### ***Sustainable Groundwater Management Act***

As described in Section 2.1.2.4 in Chapter 2, *Project Description*, the Sustainable Groundwater Management Act (SGMA), establishes a framework for local agencies to develop and implement plans to sustainably manage critically overdrafted, high priority basins like the Pajaro Valley Groundwater Basin by 2040.<sup>68</sup> PV Water is the Groundwater Sustainability Agency for the Pajaro Valley Groundwater Basin.<sup>69</sup> The BMP Update (and thus, the Projects) is a key component of PV Water’s groundwater sustainability plan alternative designed to support PV Water’s goal to achieve sustainable groundwater resources in part by managing groundwater in a manner to reduce, and eventually halt, long-term overdraft of the groundwater basin while ensuring sufficient water supplies for present and anticipated needs, consistent with the purpose of SGMA.

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<sup>68</sup> PV Water, Sustainable Groundwater Management, 2016. Available online at <https://www.pvwater.org/sgm>. Accessed on April 12, 2019.

<sup>69</sup> SGMA designated PV Water as the exclusive local agency to manage groundwater within its statutory boundaries, the Board of Directors voted to be the Groundwater Sustainability Agency for the Pajaro Valley Groundwater Basin in August 2015, and PV Water subsequently submitted a Groundwater Sustainability Agency formation notice to the California Department of Water Resources.



### ***National Pollutant Discharge Elimination System Construction General Permit***

Because construction of some components of the Projects would disturb more than one acre of land surface, potentially affecting the quality of stormwater discharges, those components of the Project would be subject to the *National Pollution Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Order 2009-0009-DWQ, NPDES No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ) (also referred to as the Construction General Permit). The Construction General Permit (CGP) regulates discharges of pollutants in stormwater associated with construction activity to waters of the U.S. from construction sites that disturb one or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface. The permit regulates stormwater discharges associated with construction or demolition activities, such as clearing and excavation; construction of buildings; and linear underground/overhead projects, including installation of water pipelines and other utility lines.

The CGP requires that construction sites be assigned a Risk Level of 1 (low), 2 (medium), or 3 (high), based both on the sediment transport risk at the site and the receiving waters risk during periods of soil exposure (e.g., grading and site stabilization). The sediment risk level reflects the relative amount of sediment that could potentially be discharged to receiving water bodies and is based on the nature of the construction activities and the location of the site relative to receiving water bodies. The receiving waters risk level reflects the risk to the receiving waters from the sediment discharge. Depending on the risk level, the construction projects could be subject to the following requirements:

1. Effluent standards
2. Good site management “housekeeping”
3. Non-stormwater management
4. Erosion and sediment controls
5. Run-on and runoff controls
6. Inspection, maintenance, and repair
7. Monitoring and reporting requirements

The CGP also requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) that includes specific construction best management practices designed to prevent sediment and pollutants from contacting stormwater and moving offsite into receiving waters. The best management practices fall into several categories, including erosion control, sediment control, waste management, and good housekeeping, and are intended to protect surface water quality by preventing the off-site migration of eroded soil and construction-related pollutants from the construction area. Routine inspection of all best management practices is required under the provisions of the CGP. In addition, the SWPPP is required to contain a visual monitoring program, a chemical monitoring program for non-visible pollutants, and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. The Pajaro River was included on the 303(d) list for the pollutant “Sedimentation/Siltation” in 2007.<sup>70</sup>

<sup>70</sup> State Water Board, Regional Board 3 – Central Coast Region, Final California 2012 Integrated Report (303(d) List/305(b) Report), Supporting information for the Pajaro River. Available online at [https://www.waterboards.ca.gov/water\\_issues/programs/tmdl/2012state\\_ir\\_reports/00811.shtml#20078](https://www.waterboards.ca.gov/water_issues/programs/tmdl/2012state_ir_reports/00811.shtml#20078). Accessed on May 10, 2018.

The SWPPP must be prepared before the construction begins. The SWPPP must contain a site map(s) that delineates the construction work area, existing and proposed buildings, parcel boundaries, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the Project area. The SWPPP must list best management practices and the placement of those best management practices that the applicant would use to protect stormwater runoff.

Examples of typical construction best management practices include scheduling or limiting certain activities to dry periods, installing sediment barriers such as silt fence and fiber rolls, and maintaining equipment and vehicles used for construction. Non-stormwater management measures include installing specific discharge controls during certain activities, such as paving operations, vehicle and equipment washing and fueling. The CGP also sets post-construction standards (i.e., implementation of best management practices to reduce pollutants in stormwater discharges from the site following construction).

In addition to stormwater discharges, the CGP also covers other non-stormwater discharges including irrigation of vegetative erosion control measures, water to control dust, uncontaminated groundwater from dewatering, and other discharges not subject to a separate general NPDES permit adopted by the Regional Water Board. The discharge of non-stormwater is authorized under the following conditions:

- The discharge does not cause or contribute to a violation of any water quality standard;
- The discharge does not violate any other provision of the CGP;
- The discharge is not prohibited by the applicable Basin Plan;
- The discharger has included and implemented specific best management practices required by the CGP to prevent or reduce the contact of the non-stormwater discharge with construction materials or equipment;
- The discharge does not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants;
- The discharge is monitored and meets the applicable Numeric Action Limits; and
- The discharger reports the sampling information in the Annual Report.

In the Project area, the CGP is implemented and enforced by the RWQCB, which administers the stormwater permitting program. Dischargers are required to electronically submit a notice of intent and permit registration documents in order to obtain coverage under this CGP. Dischargers are responsible for notifying the RWQCB of violations or incidents of non-compliance, as well as for submitting annual reports identifying deficiencies of the best management practices and how the deficiencies were corrected. The risk assessment and SWPPP must be prepared by a State Qualified SWPPP Developer and implementation of the SWPPP must be overseen by a State Qualified SWPPP Practitioner meeting the requirements set forth in the CGP. A Legally Responsible Person, who is legally authorized to sign and certify permit registration documents, is responsible for obtaining coverage under the CGP.

For linear underground and overhead projects, such as pipelines, the SWPPP must include best management practices that address stabilization of land after ground disturbance is complete. All disturbed areas of the construction site must be stabilized prior to termination of coverage under the CGP (as described in Section C.1 of CGP Attachment A). Final stabilization criteria are identified in CGP Attachment A, and specify that: (a) areas that were vegetated prior to ground disturbance must be re-vegetated at ratios identified in CGP Attachment A Section C.1, (b) areas that were not vegetated must be returned to original line and grade and/or compacted to achieve stabilization, or (c) equivalent stabilization measures must be employed.

### ***Water Quality Control Plan for the Central Coast Basin***

Since adoption of the 2014 BMP Update PEIR, the RWQCB has adopted the new 2019 Basin Plan.<sup>71</sup> The beneficial uses listed for the Pajaro River and Watsonville Slough in the 2014 BMP Update PEIR did not change in the 2019 Basin Plan. While not listed in the 2014 BMP Update PEIR, the beneficial uses for Struve and Harkins sloughs also did not change in the 2019 Basin Plan. As discussed in the 2014 BMP Update PEIR, the RWQCB has promulgated, and the United States Environmental Protection Agency (USEPA) has approved, total maximum daily loads (TMDLs) for select surface waters in the Pajaro Basin. These include TMDLs for Watsonville Slough and the Pajaro River, and are discussed below and listed in **Table 3.3-3**.

### **TMDL for Nitrogen Compounds and Orthophosphate in Streams of the Pajaro River Watershed<sup>72</sup>**

In the Pajaro River watershed, discharges of nitrogen compounds and orthophosphate are occurring in surface waters at levels which are impairing a spectrum of beneficial uses. The pollutants addressed in TMDLs established for streams of the Pajaro River watershed are nitrate, un-ionized ammonia, and orthophosphate. All water bodies are required to attain the 2019 Basin Plan general toxicity objective for un-ionized ammonia in inland surface waters and estuaries. The TMDLs are designed to address impairments in Harkins Slough (nitrate, nutrients, low dissolved oxygen), Struve Slough (nutrients, low dissolved oxygen), and Watsonville Slough (nitrate, nutrients, low dissolved oxygen), among other streams. The 2019 Basin Plan contains the following narrative water quality objectives for biostimulatory substances:

“Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses”

To implement this narrative objective, the RWQCB developed numeric targets based on established methodologies and approaches. The 2019 Basin Plan includes an implementation plan for these TMDLs and lists ways the RWQCB assesses progress towards attainment of load allocations.

<sup>71</sup> RWQCB, *Water Quality Control Plan for the Central Coast Basin, June 2019 Edition*. CalEPA. June 14, 2019.

<sup>72</sup> Unless otherwise noted, information in this section is derived from Central Coast RWQCB, *Water Quality Control Plan for the Central Coastal Basin*, July 2019 Edition.

**TABLE 3.3-3  
LIST OF 303(D) WATER QUALITY IMPAIRMENTS FOR SURFACE WATERS POTENTIALLY AFFECTED BY THE PROJECT**

<b>Water Body</b>	<b>Pollutant(s)</b>	<b>Potential Source</b>	<b>TMDL Schedule (Category 5 Criteria)<sup>a</sup></b>
Pajaro River watershed streams	Nitrogen compounds and orthophosphate	Irrigated agriculture; stormwater system discharges; Industrial and construction stormwater; livestock waste; golf courses; natural sources	Approved 2016 (5B)
	Boron (below Main Street to the mouth)	Unknown	Required by 2027 (5A)
	Sedimentation/Siltation	Agriculture; Domestic Animals/Livestock; Grazing-Related Sources; Habitat Modification; road construction; Hydromodification; Land Development; Logging Road Construction/Maintenance; Urban Runoff/Storm Sewers	Approved 2007 (5B)
	Fecal Coliform	Collection System Failure; Domestic Animals/Livestock; Urban Runoff/Storm Sewers	Approved 2010 (5B)
	Nitrate	Agriculture; Domestic Animals/Livestock; Natural Sources	Approved 2006 (5B)
	Toxicity	Unknown	Required by 2023 (5A)
	Diazinon	Agriculture	Approved 2013 (5B)
	Dieldrin, Chloride, Chlordane, Sodium, Dissolved Oxygen, E. coli, Chromium, pH, Polychlorinated biphenyls, DDD (Dichlorodiphenyldichloroethane), DDE (Dichlorodiphenyldichloroethylene), DDT Dichlorodiphenyltrichloroethane)	Unknown	Required by 2027 (5A)
	Chlorpyrifos	Agriculture	Approved 2013 (5B)
Harkins Slough	Turbidity	Unknown	Required by 2023 (5A)
	Chlorophyll-A, Dissolved Oxygen	Unknown	Required by 2018 (5A)
	Indicator Bacteria		Approved 2007 (5B)
Watsonville Slough	Nitrate, Dissolved Oxygen	Agriculture, Domestic Animals/Livestock, Natural Sources, Urban Runoff/Storm Sewers	Required by 2018 (5A)
	Toxicity, Turbidity	Unknown	Required by 2023 (5A)
	DDE (Dichlorodiphenyldichloroethylene), Eshcherichia (E. Coli), Malathion		Required by 2027 (5A)
	Fecal Coliform		Approved 2007 (5B)
Struve Slough	Chlorophyll-A, Dissolved Oxygen	Unknown	Required by 2018 (5A)
	Toxicity, Turbidity		Required by 2023 (5A)
	Escherichia Coli (E. Coli), pH		Required by 2027 (5A)
	Fecal Coliform		Approved 2007 (5B)

**TABLE 3.3-3 (CONTINUED)**  
**LIST OF 303(D) WATER QUALITY IMPAIRMENTS FOR SURFACE WATERS POTENTIALLY AFFECTED BY THE PROJECT**

<b>Water Body</b>	<b>Pollutant(s)</b>	<b>Potential Source</b>	<b>TMDL Schedule (Category 5 Criteria)<sup>a</sup></b>
Pajaro Lagoon	Diazinon	Agriculture	Approved 2013 (5B)
	Dissolved Oxygen, pH, water temperature, Toxicity, Malathion, DDE	Unknown	Required (5A)

## NOTES:

<sup>a</sup> Category 5 criteria: A water segment where standards are not met and a TMDL is required, but not yet completed, for at least one of the pollutants being listed for this segment. TMDL requirement status definitions for listed pollutants are: A- TMDL still required, B- being addressed by USEPA approved TMDL, C- being addressed by action other than a TMDL.

SOURCE: State Water Resources Control Board, 2014 and 2016 California Integrated Report (Clean Water Act Section 303(d) List and 305(b) Report, approved by USEPA, April 6, 2018.

Discharges of un-ionized ammonia, nitrate, and orthophosphate originating from the sources identified in Table 3.3-3 are contributing loads to receiving waters. Irrigated agriculture is the largest source of controllable water column nutrient loads in the Pajaro River watershed and this source category is not currently meeting its proposed load allocation. Municipal NPDES-permitted stormwater sources are a relatively minor source of nitrogen compounds and orthophosphate, but can be locally significant.<sup>73</sup> Livestock waste sources associated with grazing lands and rural residential areas are currently meeting proposed load allocations, as are sources associated with industrial and construction NPDES-permitted sources and golf courses.<sup>74</sup>

The final allocations of these pollutants, which are equal to the TMDLs for streams in the Pajaro River watershed, should be achieved 25 years after the TMDL effective date of July 12, 2016 (note that pollutant allocations are concentration-based, and so are not additive). Interim load allocations have been set for dates 10 and 15 years after the effective date of the TMDLs. Owners and operators of irrigated agricultural land must comply with the Conditional Waiver of Waste Discharge Requirements for Irrigated Lands (Order R3-2017-0002) or its renewal or replacement, to meet load allocations and achieve the TMDLs.<sup>75</sup>

### **TMDL for Sediment in the Pajaro River**

Anthropogenic watershed disturbances have accelerated the natural processes of erosion and sedimentation in the Pajaro River, including Llagas Creek, Rider Creek, and San Benito River. Special studies have identified a variety of watershed conditions that have led to excessive sedimentation. Excessive sedimentation has caused an exceedance of the narrative, general water quality objective for sediment because sediment load and rate have interfered with the beneficial uses of these waterbodies including fish and wildlife (COLD, MIGR, and SPWN). Nonpoint sources include irrigated agriculture activities upon crop, fallow and orchard lands; timber harvesting activities upon forested lands; grazing activities upon pasture and range lands; urban and rural residential development, roads, farm animal and livestock boarding upon urban lands; unpaved roads in the San Benito watershed, and paved and unpaved roads in the Corralitos Creek and Rider Creek watersheds upon lands in the roads land use category; hydromodification-related activities upon all types of land use; off-road recreational vehicle areas; sand and gravel mining; as well as natural erosion and landslides. Owners and operators of properties where hydromodification activities occur must comply with the land disturbance prohibition, relevant portions of which are summarized below:

- The controllable discharge of soil, silt, or earthen material from any grazing, farm animal and livestock, hydromodification, road, or other activity of whatever nature into waters of the State within the Pajaro River watershed is prohibited.
- The controllable discharge of soil, silt, or earthen material from any grazing, farm animal and livestock, hydromodification, road, or other activity of whatever nature to a location where such material could pass into waters of the State within the Pajaro River watershed is prohibited.

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<sup>73</sup> RWQCB, *Water Quality Control Plan for the Central Coastal Basin*, July 2019 Edition.

<sup>74</sup> RWQCB, *Water Quality Control Plan for the Central Coastal Basin*, July 2019 Edition.

<sup>75</sup> The 2017 agricultural order is the third agricultural order adopted in the Central Coast Region, and is also referred to as “Ag Order 3.0.”

### **TMDL for Pathogens in Watsonville Slough**

The beneficial uses of water contact recreation (REC-1) and non-contact water recreation (REC-2) are not supported in Watsonville Slough or its tributaries, Struve, Hanson, Harkins and Gallighan Sloughs, because fecal coliform concentrations there exceed existing 2019 Basin Plan numeric water quality objectives protecting these beneficial uses.

The TMDL for pathogens in Watsonville Slough is a receiving water concentration equal to the numeric target for fecal coliform. The allocation to each responsible party is the receiving water fecal coliform concentration equal to the TMDL. These allocations focus on reducing or eliminating the controllable sources of fecal coliform.

Currently, there is a Livestock Waste Discharge Prohibition in effect for the Watsonville Slough Watershed to address the amounts of fecal coliform. Additionally, the City of Watsonville and the County of Santa Cruz must revise their stormwater management plans and the sanitary sewer system must be improved to reduce the fecal coliform.<sup>76</sup> Operators or owners of irrigated lands where non-sterile manure is applied must comply with the Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands to implement their load allocations.

### **Water Quality Objectives for Agricultural Supply**

The RWQCB has promulgated water quality objectives for agricultural supply in the 2019 Basin Plan. These include:

- **pH.** The pH value shall neither be depressed below 6.5 nor raised above 8.3.
- **Dissolved Oxygen.** Dissolved oxygen concentration shall not be reduced below 2.0 mg/L at any time.
- **Chemical Constituents.** Waters shall not contain concentrations of chemical constituents in amounts which adversely affect the agricultural beneficial use. Interpretation of adverse effect shall be as derived from the University of California Agricultural Extension Service guidelines provided in Table 3-1 of the 2019 Basin Plan. Chemical constituents for which water quality guidelines are listed in Table 3-1 of the 2019 Basin Plan include total dissolved solids or salinity, sodium, chloride, boron, ammonia, nitrate, bicarbonate, and pH. The table notes that the “guidelines are flexible and should be modified when warranted by local experience or special conditions of crop, soil, and method of irrigation.”

In addition, waters used for irrigation and livestock watering shall not exceed concentrations for those chemicals listed in Table 3-2 of the 2019 Basin Plan, which identifies maximum concentrations for 21 elements. Salt concentrations for irrigation waters shall be controlled through implementation of the anti-degradation policy to the effect that mineral constituents of currently or potentially usable waters shall not be increased. It is emphasized that no controllable water quality factor shall degrade the quality of any groundwater resource or adversely affect long-term soil productivity.

<sup>76</sup> RWQCB, *Water Quality Control Plan for the Central Coast Basin, June 2019 Edition*. CalEPA, June 14, 2019.



### **NPDES General Permit for Discharges with Low Threat to Water Quality**

The RWQCB adopted Order No. R3-2017-0042, *Waste Discharge Requirements National Pollutant Discharge Elimination System General Permit for Discharges with Low Threat to Water Quality* (NPDES No. CAG993001) on December 7, 2017. This region-wide Low-Threat General Permit authorizes the discharge of wastes meeting the criteria specified in finding two of this general permit to waters of the U.S. by any discharger. Low-threat discharges are discharges that contain minimal amounts of pollutants and pose little or no threat to water quality and the environment, such as uncontaminated dewatered groundwater that is released to land. Discharges covered by this permit may be treated and discharged on either continuous or batch bases. A complete list of discharges eligible for coverage under this permit is not provided by the RWQCB; however, a list of discharges *not* covered includes: discharges covered by other statewide permits; discharges from domestic wastewater treatment facilities; and discharges from secondary containment structures such as brine ponds. The Low-Threat General Permit includes limitations for pH, temperature, color, turbidity, dissolved oxygen, biostimulatory substances, taste and odor, oil and grease, settleable and floating materials, toxicity, and radionuclides. To be covered by this Low-Threat General Permit, discharges must meet the following criteria:

- Pollutant concentrations in the discharge do not (a) cause, (b) have a reasonable potential to cause, or (c) contribute to an excursion above any applicable water quality objectives, including prohibitions of discharge;
- The discharge does not include water added for the purpose of diluting pollutant concentrations;
- Pollutant concentrations in the discharge will not cause or contribute to degradation of water quality or impair beneficial uses of receiving waters;
- Pollutant concentrations in the discharge shall not exceed the limits set in the order unless the executive officer determines that the applicable water quality control plan does not require effluent limits;
- The discharge shall not cause acute or chronic toxicity in receiving waters; and
- The discharger shall demonstrate the ability to comply with the requirements of this Low-Threat general permit.

### **California Recycled Water Policy - Salt and Nutrient Management Plan**

The California SWRCB adopted a Recycled Water Policy in 2009 that requires every groundwater basin or sub-basin in California to develop Salt and Nutrient Management Plans (SNMPs) to manage salts, nutrients, and other significant chemical compounds. SNMPs are intended to help streamline permitting of new recycled water projects while ensuring attainment of water quality objectives and protection of beneficial uses. PV Water developed a SNMP to meet the requirements of the Recycled Water Policy, which was adopted by the State Water Resources Control Board (State Water Board) in 2009. The purpose of the plan is to ensure attainment of water quality objectives for protection of beneficial water uses and guide management of salts, nutrients, and other significant chemical compounds within the groundwater basins of the State.

The three priority constituents selected to document and communicate groundwater and surface water quality conditions are TDS, chloride, and nitrate. TDS is used as a proxy for the bulk salt content of water, chloride is a good indicator for seawater intrusion, and nitrate, which is highly mobile in water, is used as the proxy for nutrients species including nitrogen and phosphorous. The 2019 Basin Plan has a median groundwater quality objective for TDS and chloride of 1000 mg/L and 150 mg/L, respectively. The USEPA drinking water standard for nitrate-NO<sub>3</sub> is 45 mg/L due to human health concerns when the threshold is exceeded.

As part of the SNMP process, the amount of remaining assimilative capacity was evaluated for two management areas within the Pajaro Valley Groundwater Basin for each constituent of concern. For the purpose of the SNMP, assimilative capacity was defined as the amount of loading the groundwater basin can receive from salts and nutrients without resulting in damage to aquatic life or humans who utilize and consume the water. Salt and nutrient groundwater assimilative capacity in the Pajaro Valley were based on the best estimate of existing conditions and regulatory standards. Assimilative capacity was determined by comparing the existing concentrations of the specific constituents of concern, total dissolved solids, chloride, and nitrate, to relevant Water Quality Objectives. Given that no Water Quality Objectives are explicitly stated for the Pajaro Valley Groundwater Basin in the Water Quality Control Plan for the Central Coastal Basin available at the time of SNMP preparation (2016), the thresholds defined for neighboring basins were used. The 2019 Basin Plan similarly does not establish water quality objectives for Pajaro Valley Groundwater Basin. Groundwater with salt or nutrient concentrations exceeding stated thresholds was assumed to have no additional assimilative capacity. In a review of groundwater data evaluated for the SNMP, while some individual monitoring wells exceeded the assimilative capacity threshold, nearly all areas met water quality objectives for assimilative capacity. The area that did not meet with water quality objectives was the coastal management area which exceeded assimilative capacity for chloride.

### 3.3.2.2 Local

Table 2-8 in Chapter 2, *Project Description*, identifies the permits and approvals from Santa Cruz County and/or the City of Watsonville required for the Project. **Table 3.3-4** presents pertinent local plans and policies regarding hydrology and water quality to support County and City consideration of Project consistency with general policies.<sup>77</sup> In some cases, local policies are used in this EIR as criteria to determine the significance of physical effects on the environment (e.g., Impact NOI-1 in Section 3.8, Noise and Vibration).

<sup>77</sup> California Government Code Section 53091 exempts agencies like PV Water from complying with local building and zoning ordinances when locating or constructing facilities for the production, generation, storage, treatment, or transmission of water. California Government Code Section 65402(c) requires that PV Water notify cities and counties of its plans to construct projects or to acquire or dispose of property. The planning agency then has 40 days to determine project consistency with its general plan. If the planning agency disapproves, the disapproval may be overruled by PV Water.

**TABLE 3.3-4**  
**SANTA CRUZ COUNTY PLANS AND POLICIES RELEVANT TO THE PROJECT**

<i>Santa Cruz County General Plan/Local Coastal Program</i>
<p><b>Objective 6.4 Local Flood Hazards.</b> To protect new and existing structures from flood hazards in order to minimize economic damages and threats to public health and safety, and to prevent adverse impacts on floodplains, and maintain their beneficial function for flood water storage and transport and for biotic resource preservation.</p>
<p><b>Policy 6.4.1 Geologic Hazards Assessment Required in Flood Hazard Areas.</b> Require a geologic hazards assessment of all development proposals within the County's flood hazard areas in order to identify flood hazards and development constraints.</p>
<p><b>Policy 6.4.2 Development Proposals Protected from Flood Hazard.</b> Approve only those grading applications and development proposals that are adequately protected from flood hazard and which do not add to flooding damage potential. This may include the requirement for foundation design which minimizes displacement of flood water, as well as other mitigation measures.</p>
<p><b>Policy 6.4.9 Septic Systems, Leach fields, and Fill Placement.</b> Allow the placement of fill within the 100-year floodplain in the minimum amount necessary, not to exceed 50 cubic yards. Fill shall only be allowed if it can be demonstrated that the fill will not have cumulative adverse impacts on or off site. No fill is allowed in the floodway.</p>
<p>SOURCE: Santa Cruz County, 1994. <i>1994 General Plan and Local Coastal Program for the County of Santa Cruz, California.</i></p>

### 3.3.3 Impacts and Mitigation Measures

#### 3.3.3.1 Significance Criteria

In accordance with the California Environmental Quality Act (CEQA), State CEQA *Guidelines* (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Projects could have a significant impact if they were to:<sup>78</sup>

- Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality;
- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would: (i) result in substantial erosion or siltation on- or off-site; (ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite; (iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or (iv) impede or redirect flood flows;
- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation;<sup>79</sup>
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

<sup>78</sup> Refer also to Appendix NOP for additional topics that were addressed in the Notice of Preparation.

<sup>79</sup> Tsunamis (seismic sea waves) are long-period waves that are typically caused by underwater seismic disturbances, volcanic eruptions, or submerged landslides. A seiche is caused by the oscillation of the surface of an enclosed body of water such as San Francisco Bay due to an earthquake or large wind event.

The following topics are not analyzed further in this section for the reasons described below:

- ***Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.***  
The proposed Struve Slough pump station would create about 880 square feet of new impervious area that could generate minimal new runoff draining to Struve Slough. The area is not served by a stormwater drainage system. Activities at the Struve Slough pump station would not require treatment chemicals or involve ongoing use of potential water pollutants. The Project would not release additional pollutants from the new impervious area and the Project would reduce the volume of water in the slough system before and after flood events by pumping water out of the sloughs system; therefore, the Project would not generate new polluted runoff or exceed the capacity of existing or planned stormwater drainage systems. There would be no impact with respect to this criterion resulting from construction or operation of the Project. Effects of Project construction and operations on water quality are discussed in Impacts HYD-1 and HYD-2.
- ***Risk release of pollutants due to inundation by seiche or tsunami.*** The Project site is not located within a potential tsunami hazard inundation zone nor an area subject to seiches. Therefore, there would be no impact related to these topics resulting from construction or operation of the Project. Risk of release of pollutants due to project inundation from flooding is discussed below in Impact HYD-2.

### 3.3.3.2 Methodology

As described in Section 3.1, Overview, this EIR provides an independent analysis of the potential environmental impacts associated with the Projects. **Table 3.3-5** presents mitigation measures from the 2014 BMP Update PEIR adopted by the Board of Directors for the purpose of reducing impacts related to surface water, groundwater, and water quality. These adopted mitigation measures are considered part of the Projects and thus are considered prior to any significance determinations. Potential impacts are evaluated in the following section. If warranted, additional mitigation is included and takes the form of (1) modifications to update the mitigation measures presented in Table 3.3-5 to reflect current conditions and site-specific impacts; or (2) new mitigation measures to replace or augment an adopted mitigation measure.

CEQA does not require lead agencies to consider how existing hazards or conditions might impact a project's users or residents, except where the project would significantly exacerbate an existing environmental hazard. Accordingly, hazards resulting from a project that places development in an existing or future flood hazard area are not considered impacts under CEQA unless the project would significantly exacerbate the flood hazard. Thus, the analysis below evaluates whether the Projects would exacerbate an existing or future flood hazard in the Project area, resulting in a substantial risk of loss, injury, or death. The impact is considered significant if the Projects would exacerbate flood hazards by increasing the frequency or severity (in terms of flood water elevation) of flooding or causing flooding to occur in an area that would not be subject to flooding without the Projects.

Construction effects on water quality are direct or indirect impacts that could occur during construction, including groundwater dewatering. The impact analysis considers whether compliance with regulatory requirements for these activities would ensure that these water

**TABLE 3.3-5**  
**2014 BMP UPDATE PEIR MITIGATION MEASURES – SURFACE WATER, GROUNDWATER, AND WATER QUALITY**

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**HWQ-1:** [PV Water] shall require contractors to apply for all applicable NPDES permits, including dewatering permits, develop a SWPPP for construction of proposed facilities, and comply with conditions of the permit(s), as required by the [Central Coast Regional Water Quality Control Board]. The objectives of the SWPPP are to identify pollutant sources that may affect the quality of stormwater discharge and to implement [best management practices] to reduce pollutants in stormwater discharges. The SWPPP for this proposed action would include the implementation, at a minimum, of the following elements:

- Source identification
- Preparation of a site map
- Description of construction materials, practices, and equipment storage and maintenance
- List of pollutants likely to contact stormwater
- Estimate of the construction site area and percent impervious area
- Erosion and sedimentation control practices, including soils stabilization, revegetation, and runoff control to limit increases in sediment in stormwater runoff, such as detention basins, straw bales, silt fences, check dams, geofabrics, drainage swales, and sandbag dikes
- Proposed construction dewatering plans
- Provisions to eliminate or reduce discharge of materials to stormwater
- Description of waste management practices
- Maintenance and training practices

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**HWQ-2:** Rapid, imposed water-level fluctuations shall be avoided within the sloughs, Salsipuedes Creek, and the Pajaro River to minimize erosion and failure of exposed (or unvegetated), susceptible banks. This can be accomplished by operating the pumps at an appropriate flow rate, in conjunction with commencing operation of the pumps only when suitable water levels or flow rates are measured in the water body. Criteria for minimizing fluctuations and/or protecting banks from related erosion will need to be developed, as some banks presently are stable and others are not. Control is important, as the mobilized sediment also impairs in-slough habitat values, and potentially exacerbates bacterial levels in the slough system. It may be that water-level fluctuations may be controlled as well to minimize other impacts, such as desiccation of amphibian eggs or waterlogging of agricultural soils adjacent to the sloughs.

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**HWQ-3:** If pumping rates in existing wells fall below levels that can support existing or planned land uses, and the reduction in pumping can be attributed to one or many of the project components, then one of several measures may be undertaken to mitigate the loss of pumping. These mitigation measures may include:

1. Improving irrigation efficiency
2. Modifying irrigation and agricultural operations
3. Lowering the pump in the irrigation well
4. Lowering and changing the pump in the irrigation well
5. Adding storage capacity for irrigation supply
6. Replacing the irrigation well
7. Replacing the irrigation water source to determine if well production loss can be attributed to one of the project components, PV Water will allow well owners to enroll in a monitoring and mitigation program. PV Water will collect baseline data necessary for establishing significant impacts only from wells that are enrolled in the MMP. If a well is not enrolled in the MMP, to claim a significant impact the well owner will need to provide adequate and reliable baseline data. To claim a significant impact for each well enrolled in the MMP, PV Water will first establish baseline irrigation well extraction rates, drawdowns, and water quality near planned components. Pumping rate reductions and changes in water quality from these baseline values will be analyzed to assess whether or not they are caused by the project. A pumping rate reduction or adverse change in water quality is assumed to be caused by the Project if: 1) it occurs at the same time as the onset of operations of BMP Update component(s); 2) it occurs in an area reasonably predicted to be affected by the BMP Update component(s); 3) static groundwater levels have dropped; 4) pumping groundwater levels have not dropped more than static groundwater levels; and 5) no other obvious reason exists for the drop in production capacity. For PV Water or others to identify another reason for loss of production it must be based on the written professional opinion of a qualified hydrogeologist that will be submitted to the PV Water staff or their designee, for review and concurrence.

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**HWQ-4:** Facilities shall be designated to comply with FEMA and County of Santa Cruz requirements to floodproof the facilities and shall not exacerbate upstream or downstream flood hazards on other properties. The FEMA process will require identification of the FEMA floodway zone and may require no increase water elevations for a one percent chance annual flood. The FEMA process will require identification of the FEMA zone type and may require no increase water elevations for a one percent chance annual flood. To meet the specific FEMA requirements for the component, substantial modifications to the facility design and additional mitigation may be required.

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quality-related impacts are less than significant during construction. The analysis below also evaluates the Projects' potential to directly or indirectly increase inputs or mobilization of sediment or pollutants to the streams in the watershed during the operational phase of the Projects.

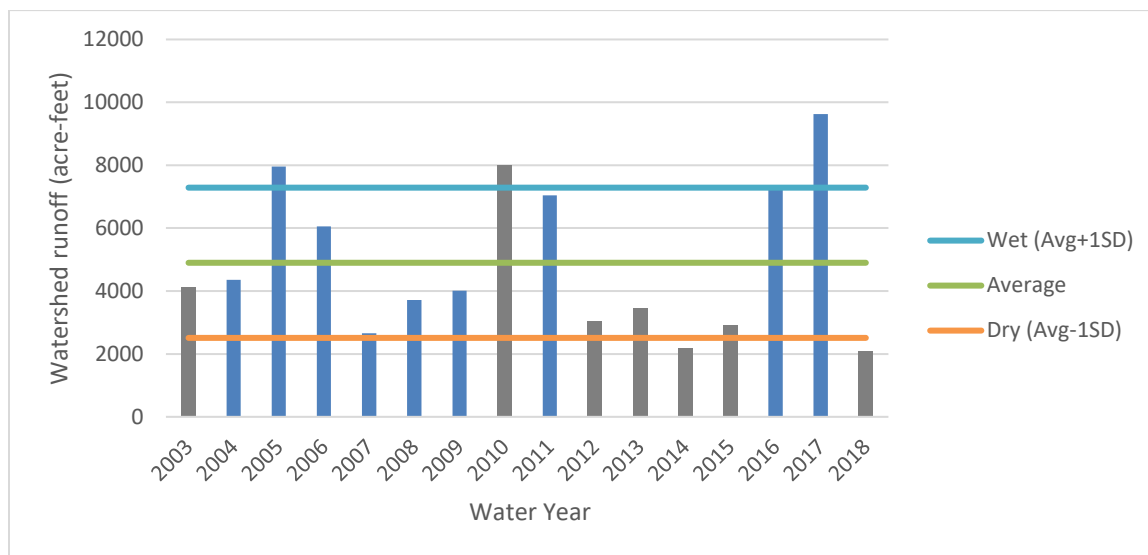
Depletion of groundwater resources is considered significant if the project would interfere with groundwater recharge, or substantially reduce groundwater supplies, such that sustainable groundwater management of the basin is impeded. Sustainable groundwater management means the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results. Undesirable results in this context are one or more of the following:

- Chronic lowering of groundwater levels;
- Significant and unreasonable reduction of groundwater storage;
- Significant and unreasonable seawater intrusion;
- Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies;
- Significant and unreasonable land subsidence that substantially interferes with surface land uses; and/or
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

Impacts associated with changes in surface water hydrology are evaluated by assessing the extent to which the Projects would change the locations, seasonality, or magnitude of surface water discharge in the watershed. The hydrology in the Project vicinity varies annually due to variations in precipitation; for this reason, the Projects' potential impacts vary depending on annual precipitation. Using historic data, "water year types" can be defined to describe the relative wetness of a given year compared to precipitation during a normal year.

For purposes of the impact discussion, this EIR chapter discusses three water year types selected from a period between Water Years 2003 and 2018 for which hydrologic and water quality data were mostly available: normal (2004), wet (2005), and dry (2008). The normal year had close to average annual runoff, while the wet and dry years had annual runoff that was close to one standard deviation above or below average. Since many of the more recent normal, wet, and dry years have been impacted by higher electrical conductivities that constrained diversion operations, they were not used as representative type years since the "signal" of water availability would have been lost in the "noise" of water quality. While this method offers a simple way to analyze results for varying hydrologic regimes, we acknowledge that it is also limited. The Watsonville, Harkins, and Struve Sloughs are inherently complex and varied, and these three type years cannot fully capture the variability and behavior of the full 16-year study period. For example, although WY 2010 had higher runoff than the average year within the study period, the project conditions model run diverted relatively little water from Struve Slough due to poor water quality; meanwhile, Harkins Slough was not salinity-limited. To allow comparisons to be made

based on variations in runoff, type years were selected from a subset of years in which water quality had little or no impact on pumping after January 1. The resulting years (shown on **Figure 3.3-6**) were 2004 (normal), 2005 (wet), and 2007 (dry). Using the selected type years is conservative in terms of assessing potential Project impacts on the sloughs since these years would have allowed more diversion than typical for the year type, and consequently more drops in water level. For the same reason that it overestimates environmental impacts, it would have overestimated water diversion potential, but this was accounted for by including all years in the estimations of available water.



Notes: Bars in grey show years where one or more diversion point was impacted by high salinity. SD – standard deviation.

**Figure 3.3-6**  
Annual Runoff for Harkins and Struve Sloughs and  
Selection of Type Water Years

### Hydrologic and Hydraulic Modeling<sup>80</sup>

Balance Hydrologics, Inc., originally developed watershed and hydraulic models of Watsonville Slough (comprising Harkins and Struve Sloughs) in 2014 for Santa Cruz Resource Conservation District.<sup>81</sup> The models were then updated by Environmental Science Associates (ESA) and used to estimate how the Projects would alter water levels in the sloughs. **Appendix HYD** contains a detailed description of the recent model development, the scenarios analyzed, and the model results.

Using the models, ESA estimated what water levels would have been during the water years 2003 to 2018 if the Project was operating, and compared those levels to a simulated baseline condition. The baseline condition assumes existing topographic and water diversion conditions between water year 2003 to 2018. Because the study sought to analyze changes in hydrology due to diversion scenarios rather than other independent watershed changes, it was assumed that

<sup>80</sup> Unless otherwise noted, content throughout the description of hydrologic and hydraulic modeling is derived from ESA, *Harkins and Struve Sloughs Hydrologic Analysis of Diversion Alternatives*, July 2020.

<sup>81</sup> Balance Hydrologics, Inc. in collaboration with Environmental Data Solutions, *Watsonville Sloughs Hydrology Study*, Prepared for Santa Cruz Resource Conservation District, February 14, 2014.



modifications to the Watsonville-Harkins confluence that took place in 2016 at APN 052-211-26 were in place throughout the simulation period. The baseline condition modeled the actual diversion rate and timing as recorded by PV Water. **Table 3.3-6** summarizes the characteristics of the baseline and Project modeled scenarios.

**TABLE 3.3-6  
EXISTING AND PROPOSED PUMP OPERATIONS**

Scenario	Spring Drawdown	Pump and Annual Pump Limit (acre-feet)	Season of Pump Operations <sup>a,b</sup>			
			November-December	January-March	April-May	June-October
Baseline Conditions	No	Harkins (no existing pump at Struve) 0	Pump as recorded at Harkins Slough			
Project	Yes	Struve 4,000	Pump at 30 cubic feet per second (cfs) if WSE > 6 feet and EC meets water quality criteria	Pump at 30 cfs if WSE > 6 feet and EC meets water quality criteria	Pump at 3 cfs if WSE > 4.5 feet and EC meets water quality criteria	
		Harkins 2,000	Pump at 30 cfs if WSE > 5 feet and EC meets water quality criteria	Pump at 30 cfs if WSE > 5 feet and EC meets water quality criteria	Pump at 3 cfs if WSE > 4.5 feet and EC meets water quality criteria	No pumping

NOTES:

<sup>a</sup> WSE – water surface elevation; all elevations reported in NAVD88; EC – electrical conductivity, measuring salinity; refer to Section 3.3.1.6.

<sup>b</sup> 30 cfs is an upper limit of pumping; actual pumping rate may be below this value.

SOURCE: ESA, *Harkins and Struve Sloughs Hydrologic Analysis of Diversion Alternatives*, July 2020.

For the Project model scenario, the Harkins and Struve slough pumps were controlled according to a set of rules designed through iterations to maximize diversion volumes while protecting habitat. In the models, three criteria determine whether pumping can occur:

- **Volume:** the cumulative pumped volume in the current water year (i.e., October 1 to date) must be below the permitted (2,000 acre-feet/year on Harkins Slough) or proposed (4,000 acre-feet/year on Struve Slough) water right.
- **Salinity:** the electrical conductivity must be less than the value of the receiving aquifer, to preserve water quality. To be conservative, based on previous observed values, the modeling assumed EC must be below 1000 uS/cm. (Note that while 1000 uS/cm is a threshold set for modeling purposes, actual operations may divert water of greater salinity depending upon conditions.)
- **Water surface elevation:** the current water surface elevation in each slough must be above the threshold set for the given month. During breeding season for California red-legged frogs (assumed to be January 1 to March 31) the threshold would be set at a relatively high level to inundate the sloughs and to avoid artificially drawing down the water level.

If these criteria are satisfied, pumping can commence or continue until any one of these conditions is no longer true.

### **Pajaro Lagoon**

To provide an understanding of how Pajaro Lagoon would respond to future with-Project and cumulative conditions, Environmental Science Associates developed a quantified conceptual model (QCM), which predicts lagoon mouth morphology and the resulting water levels of the lagoon. A QCM is a simplified time-series model which implements a lagoon water balance alongside a parametric model of the lagoon mouth and beach. Detailed discussion of QCM development, calibration, and assumptions is provided in Appendix HYD.

The QCM approach is centered on a water budget for the lagoon, which is coupled with a sediment budget for the lagoon mouth. The model is based on two core concepts:

- All water flows entering and leaving the lagoon should balance.
- The net erosion/sedimentation of the inlet channel results from a balance of erosive (fluvial and tidal) and constructive/deconstructive (wave) processes.

The model uses time series of nearshore waves and tides, watershed runoff, and evapotranspiration data as boundary conditions. Using these as forcing conditions with information about the lagoon's topography, the model dynamically simulates time series of lagoon water levels, along with inlet, beach, and lagoon state. With each time step, the net inflows or outflows to the system are estimated, along with the net sedimentation or erosion in the mouth. The flow terms vary depending on whether the mouth of the lagoon is open or closed. During closed conditions, inflows are based on watershed runoff and wave overwash into the lagoon, while outflows are based on beach berm seepage and evapotranspiration.

Boundary conditions used in the model include:

- Combined fluvial inflows from the Pajaro River (below the confluence with Corralitos Creek) and Watsonville Slough;
- Ocean tides;
- Nearshore wave conditions; and
- Evapotranspiration.

The Pajaro River and Watsonville Slough are treated as separate basins (i.e., interconnected water balances). For the purposes of this study, the "lagoon" is assumed to include both water bodies, since both experience tides during open-mouth lagoon conditions and water levels inundate both areas when the beach blocks the mouth.

Since water levels were only collected on Watsonville Slough, they are presumed to be representative of lagoon conditions for mid- to high tides in the lagoon and typical closed-lagoon water levels (when water ponds behind the beach and inundates both the slough and river), but do not show low water levels that may occur in the lagoon at low tide. This is because the bed of

Watsonville Slough is higher than the bed of the Pajaro River, and thus it truncates low tides during open-mouth lagoon conditions.

### 3.3.3.3 Impacts and Mitigation Measures

#### ***Modeled Changes in Harkins Slough, Watsonville Slough, Struve Slough, and Pajaro Lagoon Hydrology***

The Project would change the hydrology of Harkins and Struve Sloughs (the sloughs) and the Pajaro Lagoon. Using the modeling methodology discussed in Section 3.3.3.2, changes in surface water hydrology with the Project were modeled for water years 2003 to 2018 and compared with existing (baseline) operational conditions over the same period. Areas of focus of the modeling effort included:

- Changes in the seasonality and drawdown rate of water surface elevations in the sloughs; and
- Changes in the Pajaro Lagoon (e.g., effects on lagoon opening/closure).

This section summarizes the modeled results for the Project. Impact evaluations follow this general discussion, and rely on its contents, while in some cases providing more specific model output. Table 3.3-6 summarizes the characteristics of the modeled scenarios.

On average, the Projects would divert 2,070 acre-feet of water per year, combined, from the sloughs system.<sup>82</sup> During pump operations, Project rates of water surface elevation decline in the winter and spring would be lower than under baseline conditions on Harkins Slough and slightly higher than baseline on Struve Slough. These drawdowns would occur during winter and spring, when Harkins water surface elevation would generally be between 5-6 feet NAVD88, and Struve water surface elevation would generally be between 6-8 feet NAVD88.

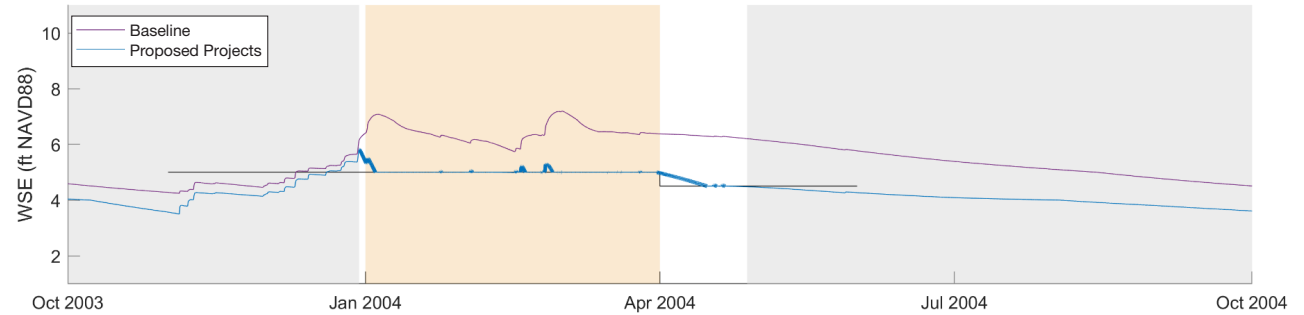
#### **Harkins Slough**

On average, 750 acre-feet of water per year would be diverted from Harkins Slough by the Projects, compared with 510 acre-feet of water per year under baseline (through WY 2018 conditions). As a result, water surface elevation in Harkins Slough during normal and wet years generally would be approximately 0.1 to 3.0 feet lower than under existing conditions throughout the year, as shown on **Figure 3.3-7**. Water levels during the period of red-legged frog breeding would be lower but less volatile than under baseline conditions because larger pumps would be better able to keep up with rising water levels during large inflows from the watershed, and diversions would not take place below 5 feet NAVD88 (diversion currently can take place down to around 3 feet NAVD88). During a dry year, with the Projects, Harkins Slough water surface elevations generally would vary but remain within the range of existing water surface elevations throughout the year. Due to proposed pumping, after April 1 the water surface elevation in Harkins Slough could be up to 1.0 feet higher than existing conditions until September during dry years.<sup>83</sup>

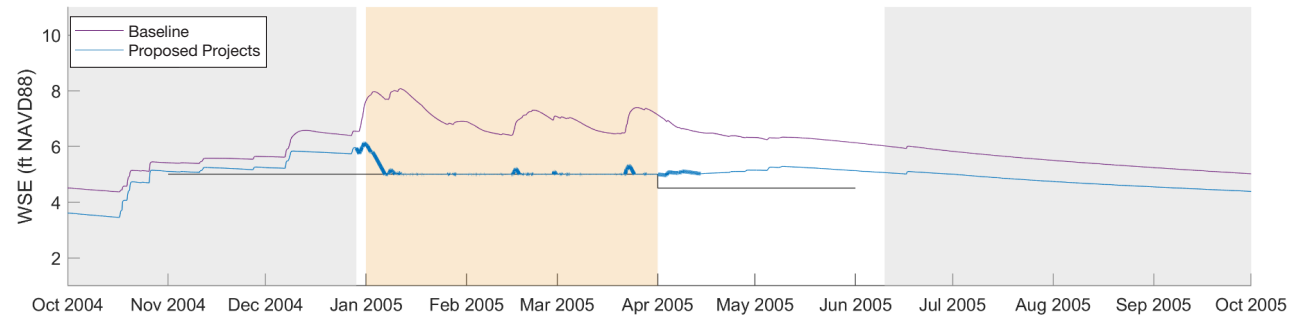
<sup>82</sup> Refer to Table 3 in ESA, *Harkins and Struve Sloughs Hydrologic Analysis of Diversion Alternatives*, July 2020.

<sup>83</sup> Water was pumped from Harkins Slough during water year 2007 (the baseline dry year), which affects the baseline water surface elevation shown on Figure 3.3-7. The existing pumping rate and limits on pumping in Harkins Slough differ from those proposed under the projects.

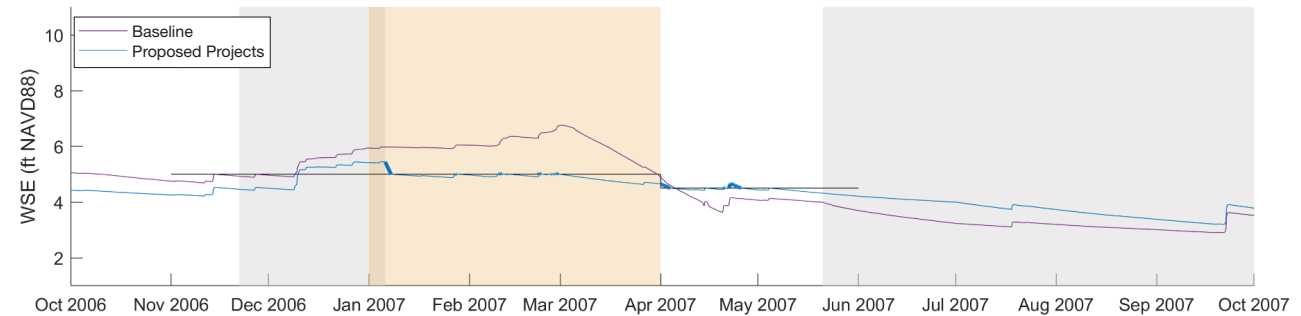
Harkins Slough Water Surface Elevation During Normal Year



Harkins Slough Water Surface Elevation During Wet Year



Harkins Slough Water Surface Elevation During Dry Year



Periods when diversions were or would be limited due to water quality (Water right requirements also limit diversions to between November 1 and May 31)

California Red Legged Frog Breeding Season

DT160822

SOURCE: ESA, 2020

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.3-7**  
Harkins Slough Water Surface Elevations:  
Baseline and Proposed Conditions

### Struve Slough

On average, the Projects would divert 1,320 acre-feet of water per year from Struve Slough, compared with no diversion under baseline conditions. As a result, water surface elevation in Struve Slough (upstream of barriers to flow) during normal and wet years generally would fluctuate within the range of existing water surface elevations between November and April, and then decline to levels approximately 0.5 to 2.0 feet lower than under existing conditions between May and October, as shown on **Figure 3.3-8**. During a dry year, Struve Slough water surface elevations generally would vary within the range of existing water surface elevations throughout the year. Due to proposed pumping after April 1, during a dry year the water surface elevation in Struve Slough would decline from up to approximately 1.5 feet higher than existing conditions in April to elevations near existing conditions in September.<sup>84</sup>

### Pajaro Lagoon

As shown on **Figure 3.3-9**, modeling indicates that the Projects would have a minimal effect on water levels in the lagoon and the timing and duration of seasonal mouth closure events. Modeled results indicate that there would be no delays in the seasonal breach events.

**Impact HYD-1: Project construction could violate water quality standards and/or waste discharge requirements, or otherwise substantially degrade surface or groundwater quality. (Less than Significant with Mitigation)**

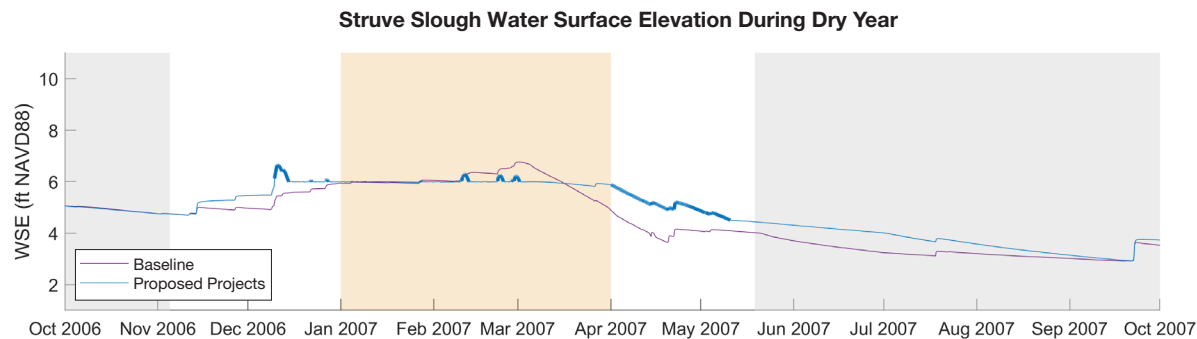
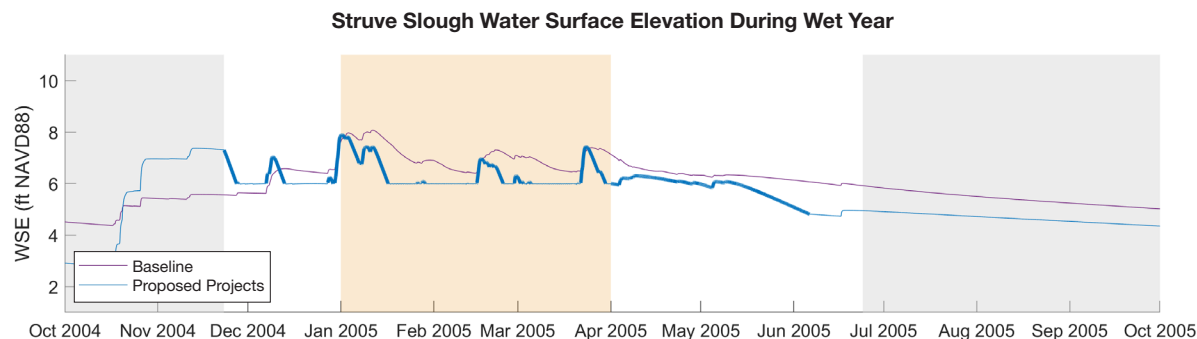
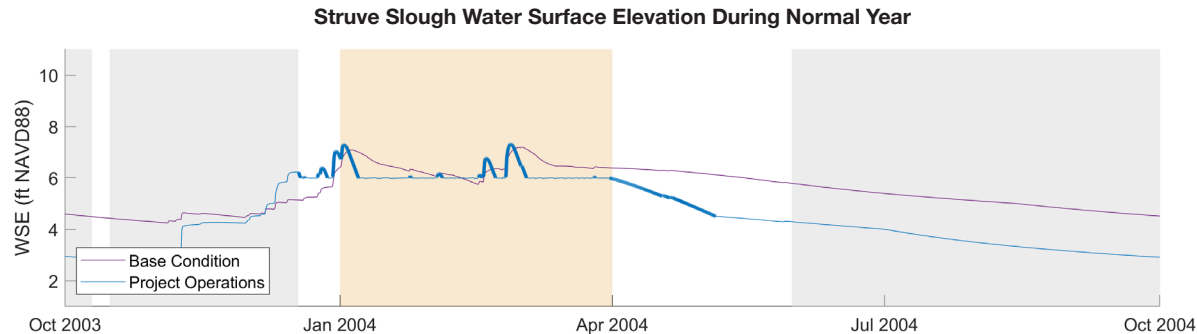
### Construction Site Stormwater Runoff

The Projects would modify existing facilities and construct new facilities within and adjacent to the sloughs, which drain to the Pajaro River and Pacific Ocean. Associated activities would include earthmoving such as excavation, grading, and soil stockpiling, which could result in soil erosion and subsequent discharge of sediment to nearby surface waters or drainages. Construction staging could also disturb soils in these areas. The intake in Struve Slough and pipeline connecting the intake to the new pump station would be constructed in inundated areas of the slough. Sections of the proposed Struve Slough to Filter Plant pipeline would cross Struve Slough once and Watsonville Slough twice: once where the Watsonville Slough channel parallels Struve Slough and again downstream near the filter plant. The pipeline would be installed via horizontal directional drilling beneath Struve Slough and Watsonville Slough (upstream crossing).

In the downstream location, near the filter plant, the pipeline would be installed by microtunneling (if conditions are wet and dewatering is not feasible) or by cutting a trench across Watsonville Slough (if conditions are dry or dewatering is feasible). Although not anticipated, there is potential for frac-outs to occur using horizontal directional drilling or microtunneling.<sup>85</sup>

<sup>84</sup> Water was pumped from Harkins Slough during water year 2007 (the baseline dry year), which affects the baseline water surface elevation shown on Figure 3.3-8. The existing pumping rate and limits on pumping in Harkins Slough differ from those proposed under the projects.

<sup>85</sup> A frac-out is the condition where drilling mud or fluid is inadvertently released through fractured bedrock into the surrounding substrate and travels toward the surface where it could impact sensitive aquatic habitat and degrade water quality (i.e., elevated turbidity, suspended sediment, and deposition of drilling material into the water body).



Periods when diversions would be limited due to water quality (Water right requirements also limit diversions to between November 1 and May 31)

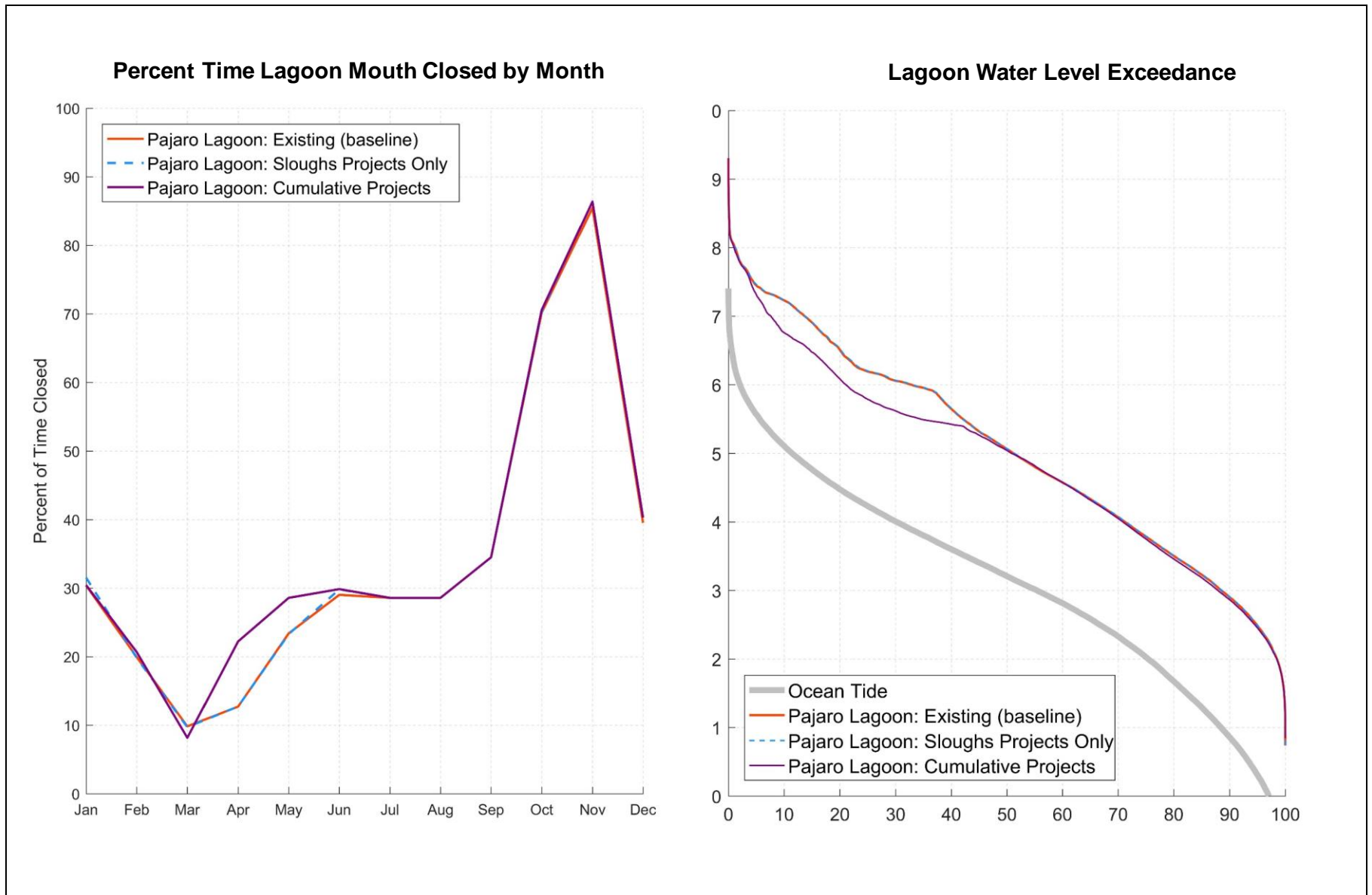
California Red Legged Frog Breeding Season

DT160822

SOURCE: ESA, 2020

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.3-8**  
Struve Slough Water Surface Elevations:  
Baseline and Proposed Conditions



SOURCE: ESA (2020)

NOTE:

- Artificial breaching was assumed whenever lagoon water levels reached 8 feet NAVD88.
- Cumulative Projects include the Sloughs projects along with the College Lake Integrated Resources Management Project and future improvements at Murphy Crossing

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.3-9**

Lagoon Characteristics: Baseline, Proposed Projects, and Cumulative Conditions

Discharge of sediment or turbid water during any of these construction activities could degrade water quality by increasing turbidity, affecting channel stability, and affecting aquatic and riparian habitats. Sediment also transports other pollutants such as nutrients, metals, and oils and greases. Hazardous materials associated with construction equipment and practices, such as fuels, oils, antifreeze, coolants, and other substances, could also adversely affect water quality if released to surface waters. The Pajaro River is listed on the 303(d) list for turbidity and sedimentation/siltation, and flows in the slough system generally have shown sensitivity to sedimentation. Because of the sensitivity of these water bodies and the proximity of construction to the sloughs, impacts related to degradation of water quality as a result of erosion and sedimentation or release of other water quality pollutants during construction would be potentially significant. If pipeline or intake construction work proceeds during periods when water is present in the sloughs, construction activities could adversely affect water quality by increasing turbidity and potentially releasing fuels and other chemicals associated with construction equipment, a potentially significant impact.

**Mitigation Measures HYD-1**, below, would address this impact. In addition, if a frac-out occurs, bentonite slurry could be released into the sloughs, which could degrade water quality, a significant impact. **Mitigation Measure BR-1a**, included in Section 3.4, Biological Resources, would reduce this impact to less than significant by requiring preparation of a Frac-out Contingency Plan and implementation of measures to contain and clean-up any frac-outs in waterways.

In areas where water is not present, this potential impact would be addressed by implementation of adopted Mitigation Measure HWQ-1 and requirements of the CGP. PV Water would require all contractors to apply for and obtain coverage under the CGP and comply with conditions of the permit(s) as required by the RWQCB, pursuant to adopted Mitigation Measure HWQ-1. Compliance with the CGP would mandate the development and implementation of a SWPPP, and would be required because the Project would disturb more than one acre of ground.

The CGP characterizes construction activities by the level of risk to water quality. This is determined using a combination of the sediment risk of the Project and the receiving water quality risk. Projects can be characterized as Risk Level 1, Risk Level 2, or Risk Level 3, with Risk Level 1 representing the lowest risk to receiving water quality. The minimum best management practices and monitoring that must be implemented during construction are based on the risk level. For Risk Level 1 sites, the CGP specifies minimum best management practices to be implemented that address good housekeeping practices (including those for managing hazardous materials used during construction); non-stormwater management, erosion, and sediment control; and run-on and runoff control. For construction activities characterized as higher risk levels, the minimum requirements identified for Risk Level 1 apply, as do other more stringent requirements. For example, a Rain Event Action Plan would be required for higher risk areas to ensure that active construction sites have adequate erosion and sediment controls in place prior to the onset of a storm event, even if construction is planned only during the dry season. The best management practices are designed to prevent pollutants from coming into contact with stormwater and to keep eroded and/or stormwater pollutants from moving off-site into receiving waters. Pursuant to the CGP, a SWPPP would be prepared for the Project. The SWPPP would be prepared by a Qualified SWPPP Developer and submitted to the RWQCB prior to Project implementation, and would specify established best management practices to be used to control



stormwater run-on/runoff and sediment (such as use of check dams and fiber rolls for reducing erosion on slopes and retaining sediment in stormwater) that would be implemented during construction. These best management practices would avoid or minimize stormwater and water quality effects caused by construction site runoff.

### **Construction Dewatering**

Construction dewatering at the Project sites would likely be required to create dry work areas for excavations (groundwater dewatering) and for work within the creek channel (areas separated from the surrounding creek by a cofferdam). Water from these areas would be discharged to agricultural lands, storm drains, or other waterways, in accordance with applicable regulatory requirements. The contractor would treat water from excavated areas as necessary prior to discharge. The treatment could include settling tanks or filter bags to allow sediment to settle out.

Sediment or other water pollutants originating from construction equipment, existing contaminated groundwater, or surrounding disturbed land could be released with discharges from dewatering, degrading surface water quality. The removed water could be contaminated with chemicals released from construction equipment, sediment from excavation, or, although unlikely (refer to Section 3.7, Hazards and Hazardous Materials), from contaminated groundwater from offsite sources. Waters isolated within cofferdam areas would likely contain high concentrations of sediment as a result of the amount of ground disturbance within the isolated work area. These discharges could violate water quality standards or substantially degrade water quality, resulting in a potentially significant water quality impact.

This impact would also be addressed by implementation of adopted Mitigation Measure HWQ-1. Under the Clean Water Act, Section 402, discharging pollutants to receiving waters of the United States is prohibited unless the discharge is in compliance with an NPDES permit. Thus, discharge of non-stormwater from a trench or excavation that contains sediment or other pollutants to sanitary sewer, storm drain systems, or receiving waters is prohibited without first securing appropriate NPDES permit authorization. The State Water Board recognizes within the CGP that certain non-stormwater discharges may be necessary for the completion of construction projects. Authorized non-stormwater discharges may include uncontaminated groundwater dewatering, and other discharges not subject to a separate general NPDES permit adopted by a RWQCB. The CGP authorizes such discharges provided they meet the following conditions:

- The discharge does not cause or contribute to a violation of any water quality standard;
- The discharge does not violate any other provision of the CGP;
- The discharge is not prohibited by the applicable Basin Plan;
- The discharger has included and implemented specific best management practices required by the CGP to prevent or reduce the contact of the non-stormwater discharge with construction materials or equipment;
- The discharge does not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants;
- The discharge is monitored and meets the applicable Numeric Action Limits; and

- The discharger reports the sampling information in the Annual Report.

If discharges from construction dewatering are found to be contaminated they would be collected, handled, and treated on-site and discharged in compliance with CGP requirements. California Water Code Section 13269 authorizes the RWQCB to waive Waste Discharge Requirements for specific discharges or specific types of discharges to land where such a waiver is consistent with any applicable state or regional water quality control plan. Therefore, disposal of dewatering discharge would be required to comply with State permit conditions, either an NPDES Permit or a waiver (exemption) from the RWQCB.

### **Pipelines and Pipeline Cleaning Discharges**

After pipeline installation, the construction contractor would clean the newly installed pipelines by removing materials and debris before bringing the pipe into service. The water at the outlet end of the pipeline would be discharged in accordance with applicable regulatory requirements.

Discharges of water from flushing the newly installed pipelines would be sent to the recharge basin or the sanitary sewer in accordance with applicable regulatory requirements. Pipeline cleaning discharges would therefore have a less-than-significant impact on water quality.

### **Impact Conclusion**

Compliance with the CGP in accordance with adopted Mitigation Measure HWQ-1, including preparation and implementation of the SWPPP and associated best management practices as well as inspection and reporting, and implementation of Mitigation Measures BR-1a and HYD-1, would effectively reduce degradation of surface water and groundwater quality to a less-than-significant level. Adherence to these requirements would also effectively reduce potential impacts associated with spills or leaks of hazardous materials and other releases to surface water during construction and thus impacts would be *less than significant with mitigation*.

**Mitigation Measure BR-1a: Frac-out Contingency Plan** (refer to Section 3.4, Biological Resources)

### **Mitigation Measure HYD-1: Implement Dewatering Best Management Practices for In-Water Construction**

For in-water construction during pipeline and screen/intake installation activities in the sloughs, PV Water shall require its contractor(s) to prepare a Dewatering Plan. The Dewatering Plan shall identify best management practices that ensure construction activities at Harkins, Watsonville, and Struve sloughs meet water quality objectives. This work shall be timed to take place only after any instream measures to reduce downstream turbidity are in place. In addition, PV Water shall require its contractors to implement the measures below, and water quality protection measures required by the RWQCB.

1. All dewatering and diversion methods shall be installed such that natural flow is maintained upstream and downstream of the Project area and that water released into the sloughs does not increase turbidity in the sloughs such that beneficial uses are adversely affected, as determined by conditions stipulated in permits issued by the RWQCB and CDFW.

2. Any temporary dams or diversion shall be installed such that the diversion does not cause sedimentation, siltation, or erosion upstream or downstream of the Project area.
3. Screened pumps shall be used in accordance with the California Department of Fish and Wildlife's fish screening criteria and in accordance with the NMFS Fish Screening Criteria for Anadromous Salmonids and the Addendum for Juvenile Fish Screen Criteria for Pump Intakes.
4. Cofferdams shall remain in place and functional throughout the in-slough construction.
5. Disturbance of protected riparian vegetation shall be limited or avoided entirely.

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**Impact HYD-2: Project operations could adversely affect surface water quality. (*Less than Significant*)**

The Projects would result in operational changes that could affect surface water quality in the Pajaro River watershed.

**Harkins and Struve Sloughs**

The Projects would not implement land use changes that could contribute to current water quality impairments present in Harkins or Struve Sloughs. As discussed in Section 3.7, Hazards and Hazardous Materials, additional coagulant used at the Harkins Slough filter plant would be stored in accordance with regulatory standards designed to avoid impacts to related surface water quality, fire hazards, and other hazards. Adherence to these standards would reduce the risk of pollutant release during flooding, resulting in less-than-significant impacts to water quality during Project operations.

The Projects would remove an average of 2,070 acre-feet per year of water from the slough system. The water would be drawn from two screened intakes at each of the two locations (Harkins and Struve Slough). As discussed in *Modeled Changes in Harkins Slough, Watsonville-Struve Slough, and Pajaro Lagoon Hydrology* (above) during pump operations, rates of drawdown in the winter and spring on Struve Slough during wet and normal years would increase compared to existing conditions. Rapid oscillations of water surface elevation over a substantially wider range of slough bank elevations compared to existing conditions could result in localized land slumping that could release additional sediment into the sloughs. While the rate of change of water surface elevation may increase with the project, the Struve Slough water surface elevation during wet and normal years would generally be between 5 to 8 feet NAVD88, similar to the range of water surface elevations during winter and spring under existing conditions. Harkins Slough water surface elevations are not expected to oscillate multiple times during the winter and spring, and changes would be within the range of existing changes in water surface elevations; therefore, the projects would not result in substantial changes to bank stability along Harkins Slough. Because the water surface in Struve Slough would not oscillate over a wider range of elevations than under existing conditions, pump operations would have a ***less than significant*** impact on sloughs water quality, and adopted Mitigation Measure HWQ-2 is no longer warranted.

### Recovered Water Use

PV Water does not have specific water quality targets for water recovered from the Harkins Slough recovery wells. However, PV Water does have targets for the blend of water delivered for irrigation through the Coastal Development System (CDS), shown in Table 3.3-2. The CDS water quality targets were developed by the Projects and Facility Operations Committee and later published as part of the SNMP, and are based on assimilative capacity for constituents of concern.<sup>86</sup> As discussed in Section 3.3.2.1, salt and nutrient assimilative capacity in the Pajaro Valley were based on the best estimate of existing conditions and regulatory standards. The blend of water recovered from the shallow groundwater by the Projects along with other water supplies used by the CDS would meet PV Water's objectives for irrigation through the CDS. Recovered water use would therefore comply with regulatory requirements, and would have *less-than-significant* impacts on surface or groundwater quality.

**Mitigation:** None required.

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**Impact HYD-3: The Projects could cause localized temporary or seasonal changes in shallow groundwater levels, but would not degrade groundwater quality or decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin. (*Less than Significant*)**

### Construction

As discussed in Impact HYD-1, dewatering may be necessary during construction that extends below shallow groundwater levels. The impact on groundwater during these excavation activities would be temporary and limited to the immediate vicinity of the excavation. The influence of pumping (i.e., cone of depression) would not extend far from the excavation, and the dewatering would be temporary. For these reasons, the impacts of pipeline installation with respect to depletion of groundwater supplies would be *less than significant*.

### Operations

#### Shallow Groundwater

As described in Section 3.3.1.4, shallow groundwater is present at the project sites, which are adjacent to the sloughs. Groundwater levels at the Project sites near Watsonville, Harkins, and Struve sloughs can be as high as the water level in the sloughs, which are approximately 3 to 10 feet below ground surface at the project sites during the wet season. The recharge basins would overlie an alluvial geologic unit with a confining layer present at about 75 to 100 feet below ground surface.<sup>87</sup>

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<sup>86</sup> For the purpose of the SNMP, assimilative capacity was defined as the amount of loading the groundwater basin can receive from salts and nutrients without resulting in damage to aquatic life or humans who utilize and consume the water.

<sup>87</sup> Hanson, R.T., Schmid, Wolfgang, Faunt, C.C., Lear, Jonathan, and Lockwood, Brian, 2014, Integrated hydrologic model of Pajaro Valley, Santa Cruz and Monterey Counties, California: U.S. Geological Survey Scientific Investigations Report 2014-5111, <http://dx.doi.org/10.3133/sir20145111>.

PV Water has water quality targets that govern both the diversion of Harkin Slough water as well as the operation of the filter plant under existing conditions. Under current conditions, PV Water diverts water from Harkins Slough when water quality meets the criteria listed in **Table 3.3-7**. The chloride and conductivity criteria were selected to be protective of shallow groundwater quality and to ensure that PV Water's delivered water quality objectives (refer to Table 3.3-2) are met. These criteria would be used to guide operations of the Struve Slough pump station once operational; therefore, the Projects would not adversely affect shallow groundwater quality.

**TABLE 3.3-7  
EXISTING PUMP STATION OPERATIONAL WATER QUALITY PARAMETERS**

Parameter	Units <sup>a</sup>	Value
Turbidity, when water is sent to filters	NTU	50 to 70
Turbidity, when rate water sent directly to recharge basin	NTU	< 50
Chlorides, maximum	mg/L	150
Conductivity, maximum	uS/cm	1,200
pH		6.5-8.5

NOTES:

<sup>a</sup> NTU - Nephelometric Turbidity unit, i.e. the unit used to measure the turbidity of a fluid or the presence of suspended particles in water. The higher the concentration of suspended solids in the water is, the higher the NTU. uS/cm - microsiemens/centimeter; mg/L - milligrams per liter.

SOURCE: Carollo Engineers, Harkins Slough Filter Plant Water Quality Study, August 2017.

The Projects would remove water from the Slough system and lower the water surface elevation of the sloughs up to 3 feet, which may affect shallow groundwater levels adjacent to the sloughs. The Projects would then recharge the shallow groundwater in the vicinity of the recharge basins with water diverted from the sloughs. If shallow groundwater in the vicinity of the sloughs is used for water supply by surrounding landowners, operation of the Projects may lower the shallow groundwater surface elevation in wells operated by surrounding landowners. PV Water would implement adopted Mitigation Measure HWQ-3 to address any seasonal reductions in groundwater levels from baseline elevations at locations adjacent to the sloughs. With implementation of adopted Mitigation Measure HWQ-3, the impact on groundwater levels would be *less than significant*.

#### Pajaro Valley Groundwater Basin

As discussed in Chapter 2, *Project Description*, the primary purposes of the Projects are to help balance the groundwater basin, prevent further seawater intrusion, and meet water supply needs in PV Water's service area by upgrading the existing Harkins Slough filter plant, developing Struve Slough as a new water supply source, and constructing new recharge basins and associated recovery wells and pipelines. PV Water is the exclusive local agency managing groundwater within its boundaries, and the Board of Directors voted to be the Groundwater Sustainability Agency under SGMA for the Pajaro Valley Groundwater Basin in August 2015. Implementation of the Projects would reduce overdraft conditions and seawater intrusion in the Pajaro Valley

Groundwater Basin. Impacts on sustainable groundwater management would therefore be beneficial, and no adverse effects would result.

**Mitigation:** None required.

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**Impact HYD-4: The Projects would alter drainage patterns and may change erosion and sedimentation patterns in the sloughs system. (*Less than Significant*)**

The Projects would not alter sediment delivery to the sloughs from upstream sources. The Projects would add a second diversion point to the sloughs system and alter seasonal water presence in the sloughs, which could alter patterns of sedimentation in these water bodies. Project impacts related to sedimentation and erosion during construction are discussed in Impact HYD-1.

The Projects would increase the rate of water drawdown in Struve Slough, generally when the water surface elevation is between 6 to 8 feet NAVD88 in Struve Slough. Rapid changes in water surface elevation in Struve Slough may increase slumping of banks along the slough, which could in turn affect hydrology in the slough system by decreasing the capacity of Struve Slough, similar to ongoing geomorphologic changes described in Section 3.3.1.2. However, the Projects would also remove water from the sloughs system, which may counteract hydrologic effects of increased sedimentation in Struve Slough. Implementation of adopted Mitigation Measure HWQ-2 would reduce this impact by developing criteria to minimize fluctuations and protecting banks from erosion due to rapid, imposed water-level fluctuations in Struve Slough. With implementation of adopted Mitigation Measure HWQ-2, this impact would be *less than significant*.

**Mitigation:** None required.

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**Impact HYD-5: The Projects would not impede or redirect flood flows such that new flooding would result. (*Less than Significant*)**

**Harkins and Struve Sloughs**

As discussed above in Section 3.3.1.4, flood hazards are present in the sloughs system. While the Projects would be constructed in areas mapped by FEMA as floodplain or floodway, none of the Projects facilities would impede or redirect flood flows in the mapped floodway. While segments of the backwash and raw water pipeline would be constructed in the one percent annual chance floodway, the pipeline would be entirely underground. The Struve Slough screened intake, and potentially the associated pump station, would be within the one percent annual chance floodplain. Improvements at the Harkins Slough filter plant would also be within the one percent annual chance floodplain.

While these new facilities could incrementally impede flood flows, the Projects would reduce the volume of water in the sloughs system before and after flood events and counteract any displacement of slough capacity caused by the Struve Slough screened intake, pump station, and improvements at the Harkins Slough filter plant. As shown on Figures 3.3-6 and 3.3-7, the

Projects would reduce water surface elevations in the sloughs during much of the wet season (between October and April) due to diversion of water from the system. Implementation of adopted Mitigation Measure HWQ-4 would further reduce impacts by requiring facilities to be designed to avoid exacerbating upstream and downstream flood hazards on other properties. Overall removal of water from the sloughs system due to the Projects would limit the potential for the Projects to impede or redirect flood flows to *less than significant* levels.

#### **Pajaro Lagoon and Pajaro Dunes**

As shown on Figure 3.3-9, the Projects would not affect water levels in Pajaro Lagoon and would not alter the timing or duration of seasonal mouth closure events (which influence the extent of flooding in the lower Pajaro River and Pajaro Dunes). The Projects therefore would not affect flooding at the Pajaro River mouth and Pajaro Dunes.

Implementation of the Projects is not expected to substantially increase the rate or amount of, or adversely alter, flood flows; therefore, impacts of the Projects would be *less than significant*.

**Mitigation:** None required.

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#### **Impact HYD-6: The Projects could conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. (*Less than Significant with Mitigation*)**

Section 3.3.2.1 describes the 2019 Basin Plan. As discussed in Impact HYD-1, PV Water would require all contractors to apply for and obtain all NPDES permits and comply with conditions of the permit(s) as required by the RWQCB, pursuant to adopted Mitigation Measure HWQ-1, including the Construction General Permit. Implementation of Mitigation Measure BR-1a would reduce the water quality impacts of inadvertent frac-out during construction of the Struve Slough to filter plant pipeline at Watsonville Slough, and implementation of Mitigation Measure HYD-1 would reduce water quality impacts associated with construction in Harkins and Struve Sloughs associated with the screened intake facilities and trenched pipelines. Operation of the Projects would be required to comply with applicable federal and state water quality regulations, such as the federal Clean Water Act and the state Porter-Cologne Water Quality Control Act, which establish beneficial uses of surface and ground waters. The Projects therefore would not conflict with or obstruct implementation of the water quality control plan.

PV Water elected to become the exclusive groundwater sustainability agency for the Pajaro Valley Groundwater Basin under the SGMA in 2015. With adoption of its first Basin Management Plan in 1994, PV Water has been implementing projects and programs designed to reduce overdraft, halt seawater intrusion, and improve and protect water quality within the Pajaro Valley Groundwater Basin for over 20 years. The Projects are two of the potential projects included in the most recent, updated Basin Management Plan (discussed in greater detail in Section 2.1.2.2) which would help meet the goals of stopping seawater intrusion and basin overdraft. Implementation of the Projects would reduce overdraft conditions and seawater intrusion in the Pajaro Valley Groundwater

Basin. Impacts on sustainable groundwater management would be beneficial, and the Projects would not conflict with implementation of a sustainable groundwater management plan.

**Mitigation Measure BR-1a: Frac-out Contingency Plan** (refer to Section 3.4, Biological Resources)

**Mitigation Measure HYD-1: Implement Dewatering Best Management Practices for In-Water Construction** (refer to Impact HYD-1)

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### ***Cumulative Impacts***

**Impact C-HYD-1: The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative hydrology impacts. (*Less than Significant*)**

Hydrology impacts of the Projects are related to shallow groundwater levels, sedimentation and erosion and flooding patterns in the sloughs. The geographic scope of cumulative impacts on shallow groundwater includes projects in the vicinity of the sloughs. The geographic scope of cumulative impacts related to erosion and flooding includes projects in or affecting discharge to the sloughs or the Pajaro Lagoon.

Cumulative projects considered in as part of the cumulative scenario for this analysis include those listed in Table 3.1-1 (in Section 3.1, Overview) that could alter hydrology, including other Basin Management Plan projects proposed by PV Water and the USACE project. Other BMP projects include the College Lake Integrated Resources Management Project and Murphy Crossing with Recharge Basins Project.<sup>88</sup>

### **Groundwater**

No other projects in the cumulative scenario would affect shallow groundwater in the sloughs system, nor would any projects in the cumulative scenario reduce discharge to the sloughs. There would be ***no adverse significant cumulative impact*** on groundwater as a result of the Projects and other projects in the cumulative scenario. Overall, the cumulative projects would benefit the long-term sustainability of the groundwater basin.

### **Sedimentation and Erosion**

The Upper Struve Slough Watershed Enhancement and Public Access Project would slow drainage to the sloughs system from urban areas of Watsonville by capturing runoff from two culverts about 2 miles upstream of the nearest Project component and redirecting the runoff to retention ponds or bioswales. The Coastal Ecosystem Resiliency Project for the Lower Watsonville Slough would improve culverts beneath slough overcrossings, improve agricultural drainage ditches, and improve the Shell Road pump station, among other activities, in Watsonville Slough downstream of Shell Road and the Harkins Slough filter plant. These projects would reduce the areal expanse of flooding in the sloughs area, and may alter patterns of sedimentation and

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<sup>88</sup> The Murphy Crossing with Recharge Basins Project is not a Basin Management Plan Phase 1 project.



erosion in the vicinity of the improvements. However, neither cumulative project would combine with the Projects to further increase the rate of drawdown in the sloughs such that bank slumping would occur more frequently. Further, the overall lowering of the sloughs water surface elevation during most of the year, which would result in the cumulative scenario, would decrease the linear feet of slough banks exposed to erosion. There would be ***no adverse significant cumulative impacts*** related to sedimentation or erosion to which the Projects would contribute.

### Discharge and Flooding

The actions of the Upper Struve Slough Watershed Enhancement and Public Access Project and Coastal Ecosystem Resiliency Project for the Lower Watsonville Slough are described above. In combination with the Projects, which would remove water from the sloughs system during the wet season, the aforementioned cumulative projects would reduce the volume of water in the sloughs system during flood events, reducing adverse flood impacts. In addition, as described under Impact HYD-5, the Projects would have no impact related to water levels in Pajaro Lagoon and would not alter the timing or duration of seasonal mouth closure events. There would be ***no adverse significant cumulative impacts*** related to flooding to which the Projects would contribute.

### Climate Change

In 2018, the State of California published the Fourth Climate Change Assessment, which includes of a wide-ranging body of technical reports, including rigorous, comprehensive climate change scenarios at a scale suitable for illuminating regional vulnerabilities and localized adaptation strategies in California.<sup>89</sup> The Fourth Climate Change Assessment also includes recommendations and information to directly inform vulnerability assessments and adaptation strategies for, among others, water resources management. As discussed in the technical report for the Central Coast, climate changes that will affect the Central Coast include:

- Maximum and minimum temperatures will increase through the next century.
- Average precipitation is expected to increase slightly, but annual precipitation variability will increase substantially.
- Atmospheric rivers, which are the dominant drivers of extreme rainfall events locally, are expected to increase.
- The wettest day of the year will become wetter relative to historical conditions.
- Water shortages during droughts may be exacerbated.

Modeling conducted for the Projects incorporated a range of previous water year types to assess potential impacts over a range of hydrologic conditions; however, current 10- and 100-year design storms may not remain applicable over decadal or longer timescales.

At Pajaro Lagoon, inland migration of the beach in response to sea level rise would result in an increase in overall volume of the lagoon at times. The amount of increase in water storage in the lagoon will depend on several factors, including (1) the likelihood that agriculture fields would

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<sup>89</sup> Langridge, Ruth. (University of California, Santa Cruz). Central Coast Summary Report. California's Fourth Climate Change Assessment. Publication number: SUM-CCCA4-2018-006, 2018.

raise existing levees to continue to contain floodwaters in the lagoon, (2) the ability of sedimentation to partially offset some of the expected sea-level rise, and (3) the need to continue to breach the lagoon mouth at certain elevations to prevent flooding of existing properties. If, despite these factors, the volume of water stored in the lagoon increases, the net impact of the projects in the cumulative scenario could potentially decrease, since the alterations to inflows would represent a smaller fraction of the total lagoon volume.<sup>90</sup>

In summary, with climate change, the Projects would not result in additional or more severe significant adverse hydrology impacts beyond those identified in this section. The Projects' contributions to factors causing climate change are evaluated in Section 3.5, Air Quality and Greenhouse Gas Emissions.

**Mitigation:** None required.

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**Impact C-HYD-2: The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative water quality impacts. (*Less than Significant*)**

Water quality impacts of the Projects are related to the release of pollutants into stormwater during construction and changes in the rate of drawdown in the sloughs system. The geographic scope for cumulative water quality impacts on the sloughs includes projects within the Watsonville Slough watershed.

As discussed in Impact HYD-1, compliance with applicable regulatory requirements designed to reduce the cumulative effects of development on water quality (such as the State Water Board Construction General Permit) would ensure that the Projects would not result in any significant water quality impacts as a result of construction-related discharges and operational stormwater and treated water discharges.

As discussed in Impact C-HYD-1 above, the cumulative projects would reduce the areal expanse of flooding in the sloughs area. However, neither cumulative project would combine with the Projects to further increase the rate of drawdown in the sloughs such that bank slumping would be occur more frequently. Further, the overall lowering of the sloughs water surface elevation during most of the year, which would result in the cumulative scenario, would decrease the linear feet of slough banks exposed to erosion and thus decrease the potential release of sediment into the sloughs. There would be *no adverse significant cumulative impacts* related to water quality to which the Projects would contribute.

**Mitigation:** None required.

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<sup>90</sup> Further modeling would be required to understand the likelihood of this outcome, especially since future precipitation and runoff conditions could also change, which would also impact the amount of water delivered to the lagoon, with or without the Project.

## 3.4 Biological Resources

This section presents an analysis of potential impacts related to biological resources that would result from implementation of the proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects). Information from the 2014 Basin Management Plan Update Program Environmental Impact Report (2014 BMP Update PEIR) that remains relevant and accurate for the purposes of describing the physical or regulatory setting of biological resources has been incorporated as appropriate. The Projects includes mitigation measures adopted by the Board of Directors and several additional measures to reduce the severity and magnitude of potential environmental effects.

### 3.4.1 Setting

The 2014 BMP Update PEIR Section 3.4.1 describes existing biological resources in the Project region. Regional environmental setting information from the 2014 BMP Update PEIR is included below when relevant. Additional setting information based on database searches and surveys is provided below.

#### 3.4.1.1 Definitions and Literature Review

The following terms are used throughout this section:

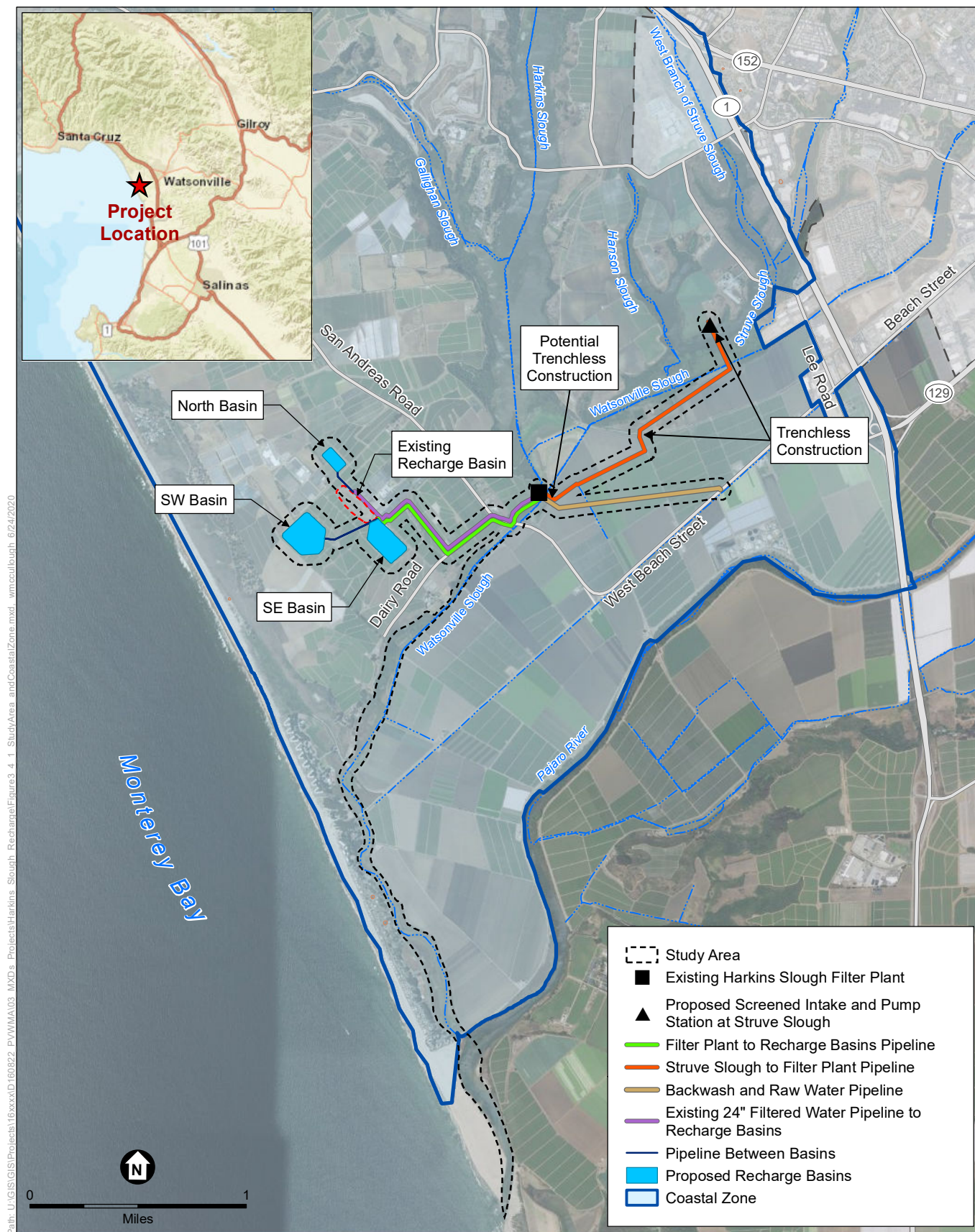
For the assessment of biological resources, the “Project area” is defined as the area supporting any Project component (see Chapter 2, *Project Description*), including some areas assumed to be affected by construction or operations. The Project area includes the existing Harkins Slough filter plant and pump station, the proposed screened intake and pump station at Struve Slough, the proposed recharge basins, new recovery wells, and all associated pipelines (i.e., filter plant to recharge basins pipeline, Struve Slough to filter plant pipeline, backwash and raw water pipeline, pipelines between recharge basins).

The “biological resources study area” or “study area” includes a larger area within which potential effects on biological resources were studied for this evaluation. The study area includes the Project area, plus a 250-foot buffer, as well as Watsonville Slough downstream of the Project area and Pajaro Lagoon (refer to **Figure 3.4-1**).

The following resources were used in the analysis of the Project:

- California Department of Fish and Wildlife’s (CDFW) California Natural Diversity Database (CNDDDB). CNDDDB reports occurrences of special-status species using United States Geological Survey (USGS) 7.5-minute topographic quadrangles. The study area is located within the Watsonville West USGS 7.5-minute quadrangle and is surrounded by the following quadrangles: Watsonville East, Laurel, Loma Prieta, Mount Madonna, Soquel, Moss Landing, and Prunedale.
- California Native Plant Society (CNPS), Rare Plant Program Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.45). The database search included the USGS 7.5-minute quadrangles identified above.<sup>1</sup>

<sup>1</sup> California Native Plant Society (CNPS), Rare Plant Program, 2020. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.45). Available online at [www.rareplants.cnps.org](http://www.rareplants.cnps.org). Accessed on January 23, 2020.



SOURCE: Carollo Engineers, 2019;  
ESRI World Imagery, 7/23/2016; ESA

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.4-1**  
Project Study Area and Coastal Zone

- United States Fish and Wildlife Service (USFWS) *Official List of Federal Endangered and Threatened Species that Occur in or may be Affected by the Projects*<sup>2</sup>
- Information documented in prior environmental impact reports (EIRs) prepared by Pajaro Valley Water Management Agency (PV Water), including the 2014 BMP Update PEIR.
- USFWS National Wetlands Inventory maps were reviewed for mapped wetland features in or near the Project area.<sup>3</sup>

### 3.4.1.2 Surveys

Results from the following surveys and assessments were used in the analysis of the Project:

- On January 23, 2020, biologists from Environmental Science Associates (ESA) and Kittleson Environmental Consulting (KEC) conducted a reconnaissance survey of the Project area to document site conditions and assess the potential for special-status biological resources to occur in and around the Project area.
- Aerial photographs and assessments from the 2014 BMP Update PEIR were used for descriptions of aquatic habitat within the study area
- An aquatic resources delineation was conducted within the Project area by ESA biologists on July 11, 2019.<sup>4</sup>
- Since 2001, KEC and collaborators have conducted numerous wildlife field studies in the Lower Pajaro River watershed and the Watsonville Slough system. Focused wildlife surveys have been conducted for the Watsonville Sloughs Watershed Conservation & Enhancement Plan (2003), the three Harkins Slough Road Bridge construction and mitigation projects (2004 to 2008), the Land Trust of Santa Cruz County-Watsonville Slough Farm Master Plan (2009 to 2016), the Manabe-Ow Wetland Restoration Project (2006 to 2008), the Pajaro River Flood Control Bench Excavation Project (2006 to 2016), and the Pajaro Storm Drain Maintenance District/Santa Cruz County Zone 7 Flood Control District (Zone 7; 2001 to 2020). Field surveys for these resource management efforts have resulted in increased understanding of California red-legged frog (*Rana draytonii*; CRF) and western pond turtle (*Actinemys marmorata*; WPT) populations and distribution in the lower Pajaro Valley.
- During summer and fall 2018, KEC conducted focused wildlife surveys on Salsipuedes Creek and the Pajaro River for USACE storm damage repairs and Zone 7 flood control clearing from Murphy Road Crossing to the State Route (SR) 1 bridge. Surveys considered the potential presence of CRF, WPT, and San Francisco dusky-footed woodrat in the Salsipuedes Creek corridor and in mainstem Pajaro River, within the levees, and areas upstream (east) of SR 1.
- Since 2010, the Watsonville Wetlands Watch (WWW) has organized regular, three-times a year bird surveys throughout the sloughs, focusing on winter waterfowl (February), spring breeding season (May), and fall migration (September). Since 2010, the WWW bird survey

<sup>2</sup> U.S. Fish and Wildlife Service (USFWS), 2020. *List of Threatened and Endangered Species that May Occur in Your Proposed Project Location, and/or May be Affected by Your Proposed Project*. Accessed January 23, 2020.

<sup>3</sup> U.S. Department of the Interior, 2019. *Fish and Wildlife Service, National Wetlands Inventory*. Available: [www.wetlands.fws.gov](http://www.wetlands.fws.gov). Accessed on November 15, 2019

<sup>4</sup> Environmental Science Associates (ESA), *Draft Watsonville Slough System Managed Aquifer Recharge and Recovery Project Aquatic Resources Delineation Report*. Prepared for Pajaro Valley Water Management Agency, February 2020.

coverage has expanded from 10 to 22 individual survey routes. All WWT survey results are compiled in Ebird.

- Since 2012, D. W. Alley & Associates have conducted annual fish sampling in the Pajaro Lagoon as a permit condition for periodic lagoon breaching activities by Zone 7. The ongoing fish sampling effort documents the presence/absence, distribution and abundance of steelhead (*Oncorhynchus mykiss*), tidewater goby (*Eucyclogobius newberryi*), and other fish and wildlife species in the Pajaro River Lagoon and lower Watsonville Slough.

### 3.4.1.3 Regional Setting<sup>5</sup>

#### **Pajaro Valley**

Historically, the Pajaro Valley supported a variety of vegetation communities, including extensive riparian forests along waterways, oak savanna intermixed with grasslands in the lowland areas, mixed hardwood forests on hillsides, coastal dunes near the ocean, and coastal scrub on rocky sites. Although remnants of these habitats can be seen in isolated patches, much of the Pajaro Valley is now in agriculture. The Pajaro Valley is an agricultural area drained by the Pajaro River and two of its major tributaries, Salsipuedes Creek and Corralitos Creek, as well as by Watsonville Slough and Harkins Slough. Portions of these watercourses are bounded by levees to control periodic winter flooding. Smaller drainages also are found in the immediate vicinity of the Pacific Ocean.

For a general description of the Pajaro River watershed and regional hydrology as well as general climate characteristics, please refer to Section 3.3.1.1 in Section 3.3, Surface Water, Groundwater, and Water Quality.

#### **Rivers and Creeks**

The watershed containing Watsonville Slough and Harkins Slough is mostly west of the City of Watsonville and State Route (SR) 1. The confluence of Harkins Slough and Watsonville Slough is near San Andreas Road where these two drainages support freshwater marsh and riparian vegetation. From this point, Watsonville Slough flows west in a narrow ditch for about 1.5 miles, and then turns south for about 1.2 miles, where it empties into the Pajaro River Lagoon. The County of Santa Cruz operates a tidal dam/pump structure on Watsonville Slough at Shell Road. The structure was constructed in the 1940's to block saltwater and tidal flows from flowing upstream and form a hydrologic boundary between higher and lower salinity water, except during backflow conditions.

### 3.4.1.4 Vegetation Communities and Associated Wildlife Habitat in the Study Area

The study area supports three upland vegetation communities and four wetland communities, and associated wildlife habitats: ruderal, cropland/agricultural uplands, and urban/developed, Central Coast arroyo willow riparian forest, Coastal freshwater marsh, and cropland/agricultural wetlands.

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<sup>5</sup> Information in this section is derived from Duffy & Associates, Inc., *Draft Environmental Impact Report for the Basin Management Plan Update*, prepared for Pajaro Valley Water Management Agency, October 2013.



Vegetation types are on the *Preliminary Descriptions of the Terrestrial Natural Communities of California*<sup>6</sup> and *A Manual of California Vegetation, Second Edition*.<sup>7</sup>

## Upland Vegetation Communities

### Ruderal

Ruderal habitat, defined as areas where natural vegetation cover has been removed or disturbed by humans, occurs throughout the study area, including at the proposed location for the Struve Slough pump station, the existing Harkins Slough filter plant, and within assessor parcel number (APN) 052-221-25 north of the railroad tracks. Ruderal habitat is also present on the margins of agricultural ditches, cropland areas, and associated dirt roads; however, none was observed adjacent to the croplands in the proposed locations for the new recharge basins. Common plant species observed in ruderal habitat include the following non-native grasses and forbs: English plantain (*Plantago lanceolata*), soft brome (*Bromus hordeaceus*), Harding grass (*Phalaris aquatica*), wild radish (*Raphanus sativus*), wild mustard (*Hirschfeldia incana*), Italian thistle (*Carduus pycnocephalus*), bristly ox-tongue (*Helminthotheca echioides*), annual yellow sweetclover (*Melilotus indicus*), and white sweetclover (*Melilotus albus*). Ruderal vegetation does not conform to any recognized natural vegetation classification system, but some observed areas contain elements of non-native grassland and the wild oats grasslands/upland mustard vegetation types.

Numerous species disperse, forage, or take cover, and several species breed, in this community. Small mammals such as deer mice (*Peromyscus maniculatus*), California vole (*Microtus californicus*), brush rabbit (*Sylvilagus bachmani*), and Botta's pocket gopher (*Thomomys bottae*) are common residents in annual grasslands. Western fence lizards (*Sceloporus occidentalis*), gopher snakes (*Pituophis catenifer catenifer*), and other snakes are also likely to occur in this community.

A variety of birds use ruderal vegetation as nesting and foraging habitat, including red-winged blackbirds (*Agelaius phoeniceus*) and mourning doves (*Zenaida macroura*). Raptors, such as red-tailed hawks (*Buteo jamaicensis*), and northern harriers (*Circus cyaneus*), may forage over ruderal habitat as well. Some species of raptors, such as red-tailed hawks and white-tailed kites, may occasionally nest in trees within ruderal habitats. Western burrowing owl (*Athene cunicularia hypugaea*), a California species of special concern, can occupy ruderal habitat, or its margins, where California ground squirrel (*Otospermophilus beecheyi*) burrows are present and vegetation is non-existent or lower than about 6 inches.

Santa Cruz tarplant (*Holocarpha macradenia*) and Congdon's tarplant (*Centromadia parryi* var. *congdonii*), which are both special-status species, can grow in previously disturbed areas and could therefore be present in ruderal vegetation communities.

<sup>6</sup> Holland, R. F., 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. California Department of Fish and Game, Sacramento, CA. 1986.

<sup>7</sup> Sawyer, J.O., T. Keeler-Wolf, and J.M. Evans, 2009. *A Manual of California Vegetation, Second Edition*. California Native Plant Society. 2009.

### **Cropland/Agriculture**

The deep alluvial soils along the floodplain of the Pajaro River and tributaries, as well as the mild climate, support a variety of row crops such as strawberries, bush berries, caneberries, lettuce, broccoli, cauliflower, and cut flowers. Agricultural habitats are subject to periodic discing, planting, harvesting, and the application of pesticides, herbicides, fungicides and fertilizers, which prevent the establishment of native plant species and communities. No special-status plant species would be expected in the active cropland agricultural areas. Agricultural areas can support wildlife species that have adapted to disturbances, but generally support few wildlife species because of their lack of diversity in vegetation and foraging opportunities. California ground squirrels and Botta's pocket gopher often occur along the margins of cropland. Raptors such as red-tailed hawk, American kestrel (*Falco sparverius*), white-tailed kite (*Elanus leucurus*), and northern harrier often forage for these and other small rodents over agricultural lands. Fallow fields can attract other foraging birds, including Brewer's blackbird (*Euphagus cyanocephalus*), American pipit (*Anthus rubescens*) and killdeer (*Charadrius vociferus*). California horned larks (*Eremophila alpestris actia*) were observed foraging in strawberry fields in the study area during ESA's reconnaissance survey.<sup>8</sup>

### **Urban/Developed**

Urban/developed areas in the study area include housing, buildings and storage yards associated with farming, and roadways. Developed areas tend to be landscaped with non-native ornamental plant species. Stands of upland landscape trees, including eucalyptus (*Eucalyptus* spp.), occur within the study area, such as along the access road to the Harkins Slough filter plant. No special-status plant species occur in these areas. Common wildlife species may use landscaped areas for dispersal, cover, or foraging, and nesting birds tolerant of human activity, such as house finch (*Haemorhous mexicanus*), mourning dove (*Zenaida macroura*), Anna's hummingbird (*Calypte anna*), California scrub jay (*Aphelocoma californica*), and American crow (*Corvus brachyrhynchos*) may nest in landscaped areas; raptors like red-tailed hawk, red-shouldered hawk (*Buteo lineatus*), great horned owl (*Bubo virginianus*), and bald eagle (*Haliaeetus leucocephalus*) may nest in small developed areas with large trees near open water, such as the eucalyptus near the Harkins Slough filter plant.

### **Aquatic Resources/Wetland Communities**

#### **Central Coast Arroyo Willow Riparian Forest**

Central Coast Arroyo Willow Riparian Forest is found along a portion of the Watsonville Sloughs System. This broadleaf deciduous forest is dominated by a dense native riparian species canopy consisting of arroyo willow (*Salix lasiolepis*) and red willow (*Salix laevigata*). The understory is much less dense due to light restrictions from the intercepting canopy, and common herb species observed include the perennial western goldenrod (*Euthamia occidentalis*), pennyroyal (*Mentha pulegium*), poison hemlock (*Conium maculatum*), and the annual yellow sweetclover (*Melilotus indicus*).

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<sup>8</sup> Environmental Science Associates reconnaissance survey, January 27, 2020.



Central Coast Arroyo Willow Riparian Forest provides cover and resources for a variety of wintering and breeding birds, such as yellow warbler (*Setophaga petechia*), yellow-rumped warbler (*Dendroica coronata*), warbling vireo (*Vireo gilvus*), orange-crowned warbler (*Oreothlypis celata*), and Wilson's warbler (*Cardellina pusilla*). The mixed understory in this community also supports a variety of small mammals and reptiles, including raccoon (*Procyon lotor*), deer mice (*Peromyscus maniculatus*), and coast garter snake (*Thamnophis elegans terrestris*).

### Coastal Freshwater Marsh

Coastal Freshwater Marsh occur where Harkins Slough and Watsonville Slough meet, as well as one nearby seep. Marsh pennywort (*Hydrocotyle ranunculoides*), an emergent aquatic plant, forms a dense mat across the Harkins Slough channel, with bur-reed (*Sparganium eurycarpum*), broadleaf cattail (*Typha latifolia*), Italian rye grass (*Festuca perennis*), and bristly ox-tongue occupying some of the margins. The seep is adjacent to the Harkins Slough Facility, and is dominated by broadleaf cattail. American coots (*Fulica americana*), mallard (*Anas platyrhynchos*), northern shoveler (*Anas chlypeata*), gadwall (*Mareca strepera*), and bufflehead (*Bucephala albeola*) were observed foraging in this area during the reconnaissance survey,<sup>9</sup> and WPT could potentially use this habitat for foraging and dispersal.

### Cropland/Agricultural Wetland

Cropland/Agriculture Wetland occurs within the study area on a wetland that was farmed within the past five years. The historic land use and its associated boundary were determined by reviewing historical imagery. In contrast with many farmed wetlands in the surrounding area that are farmed every year once water has been pumped out (such as those at College Lake), the mapped areas appear to be regularly excluded from agriculture in wet years, and also appear to be expanding in size, over the past several years. This retreat of agricultural lands results in an ongoing transition along the slough perimeter from farmland to a mix of plant species often associated with seasonal wetland and ruderal habitat. This habitat would primarily provide wildlife movement for a range of species, such as Columbian black-tailed deer (*Odocoileus hemionus columbianus*), raccoon (*Procyon lotor*), deer mouse (*Peromyscus* sp.), WPT, and Sierran tree frog.

### Ditch

These manmade features, which are dug in uplands, convey historic drainage into Watsonville Slough and carry a relatively permanent flow of water. Such features are mostly unvegetated with the exception of Ditch D6 shown on **Figure BIO-1f** in **Appendix BIO**, which is vegetated with bristly ox-tongue, rabbitsfoot grass (*Polypogon monspeliensis*), fat hen (*Atriplex prostrata*), and Italian rye grass. In addition, Ditch D1 south of San Andreas Road (refer to Figure BIO-1a in Appendix BIO), has a dense riparian canopy at its eastern extent, with mature riparian trees rooted along the channel banks both above and below the Ordinary High Water Mark (OHWM). Agricultural ditches provide somewhat marginal habitat for wildlife due to agriculture run-off and seasonal maintenance activities such as weed wacking; however, can provide habitat for CRF and WPT.

<sup>9</sup> Environmental Science Associates reconnaissance survey, January 27, 2020.

## Open Water

Struve Slough and Harkins Slough are perennial aquatic features, also referred to as open water. Open water is characterized by a lack of emergent vegetation and continuous inundation throughout the year. In Struve Slough, water levels fluctuate according to climate, precipitation, and run-off from adjacent fields.<sup>10</sup> Open water habitats support a range of fish species including native Sacramento blackfish (*Orthodon microlepidotus*) and non-native bluegill (*Lepomis macrochirus*). Fish-eating birds such as osprey (*Pandion haliaetus*) and bald eagle forage over open water, as do aerial insectivores such as black phoebe (*Sayornis nigricans*) and cliff swallow (*Petrochelidon pyrrhonota*). A range of migratory, resident and overwintering waterfowl are known to use Struve Slough and Harkins Slough for resting and foraging. On the day of the reconnaissance survey, the following species were observed on Struve Slough: northern shoveler, mallard, American coot, bufflehead, ruddy duck (*Oxyura jamaicensis*), double-crested cormorant (*Phalacrocorax auritus*), and American white pelican (*Pelecanus erythrorhynchos*).<sup>11</sup> In addition, CRF and Sierran treefrog (*Pseudacris sierra*) use open water habitat with emergent vegetation for egg-laying, followed by juvenile growth and dispersal into open water. Open water also provides foraging, hibernation and dispersal habitat for WPT.

## Seasonal Pond

A restoration pond, Bryant Haber Pond, is present within the otherwise ruderal habitat in APN 052-221-25, north of the willow riparian forest mapped on Figures BIO-1e and BIO-1f in Appendix BIO. Currently this pond is too shallow and dries up too quickly to support breeding CRF, but it may provide non-breeding habitat to this species, as well as other amphibians such as Sierran treefrog.

### 3.4.1.5 Sensitive Natural Communities

Sensitive natural communities are those identified by CDFW as terrestrial natural communities native to California, listed in the *California Sensitive Natural Communities list*.<sup>12</sup> Natural communities with State ranks of S1 – critically imperiled, S2 – imperiled, and S3 – vulnerable, are considered sensitive. The following sensitive natural communities occur in the Project area:

- *Salix laevigata*/*Salix lasiolepis* (Godding’s willow-red willow riparian woodlands) – rarity rank S3, Alliance: yes
- *Hydrocotyle ranunculoides* (Mats of floating pennywort) – rarity rank S3?,<sup>13</sup> Alliance: yes

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<sup>10</sup> One 6.55-acre recharge basin and two drainage basins encompassing 0.24 acres are present in the study area. All features are artificial and were built in upland habitat. The surface water is not considered “relatively permanent” since it infiltrates quickly upon application in the recharge basin, and is highly seasonal in the drainage basins. Further, the drainage basins are isolated from watershed tributaries and traditional navigable waters. Therefore, none of these features is considered “open water”.

<sup>11</sup> Environmental Science Associates reconnaissance survey, January 27, 2020.

<sup>12</sup> CDFW, California Sensitive Natural Communities List, 2018. Accessed on October, 15, 2018. Available online at <https://www.wildlife.ca.gov/Data/VegCAMP/Natural-Communities#sensitive%20natural%20communities>.

<sup>13</sup> The question mark in “rarity rank S3?” is not a typographical error, but part of the rank.

The sensitive natural communities within the Project area are also designated as riparian habitat and wetlands and other waters of the United States and State (see Section 3.4.1.7) and are afforded a higher level of regulatory protection because of this designation.

#### **3.4.1.6 Environmentally Sensitive Habitat Areas**

The entire Project area is located within the Coastal Zone (refer to Figure 3.4-1). The Coastal Act defines Environmentally Sensitive Habitat Areas (ESHA) as “any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments” (Public Resources Code Section 30107.5). ESHA is designated within the Coastal Zone by the California Coastal Commission (CCC) or in an applicable local coastal program. The Santa Cruz County Local Coastal Program (LCP) restricts development in environmentally sensitive coastal habitat areas. The study area contains potentially jurisdictional waters (refer to Section 3.4.1.9, Aquatic Resources in the Project Area) within the Coastal Zone which, pursuant to Santa Cruz County Code criteria, would be considered ESHA.<sup>14</sup>

#### **3.4.1.7 Aquatic Resources in the Project Area**

ESA’s aquatic resources delineation of the 99.4-acre delineation study area<sup>15</sup> concluded that a total of 12.93 acres (563,276 square feet) and 5,045 linear feet of aquatic resources occur within the delineation study area, including the following:

- 0.71 acre central coast arroyo willow riparian forest;
- 0.33 acre coastal freshwater marsh;
- 0.91 acre (4,945 linear feet) of vegetated ditch;
- 1.94 acres (100 linear feet) of Watsonville Slough;
- 2.26 acres of cropland/agriculture wetland;
- 0.24 acre of drainage basin; and
- 6.55 acres of recharge basin

The features listed above, excluding the drainage basin and recharge basin, are likely to be considered Waters of the U.S. by the USACE and would therefore be regulated under Section 404 and Section 401 of the Clean Water Act. All aquatic resources are also likely to be considered waters of the State, protected under the Porter-Cologne Water Quality Control Act by the California Water Boards.

The aquatic resources in the Project area are described in Section 3.4.1.6, Vegetation Communities and Associated Wildlife Habitats in the Project Area.

<sup>14</sup> County of Santa Cruz, 2018. Santa Cruz County Code, Chapter 16.32. Available online at <https://www.codepublishing.com/CA/SantaCruzCounty/#!/SantaCruzCounty16/SantaCruzCounty1632.html>. Accessed on December 21, 2018.

<sup>15</sup> Environmental Science Associates (ESA), *Draft Watsonville Slough System Managed Aquifer Recharge and Recovery Project Aquatic Resources Delineation Report*. Prepared for Pajaro Valley Water Management Agency, February 2020.

### 3.4.1.8 Special-Status Species

For the purposes of this EIR, “special-status” species include threatened, endangered, rare, candidate, and other sensitive species identified in local and regional plans, policies, and regulations, and by the CDFW, USFWS, and National Marine Fisheries Service (NMFS). Special-status species also include the following:

- Plant and wildlife species listed as rare, threatened, and endangered under the Federal Endangered Species Act (FESA) and California Endangered Species Act (CESA);
- Candidate species (species that are proposed for listing under either FESA or CESA);
- Species designated by CDFW as species of special concern or Fully Protected Species;
- Bald and golden eagles protected by the federal Bald and Golden Eagle Protection Act (16 USC Section 668); and
- Species that may be considered rare or endangered pursuant to Section 15380 of the CEQA *Guidelines* (including plants species with California Rare Plant Ranks of 1 or 2).

Appendix BIO-1 provides the results of species occurrence database queries from the CDFW CNDDDB and CNPS Rare Plant Inventory for the project vicinity. Based on this information, Table BIO-1 in Appendix BIO provides a focused list of special-status plant and animal species that could potentially occur in the project vicinity and their potential to occur within the study area based on previous special-status record locations, the species’ known ranges, and current site conditions. Following this review, special-status species with a moderate or higher potential to occur within the study area are discussed in detail below.

#### **Plant Species**

Many special-status plant species have a low or unlikely potential to occur in the study area due to the absence of suitable habitat, the conversion of most open land for agricultural production, and regular or periodic disturbance by disking. However, two special-status plant species have a moderate potential to occur in the study area: Congdon’s tarplant (*Centromadia parryi* ssp. *congdonii*) and Santa Cruz tarplant (*Holocarpha macradenia*).

#### **Congdon’s Tarplant**

Congdon’s tarplant has a California Rare Plant Rank (CRPR) of 1B.1. This species is generally observed within terraces, swales, floodplains, grassland, and disturbed sites at elevations below 300 meters, and has been observed within approximately 1.5 miles of the Project area.<sup>16</sup> Suitable habitat for this species includes the margins of Struve Slough and Watsonville Slough, and ruderal areas in the study area.

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<sup>16</sup> CDFW, 2020. California Natural Diversity Database query for USGS 7.5-minute topographic quadrangle of Watsonville West, Loma Prieta, Laurel, Mt. Madonna, Soquel, Watsonville East, Moss Landing, and Prunedale, accessed January 2020.

### Santa Cruz Tarplant

Santa Cruz tarplant is federally listed as threatened and California listed as endangered, and has a CRPR of 1B.1. This species is often found in clay and sandy soils in coastal prairie, coastal scrub, and valley and foothill grassland at elevations ranging from 10 to 220 meters. Santa Cruz tarplant is known to occur in three locations within one mile of study area.<sup>17</sup> Ruderal vegetation communities present within study area provide marginally suitable habitat.

### Fish Species

The Pajaro River provides habitat for at least nine documented fish species, including native species such as south-central California coast (S-CCC) steelhead, Pacific lamprey (*Lampetra tridentata*), and hitch (*Lavinia exilicauda*). Tidewater goby (*Eucyclogobius newberryi*) are known to occur in the Pajaro River Lagoon and lowermost reaches of Watsonville Slough downstream of the Shell Road pump station.

Based on previous studies, the fish assemblage in the upper Watsonville Slough, Harkins Slough, and Struve Slough project area is dominated by non-native, warm-water species, including common carp (*Cyprinus carpio*), largemouth bass (*Micropterus salmoides*), brown bullhead (*Ameiurus nebulosus*), bluegill (*Lepomis macrochirus*), green sunfish (*Lepomis cyanellus*), western mosquitofish (*Gambusia affinis*) and black crappie (*Pomoxis nigromaculatus*).<sup>18,19</sup>

### Steelhead

The Pajaro River watershed is one of the major components of the S-CCC Distinct Population Segment (DPS) of steelhead, as defined by NMFS.<sup>20</sup> Coastal steelhead are anadromous fish, spawning in coastal streams and rivers but migrating to ocean waters as one- to three-year-old juveniles (smolts). Steelhead in this DPS are listed as a federal threatened species.

In south-central California, near the southern limit of the range for steelhead on the Pacific Coast, it is estimated that annual S-CCC steelhead runs have declined dramatically from an estimated 25,000 returning adults historically, to currently less than 500 returning adults.<sup>21</sup>

Studies from the 1960s report steelhead runs in the Pajaro River ranging from 1,000 to 2,000 individuals (62 FR 43974). Reliable data to estimate current run size are not available, but populations are substantially smaller due to habitat quality declines stemming from water quality changes in the wake of land development along the watershed and loss of vegetation and

<sup>17</sup> CDFW, 2020. California Natural Diversity Database query for USGS 7.5-minute topographic quadrangle of Watsonville West, Loma Prieta, Laurel, Mt. Madonna, Soquel, Watsonville East, Moss Landing, and Prunedale, accessed January 2020.

<sup>18</sup> KEC, personal observations, 2018.

<sup>19</sup> Swanson Hydrology & Geomorphology, Biotic Resources Group, Dana Balnd & Associates, Hagar Environmental Sciences and VB Agricultural Services, *Watsonville Sloughs Watershed Resource Conservation & Enhancement Plan*, prepared for County of Santa Cruz Planning Department, Santa Cruz, CA, January 2003.

<sup>20</sup> 62 FR 43937, August 18, 1997.

<sup>21</sup> Williams, T. H., S. T. Lindley, B. C. Spence, and D. A. Boughton, Status Review Update for Pacific Salmon and Steelhead Listed Under the Endangered Species Act: Southwest, May 20, 2011 update to January 5, 2011 Report to Southwest Region National Marine Fisheries Service from Southwest Fisheries Science Center, Fisheries Ecology Division, 2011.

channelization along riparian corridors.<sup>22</sup> The Pajaro River serves as a migration pathway for adult steelhead migrating to spawning and nursery habitat in the upper watershed, and for steelhead smolts migrating downriver from that habitat to the ocean. The adult steelhead migration periodicity in the Pajaro River has not been studied, but is expected to be similar to Waddell Creek in northern Santa Cruz County where Shapovalov and Taft (1954)<sup>23</sup> documented adults entering freshwater to spawn from late December into April, with peak migration occurring January through mid-March, and most smolts migrating to the Pacific Ocean in April and May.<sup>24</sup>

The mainstem Pajaro River provides steelhead passage and supplies freshwater to the Pajaro River estuary. In spring, the freshwater inflow provides a surface wedge of lighter freshwater on top of the salt water in the Pajaro River estuary. This freshwater wedge allows steelhead smolts to move up and down in the water column to aid in gradually adjusting to seawater. When flows are sufficient for passage to the estuary, the inflows are probably adequate to provide a good freshwater to saltwater transition zone. Migrating smolts may spend several weeks feeding in the estuary and adjusting to seawater. This transition may not be required, as many central California streams lack good transitional estuaries while sustaining steelhead populations. However, the transition may improve survival of smolts, especially smaller smolts, upon their entering the ocean.

The majority of juvenile steelhead rear in perennial freshwater streams with clean, cool water, coarse channel substrates, and adequate instream cover (e.g., large woody debris, undercut stream banks). However, steelhead have also been shown to utilize lagoons and estuaries for seasonal rearing. Studies conducted on lagoon systems in central California (San Mateo and Santa Cruz counties) have shown that each summer a fraction of juvenile steelhead over-summered in the estuary of their natal creek.<sup>25,26</sup> These estuaries are cut off from the ocean during the summer by the formation of a mouth berm, creating a seasonal lagoon. Many juveniles grow fast enough during their first year of lagoon rearing to migrate to the ocean, and most enter the ocean at a larger size than the same year class fish rearing in freshwater habitats of the stream system.<sup>27</sup>

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<sup>22</sup> National Marine Fisheries Service, 5-Year Review: Summary and Evaluation of South-Central California Coast Steelhead Distinct Population Segment. National Marine Fisheries Service. West Coast Region. California Coastal Office. Santa Rosa, CA., 2016.

<sup>23</sup> Shapovalov, L. and A. C. Taft, The Life Histories of the Steelhead Rainbow Trout (*Salmo gairdneri gairdneri*) and Silver Salmon (*Oncorhynchus kisutch*) with Special Reference to Waddell Creek, California, and Recommendations Regarding Their Management. State of California, Department of Fish and Game, Fish Bulletin No. 98, 1954.

<sup>24</sup> Shapovalov, L. and A. C. Taft, The Life Histories of the Steelhead Rainbow Trout (*Salmo gairdneri gairdneri*) and Silver Salmon (*Oncorhynchus kisutch*) with Special Reference to Waddell Creek, California, and Recommendations Regarding Their Management. State of California, Department of Fish and Game, Fish Bulletin No. 98, 1954.

<sup>25</sup> Smith, J.J., *The effects of sandbar formation and inflows on aquatic habitat and fish utilization in Pescadero, San Gregorio, Waddell and Pomponio Creek estuary/lagoon systems, 1985–1989* [online]. Interagency Agreement 84-04-324, San Jose State University, prepared for California Department of Parks and Recreation. 1990.

<sup>26</sup> Bond, M.H., S.A. Hayes, C.V. Hanson, R.B. MacFarlane, Marine survival of steelhead (*Oncorhynchus mykiss*) enhanced by a seasonally closed estuary. Canadian Journal of Fisheries and Aquatic Sciences, 65(10): 2242-2252, September 30, 2008.

<sup>27</sup> Bond, M.H., S.A. Hayes, C.V. Hanson, R.B. MacFarlane, Marine survival of steelhead (*Oncorhynchus mykiss*) enhanced by a seasonally closed estuary. Canadian Journal of Fisheries and Aquatic Sciences, 65(10): 2242-2252, September 30, 2008.

A beach berm forms across the mouth of the Pajaro River in most years (refer to **Appendix HYD**). Beach berm formation at the Pajaro River generally occurs once stream discharge has receded each year. Tidal flux through the mouth is substantially higher than freshwater inflows. Even after the sandbar forms, seepage through the large sandbar probably is sufficient to prevent overtopping and sandbar breaching.

After sandbar formation, freshwater inflows lower the salinity of the summer lagoon and may be important to lagoon ecology.<sup>28</sup> Based on observations between 2012 and 2017, the beach berm formed annually in mid to late summer, with the exception of drought years 2014 to 2015, when the beach berm formed earlier due to low Pajaro River discharge (Appendix HYD). This is generally much later than the period of steelhead smolt passage and estuary adjustment. Juvenile steelhead have not been documented in the Pajaro Lagoon during seven years (2012-2018) of late summer sampling<sup>29</sup> and are currently not known to utilize Pajaro River Lagoon for extended periods of rearing. However, some of these surveys (e.g., 2016 to 2018) have been conducted when the sandbar was open, creating tidally-influenced conditions that are not favorable to juvenile steelhead rearing. Smith<sup>30</sup> noted that steelhead apparently do not rear in the lagoon because spawning areas are far upstream within Pajaro River tributaries, but that the estuary provides potentially important feeding habitat in spring for outmigrating smolts.

Steelhead are not known to occupy the Watsonville Slough system in the vicinity, or upstream, of the Harkins Slough and Struve Slough project sites. Fishes encountered in previous studies are predominantly non-native, warm-water species that are considered predators to juvenile steelhead. Native, potentially predatory fish include Sacramento pikeminnow (*Ptychocheilus grandis*) and Sacramento blackfish.

### Tidewater Goby

Tidewater goby (*Eucyclogobius newberryi*), a federal endangered species, is present in the Pajaro River estuary and up to a mile further upstream in the Pajaro River. Tidewater goby habitat is characterized by brackish estuaries, lagoons, and lower stream reaches where the water is fairly still but not stagnant. This annual species can withstand a range of habitat conditions and has been documented in waters with salinity levels ranging from 0 to 42 parts per thousand (ppt)<sup>31</sup>, temperatures from 8 to 25°C, and depths from approximately 10 inches to 6.5 feet.<sup>32</sup> Tidewater gobies have been shown to withstand extremes in dissolved oxygen concentrations.<sup>33</sup> High wet season flows typically wash out lagoons and stream-estuarine interface habitats to a varying degree, at times dramatically reducing tidewater goby population sizes. In some cases, extreme flood events

<sup>28</sup> Smith, J.J., *The effects of sandbar formation and inflows on aquatic habitat and fish utilization in Pescadero, San Gregorio, Waddell and Pomponio Creek estuary/lagoon systems, 1985–1989* [online]. Interagency Agreement 84-04-324, San Jose State University, prepared for California Department of Parks and Recreation. 1990.

<sup>29</sup> D.W. Alley & Associates, Fishery and Water Quality Monitoring of Pajaro River Lagoon in 2018, 2018.

<sup>30</sup> Smith, J. J., Steelhead distribution and ecology in the upper Pajaro River system, 2002.

<sup>31</sup> Salinity as total dissolved solids (TDS).

<sup>32</sup> USFWS, Recovery Plan for the Tidewater Goby (*Eucyclogobius newberryi*). Pacific Region U. S. Fish and Wildlife Service Portland, Oregon. December 7, 2005.

<sup>33</sup> Chamberlain, C. D., Environmental Variables of Northern California Lagoons and Estuaries and the Distribution of Tidewater Goby (*Eucyclogobius newberryi*), Arcata Fisheries Technical Report TR 2006-04. U.S. Fish and Wildlife Service, Arcata, California, 2006.

can temporarily extirpate local populations, which are generally recolonized by gobies from other nearby coastal water bodies. Velocity refuges, such as backwater marshes, aquatic vegetation, or structural cover, are important habitat features for self-sustaining tidewater goby populations. Tidewater goby densities tend to be greatest among emergent and submerged vegetation.

Aquatic sampling and surveys in the Pajaro Lagoon from 2012 through 2017 have found tidewater goby widely distributed in the Pajaro Lagoon, as far upstream as the Watsonville Wastewater Treatment Facility, but they are typically present in low numbers.<sup>34</sup> However, the species was not observed during 2018 or 2019 surveys.<sup>35,36</sup> Tidewater gobies have also been documented in the lowermost reach of Watsonville Slough, downstream of the Shell Road pump station.<sup>37</sup> Targeted tidewater goby studies have been conducted in the slough reaches upstream of Shell Road and San Andreas Road in Watsonville Slough, but periodic fish surveys conducted in that area have not documented this species.<sup>38,39</sup>

The tidewater goby in central California maintain highly localized populations in lagoons ranging from freshwater (Soquel Creek in 1988, Pescadero Creek in 1985) to ocean salinities (Corcoran and Moran lagoons in 1996). After partial sandbar formation in late spring and summer, the Pajaro River Lagoon height increases, backing brackish water upstream to above State Route 1. Tidewater goby may be found that far upstream in years of high abundance; however, in years of heavy winter floods, this species is probably confined to the downstream portion of the Pajaro River estuary and to Watsonville Slough.<sup>40</sup>

### **Pacific Lamprey**

Pacific lamprey, a California species of special concern, is an anadromous species that, like steelhead, migrate into freshwater to spawn and juveniles return to the ocean to mature. Adult migration times for lamprey tend to occur somewhat later (March to May) than the peak of the steelhead adult migration (January to March). Juvenile lampreys migrate to the ocean with peak winter flows, and rarely suffer migration blockage. Estuaries may be as important to lamprey as they are to anadromous salmonids, that utilize them for foraging, rearing and holding habitat, as well as transitional habitats that enable osmoregulation and migration orientation.<sup>41</sup> Pacific lamprey are known to occur in the Pajaro River watershed and are therefore assumed present in the Pajaro River estuary seasonally, at a minimum.

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<sup>34</sup> D.W. Alley & Associates, Fishery and Water Quality Monitoring of Pajaro River Lagoon in 2017, 2017.

<sup>35</sup> Kristen Kittleson, Santa Cruz County Fisheries Resource Planner, personal communication, 2020.

<sup>36</sup> D.W. Alley & Associates, Fishery and Water Quality Monitoring of Pajaro River Lagoon in 2018, 2018.

<sup>37</sup> D.W. Alley & Associates, Fishery and Water Quality Monitoring of Pajaro River Lagoon in 2012, 2012.

<sup>38</sup> KEC, personal observations, 2018.

<sup>39</sup> Swanson Hydrology & Geomorphology, Biotic Resources Group, Dana Bland & Associates, Hagar Environmental Sciences and VB Agricultural Services, *Watsonville Sloughs Watershed Resource Conservation & Enhancement Plan*, prepared for County of Santa Cruz Planning Department, Santa Cruz, CA, January 2003.

<sup>40</sup> Smith, J.J., *The effects of sandbar formation and inflows on aquatic habitat and fish utilization in Pescadero, San Gregorio, Waddell and Pomponio Creek estuary/lagoon systems, 1985–1989* [online]. Interagency Agreement 84-04-324, San Jose State University, prepared for California Department of Parks and Recreation. 1990.

<sup>41</sup> Moyle, P.B., R. M. Quiñones, J. V. Katz and J. Weaver, *Fish Species of Special Concern in California*. Sacramento: California Department of Fish and Wildlife, 2015.



### Monterey Hitch

Monterey hitch (*Lavinia exilicauda harengus*), a subspecies of hitch and a California species of special concern, can occupy a wide variety of habitats, but are most abundant in lowland areas with large pools or in small reservoirs. Monterey hitch were found to be most abundant in low-gradient sites in the Pajaro River watershed that had permanent water and large pools in summer.<sup>42</sup> The water at these sites tended to be clear, warm in late summer, and moderately deep. Bottom substrates were mostly a mixture of sand and gravel and the presence of cover (e.g., fallen trees, overhanging bushes) was an important factor. Monterey hitch are known to occur in the Pajaro River and upstream tributaries such as Uvas, Llagas, and Pacheco creeks. Depending on conditions, Monterey hitch may seasonally inhabit the Pajaro River Lagoon.<sup>43</sup>

### Critical Habitat

Critical habitat for two federally listed fish species, S-CCC steelhead and tidewater goby, is designated within the study area.

#### South-Central California Coast Steelhead

Critical habitat for the S-CCC DPS within the study area includes the Pajaro River Lagoon, but does not include Watsonville, Harkins, or Struve Sloughs. Primary constituent elements considered essential for the conservation of the S-CCC DPS are those sites and habitat components that support one or more life stages and contain physical or biological features essential to survival, growth, and reproduction.

The Federal Register critical habitat designation notice for S-CCC steelhead (70 FR 52488) defines the following primary constituent element applicable to the study area:

Estuarine areas that provide uncontaminated water and substrates; food and nutrient sources to support growth and development; and connected shallow water areas and wetlands to conceal and shelter juveniles. Estuarine areas include coastal lagoons that are seasonally stable, predominantly freshwater - flooded habitats that remain disconnected from the marine environment except during high streamflow events, and tidally-influenced estuaries that provide a dynamic shallow water environment.

#### Tidewater Goby

Tidewater goby critical habitat Unit SC-8 (Pajaro River) includes the lower reach of the Pajaro River and lagoon, as well as the lowermost 1.2 miles of Watsonville Slough south of West Beach Road. Watsonville Slough north of West Beach Road, including the Harkins and Struve Sloughs project areas are excluded from the designation. Unit SC-8 is currently considered occupied by tidewater goby. The Federal Register critical habitat designation notice for tidewater goby (78 FR 8746) defines the primary constituent elements for tidewater goby as follows:

<sup>42</sup> Moyle, P.B., R. M. Quiñones, J. V. Katz and J. Weaver, Fish Species of Special Concern in California. Sacramento: California Department of Fish and Wildlife, 2015.

<sup>43</sup> Moyle, P.B., R. M. Quiñones, J. V. Katz and J. Weaver, Fish Species of Special Concern in California. Sacramento: California Department of Fish and Wildlife, 2015.

- Persistent, shallow (in the range of approximately 0.3 to 6.6 feet (0.1 to 2 meters)), still-to-slow-moving lagoons, estuaries, and coastal streams with salinity up to 12 parts per thousand<sup>44</sup>, which provide adequate space for normal behavior and individual and population growth that contain one or more of the following:
  - Substrates (e.g., sand, silt, mud) suitable for the construction of burrows for reproduction;
  - Submerged and emergent aquatic vegetation, such as Sago pondweed (*Stuckenia pectinata*), ditch grass (*Ruppia maritima*), broadleaf cattail (*Typha latifolia*), and bulrushes (*Scirpus* spp.), that provides protection from predators and high flow events; or
  - Presence of a sandbar(s) across the mouth of a lagoon or estuary during the late spring, summer, and fall that closes or partially closes the lagoon or estuary, thereby providing relatively stable water levels and salinity.

### Essential Fish Habitat

A portion of the study area has been identified by the Pacific Fishery Management Council as Essential Fish Habitat (EFH) for various life stages of marine and estuarine fish species managed under the following two Fisheries Management Plans (FMPs): Pacific Coast Groundfish FMP and Coastal Pelagic Species FMP. EFH is the aquatic habitat (water and substrate) necessary for fish to spawn, breed, feed, or grow to maturity (50 Code of Federal Regulations 227) that will allow a level of production needed to support a long-term, sustainable commercial fishery and contribute to a healthy ecosystem.

#### Pacific Coast Groundfish FMP

The Pacific Coast Groundfish Fishery Management Council has designated EFH for 80-plus species of groundfish, which taken together include all waters from the high-water line and the upriver extent of saltwater intrusion in river mouths along the coast from Washington to California, including the Pajaro River. Within the study area, starry flounder (*Platichthys stellatus*) and English sole (*Parophrys vetulus*) have been reported by Smith<sup>45</sup> to occur in the Pajaro River estuary.

#### Coastal Pelagic Species FMP

Four fish species, Pacific sardine (*Sardinops sagax*), northern anchovy (*Engraulis mordax*), Pacific mackerel (*Scomber japonicus*), and jack mackerel (*Trachurus symmetricus*), and one invertebrate species, California market squid (*Loligo opalescens*) are managed under the Coastal Pelagic Species FMP. The EFH designation for coastal pelagic species groups the managed species into one complex based on similarities in their life histories and habitat requirements. EFH is based upon a thermal range bordered within the geographic area where a coastal pelagic species occurs at any life stage, where the species has occurred historically during periods of similar environmental conditions, or where environmental conditions do not preclude colonization by the coastal pelagic species. Within the study area, Pacific sardine and northern anchovy have been reported by Smith to occur in the Pajaro River estuary.<sup>46</sup>

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<sup>44</sup> Salinity as total dissolved solids (TDS).

<sup>45</sup> Smith, J.J., Appendix A: Aquatic Habitat and Fisheries in: Mitchell Swanson & Associates, 1993. Pajaro Lagoon Management Plan, 1993.

<sup>46</sup> Smith, J.J., Appendix A: Aquatic Habitat and Fisheries in: Mitchell Swanson & Associates, 1993. Pajaro Lagoon Management Plan, 1993.

## Wildlife Species

### Amphibians

#### California Red-legged Frog

CRF is federally listed as a threatened species throughout its range in California and is a CDFW Species of Special Concern. This frog historically occurred over much of the state from the Sierra Nevada foothills to the coast and from Mendocino County to the Mexican border. CRF typically breed in ponds, slow-moving creeks, and streams with deep pools that are lined with dense emergent marsh or shrubby riparian vegetation. However, this species is capable of inhabiting a wide variety of perennial aquatic habitats, including coastal lagoons, marshes, springs, stock ponds and siltation ponds.<sup>47</sup> In summer (non-breeding season), CRF are likely to be observed near a deep pool in a creek or a pond, where emergent vegetation, semi-submerged root masses and undercut banks provide protection from predators.<sup>48</sup> CRF use upland habitat such as open grasslands for foraging and dispersal. Prey items include invertebrates and small vertebrates. Suitable upland habitat includes moist seeps or springs, burrows or moist debris piles for dispersal and aestivation.<sup>49</sup>

CRF is known to occur in the Watsonville Slough complex.<sup>50</sup> Breeding surveys conducted by KEC, Bioresearch Associates, and Bryan Mori Biological Consulting from 2012 to 2016 have documented CRF breeding activity in Middle Watsonville Slough, lower Harkins Slough, Hanson Slough, and three ponds at the Land Trust of Santa Cruz – Watsonville Slough Farm (0.2 mi north of the proposed Struve Slough screened intake and pump station) as recently as 2017 (CNDDDB, 2020). In March 2013, CRF breeding was recorded 1000 feet upstream of the existing Harkins Slough intake facility in both Watsonville Slough and Harkins Slough. Adult and subadult frogs have been observed over-summering in Harkins Slough near the filter plant and pump station, and within the pump station facility. CRF is assumed to be present in the study area.

### Reptiles

#### Western Pond Turtle

WPT occurs in the Pacific Coast region of North America from Washington State to Baja California, west of the Cascade Mountains and Sierra Nevada Range.<sup>51</sup> It is a CDFW species of special concern and is the only native turtle in California. Recent genetic studies indicate the presence of four groups or clades within the species; although historically there were two

<sup>47</sup> USFWS, Species Account for California Red-legged Frog, 2017. Available at: [https://www.fws.gov/sacramento/es\\_species/Accounts/Amphibians-Reptiles/ca\\_red\\_legged\\_frog/](https://www.fws.gov/sacramento/es_species/Accounts/Amphibians-Reptiles/ca_red_legged_frog/). Accessed August 31, 2020.

<sup>48</sup> USFWS, Species Account for California Red-legged Frog, 2017. Available at: [https://www.fws.gov/sacramento/es\\_species/Accounts/Amphibians-Reptiles/ca\\_red\\_legged\\_frog/](https://www.fws.gov/sacramento/es_species/Accounts/Amphibians-Reptiles/ca_red_legged_frog/). Accessed August 31, 2020.

<sup>49</sup> Stebbins, R.C. and Samuel McGinnis 2012. A Field Guide to Amphibians and Reptiles of California. University of California Press, Berkeley, CA.

<sup>50</sup> CDFW, 2020. California Natural Diversity Database (CNDDDB) Rarefind version 5 query of the Watsonville West, Loma Prieta, Laurel, Mt. Madonna, Watsonville East, Moss Landing, and Prunedale USGS 7.5-minute topographic quadrangles, Commercial Version. Version: January 3, 2020. Accessed January 23, 2020.

<sup>51</sup> Bury 1970; Iverson 1986; Stebbins 2003 as cited in Denise Duffy & Associates, Inc., *Draft Environmental Impact Report for the Basin Management Plan Update*. Prepared for the Pajaro Valley Water Management Agency, October 2013.

recognized subspecies.<sup>52</sup> The species appears to be declining in abundance in the northernmost and southernmost portion of its range, but not in the core of its range from central California to southern Oregon. The primary threats are loss and alteration of both aquatic and terrestrial habitats. These losses fragment remaining populations and, perhaps, magnify the effects of introduced species through predation, competition, and epidemic diseases.<sup>53</sup> Western pond turtle is found in and around in ponds, lakes, rivers, streams, creeks, marshes, and irrigation ditches with abundant vegetation and either rocky or muddy bottoms in woodland, forest, and grassland. In streams, this species prefers pools to shallower areas. Logs, rocks, cattail mats, and/or exposed banks are needed by western pond turtles for basking, and this species lays eggs in sandy soils along stream or pond margins.

WPT is known to occur in Watsonville Slough system.<sup>54</sup> Visual observations of individual adult WPT have been made in Struve Slough, Hanson Slough, and Harkins Slough, although records indicate that the species is relatively uncommon in the slough system.<sup>55</sup> However, field mark-recapture studies on the Pajaro River conducted from 2009 to 2019 indicate an estimated population of between 148 and 182 western pond turtles in the Pajaro River Flood Control Channel portion of the 2014 BMP Update PEIR study area.<sup>56</sup> WPT observations downstream of Thurwachter Bridge on the Pajaro River Lagoon are limited, and no WPT have been observed in the lower lagoon and lower Watsonville Slough's estuarine habitats. Habitat connectivity between the Pajaro River WPT population and the Watsonville Slough system is likely limited by the extensive urban and agricultural development on lands between the two areas and brackish, saltmarsh habitat conditions in the vicinity of the confluence and the last mile of Watsonville Slough. WPT has a moderate potential to occur in the Watsonville Slough study area.

## Birds

### Burrowing Owl

Western burrowing owl (*Athene cunicularia hypugaea*) is a CDFW species of special concern. It is a small, terrestrial owl of open country that favors flat, open grassland and sparse shrubland ecosystems. In California, western burrowing owls are found in close association with California ground squirrels, the burrows of which western burrowing owls occupy for nesting and refuge. Western burrowing owl prefers burrows in areas of short vegetation height (e.g., mowed or grazed grasslands), providing foraging habitat and allowing for visual detection of avian predators. Burrowing owls are semi-colonial nesters, and group size is one of the most significant factors contributing to site constancy by breeding burrowing owls. The nesting season, as recognized by the CDFW, runs from February 1 through August 31.

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<sup>52</sup> Bury and Germano, 2008 as cited in Denise Duffy & Associates, Inc., *Draft Environmental Impact Report for the Basin Management Plan Update*. Prepared for the Pajaro Valley Water Management Agency, October 2013.

<sup>53</sup> Bury and Germano, 2008 as cited in Denise Duffy & Associates, Inc., *Draft Environmental Impact Report for the Basin Management Plan Update*. Prepared for the Pajaro Valley Water Management Agency, October 2013.

<sup>54</sup> CDFW, 2020. California Natural Diversity Database (CNDDDB) Rarefind version 5 query of the Watsonville West, Loma Prieta, Laurel, Mt. Madonna, Watsonville East, Moss Landing, and Prunedale USGS 7.5-minute topographic quadrangles, Commercial Version. Version: January 3, 2020. Accessed January 23, 2020.

<sup>55</sup> KEC, personal observations, 2006, 2009, 2014.

<sup>56</sup> KEC, personal communication, 2020

Western burrowing owl is an occasional non-breeding visitor from October through February.<sup>57</sup> This species has been observed at burrows along the railroad tracks south of Watsonville Slough in winter as recently as January 1, 2019,<sup>58</sup> and suitable burrows observed in this area during a site visit in January 2020. In addition, a pair of over-wintering, non-breeding burrowing owls was observed on February 29, 2020 at the existing recharge basin in the study area, but was confirmed to have left the site by April 24, 2020.<sup>59</sup> Western burrowing owl has a low potential to occur in the study area during the breeding season, and a moderate potential to occur in the study area in the winter season.

#### White-tailed Kite

White-tailed kite (*Elanus leucurus*) is a CDFW fully protected species. These raptors inhabit herbaceous and open stages of most habitats in California, excluding the mountains, and are present year-round in coastal and valley lowlands. White-tailed kites hunt in open grassy or scrubby areas, as well as in open marshlands. Their prey is mostly voles and other small, diurnal mammals, occasionally birds, insects, reptiles, and amphibians. They nest in dense oak, willow, other trees or large shrubs or tree stands 20 to 100 feet above ground adjacent to good hunting habitat.

Suitable nesting habitat for white-tailed kite is present in vegetation along Watsonville, Struve and Harkins Sloughs. This species is frequently observed in the study area year-round and has nested in the willows at the Hanson Slough-Middle Watsonville Slough confluence.<sup>60, 61</sup> White-tailed kite has a high potential to occur in the study area.

#### Bald Eagle

Bald eagle is a state endangered species and a CDFW fully protected species. This species forages in rivers and lakes for large fish. Although fish constitute the centerpiece of the bald eagle's diet, this species is an opportunistic hunter and scavenger, and will consume birds, reptiles, amphibians, invertebrates such as crabs, and mammals, including rabbits, as well as carrion. Bald eagles build very large stick nests, typically 5 to 6 feet in diameter, generally in tall sturdy trees that provide easy flight access and good visibility, except where only cliff faces or ground sites are available.

Suitable nesting habitat is present in the study area in eucalyptus groves along the slough margins. Bald eagles are present year-round in Santa Cruz County. Since 2014, an annually active nest has been documented in Gallighan Slough 1.3 miles upstream of the Harkins Slough filter plant, and breeding has been successful 5 of 6 years.<sup>62</sup> Bald eagles may forage in Harkins and Struve Sloughs where this species is observed uncommonly, but year-round.<sup>63</sup> A bald eagle is

<sup>57</sup> Suddjian, Kittleson, and Mori, Pajaro River Bench Excavation Project, 2007 Bird Surveys Draft Report, October 15, 2007.

<sup>58</sup> KEC, personal observations, 2018, 2019.

<sup>59</sup> KEC, personal observations, 2020.

<sup>60</sup> eBird. 2020. eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available online at <http://www.ebird.org>. Accessed on February 10, 2020.

<sup>61</sup> KEC, personal observations, 2018.

<sup>62</sup> KEC, personal observations, 2020.

<sup>63</sup> KEC, personal observations, 2020.

presently nesting in the study area, and has a high potential to nest and forage in the study area in the future.

### Osprey

Osprey is on the CDFW watch list. Ospreys are the only North American raptor whose diet is almost exclusively composed of fish; as such, their habitat includes almost any large body of fresh- or saltwater containing fish, including rivers, lakes, reservoirs, lagoons, swamps and marshes. This species forages by diving feet first into shallow water (approximately 3 feet or less), or deeper water where fish school near the surface. Ospreys nest within about 12 miles or less from their foraging grounds, and choose open, elevated sites that prevent intrusion by predatory mammals. They are known to nest on power poles, snags, crowns of tall trees, cliffs, and human-made structure such as nesting platforms, tall light poles, and cranes. Osprey nests are constructed of sticks and may add to them annually until they are 10 to 13 feet deep and 3 to 6 feet in diameter.

Ospreys occur year-round in the study area, are seen foraging frequently and consistently from July through October,<sup>64</sup> and have been documented, including in 2020, nesting at Harkins Slough Road crossing at Harkins Slough on a Pacific Gas and Electric Company (PG&E)-placed nest platform and at two locations at College Lake, about 3 miles from the study area. Osprey are also currently nesting on a PG&E pole along West Beach Road near Pajaro Dune and the lower Watsonville Slough tidal outlet channel. Osprey has a high potential to nest within the study area.

### Yellow Warbler

Yellow warbler (*Setophaga petechia*) is a California species of special concern that generally occupies riparian vegetation near water along streams and in wet meadows.<sup>65</sup> Throughout California, they are found in willows (*Salix* spp.) and cottonwoods (*Populus* spp.). This species breeds from April to late July and commonly nests in willow-riparian habitats. Despite many local declines, yellow warblers currently occupy much of their former breeding range, except in the Central Valley, where they are close to extirpation. Broad-scale significant declines have been documented for the U.S. Pacific Northwest region (1979 to 1999) and declines approaching significance in California (1968 to 2016).<sup>66,67</sup> Both local abundance and long-term trends, however, vary greatly by region.

Yellow warbler is known to breed in dense willow riparian habitat along the Pajaro River.<sup>68</sup> The study area supports breeding habitat in riparian vegetation, and this species has been observed

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<sup>64</sup> eBird. 2020. eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available online at <http://www.ebird.org>. Accessed on February 10, 2020.

<sup>65</sup> Lowther, P. E., Yellow Warbler (*Setophaga petechia*), Version 2.0. In The Birds of North America (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, 1999. Available online at [doi.org/10.2173/bna.454](https://doi.org/10.2173/bna.454).

<sup>66</sup> Ballard, G., Geupel, G. R., Nur, N., and Gardali, T., Long-term declines and decadal patterns in population trends of songbirds in western North America, 1979–1999. *Condor* 105:737–755, 2003.

<sup>67</sup> Sauer, J.R., The North American Breeding Bird Survey, Results and Analysis 1966 - 2015. Version 2.07.2017 USGS Patuxent Wildlife Research Center, Laurel, MD., 2017.

<sup>68</sup> KEC, unpublished data, 2010.

during the breeding season in Harkins and Struve Sloughs.<sup>69</sup> Yellow warbler has a high potential to occur in riparian habitat within the study area.

## Mammals

### Western Red Bat

Western red bat (*Lasiurus blossevillei*) is a California species of special concern and is rated as a “high” conservation priority (i.e., species at risk or at high risk of imperilment) for the California region by the Western Bat Working Group.<sup>70</sup> This species is a solitary rooster in tree foliage and leaf litter, and is found in forests and woodlands from sea level up through mixed conifer forests, but its primary habitat is riparian woodland. This species feeds over a wide variety of habitats including grasslands, shrublands, open water, open woodlands and forests, and croplands. The western red bat could occur in trees within the study area, particularly those associated with riparian areas.

Although there are no records of western red bat in the study area, suitable habitat is present along Harkins Slough, Struve Slough, the access road to the Harkins Slough filter plant, and the Pajaro River. Western red bat has a moderate potential to occur in the study area.

### Critical Habitat

Critical habitat for one wildlife species, CRF, is designated within the study area, specifically within Watsonville Slough, Harkins Slough, and Struve Slough. CRF critical habitat Unit SCZ-2 includes Harkins Slough and Struve Slough, and surrounding uplands west of SR 1. Within the project area, the western edge of SCZ-2 extends approximately 500 feet west of San Andreas Road; therefore, the proposed recharge basins, pipeline between basins, and portions of the backwash and raw water pipeline, the filter plant to recharge basins pipeline, and Struve Slough to filter plant pipeline are outside of SCZ-2. Project components within SCZ-2 include the Struve Slough pump station, Struve Slough intake and intake pipeline, the Harkins Slough filter plant and intake, and portion of the backwash and raw water pipeline, the filter plant to recharge basins pipeline, and Struve Slough to filter plant pipeline. The Federal Register critical habitat designation notice for CRF (50 FR Part 17) defines the primary constituent elements for CRF as follows:

- Space for individual and population growth and for normal behavior;
- Food, water, air, light, minerals, or other nutritional or physiological requirements;
- Cover or shelter;
- Sites for breeding, reproduction, or rearing (or development) of offspring; and,

<sup>69</sup> eBird. 2020. eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available online at <http://www.ebird.org>. Accessed on February 10, 2020.

<sup>70</sup> Western Bat Working Group Western Bat Species Regional Priority Matrix, 2017. Available online at <http://wbwg.org/matrices/species-matrix/>. Accessed on March 12, 2020.

- Habitats that are protected from disturbance or are representative of the historical, geographical, and ecological distribution of species.<sup>71</sup>

## 3.4.2 Regulatory Framework

### 3.4.2.1 Federal

#### ***Federal Endangered Species Act***

The USFWS (jurisdiction over terrestrial and freshwater aquatic species) and NMFS (jurisdiction over most anadromous and marine fish, and mammals) oversee the FESA. The FESA prohibits the “take”<sup>72</sup> of any fish or wildlife species listed as threatened or endangered, including the destruction of habitat that could hinder species recovery. Section 7 of the FESA mandates that a federal agency undertaking funding, issuing a permit or authorization, or carrying out an activity, consult with the USFWS and, or NMFS, depending on the affected species, to ensure that federal agency actions do not jeopardize the continued existence of a listed species or destroy or adversely modify critical habitat for listed species. The federal agency is required to consult with the USFWS and NMFS if it determines the Project “may affect” listed species or critical habitat.

#### ***Federal Migratory Bird Treaty Act***

Unless and except as permitted by regulations, the Migratory Bird Treaty Act (MBTA) states that without a permit issued by the U.S. Department of the Interior, it is unlawful to pursue, hunt, take, capture, or kill any migratory bird. The law also applies to the intentional disturbance and removal of nests occupied by migratory birds or their eggs during the breeding season. On December 22, 2017, the U.S. Department of the Interior redefined “incidental take” under the MBTA such that “the MBTA's prohibition on pursuing, hunting, taking, capturing, killing, or attempting to do the same applies only to direct and affirmative purposeful actions that reduce migratory birds, their eggs, or their nests, by killing or capturing, to human control.” Thus, the federal MBTA definition of “take” does not prohibit or penalize the incidental take of migratory birds that results from actions that are performed without motivation to harm birds. However, CDFW subsequently issued an advisory that affirms that California law continues to prohibit incidental take of migratory birds.<sup>73</sup>

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<sup>71</sup> USFWS, 2010. 50 CFR Part 17, Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the California Red-Legged Frog. Federal Register Vol. 75, No. 51. March 17, 2010. [https://www.fws.gov/arcata/es/amphibians/crlf/documents/20100317\\_75FR12816\\_California%20Red-legged%20Frog%20Critical%20Habitat%20Revised%20Designated.pdf](https://www.fws.gov/arcata/es/amphibians/crlf/documents/20100317_75FR12816_California%20Red-legged%20Frog%20Critical%20Habitat%20Revised%20Designated.pdf)

<sup>72</sup> The definition of “take” pursuant to the FESA is to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” (16 USCS § 1532). The USFWS has also interpreted “harm” to include significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife. NMFS has defined harm to mean “an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering.” 50 CFR 222.102.

<sup>73</sup> CDFW, CDFW and California Attorney General Xavier Becerra Advisory Affirming California’s Protections for Migratory Birds, November 29, 2018. Available online at <https://oag.ca.gov/system/files/attachments/press-docs/20181129mbta-advisory3.pdf>.



### ***Magnuson-Stevens Fishery Conservation and Management Act***

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act or MSA) (16 USC Sections 1801–1884) of 1976, as amended in 1996 and reauthorized in 2007, is intended to protect fisheries resources and fishing activities within 200 miles of shore.

Conservation and management of U.S. fisheries, development of domestic fisheries, and phasing out of foreign fishing activities are the main objectives of the MSA. The MSA provided NOAA Fisheries with legislative authority to regulate U.S. fisheries in the area between 3 miles and 200 miles offshore and established eight regional fishery management councils that manage the harvest of the fish and shellfish resources in these waters.

The MSA defines “essential fish habitat” as those waters and substrate that support fish for spawning, breeding, feeding, or maturation. The MSA requires that NOAA Fisheries, the regional fishery management councils, and federal agencies that take an action that may have an effect on managed fish species under MSA, identify essential fish habitat and protect important marine and anadromous fish habitat. The regional fishery management councils, with assistance from NOAA Fisheries, are required to develop and implement Fishery Management Plans. Fishery Management Plans delineate essential fish habitat and management goals for all managed fish species, including some fish species that are not protected under the MSA. Federal agency actions that fund, permit, or carry out activities that may adversely affect essential fish habitat are required under Section 305(b) of the MSA, in conjunction with required Section 7 consultation under FESA, to consult with NOAA Fisheries regarding potential adverse effects of their actions on essential fish habitat and to respond in writing to NOAA Fisheries’ recommendations.

### ***Clean Water Act Section 404***

The federal Clean Water Act (CWA) was enacted as an amendment to the federal Water Pollution Control Act of 1972, which outlined the basic structure for regulating discharges of pollutants to waters of the United States. The CWA serves as the primary federal law protecting the quality of the nation’s surface waters, including lakes, rivers, and coastal wetlands.

Waters of the United States are areas subject to federal jurisdiction pursuant to Section 404 of the CWA. Waters of the United States are typically divided into two types: (1) wetlands and (2) other waters of the United States. Wetlands are “areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (33 CFR Section 328.3(c)(4), 40 CFR Section 230.3(o)(3)(iv)). To be considered subject to federal jurisdiction, a wetland must normally support hydrophytic vegetation (plants growing in water or wet soils), hydric soils, and wetland hydrology.<sup>74</sup> Other waters of the United States are seasonal or perennial water bodies, including lakes, stream channels, drainages, ponds, and other surface water features, that exhibit an ordinary high-water mark but lack positive indicators for the three wetland parameters (33 CFR 328.4).

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<sup>74</sup> Environmental Laboratory, *Corps of Engineers Wetland Delineation Manual*, Final Report, Department of the Army Waterways Experiment Station, Vicksburg, Mississippi, January 1987.

CWA Section 404 regulates the discharge of dredged and fill materials into waters of the United States. Applicants must obtain a permit from the USACE for discharges of dredged or fill material into waters of the United States, including wetlands, before proceeding with a proposed activity.

### **3.4.2.2 State**

#### ***California Coastal Act***

The California Coastal Act (Public Resources Code Section 30000 et seq.) provides for the long-term management of lands within California's Coastal Zone boundary, as established by the California Legislature and defined in the Coastal Act. Of primary relevance to terrestrial biological resources are Coastal Act policies concerning ESHAs and adjacent developments, and diking, filling, or dredging and continued movement of sediment and nutrients.

The CCC, in partnership with coastal cities and counties, plans and regulates the use of land and water in the Coastal Zone under the Coastal Act. Development activities are broadly defined by the Coastal Act to include: the construction of buildings and structures, divisions of land, and activities that change the intensity of use of land or public access to coastal waters. A development activity within the Coastal Zone generally requires a coastal development permit from either the CCC, or from a local government with a certified LCP, to ensure that the activity complies with the Coastal Act. The Coastal Act includes goals and policies that constitute the statutory standards that are applied to planning and regulatory decisions made by the CCC and by local governments.

The CCC generally treats wetlands, streams, riparian habitats, and open coastal waters as ESHAs, although exceptions may exist where the definition of ESHA is not satisfied. Because the CCC typically defines wetlands based on a "one-parameter approach", CCC jurisdictional wetlands are typically greater in extent than those regulated by the USACE under the CWA. An ESHA may also be found in upland areas, for example stands of large, mature trees in an area otherwise lacking such habitat.

The principal Coastal Act policy pertaining to ESHAs is Public Resources Code Section 30240, which provides: "Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within such areas." ESHA policy is applied by the CCC or by local agencies with approved LCPs.

#### ***Native Plant Protection Act***

The Native Plant Protection Act (NPPA) enacted in 1977 includes measures to preserve, protect, and enhance rare and endangered native plants. There are 64 species, subspecies, and varieties of plants that are protected as rare under the NPPA. The NPPA prohibits take of endangered or rare native plants, but includes some exceptions for agricultural and nursery operations; emergencies; and after properly notifying CDFW for vegetation removal from canals, roads, and other sites, changes in land use, and in certain other situations. Individual landowners are required to notify CDFW at least 10 days in advance of changing land uses to allow CDFW to salvage any rare or endangered native plant material.

### ***California Endangered Species Act***

California adopted the CESA in 1984. The state act prohibits the take<sup>75</sup> of state listed endangered and threatened species; however, habitat destruction is not included in the state's definition of take. Section 2090 of CESA requires state agencies to comply with endangered species protection and recovery and to promote conservation of these species. The CDFW administers the act and authorizes take through Section 2081 agreements (except for designated fully-protected species, as described under the heading, California Fish and Game Code, below). Under CCR Title 14, Section 786.9(b), CDFW can also approve the take of state rare plants under Section 2081.

### ***California Fish and Game Code***

Under California Fish and Game Code (CFGF) Section 3503, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. In 2018, CDFW and the California Attorney General clarified that Section 3503 retains California's protections for migratory birds, including a prohibition against incidental take.<sup>76</sup> CFGF Section 3503.5 prohibits take, possession, or destruction of any birds in the orders Falconiformes (hawks)<sup>77</sup> or Strigiformes (owls), or of their nests and eggs.

CFGF Sections 3511 [birds], 4700 [mammals], 5050 [reptiles and amphibians] and 5515 [fish] allows the designation of a species as Fully Protected. This is a greater level of protection than is afforded by the CESA, since such a "Fully Protected" designation means the listed species cannot be taken at any time.

Under CFGF Sections 1600-1616, the CDFW regulates activities that would substantially divert, obstruct the natural flow of, or substantially change rivers, streams and lakes. CDFW's regulated limits are defined in CFGF Section 1602 as, "bed, channel, or bank of, any river, stream, or lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake...." The CDFW requires a Streambed Alteration Agreement for activities within its regulated area. If CDFW determines that a project would result in substantial adverse effects on an existing fish or wildlife resource, CDFW would prepare a Lake or Streambed Alteration Agreement that includes reasonable measures to protect the resources.

### ***CEQA Guidelines Section 15380***

Although threatened and endangered species are protected by specific federal and state statutes, CEQA *Guidelines* Section 15380 provides that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet

<sup>75</sup> Take, under the CESA, is defined as "to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

<sup>76</sup> CDFW, CDFW and California Attorney General Xavier Becerra Advisory Affirming California's Protections for Migratory Birds, November 29, 2018.

<sup>77</sup> At the time Section 3503.5 was written, the order Falconiformes included diurnal birds of prey in the families Accipitridae (eagles, hawks, kites, harriers and others) and Falconidae (falcons and caracaras). In 2010, Accipitridae was placed in a new order, Accipitriformes, by the North American Classification Committee (NACC). However, for the purposes of this report, we interpret the reference to the order Falconiformes in Section 3503.5 to also include diurnal birds of prey in the order Accipitriformes.

certain specified criteria. These criteria have been modeled after the definition in the FESA and the section of the CFGC dealing with rare or endangered plants or animals. This section was included in the Guidelines primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on, for example, a “candidate species” that has not yet been listed by either the USFWS or CDFW. Thus, CEQA provides an agency with the ability to protect a species from a project’s potential impacts until the respective government agencies have an opportunity to designate the species as protected, if warranted.

### ***Clean Water Act Section 401***

Under CWA Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected water at the point where the discharge would originate. The California Regional Water Quality Control Board (RWQCB) administers this certification. Therefore, all projects that have a federal component and that may affect state water quality (including projects that require federal agency approval, such as issuance of a Section 404 permit) must also comply with CWA Section 401.

### ***Porter-Cologne Water Quality Control Act of 1969***

The Porter-Cologne Water Quality Control Act established the State Water Resources Control Board (State Water Board) and divided the state into nine basins, each with its own RWQCB. The State Water Board is the primary state agency responsible for protecting the quality of the state’s surface and subsurface water supplies, while the RWQCBs are responsible for developing and enforcing water quality objectives and implementation plans (basin plans).

The Porter-Cologne Water Quality Control Act authorizes the State Water Board to enact state policies regarding water quality in accordance with Section 303 of the CWA. In addition, the act authorizes the State Water Board to issue Water Discharge Requirements for projects that would discharge to state waters. “Waters of the state” are broadly defined as “any surface water or groundwater, including saline waters, within the boundaries of the state”<sup>78</sup> and include isolated, intrastate, and non-navigable waters and/or wetlands. The Porter-Cologne Water Quality Control Act also provides for protection of the beneficial uses of waters of the state, as described in the regional basin plan.

With respect to biological resources, the State Water Board and RWQCBs have authority over any fill activities within state waters, including isolated water/wetlands that may be outside the jurisdiction of the USACE. The California Wetlands Conservation Policy (Executive Order W-59-93) established a primary objective to “ensure no overall net loss... of wetlands acreage and values in California.” The RWQCBs implement this policy, which requires mitigation for wetland impacts.

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<sup>78</sup> California Water Code Section 13050.

### 3.4.2.3 Local

Table 2-8 in Chapter 2, *Project Description*, identifies the approvals from Santa Cruz County required for the Projects. **Table 3.4-1** presents pertinent local plans and policies regarding biological resources to support County consideration of the Projects' consistency with general policies.<sup>79</sup> In some cases, local policies are used in this EIR as criteria to determine the significance of physical effects on the environment (e.g., Impact BR-8 in Section 3.4.3.3).

**TABLE 3.4-1**  
**SANTA CRUZ COUNTY LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT**

<i>Santa Cruz County General Plan / Local Coastal Program</i>
<p><b>Objective 5.1:</b> To maintain the biological diversity of the County through an integrated program of open space acquisition and protection, identification and protection of habitat and wildlife corridors and habitats, low-intensity and resource-compatible land uses in sensitive habitats and mitigations on projects and resource extraction to reduce impacts on plant and animal life. (see Santa Cruz County General Plan/Local Coastal Program for details)</p>
<p><b>Policy 5.1.4:</b> Implement the protection of sensitive habitats by maintaining the existing Sensitive Habitat Protection ordinance. The ordinance identifies sensitive habitats, determines which uses are allowed in and adjacent to sensitive habitats, and specifies required performance standards for land in or adjacent to those areas. Any amendments to this ordinance will require a finding that sensitive habitats will be afforded equal or greater protection by the amended language.</p>
<p><b>Policy 5.1.6:</b> Sensitive habitats will be protected against any significant disruption of habitat values; and any proposed development within or adjacent to these areas must maintain or enhance the functional capacity of the habitat. Reduce in scale, redesign, or if no other alternative exists, deny any project which cannot sufficiently mitigate significant adverse impacts on sensitive habitats unless approval of a project is legally necessary to allow a reasonable use of the land.</p>
<p><b>Policy 5.1.11:</b> For areas, which may not meet the definition of sensitive habitat, yet contain valuable wildlife resources (such as migration corridors or exceptional diversity), protect these wildlife habitat values and species and use other mitigation measures identified through environmental review process.</p>
<p><b>Policy 5.1.12:</b> Require as a condition of development approval, restoration of any areas of the subject property, which is identified as degraded sensitive habitat, with the magnitude of restoration to be commensurate with the scope of the project. Such conditions may include erosion control measures, removal of non-native or invasive species, planting with characteristic native species, diversion of polluting run-off, water impoundment, and other appropriate means. The object of habitat restoration activities will be to enhance the functional capacity and biological productivity of the habitat(s) and whenever feasible, to restore them to a condition which can be sustained by natural occurrences, such as tidal flushing of lagoons.</p>
<p><b>Objective 5.2:</b> To preserve, protect and restore all riparian corridors and wetlands for the protection of wildlife and aquatic habitat, water quality, erosion control, open space, aesthetic and recreational values and conveyance and storage of flood waters.</p>
<p><b>Policy 5.2.1:</b> Designate the following areas as Riparian Corridors: a) 50 feet from the top of a distinct channel or physical evidence of high water mark on perennial stream; b) 30 feet from the top of a distinct channel or physical evidence of high water mark of an intermittent stream as designated from the General Plan maps and through field inspection of undesignated intermittent and ephemeral streams; c) 100 feet of the high water mark of a lake, wetland, estuary, lagoon, or natural body of standing water; d) The landward limit of a riparian woodland community; e) Wooded arroyos within urban areas. Transitional areas between terrestrial and aquatic systems are where the water table is usually at or near the surface, or the land is covered by water. Under a unified methodology now used by all federal agencies, wetlands defined as "those areas meeting certain criteria for hydrology, vegetation, and soils." Examples of wetlands are saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens.</p>
<p><b>Policy 5.2.2:</b> Implement the protection of Riparian Corridors and Wetlands through the Riparian Corridor and Wetland Protection ordinance. The ordinance identifies and defines riparian corridors and wetlands, determines the uses which are allowed in and adjacent to these habitats, and specifies required buffer setbacks and performance standards for land in and adjacent to these areas. Any amendments to this ordinance will require a finding that riparian corridors and wetlands will be afforded equal or greater protection by the amended language.</p>

<sup>79</sup> California Government Code Section 53091 exempts agencies like PV Water from complying with local building and zoning ordinances when locating or constructing facilities for the production, generation, storage, treatment, or transmission of water. California Government Code Section 65402(c) requires that PV Water notify cities and counties of its plans to construct projects or to acquire or dispose of property. The planning agency then has 40 days to determine project consistency with its general plan. If the planning agency disapproves, the disapproval may be overruled by PV Water.

**TABLE 3.4-1 (CONTINUED)**  
**SANTA CRUZ COUNTY LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT**

<b><i>Santa Cruz County General Plan / Local Coastal Program (cont.)</i></b>
<b>Policy 5.2.3:</b> Development activities, land alteration and vegetation disturbance within riparian corridors and wetlands and required buffers will be prohibited unless an exception is granted per the Riparian Corridor and Wetlands Protection Ordinance.
<b>Policy 5.2.4:</b> Require a buffer setback from riparian corridors in addition to the specified distances found in the definition of riparian corridor. This setback will be identified in the Riparian Corridor and Wetland Protection ordinance and established based on stream characteristics, vegetation and slope. Allow reductions to the buffer setback only upon approval of a riparian exception. Require a 10-foot separation from the edge of the riparian corridor buffer to any structure. For wetlands, the buffer setback is included in the riparian corridor which surrounds the wetland.
<b>Policy 5.2.5:</b> Prohibit development within the 100-foot riparian corridor of all wetlands. Require measurements to prevent water quality degradation from adjacent land uses, as outlined in the Water Resources section.
<b>Policy 5.2.7:</b> Allow compatible uses in and adjacent to riparian corridors that do not impair or degrade the riparian plant and animal systems, or water supply values, such as non-motorized recreation and pedestrian trails, parks, interpretive facilities and fishing facilities.
<b>Policy 5.2.9:</b> Require development in or adjacent to wetlands to incorporate the recommendations of a management plan which evaluates: migratory waterfowl use December 1 to April 30; compatibility of agricultural use and biotic and water quality protection; and the protection of adjoining lands.
<b>Policy 5.3.5:</b> Require new water diversions, dams, and reservoirs which are constructed on anadromous fish streams to be designed to protect fish populations and to provide adequate flow levels for successful fish production.
<b>Policy 5.6.1:</b> Pending a determination based on a biological assessment, preserve perennial stream flows at 95 percent of normal levels during summer months and at 70 percent of the normal winter baseflow levels. Oppose new water rights which would diminish the instream flows necessary to maintain anadromous fish runs and riparian vegetation below the 97 percent/70 percent standard.
<b><i>Santa Cruz County Code</i></b>
<b>Chapter 16.30 Riparian Corridor and Wetland Protection</b>
<b>16.30.040 Protection.</b> No person shall undertake any development activities other than those allowed through exemptions and exceptions as defined in the Santa Cruz County Code (see code for details)
<b>Chapter 16.32 Sensitive Habitat Protection</b> (see code for details)
<b>Chapter 16.34 Significant Trees Protection</b> (see code for details)
SOURCE: County of Santa Cruz, 1994 General Plan/Local Coastal Program, Chapter 5 – Conservation and Open Space, Effective December 19, 1994.

### 3.4.3 Impacts and Mitigation Measures

#### 3.4.3.1 Significance Criteria

In accordance with the CEQA, state CEQA *Guidelines* (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Projects could have a significant impact if they were to:<sup>80</sup>

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW or USFWS;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW and USFWS;

<sup>80</sup> Refer also to Appendix NOP for additional topics that were addressed in the Notice of Preparation.

- Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

The following topics are not analyzed further in this section for the reasons described below:

***Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.***

The Project would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan, because there are no adopted Habitat Conservation Plans, Natural Community Conservation Plans, or other approved habitat conservation plans within the Project area.

### 3.4.3.2 Methodology

As described in Section 3.1, this EIR provides an independent analysis of the Projects' potential environmental impacts. As part of approval of the 2014 BMP Update PEIR, the Board of Directors adopted extensive mitigation measures (Resolution 2014-05) to avoid or reduce significant impacts on biological resources. **Appendix PD-2** presents these measures, which are considered part of the Projects and thus are considered prior to any significance determinations. Potential impacts are evaluated in the following section. If warranted, additional mitigation is included and takes the form of (1) modifications to update the mitigation measures presented in Appendix PD-2 to reflect current conditions and site-specific impacts; or (2) new mitigation measures to replace or augment an adopted mitigation measure.

### 3.4.3.3 Impacts and Mitigation Measures

**Impact BR-1: Construction of Project components could result in a substantial adverse effect on special-status species. (*Less than Significant with Mitigation*)**

Several special-status plant, fish and wildlife species have a moderate or high potential to occur within or adjacent to the Project construction areas. Potential construction-related impacts on these species are addressed below.

#### **Congdon's Tarplant and Santa Cruz Tarplant**

Congdon's tarplant and Santa Cruz tarplant could occur in the sandy substrate along the margins of the sloughs and ruderal habitat in portions of APN 052-221-25 north of the railroad tracks; therefore, construction-related activities that could directly impact these species include access

and use of construction equipment associated with installation of 1) the Struve Slough intake and Struve Slough intake pipeline, 2) installation of the Struve Slough to filter plant pipeline, 3) installation of diversion pump screens on the intake at the Harkins Slough pump station, and 4) excavation of the pipeline alignment north of the railroad tracks in portions of APN 052-221-25. If present, the loss of individual plants during construction would be a significant impact.

Implementation of adopted Mitigation Measures BIO-2d, BIO-2e, BIO-3a, and BIO-3b, detailed in Appendix PD-2, would reduce these potential impacts to *less than significant*.

### **Fish**

Tidewater gobies are known to occur in the Pajaro River estuary and the lowermost reaches of Watsonville Slough downstream of the Harkins and Struve Sloughs project sites. S-CCC steelhead are known to occur seasonally in the Pajaro River estuary and mainstem Pajaro River. Steelhead spawning and rearing habitat is present in upstream tributaries of the Pajaro River, but not upstream of the sloughs project sites. Pacific lamprey and Monterey hitch may occur seasonally within the Pajaro River estuary. None of these special-status fish species have been documented to occur within the Harkins and Struve Sloughs project sites and are unlikely to occur there, especially during the warm water conditions expected during the construction season (refer to Tables 2-4A and 2-4B in Chapter 2, *Project Description*, for anticipated construction schedules).

### **Direct and Indirect Impacts**

Although special-status fish species are unlikely to occur in the vicinity of project construction activities, their presence cannot be entirely ruled out. In the unlikely event special-status fish species are present during construction, potential direct and indirect impacts similar to those described below for other aquatic species (CRF, WTP) may occur, including injuries or mortalities caused by in-water construction work, including installation and removal of coffer dams and dewatering, and temporary impacts to water quality, as described below. These impacts would be significant. Implementation of adopted Mitigation Measures BIO-1b, BIO-2a through 2h, BIO-2l, and HWQ-1, as well as implementation of **Mitigation Measure BR-1a** would reduce potential direct and indirect construction-related impacts to special-status fish species to *less than significant with mitigation*.

### **California Red-Legged Frog and Western Pond Turtle**

CRF are known to occur in the Watsonville Slough complex and agricultural ditches that are adjacent to, or will be crossed by, the Struve Slough to filter plant pipeline, the filter plant to recharge basins pipeline, and the backwash and raw water pipeline. WPT has potential to occur within these same aquatic features. CRF and WPT also have moderate to high potential to occur in upland ruderal grassland habitat across the study area, with the exception of the uplands surrounding the proposed recharge basins, which are sited in isolated topographic depressions within a mix of strawberry fields and greenhouse complexes, and where there is a low potential for CRF and WPT occurrence.



### Direct Impacts

Direct impacts to CRF and WPT could occur during in-water work associated with construction of the Struve Slough intake and modification of the Harkins Slough intake if CRF or WPT are crushed by equipment, materials (i.e., pre-case concrete supports, piers, or pilings) or workers, or if CRF or WPT need to be relocated. Similarly, CRF and WPT could be directly impacted during installation of sheet piles in Watsonville Slough, and temporary dewatering, during open trench installation of the Struve Slough to filter plant pipeline and backwash and raw water pipeline across Watsonville Slough. The movement of construction vehicles and equipment, stockpiling of spoils, or staging equipment and materials, and excavation of trenches and entry/exit pits in upland habitat could potentially injure or kill CRF or WPT that are dispersing overland, basking, or sheltering in burrows. These impacts would be significant. Implementation of adopted Mitigation Measures BIO-1b, 2a through 2h, 2j, and 2k, which address most of these impacts, are presented in Appendix PD-2. Implementation of these adopted mitigation measures would reduce but not completely eliminate potential impacts on CRF and WPT and their habitat to a less-than-significant level. Additional impacts on CRF and WPT due to poor water quality during construction, and the loss of habitat are discussed below.

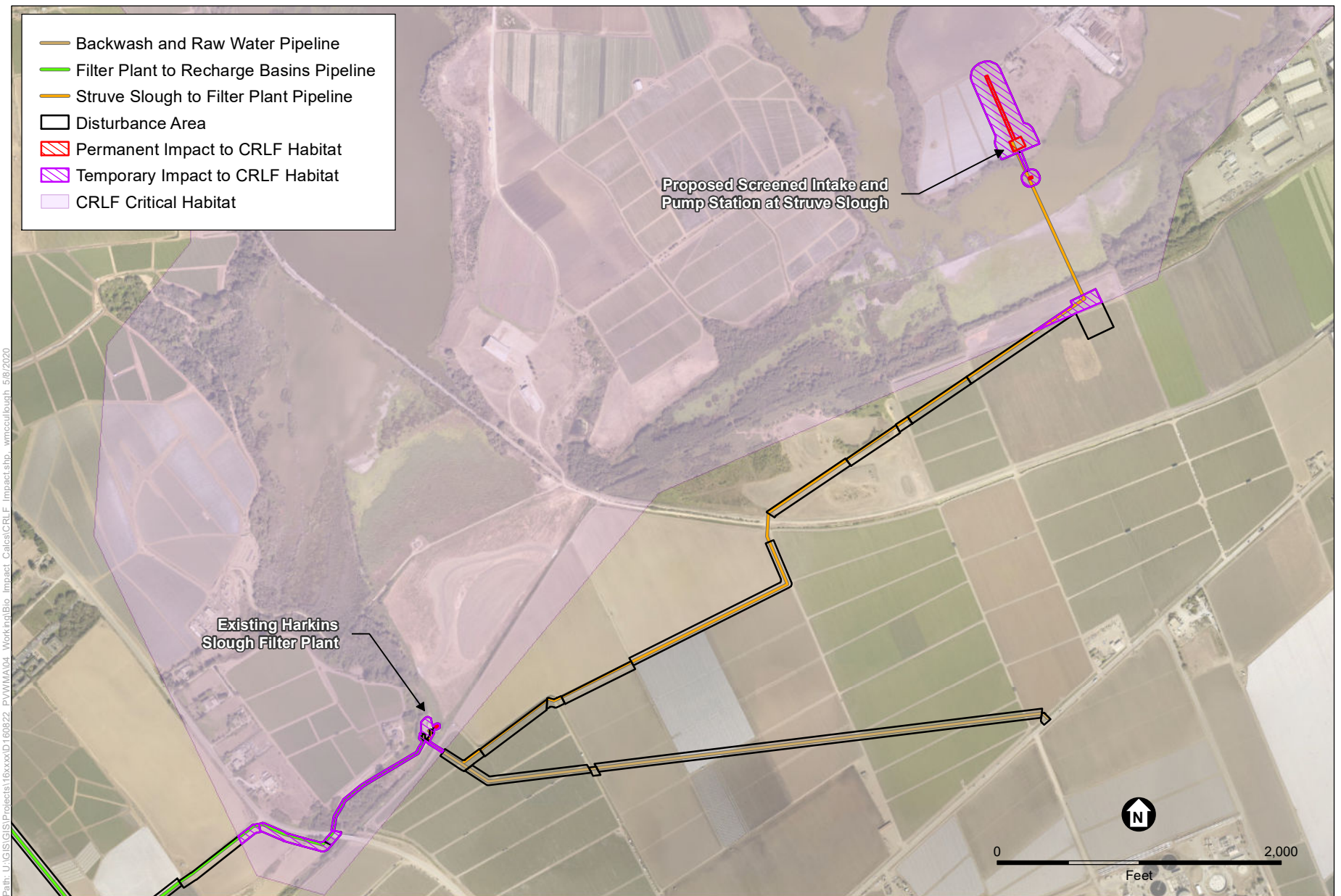
#### *Temporary and Permanent Impacts to CRF Critical Habitat*

CRF critical habitat is present in portions of the project footprint and construction disturbance area (refer to **Figure 3.4-2**). Project construction would result in approximately 6.0 acres of temporary impacts, and 0.4 acres of permanent impacts, to CRF critical habitat. Temporary construction-related impacts to CRF critical habitat would result from the following construction activities:

- Installation of screen and associated infrastructure on the existing Harkins Slough intake
- Open trench construction of portions of:
  - Filter plant to recharge basins pipeline
  - Backwash and raw water pipeline
  - Struve Slough to filter plant pipeline
- Installation of the Struve Slough screened intake and intake pipeline
- Use of entry and exit pits for horizontal directional drilling (HDD) and microtunneling for pipeline installation
- Construction of the Struve Slough pump station and electrical control building

Permanent construction-related impacts to CRF critical habitat would result from the following activities:

- Installation of screen and associated infrastructure on the existing Harkins Slough intake
- Installation of the Struve Slough screened intake and intake pipeline



SOURCE:

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.4-2**  
CRF Critical Habitat Within the Project Area

The implementation of **Mitigation Measure BR-1b**, below would reduce temporary and permanent impacts to CRF critical habitat to *less than significant with mitigation* by ensuring that CRF critical habitat that is temporarily impacted is restored to pre-construction conditions, and by requiring that permanently impacted CRF critical habitat is restored via compensatory mitigation.

#### Indirect Impacts

##### *Temporary Impacts to Water Quality*

Discharge of sediments could degrade water quality by increasing turbidity, affecting channel stability, and affecting aquatic and riparian habitats. Sediment also transports other pollutants such as nutrients, metals, and oils and greases. Hazardous materials associated with construction equipment and practices, such as fuels, oils, antifreeze, coolants, and other substances, could also adversely affect water quality if released to surface waters. Construction activities can impact a construction site's runoff sediment supply and transport characteristics both during and after the construction phase. Excess sediment could be mobilized anywhere earthwork occurs; Earthwork adjacent to Struve Slough, Harkins Slough, and agricultural ditches could transport sediment offsite via stormwater runoff and adversely affect receiving downstream water bodies and degrade habitat for aquatic animals. Compliance with the *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Order 2009-0009-DWQ, NPDES No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ) (also referred to as the Construction General Permit) mandates the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP would specify established best management practices to be used to control stormwater run-on/runoff and sediment (such as use of check dams and fiber rolls for reducing erosion on slopes and retaining sediment in stormwater) that would be implemented during construction. These best management practices would avoid or minimize stormwater and water quality effects on aquatic habitat caused by construction site runoff. Project components larger than one acre and are required to comply with conditions of the Construction General Permit. As such, PV Water would comply with conditions of the Construction General Permit, and any additional measures required by the RWQCB as the local agency for oversight on compliance with the Construction General Permit, pursuant to adopted Mitigation Measure HWQ-1. See additional discussion of potential water quality-related impacts in Section 3.3, Surface Water, Groundwater, and Water Quality.

Indirect impacts could also occur if CRF or WPT are subject to increased sediment suspension caused by in-water work associated with construction of the Struve Slough intake and modification of the Harkins Slough intake, including installation and removal of coffer dams and the use of dewatering pumps. Suspended sediment in the water column can lower levels of dissolved oxygen, increase concentrations of suspended solids, and possibly release chemicals present in the sediment into the water column. Turbidity increases would be relatively brief, on the order of two to three weeks, and generally confined to within a few hundred feet of the activity. Turbidity levels would initially be higher than baseline levels, but the sediment would disperse and re-deposit, and background levels would be expected to be restored within hours of the disturbance.

The Struve Slough to filter plant pipeline would be installed using trenchless methods underneath Struve Slough. Microtunneling, a trenchless technique, would be used to install the Struve Slough to filter plant pipeline under the railroad tracks and Ditch 5. Although not anticipated, there is potential for frac-outs to occur during trenchless construction. If a frac-out occurs, bentonite slurry could be released into the slough or ditch, which could degrade water quality and adversely affect CRF and WPT habitat and/or individuals by increasing suspended sediments, a significant impact. Mitigation Measure BR-1a would reduce this impact to *less than significant with mitigation* by requiring preparation of a Frac-out Contingency Plan and implementation of measures to contain and clean-up any frac-outs in waterways to minimize impacts of frac-outs on special-status species and their habitat.

#### *Noise and Lighting*

Increased noise, lighting and human activity associated with construction may alter CRF and WPT behavior in ways that could result in injury or mortality. These activities could result in increased movement, flushing from cover, or other altered activity patterns that reduce energy reserves and increase predation risks. Underwater noise associated with the installation of piles and piers using vibratory hammers around the Harkins Slough and Struve Slough intakes, could directly impact CRF larvae and tadpoles since they must remain underwater at these life stages; however, the use of coffer dams and dewatering would prevent harmful sound waves from vibratory pile driving from propagating through aquatic habitat. PV Water would require contractors to comply with all local sound control and noise levels rules and regulations during construction on land. As described in Section 3.8, Noise and Vibration, implementation of **Mitigation Measure NOI-1a** (Construction Noise Management Plan, presented in Section 3.8, *Noise and Vibration*) would reduce construction noise impacts to a less-than-significant level by PV Water developing and implementing a plan requiring that equipment and trucks used for construction activities utilize the best available noise control techniques, and that impact equipment will be hydraulically- or electrically-powered whenever possible, to avoid noise associated with pneumatically-powered tools. In addition, noise-related construction impacts would be similar to baseline noise levels in the area, including the use of motorized farm equipment and vehicular traffic and, therefore, noise-related construction impacts on CRF and WPT would be *less than significant*.

In general, construction would take place during daytime hours, and would not require construction lighting. However, as described in Section 2.6.1.2, Construction Hours, exceptions to standard construction hours include trenchless pipeline construction due to the need for continuous drilling and tunneling. Similarly, potential trenchless pipeline construction for portions of the Struve Slough to filter plant pipeline could require construction for up to 24 hours per day for up to several days in a row. Construction-related lighting would be temporary in duration and limited to the entry/exit pit sites, in agricultural and ruderal habitats. In addition, implementation of **Mitigation Measure AES-1** (Construction Lighting, presented in Section 3.13, *Aesthetics*) would require PV Water or its contractor to use shielded and hooded outdoor construction lighting directed to the area where the lighting would be required to minimize ambient light during Project construction. With the implementation of Mitigation Measure AES-1, impacts to wildlife related to construction lighting would be *less than significant with mitigation*.

### *Other Potential Indirect Impacts*

Other potential indirect impacts to CRF or WPT include trash left on-site during or after construction, which could attract predators, and the introduction and spread of non-native invasive vegetation by construction equipment and workers coming from other sites, which could degrade habitat over time. These impacts would be significant. Implementation of adopted Mitigation Measures BIO-2a and 2c would reduce these impacts to less than significant by requiring construction-related trash to be contained and removed from the site regularly, and avoiding the spread or introduction of invasive exotic plant species.

### **Birds**

Bird surveys conducted throughout the Watsonville Slough complex between 2010 and 2020 by Watsonville Wetlands Watch have documented over 200 species. In addition, the slough supports a high diversity of bird species throughout the year, with an average of 113 species observed in fall, 114 species observed in winter, and 95 species observed in spring, between 2010 and 2020. These birds and their nests are protected by the MBTA and CFGC. In addition, special-status birds such as burrowing owl, white-tailed kite, yellow warbler, osprey, and bald eagle have potential to nest in or around the Project area. Impacts to nesting birds caused from construction activities would generally be a violation of CFGC Sections 3503–3513, and a potentially significant impact. Impacts during the non-breeding season generally are not considered significant, primarily because of the birds' mobility and ability to access other comparable foraging habitat in the region.

### **Direct Impacts**

Construction activities could result in direct impacts on breeding birds through direct removal of breeding habitat such as the ruderal vegetation at the Struve Slough pump station site, the central coast arroyo willow riparian forest habitat located along two sections of the Struve Slough to filter plant pipeline, and the removal of trees at the Southeast Recharge Basin. Direct impacts can also occur to ground nesting birds that nest in grassland, such as western meadowlark (*Sturnella neglecta*) and horned lark, and in barren areas, to birds such as killdeer. Adopted Mitigation Measures BIO-1b, BIO-2a through 2h, and BIO-2i, which address most potential impacts to nesting birds described above, are presented in Appendix PD-2. In particular, in accordance with adopted Mitigation Measure BIO-2i, for any work conducted within the breeding bird season, PV Water would ensure that the Project area is surveyed for breeding birds and that any breeding birds are avoided. Adopted Mitigation Measure BIO-2i would reduce the potential impacts on special-status nesting birds to *less than significant*.

### **Indirect Impacts**

Construction activities could result in indirect impacts to birds nesting in trees, shrubs, and other structures adjacent to the construction footprint, for example, the willow riparian forest near the Struve Slough pump station site, and the eucalyptus trees adjacent to the filter plant to recharge basins pipeline. If nesting birds are present, construction noise, light, and increased human activity could result in nest failure (disturbance, avoidance, or abandonment that leads to unsuccessful reproduction), or could cause flight behavior that would expose an adult or its young to predators. PV Water would require contractors to comply with all local sound control and noise levels rules and regulations during construction. As described in Section 3.8, Noise and Vibration, implementation of Mitigation Measure NOI-1a would reduce construction noise impacts to a less-

than-significant level by PV Water developing and implementing a plan requiring that equipment and trucks used for construction activities utilize the best available noise control techniques, and that impact equipment be hydraulically- or electrically-powered whenever possible, to avoid noise associated with pneumatically-powered tools. In addition, noise-related construction impacts would be similar to baseline noise levels in the area, including the use of motorized farm equipment and vehicular traffic and, therefore, noise-related construction impacts on nesting birds would be *less than significant*.

In general, construction would take place during daytime hours, and would not require construction lighting. However, as described in Section 2.6.1.2, Construction Hours, exceptions to standard construction hours include trenchless pipeline construction due to the need for continuous drilling and tunneling. Similarly, potential trenchless pipeline construction for portions of the Struve Slough to filter plant pipeline could require construction for up to 24 hours per day for up to several days in a row. Construction-related lighting would be temporary in duration and limited to the entry/exit pit sites, in agricultural and ruderal habitats. In addition, implementation of Mitigation Measure AES-1 would require PV Water or its contractor to use shielded and hooded outdoor construction lighting directed to the area where the lighting would be required to minimize ambient light during Project construction. With the implementation of Mitigation Measure AES-1, impacts to wildlife related to construction lighting would be *less than significant with mitigation*.

### **Bats**

Bats, including special-status bats such as western red bat, have potential to roost in trees in riparian areas and eucalyptus trees in or around the Project area during daytime construction hours.

#### **Direct Impacts**

Construction activities could result in direct impacts to roosting bats if they were disturbed, killed, or injured by construction-related removal or trimming of a tree in which they were roosting.

Adopted Mitigation Measures BIO-1b and BIO-2a through 2h, which address most potential impacts to roosting bats described above, would be implemented and are presented in Appendix PD-2. In addition, implementation of **Mitigation Measure BR-1c** would reduce this impact to *less than significant* by requiring the identification and avoidance of active bat roost sites and the implementation of avoidance and minimization measures when non-maternity or hibernation bat roosts cannot be avoided.

#### **Indirect Impacts**

Construction activities could result in indirect impacts to roosting bats in trees adjacent to the construction footprint, for example, riparian forest near the proposed Struve Slough pump station and Harkins Slough filter plant, and the eucalyptus trees adjacent to the filter plant to recharge basins pipeline alignment. If roosting bats are present, construction noise could result in disturbance, avoidance, or abandonment of roosts resulting in unsuccessful reproduction. PV Water would require contractors to comply with all local sound control and noise levels rules and regulations during construction on land. As described in Section 3.8, Noise and Vibration, implementation of Mitigation Measure NOI-1a would reduce construction noise impacts to a less-than-significant level by PV Water developing and implementing a plan requiring that equipment

and trucks used for construction activities utilize the best available noise control techniques, and that impact equipment be hydraulically- or electrically-powered whenever possible, to avoid noise associated with pneumatically-powered tools. In addition, noise-related construction impacts would be similar to baseline noise levels in the area, including the use of motorized farm equipment and vehicular traffic and, therefore, noise-related construction impacts on roosting bats would be *less than significant*.

### Impact Conclusion

Compliance with the adopted Mitigation Measures BIO-1b, BIO-2a through 2l, BIO-3a, BIO-3b, and HWQ-1, and implementation of Mitigation Measures BR-1a, BR-1b, BR-1c, NOI-1a, and AES-1 would effectively reduce construction-related impacts on special-status species and their habitat to less-than-significant levels. Thus, construction-related impacts on special-status species would be *less than significant with mitigation*.

#### Mitigation Measure BR-1a: Frac-out Contingency Plan.

If HDD installation is implemented, PV Water shall require the contractor to retain a licensed geotechnical engineer to develop a Frac-out Contingency Plan. PV Water would submit the Frac-out Contingency Plan to the appropriate resource agencies (CDFW and RWQCB) for review prior to the start of construction of any pipeline that would use HDD installation to avoid surface waters. The Frac-out Contingency Plan shall be implemented where HDD installation under a waterway will occur to avoid, minimize, or mitigate for potential Project impacts during HDD installation, as specified in the Frac-out Contingency Plan. The Frac-out Contingency Plan shall include, at a minimum:

- 1) Measures describing training of construction personnel about monitoring procedures, equipment, materials and procedures in place for the prevention, containment, clean-up (such as creating a containment area and using a pump, using a vacuum truck, etc.), and disposal of released bentonite slurry, and agency notification protocols;
- 2) Methods for preventing frac-out including maintaining pressure in the borehole to avoid exceeding the strength of the overlying soil.
- 3) Methods for detecting an accidental release of bentonite slurry that include: (a) monitoring by a minimum of one designated monitor throughout drilling operations to ensure swift response if a frac-out occurs; (b) continuous monitoring of drilling pressures to ensure they do not exceed those needed to penetrate the formation; (c) continuous monitoring of slurry returns at the exit and entry pits to determine if slurry circulation has been lost; and (d) continuous monitoring by spotters to follow the progress of the drill bit during the pilot hole operation, and reaming and pull back operations.
- 4) Protocols that the contractor would follow if there is a loss of circulation or other indicator of a release of slurry.
- 5) Cleanup and disposal procedures and equipment the contractor would use if a frac-out occurs.
- 6) If a frac-out occurs, the contractor shall immediately halt work, implement the measures outlined in Item 5 of the Frac-out Contingency Plan to contain, clean-up, and dispose of the bentonite slurry, and, if the frac-out occurs in the water channel,

notify and consult with the staffs of the agencies listed above before HDD activities can begin again.

PV Water shall require the contractor to implement Frac-out Contingency Plan to ensure that measures are implemented to prevent frac-out and if a frac-out occurs, implement measures to contain, clean-up, and dispose of the bentonite slurry.

**Mitigation Measure BR-1b: Compensate for Temporary and Permanent Impacts to CRF Critical Habitat.**

Where temporary impacts to vegetation in CRF critical habitat occur, revegetation measures will include the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met. Temporarily impacted areas will be restored to pre-construction conditions with equivalent or greater habitat quality. Revegetation will include a 3:1 replacement ratio of trees lost on the acreage of CRF wetland habitat as a result of the Project to account for the reduced habitat value of smaller trees compared with mature vegetation (or an equivalent habitat replacement strategy as agreed upon by PV Water and the appropriate regulatory agencies). Success criteria for replanting will be less than 20 percent mortality of individual species annually for 5 years. Replanting will be conducted each year that plantings exceed 20 percent mortality, such that 80 percent plant survival is maintained each year of the 5-year monitoring period. Cover provided by invasive, non-native plant species shall not exceed 5 percent during each year of the 5-year monitoring period. If natural recovery is a viable strategy, then a wetland plant cover exceeding 50 percent should be attained after two growing seasons.

Where permanent impacts to CRF wetland habitat occur, mitigation may occur via restoration, creation, or preservation of wetlands that support CRF breeding. Mitigation will occur at a 3:1 ratio (or an equivalent habitat replacement strategy as agreed upon by PV Water and the appropriate regulatory agencies) at a site acceptable to permitting agencies and pursuant to Project permit requirements. If the compensatory mitigation includes restoration, enhancement, or creation of wetlands, a qualified biologist will monitor the designated wetland mitigation area for a minimum of five years to ascertain if the wetland mitigation is successful. Annual reports will be submitted to permitting agencies by December 31 of each monitoring year, describing the results of the monitoring and any remedial actions needed to achieve a minimum 3:1 habitat replacement ratio or equivalent for permanent impacts to wetlands and other waters.

**Mitigation Measure BR-1c: Avoid and Minimize Impacts on Special-status Bat Species.**

A qualified biologist who is experienced with bat surveying techniques, behavior, roosting habitat, and identification of local bat species shall be consulted prior to initiation of construction activities to conduct a preconstruction habitat assessment to characterize potential bat habitat and identify active roost sites. The preconstruction habitat assessment shall be conducted within 100 feet of construction activities conducted in and around riparian habitat.

Should potential roosting habitat or potentially active bat roosts be identified during the habitat assessment in trees and/or structures to be disturbed under the Project, the following measures shall be implemented:



1. Removal or disturbance of trees or structures identified as potential bat roosting habitat or active roosts shall occur when bats are active, approximately between the periods of March 1 to April 15 and August 15 to October 15, to the extent feasible. These dates avoid bat maternity roosting season (approximately April 15 to August 31) and periods of winter torpor (approximately October 15 to February 28).
2. If removal or disturbance of trees and structures identified as potential bat roosting habitat or active roosts during the periods when bats are active is not feasible, a qualified biologist would conduct pre-construction surveys within 14 days prior to disturbance to further evaluate bat activity within the potential habitat or roost site.
  - a. If active bat roosts are not identified in potential habitat during preconstruction surveys, no further action is required prior to removal of- or disturbance to trees and structures within the preconstruction survey area.
  - b. If active bat roosts or evidence of roosting is identified during pre-construction surveys, the qualified biologist shall determine, if possible, the type of roost and species.
    - i. If special-status bat species or maternity or hibernation roosts are detected during these surveys, appropriate species- and roost-specific avoidance and protection measures shall be developed by the qualified biologist in coordination with CDFW. Such measures may include postponing the removal of structures or trees, or establishing exclusionary work buffers while the roost is active. A minimum 100-foot no disturbance buffer shall be established around special-status species, maternity, or hibernation roosts until the qualified biologist determines they are no longer active. The size of the no-disturbance buffer may be adjusted by the qualified biologist, in coordination with CDFW, depending on the species present, roost type, existing screening around the roost site (such as dense vegetation or a building), as well as the type of construction activity that would occur around the roost site, and if construction would not alter the behavior of the adult or young in a way that would cause injury or death to those individuals.  
  
Under no circumstances shall active maternity roosts be disturbed until the roost disbands at the completion of the maternity roosting season or otherwise becomes inactive, as determined by the qualified biologist.
    - ii. If a non-maternity or hibernation roost (e.g., bachelor daytime roost) is identified, disturbance to- or removal of trees or structures may occur under the supervision of a qualified biologist as described under measure 3).
3. The qualified biologist shall be present during tree and structure disturbance or removal if active non-maternity or hibernation bat roosts or potential roosting habitat are present. Trees and structures with active non-maternity or hibernation roosts or potential habitat shall be disturbed or removed only under clear weather conditions when precipitation is not forecast for three days and when nighttime temperatures are at least 50 degrees Fahrenheit, and when wind speeds are less than 15 mph.
  - a. Trimming or removal of trees with active (non-maternity or hibernation) or potentially active roost sites shall follow a two-step removal process:
    - i. On the first day of tree removal and under supervision of the qualified biologist, branches and limbs not containing cavities or fissures in which bats could roost, shall be cut only using hand tools (e.g., chainsaws).

- ii. On the following day and under the supervision of the qualified biologist, the remainder of the tree may be removed, either using hand tools or other equipment (e.g. excavator or backhoe).
    - iii. All felled trees shall remain on the ground for at least 24 hours prior to chipping, off-site removal, or other processing to allow any bats to escape, or be inspected once felled by the qualified biologist to ensure no bats remain within the tree and/or branches.
  - b. Disturbance to or removal of structures containing or suspected to contain active bat (non-maternity or hibernation) or potentially active bat roosts shall be done in the evening and after bats have emerged from the roost to forage. Structures shall be partially dismantled to significantly change the roost conditions, causing bats to abandon and not return to the roost. Removal would be completed the subsequent day.
4. Bat roosts that begin during construction are presumed to be unaffected as long as a similar type of construction continues, and no buffer would be necessary. Direct impacts on bat roosts or take of individual bats would be avoided.

**Mitigation Measure AES-1: Construction Lighting** (refer to Section 3.13, Aesthetics)

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**Impact BR-2: Construction of Project components would result in a substantial adverse effect on riparian habitat or other sensitive natural community or on state or federally protected wetlands or waters through direct removal, filling, hydrological interruption, or other means. (*Less than Significant with Mitigation*)**

This section addresses potential construction impacts on riparian habitat, sensitive natural communities, and state or federally protected wetland or waters in the Project area. As described in the *Environmental Setting* discussion, the study area includes two sensitive natural communities and potential state or federally protected wetlands and waters.

**Direct Impacts**

Floating pennywort is located in Harkins Slough and Watsonville Slough. These features are considered sensitive natural communities, as well as potentially jurisdictional as regulated by the USACE, CDFW, and RWQCB. Currently, floating pennywort is present as a nearly solid mat of vegetation in the construction footprint, making this plant community unavoidable, and temporary impacts from possible open trench pipeline construction in Watsonville Slough and installation of screens on the Harkins Slough intake are anticipated. However, as an aggressive native species, floating pennywort is expected to rapidly recolonize the area following construction. Therefore, temporary and permanent impacts to floating pennywort would be *less than significant*.

Within the study area, willow riparian forest is present in three locations, as shown on Figures BIO-1e through BIO-1h in Appendix BIO: SW1, SW2, and SW3. SW1 is within the Struve Slough to filter plant pipeline alignment in a parcel owned by the Land Trust of Santa Cruz County immediately south of Watsonville Slough. Construction of the pipeline in this location will use the open trench method and result in temporary impacts to willow riparian forest. SW2 is

located on the southern bank of Struve Slough, within the Struve Slough to filter plant pipeline alignment. Construction of the Struve Slough to filter plant pipeline at this location will be by HDD and entry/exit pits will be outside of the willow riparian woodland habitat; therefore, no impacts are expected at SW2. SW3 is on the northern bank of Struve Slough within the intake pipeline alignment. Construction of the intake pipeline will use open trenching and result in temporary impacts to willow riparian forest. This would be a significant impact. Consistent with adopted Mitigation Measure BIO-1a, during design, PV Water would realign the segment of the Struve Slough to filter plant pipeline to avoid SW1 (the willow riparian forest within the Land Trust of Santa Cruz property). Temporary and permanent impacts to willow riparian forest would otherwise be mitigated by implementation of adopted **Mitigation Measure BIO-1c** (Revised).

Other potentially jurisdictional wetlands and waters in the study area include coastal freshwater marsh (CFM1, CFM2), agricultural wetland (FM1), Struve Slough (WS1), and ditches (D1 – D7) (Figure BIO-1 in Appendix BIO). Temporary impacts to these biological resources could occur due to open trench pipeline construction through coastal freshwater marsh, agricultural wetland, Struve Slough and ditches (D1 to D4, and D6) due to disturbance to, or removal of, wetland vegetation. For open trench pipeline construction in standing water, such as in Struve Slough, Watsonville Slough, Harkins Slough and most of the agricultural ditches, the installation of temporary coffer dams and dewatering devices, as needed, would result in temporary impacts to water quality due to increased turbidity. Similarly, the installation of the new screened intake in Struve Slough and the screen on the existing intake at Harkins Slough would require in-water work and, likely, the use of coffer dams, which would cause temporary impacts to water quality. Temporary impacts could also occur if pipeline construction using HDD resulted in frac-out, as described under Impact BR-1. Installation of screens and associated infrastructure would also result in permanent impacts to coastal freshwater marsh and Struve Slough. These impacts would be significant. Temporary and permanent impacts to coastal freshwater marsh, agricultural wetland, Struve Slough, and ditches will be mitigated by implementation of adopted **Mitigation Measure BIO-1d** (Revised).

Temporary and permanent impacts on riparian willow forest and other potentially jurisdictional wetlands and waters are shown below in **Table 3.4-2**.

### Indirect Impacts

Downstream of the Project footprint, the Watsonville Slough complex, a potentially jurisdictional wetland or water, and sensitive natural communities on the perimeter of the slough, could be subject to indirect impacts as a result of Project construction. The Watsonville Slough system is also located within the Coastal Zone and therefore may be considered an ESHA by the CCC/County LCP. Indirect impacts on sensitive natural communities outside the Project footprint could occur if construction activities inadvertently extend beyond the designated construction work area, if sediment is discharged downstream as a result of the installation of temporary cofferdams and dewatering, and/or if trash and debris is left in the features following construction. Other indirect impacts include sedimentation as a result of increased soil erosion from grading or trenching activities and degradation of water quality from pollutants (e.g., oil, hydraulic fluid) that are conveyed by surface water runoff from the construction site to offsite sensitive natural communities. These indirect impacts would be potentially significant.

**TABLE 3.4-2  
PERMANENT AND TEMPORARY IMPACTS TO RIPARIAN HABITAT  
AND STATE AND FEDERALLY- PROTECTED WETLANDS AND WATERS**

Resource Type (label on Aquatic Resources Figure 3.4-1)	Project Element	Permanent Impacts (acres)	Temporary Impacts (acres)
<b>Wetlands</b>			
Central Coast Arroyo Willow Riparian Forest (SW1, SW2, SW3)	SW1: Struve Slough to Filter Plant Pipeline crossing Land Trust Parcel (APN 052-221-25)	0	0.14
	SW2: Struve Slough to Filter Plant Pipeline crossing at Watsonville Slough	0	0
	SW3: Intake pipeline at Struve Slough	0	0.03
Coastal Freshwater Marsh (CFM1, CFM2)	CFM1: Filter Plant to Recharge Basins Pipeline	0	0.007
	CFM2: Struve Slough to Filter Plant Pipeline crossing Watsonville Slough and Harkins Slough, and installation of intake screen and supports	0.003	0.05
Cropland/Agricultural Wetland (FM1)	FM1: Struve Slough to Filter Plant Pipeline crossing APNs 052-221-24, 052-221-23, 052-221-09	0	1.21
<b>Wetlands Total</b>		<b>0.003</b>	<b>1.44</b>
<b>Other Waters</b>			
Struve Slough (WS1)	WS1: Struve Slough to Filter Plant Pipeline crossing Struve Slough via HDD WS1: Installation of Screened Intake	0.008	0.29
Ditch (D1 - D7)	D1: Filter Plant to Recharge Basins	0	0.17
	D2, D3, D4: Backwash and Raw Water Pipeline	0	0.18
	D5, D6, D7: Struve Slough to Filter Plant Pipeline	0	0.02
<b>Other Waters Total</b>		<b>0.008</b>	<b>0.66</b>

NOTE: There are no impacts associated with the pipeline crossings at D5 and D7 since pipeline crossings of these ditches will utilize microtunneling and HDD, respectively.

SOURCE: Environmental Science Associates, 2020.

PV Water would require the contractor to prepare and implement a SWPPP and best management practices to avoid or minimize water quality effects on aquatic sensitive natural communities, pursuant to adopted Mitigation Measure HWQ-1, which would reduce impacts from sedimentation and erosion to less than significant. Further, implementation of adopted Mitigation Measures BIO-1b, and revised adopted Mitigation Measures BIO-1c (Revised) and BIO-1d (Revised) would ensure that direct and indirect impacts on sensitive natural communities are *less than significant*. In accordance with Mitigation Measure BIO-1b, PV Water would require the contractor to implement measures to maintain water quality and to control erosion and sedimentation such as restricting trenching across all waterways to low-flow periods, diverting water around work areas, and placing sediment curtains downstream of the construction zone. In accordance with revised adopted Mitigation Measures BIO-1c and BIO-1d, PV Water would ensure that temporarily impacted sensitive natural communities are restored to pre-construction conditions and provide compensation for permanent loss of sensitive natural communities.

As described under Impact BR-1, the Struve Slough to filter plant pipeline would be installed beneath Struve Slough and ditch D5, all potentially jurisdictional features regulated by the USACE, CDFW, and RWQCB, as well as Watsonville Slough and Harkins Slough, which support the floating pennywort sensitive natural community described above, as well as being potentially jurisdictional features regulated by the USACE, CDFW, and RWQCB. The pipeline would be installed using HDD, requiring preparation of a Frac-out Contingency Plan and implementation of measures in the Plan to contain and clean-up any frac-outs in waterways to minimize impacts of frac-outs on sensitive natural communities pursuant to Mitigation Measure BR-1a.

### Impact Conclusion

Compliance with the adopted Mitigation Measures BIO-1b and HWQ-1, implementation of revised adopted Mitigation Measures BIO-1c and BIO-1d, and implementation of Mitigation Measure BR-1a would effectively reduce and mitigate impacts on sensitive natural communities, including potentially jurisdictional wetlands and waters, to a less-than-significant level. Thus, impacts would be *less than significant with mitigation*. Minimization of temporary and permanent impacts on sensitive natural communities (including potentially jurisdictional features regulated by the USACE, CDFW, and RWQCB) would be achieved through implementation of best management practices to protect water quality, and a Frac-out Contingency Plan to protect the sloughs and agricultural ditch D5. Mitigation for temporary and permanent impacts on sensitive natural communities would be achieved through on-site restoration and revegetation of areas temporarily impacted by construction, and on-site or off-site restoration, enhancement, or creation of wetlands to replace the area of sensitive natural communities that would be permanently lost. On and off-site revegetation would be carried out at a 3:1 replacement ratio, and according to a revegetation plan with stated success criteria. Success would be tracked and assessed through monitoring and reporting.

#### Mitigation Measure BIO-1c (Revised):

During design, PV Water will realign the Struve Slough to filter plant pipeline to avoid the willow riparian forest at location SW1. Where construction impacts on mixed riparian or willow riparian forest will otherwise occur, revegetation and restoration measures will be developed as part of a revegetation plan approved by CDFW, RWQCB, and if applicable, USACE, Santa Cruz County, and/or California Coastal Commission, pursuant to regulatory agency permitting. The revegetation plan will include specific plans for the revegetation and restoration of impacted willow riparian forest, and for restoration of nearby creek riparian habitat, as appropriate. No trees will be placed above pipelines. Upon approval by Santa Cruz County and other applicable agencies, PV Water the PVWMA may choose to coordinate with the Natural Resources Conservation Service (NRCS) and the Santa Cruz County Resource Conservation District (RCD) to develop and implement the required riparian revegetation, including providing funds to the RCD for their implementation of the revegetation. Revegetation measures will include the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met. Temporarily impacted areas will be restored to pre-construction conditions with equivalent or greater habitat quality. Revegetation will include a 3:1 replacement ratio of the acreage of willow riparian forest habitat lost and for all trees lost as result of the Project to account for the reduced habitat values of smaller trees compared with mature vegetation. Success criteria for replanting will be less

than 20 percent mortality of individual species ~~annually yearly~~ for 5 years. Replanting will be conducted each year that plantings exceed 20 ~~percent-%~~ mortality, such that 80 ~~percent-%~~ plant survival is maintained each year of the 5-year monitoring period. Cover provided by invasive, non-native plant species shall not exceed 5 ~~percent-%~~ during each year of the 5-year monitoring period. Mitigation may occur via restoration, creation, or preservation of wetlands or waters. Mitigation will occur at a site acceptable to permitting agencies and pursuant to the Project's permit requirements. If the compensatory mitigation includes restoration, enhancement, or creation of wetlands or waters, a qualified biologist will monitor the designated wetland mitigation area for a minimum of five years to ascertain if the wetland mitigation is successful. Annual reports will be submitted to permitting agencies by December 31 of each monitoring year, describing the results of the monitoring and any remedial actions needed to achieve a minimum 3:1 habitat replacement ratio or equivalent for permanent impacts on willow riparian forest.

**Mitigation Measure BIO-1d (Revised):**

Where construction or operational impacts on open water (creeks, streamssloughs, jurisdictional ditches), agricultural wetlands, or coastal freshwater marsh occurs, revegetation and restoration measures will be developed as part of a revegetation plan approved by CDFW, RWQCB, USACE, Santa Cruz County and/or California Coastal Commission, pursuant to regulatory agency permitting. Upon approval by ~~Santa Cruz County and other~~ applicable agencies, PV Water the PVWMA may choose to coordinate with the Natural Resources Conservation Service (~~NRCS~~) and the Santa Cruz County ~~Resource Conservation District (RCD)~~ to develop and implement the required wetland revegetation and restoration, including providing funds to the RCD for their implementation of the revegetation and restoration. The revegetation plan will include specific plans for the revegetation of impacted ~~coastal marsh wetlands~~, and for restoration of nearby wetland habitat, as appropriate. Revegetation measures will include the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met. Temporarily impacted areas will be restored to pre-construction conditions with equivalent or greater habitat quality. Revegetation will include a 3:1 replacement ratio (or an equivalent habitat replacement strategy as agreed upon by PV Water PVWMA and regulatory agencies) for impacted wetlands. If natural recovery is a viable strategy, then a wetland plant cover exceeding 50 ~~percent-%~~ should be attained after two growing seasons. Mitigation may occur via restoration, creation, or preservation of wetlands or waters. Mitigation will occur at a site acceptable to permitting agencies and pursuant to the Project's permit requirements. If the compensatory mitigation includes restoration, enhancement, or creation of wetlands or waters, a qualified biologist will monitor the designated wetland mitigation area for a minimum of five years to ascertain if the wetland mitigation is successful. Annual reports will be submitted to permitting agencies by December 31 of each monitoring year, describing the results of the monitoring and any remedial actions needed to achieve a minimum 3:1 habitat replacement ratio or equivalent for permanent impacts ~~on wetlands and other waters~~.

**Mitigation Measure BR-1a: Frac-out Contingency Plan (Refer to Impact BR-1)**

**Impact BR-3: Construction of Project components could interfere substantially with the movement of any native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. (*Less than Significant*)**

Construction-related impacts on breeding CRF and their habitat, and MBTA-protected nesting birds, are analyzed under Impact BR-1, and are mitigated by adopted Mitigation Measures BIO-1b, BIO-1c (Revised), and BIO-1d (Revised), BIO-2a through 2i, BIO-2j, HWQ-1, and BR-1a. No other nursery sites, such as egret or heron rookeries, are known from the study area.

When filled with stormwater runoff in winter and spring, the Watsonville Slough complex supports a variety of waterfowl, including ducks, herons, gulls and shorebirds. Watsonville Slough provides wintering habitat for many migratory bird species, and is noted for waterfowl abundance and diversity during the winter. It also provides migration habitat for many shorebird species during spring drawdown. In-water construction activities at Struve Slough is expected to occur over approximately 6 months in the winter and spring of 2022/2023. Harkins Slough filter plant upgrades, including in-water work, is expected to occur over 12 months 2024/2025. Because of the extent of the Watsonville Slough complex, and the relatively small area of the slough complex that will be disturbed at any given time, as well as the relatively short and asynchronous work windows, in-water work is not expected to significantly impact migratory birds. The remaining adjacent slough and open terrestrial habitat would remain intact and would provide wildlife passage around the construction activity, and the impact would be *less than significant*.

**Mitigation:** None required.

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**Impact BR-4: Project operations could result in a substantial adverse effect on riparian habitat or other sensitive natural community or on state or federally protected wetlands or waters through direct removal, filling, hydrological interruption, or other means. (*Less than Significant with Mitigation*)**

As discussed in Section 3.4.1, Environmental Setting, open water and mudflat habitat are present within the sloughs, and both Coastal Freshwater Marsh (wetland) and Central Coast Willow Riparian Forest (riparian) vegetation communities are present along the margins of the sloughs within the shallow inundation zone and adjacent to it, where a shallow groundwater table is present year-round. This band of riparian and wetland vegetation along the slough margins between approximately 6 feet and 9 feet North American Vertical Datum of 1988 (NAVD88) is the location of potential change resulting from water operations. The impact discussion below is separated into a brief discussion of wetland loss at the existing wetland-upland transition elevations, followed by a discussion of wetland and riparian habitat change at lower elevations along the slough banks.

To evaluate the potential loss of wetlands and wetland conditions at the upper wetland limit, the USACE's wetland hydrology standard was applied to the results of the hydraulic modeling

(Appendix HYD).<sup>81</sup> This standard requires a minimum duration (greater than 14 consecutive days) and frequency (minimum of 5 years in 10 or greater than or equal to 50 percent probability) of inundation or shallow groundwater table (within 12 inches of the soil surface) during the growing season. For each of the modeled years (2003 to 2018; Appendix HYD), ESA identified the highest elevation that was continuously inundated for a minimum of 14 days during the growing season (defined as February 1 to October 15). All modeled years (2003 to 2018) were used to generate a median value, corresponding with the frequency requirement (minimum of 5 years in 10 or greater than or equal to 50 percent probability) of the wetland hydrology standard. **Figure 3.4-3** shows the median value of all water years modeled for project operations as well as the base value which represents modeled existing conditions.

Figure 3.4-3 shows that the median base conditions (existing conditions) water surface elevation (WSE) for Harkins Slough for the period of 2003 to 2018 is 6.51 feet NAVD88 and for Struve Slough is 7.91 feet NAVD88. The median WSE for proposed project operations that meets the minimum inundation requirements for wetland hydrology would be 6.12 feet NAVD88 for Harkins Slough and 7.67 feet NAVD88 for Struve Slough. This summary of model results shows that the median water surface elevation supporting the minimum inundation requirements for wetland conditions will be lower with project operations than for existing conditions. The hydrology standard<sup>82</sup> includes not only surface water but also a shallow groundwater table within 12 inches, so another 12 inches of elevation was added to account for this capillary zone associated with the actual water surface elevation. Therefore, within the elevation ranges of 7.12 feet to 7.51 feet NAVD88 in Harkins Slough and 8.67 feet to 8.91 feet NAVD88 in Struve Slough wetland conditions may no longer be present. The areas within these narrow elevation bands include 11.9 acres in Harkins Slough and 3.6 acres in Struve Slough.

Within this zone, the anticipated change is a loss of sufficient wetland hydrology to support wetland conditions. Therefore, a gradual decline of coastal freshwater marsh wetlands in this band is the likely result, unless they are also supported by seep action or other upslope hydrology inputs such as tributary streams.

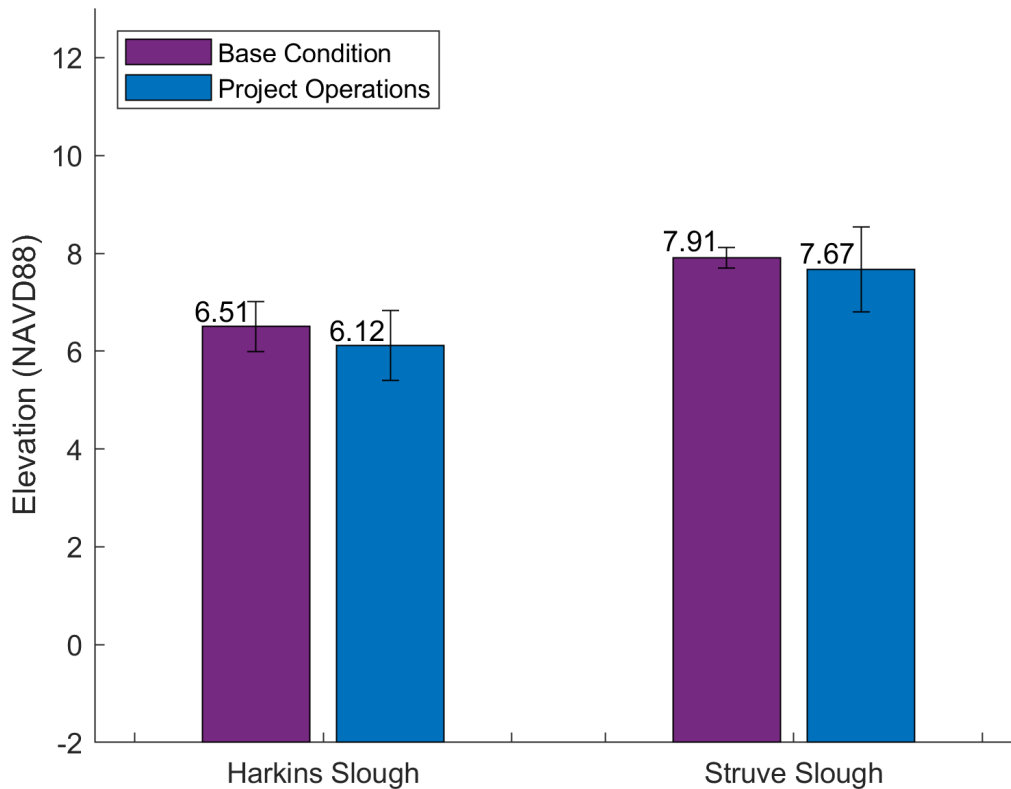
Where riparian trees and shrubs are established at the upper wetland limit, and at higher elevations around the sloughs, hydrology changes may have a minimal short-term effect because this existing vegetation may persist for many decades, and beyond, based on the existing below-ground connection to the groundwater table. A median WSE change of less than half a foot is unlikely to affect groundwater levels for riparian vegetation established on the slough banks to such a degree that it would decline solely based on the proposed project operations. A potential long-term impact would be a lack of recruitment of new riparian vegetation, except where riparian vegetation is also supported by other hydrology inputs such as seep activity upslope, and tributary streams.

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<sup>81</sup> USACE, *Technical Standard for Water-Table Monitoring of Potential Wetland Sites*, WRAP Technical Notes Collection (ERDC TN-WRAP-05-2), U. S. Army Engineer Research and Development Center, Vicksburg, MS., 2005.

<sup>82</sup> USACE, *Technical Standard for Water-Table Monitoring of Potential Wetland Sites*, WRAP Technical Notes Collection (ERDC TN-WRAP-05-2), U. S. Army Engineer Research and Development Center, Vicksburg, MS., 2005.





Note: This figure shows the median values of the highest elevation that was continuously inundated for a minimum of 14 days during the growing season (defined as February 1 to October 15) for modeled years 2003 to 2018. Bars show two standard deviations of the mean. Harkins Slough elevations were taken from the downstream storage area.

**Figure 3.4-3**  
Median Water Surface Elevation for  
Wetland Criteria

SOURCE: ESA, 2020

Within the elevation ranges that would continue to support wetland conditions with project operations (below 7.24 feet NAVD88 in Harkins Slough, and below 8.67 feet NAVD88 in Struve Slough), the main effect is likely to be an increase in the variability in WSE between years. As the model results show, water diversions would not be made in certain years, or would be very low, due to water quality limitations, consistent with existing operations in Harkins Slough. This means that in years where water diversions are not made, wetland hydrology conditions will be the same as existing. In years where water diversions do occur, WSEs will be lower than existing conditions during the growing season (approximately February through October) by around 1.5 to 2 feet in normal and wet years, and less than a foot in dry years for Harkins Slough. For Struve Slough, WSEs will be lower than existing conditions during the growing season by 2 feet in normal and wet years, and around 1.5 feet in dry years (Appendix HYD).

These dynamics are likely to result in a shift from perennial wetland, where it occurs, to more seasonal wetland vegetation. Emergent wetland areas dominated by cattails (*Typha* sp.), bur-reed (*Sparganium* sp.), or tule and bulrush (*Schoenoplectus* sp.) where it occurs, in favor of seasonal wetland which may support knotweeds (*Persicaria* spp.), rushes (*Juncus* spp.), spikerush (*Eleocharis macrostachya*), dock (*Rumex* spp.), fat hen (*Atriplex prostrata*), rabbits-foot grass (*Polypogon monspeliensis*), and many others. These changed conditions may also result in

establishment of riparian habitat at lower elevations because exposed mud banks in the early spring (March and April) in the 5 to 7 feet NAVD88 elevation range will provide suitable recruitment conditions for willows. The sloughs system is already a dynamic system with variability between years, but with diversions occurring in only some years, resulting in lower WSE when they do occur, this will increase the variability between years, leading to less stability in the fluctuation zone. These conditions are less conducive to coastal freshwater marsh and more conducive to seasonal wetland vegetation and mudflats, as well as riparian vegetation establishment.

The larger variability between years will increase the range of elevations that support wetland conditions, including mudflats, over time. Currently, the lower extent of wetland and riparian vegetation is around 6 feet NAVD88 in Harkins Slough and 7 feet NAVD88 in Struve Slough. Based on the modeled project operations, in normal and wet years when diversions are made, WSEs are expected to be 1.5 to 2 feet lower starting around February and continuing through the growing season (refer to Appendix HYD). Based on the model, the lowest drawdown elevation for Harkins and Struve Sloughs, starting in April, will be 4.5 feet NAVD88, 1.5 feet lower than the existing operations in Harkins Slough which is currently set at 6 feet NAVD88. This lower drawdown elevation in the spring will potentially expand the elevation range, and corresponding area, that support wetland conditions. As discussed above, this increased range is likely to support wetland types that are less sensitive to year to year changes such as mudflats, seasonal wetland, and riparian vegetation. The effect will be greater in Struve Slough than Harkins Slough because the existing WSEs and corresponding wetland habitats are higher in that part of the sloughs system (between 7 feet to 9 feet NAVD88), so a drop in WSE to 4.5 feet in years when the Struve Slough pump is operating would greatly increase the area of slough banks suitable for colonization by seasonal wetland and riparian vegetation.

The change in character from open water aquatic habitat to mudflat, seasonal wetland, and possibly riparian vegetation between elevations 4.5 feet and approximately 6 feet to 7 feet NAVD88 represents a reduction in the overall area of open water aquatic habitat, as well as shallower aquatic habitat conditions throughout the sloughs systems in years when diversions are made. The current extent of open water aquatic habitat includes areas below approximately 6 feet NAVD88 in Harkins Slough and approximately 7 feet NAVD88 in Struve Slough, totaling around 460 acres. In years when water diversions are made at both Harkins and Struve Sloughs, the WSE may drop to 4.5 feet NAVD88, and potentially lower with combined operations and natural evaporation. With a WSE of 4.5 feet NAVD88, the area of open water aquatic habitat in the sloughs system would be around 259 acres.

In summary, the overall effects of proposed project operations in Harkins and Struve Sloughs include a small shift downslope in the upper limit of wetland conditions, combined with an increase in the WSE range that will support wetland conditions over time (i.e., an extension of the range to lower elevations in years when water is diverted). This will likely result in a greater area of mudflat and seasonal wetland habitat, and possible colonization of willows at lower elevations, and in locations that are no longer able to support emergent marsh vegetation (comprised of cattails, tules, and bur-reed) due to the year to year variability. The shift and expansion of wetland conditions to lower elevations along the slough banks will change the character of aquatic habitats in the 4.5 feet

to approximately 6 to 7 feet NAVD88 elevation band, resulting in less area of permanently inundated open water aquatic habitat, and a greater area of mudflat, seasonal wetland, and riparian habitat.

The overall reduction in open water aquatic habitat in years when water is diverted is less than significant because with the project around 259 acres of open water aquatic habitat remain, which provides adequate area for fishes and other aquatic organisms. In addition, peat-mined areas in Harkins Slough that are now managed by CDFW have depths of over 10 feet, and are now perennial lacustrine habitat. Since being dredged in the 1980s, this approximately 30-acre area of deep water has existed within a seasonal wetland complex. This deep open water habitat serves as summer and drought-period refuge habitat for the native and non-native warm-water fishes that inhabit the sloughs and now support nesting ospreys and bald eagles. Conversely, this area also has allowed for an expanding predatory fish population that adversely impacts CRF breeding and rearing potential in the sloughs contiguous open-water and emergent marsh wetland habitats. As a result, the impact of the loss of open water habitat under project implementation is buffered by the existence of a consistent, perennial lacustrine habitat that did not exist in the Watsonville Slough system prior to 1982.

The anticipated decline of Coastal Freshwater Marsh within the elevations that may no longer support wetland conditions (elevations 7.24 feet to 7.70 feet NAVD88 in Harkins Slough and 8.67 feet to 8.98 feet NAVD88 in Struve Slough) is a potentially significant impact. This impact would be partially offset by the overall increase in area of wetlands (mudflat, seasonal wetland, and riparian habitat) along the slough banks; however, revised adopted Mitigation Measure BIO-1d would be implemented to compensate for the type change, and would reduce this impact to less-than-significant by on-site or off-site restoration, enhancement, or creation to replace the area of wetland that would be permanently lost.

### **Impact Conclusion**

Implementation of revised adopted Mitigation Measure BIO-1d, presented under Impact BR-2, would effectively reduce operational impacts to CRF to *less than significant with mitigation*.

#### **Mitigation Measure BIO-1d (Revised) (Refer to Impact BR-2)**

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### **Impact BR-5: Project operations could result in a substantial adverse effect on terrestrial special-status species. (*Less than Significant with Mitigation*)**

Special-status terrestrial wildlife species that have a moderate or high potential to occur within or adjacent to the Project operation areas (Struve Slough and Harkins Slough) include Congdon's tarplant, Santa Cruz tarplant, CRF, WPT, MBTA-protected and special-status nesting birds, and western red bat (refer to Table BIO-1 in Appendix BIO). Potential operation-related impacts on these species are addressed below, based on the WSE and habitat changes described under Impact BR-4.

Several special-status bird species, including white-tailed kite, bald eagle, and yellow warbler, as well as many common land bird and waterfowl species, have at least a moderate-to high potential

to nest within the study area. Suitable roosting habitat for western red bat is present among tree and shrub foliage edge habitat.

### **Congdon's Tarplant and Santa Cruz Tarplant**

Within the study area, Congdon's tarplant, could be present in ruderal habitat or margins of the sloughs, specifically in terraces, swales, and floodplains. This species is not expected to be impacted by project operations since, as described under Impact BR-4, changes in WSE are likely to result in a small shift downslope in the upper limit of wetland conditions. This means that there would not be a loss of upland habitat, where Congdon's tarplant could be present. Similarly, Santa Cruz tarplant is not expected to be impacted by project operations since, if it were present in the study area, it would be in upland ruderal habitat. Therefore, impacts on special-status plants would be *less than significant*.

### **California Red-legged Frog**

California red-legged frogs are known to inhabit the Watsonville Sloughs, and are assumed to be present in all life stages, year-round. While they have been widely observed around the sloughs since 1990, their numbers are low, and they are subject to the pressures of a large, expanding bullfrog population. Given the long history of agricultural conversion of bottomland wetland habitats and peat mining in the sloughs, the historic range and size of the local CRF population is unknown. In the past 40 years, the lower elevations in sloughs have been undergoing a gradual re-conversion to wetland and open water habitat while the uplands have been subject to urbanization and expansion of irrigated agriculture. As a result, the status of the CRF population throughout the slough system is not completely understood at this time.

Focused CRF breeding season surveys conducted in the project area for the Land Trust of Santa Cruz and the Resource Conservation District of Santa Cruz County from 2012 to 2016 found that CRF successfully bred in a range of emergent marsh habitats in the system. While the overall number of egg masses detected each year was relatively low for the area studied, CRF were found to opportunistically breed in a variety of hydrologically-suitable early-successional and established wetland habitats that have evolved since the cessation of the active bottomland row-crop agriculture. Egg masses observed in habitats to be impacted by the proposed Struve Slough diversion were found in formerly farmed areas with ground surface elevations of 6 feet and 8 feet NAVD88 in water that was approximately 1.0 foot to 2.5 feet deep. The CRF breeding season in this study area was found to extend from early January through March. In the Middle Watsonville Slough breeding areas, egg mass locations were found to be dry by late June to early July, while the vestigial farm field perimeter ditchlines provided vegetative cover and summering aquatic habitats for young metamorph and resident CRF through the late summer and early fall. The 2012 to 2016 CRF studies also found that disturbance of CRF egg masses by large carp and foraging waterfowl was common in the contiguous sloughs. CRF egg masses in the off-channel ponds and the tributary agricultural ditches were not impacted by fish, but were similarly impacted by congregating and feeding waterfowl.

The presence of predatory fish and a large and expanding bullfrog population appears to limit the viability of CRF in the system under existing conditions; however, good quality CRF summering and rearing habitat exists throughout the slough system due to the expansive perennial marshes,

riparian woodlands and remaining grassland, oak woodland and scrub margins providing a mix of escape cover and foraging habitat.

Based on the hydrologic modeling for the proposed diversions, project operations would potentially impact aquatic habitats that support breeding, rearing and summering CRF, by:

- Altering the seasonal extent of flooded emergent marsh habitat in diversion years;
- Affecting WSE in the main sloughs' CRF breeding areas during breeding season, which could result in drawdown leading to desiccation of egg masses in shallow emergent vegetation and stranding of CRF larvae;
- Concentrating predatory fish and birds by lowering WSE in areas that support CRF breeding and rearing; and,
- Reducing spring and summer CRF rearing habitat through water withdrawals in years when water quality is adequate for use in the recharge facilities.

These would be significant impacts. Mitigation Measure BR-1b would reduce impacts to CRF to ***less than significant with mitigation*** by requiring restoration, enhancement, or creation of CRF breeding habitat.

#### Noise and Lighting

The primary noise sources during operation of the Projects would be the new onsite pumps at the Struve Slough pump station and replacement pumps and an enclosed blower at the expanded Harkins Slough filter plant, which would be designed to meet Santa Cruz County noise standards. The noise associated with operations at the Harkins Slough filter plant and Struve Slough pump station is not expected to impact CRF due to the small, focused area where the noise would occur relative to available CRF habitat within the sloughs watershed. CRF would be expected to easily avoid the area or habituate to the noise as it has for existing operations, and the use of motorized farm equipment and vehicles in the vicinity of the sloughs associated with farming. As described in Section 2.7.1.3 in Chapter 2, *Project Description*, existing lighting at the Harkins Slough filter plant would be supplemented by additional exterior lighting at the new filters. Exterior security lighting proposed at the Struve Slough screened intake and pump station would be limited to nighttime security lighting. Lighting for the Project components would be required to comply with the California Green Building Standards Code 5.106.8 Light pollution reduction,<sup>83</sup> which would reduce the amount of light that would extend beyond property boundaries. Noise and lighting impacts associated with project operations are, therefore, expected to be ***less than significant*** for CRF.

<sup>83</sup> 2019 California Green Building Standards Code, Title 24, Part 11. Chapter 5 – Non-residential Mandatory Measures. Available online at <https://codes.iccsafe.org/content/CAGBSC2019/chapter-5-nonresidential-mandatory-measures>. Accessed on May 19, 2020.

### Western Pond Turtle

Western pond turtle is known to occur in the Watsonville Sloughs in very low numbers, possibly due to the area's long history of wetland reclamation and row-crop agriculture. Only a handful of observations of adult WPT have been recorded since 2000.<sup>84</sup> This species is not known to breed in the project area, and impacts associated with project operations are expected to be *less than significant* for WPT.

### Special-Status and MBTA-Protected Nesting Birds and Raptors

Several special-status and MBTA-protect bird species have a moderate to high potential to nest within the study area, including white-tailed kite, bald eagle, osprey, and yellow warbler (refer to Table BIO-1 in Appendix BIO). While burrowing owl has a moderate potential to occur in the study area during winter, this species is not expected to breed there. Habitat conversion resulting from project operations would affect special-status and MBTA-protected nesting birds differently depending on species-specific nesting requirements. In general, the projected increase in riparian habitat over time would favor nesting white-tailed kites and yellow warblers and many common riparian land birds by expanding their preferred nesting habitat. Osprey that nest in the area use human-made structures in upland habitat and would not be expected to be impacted by project operations.

The primary noise sources during operation of the Projects would be the new onsite pumps at the Struve Slough pump station and replacement pumps and an enclosed blower at the expanded Harkins Slough filter plant, which would be designed to meet Santa Cruz County noise standards. The noise associated with operations at the Harkins Slough filter plant and Struve Slough pump station is not expected to impact nesting birds due to the small, focused area where the noise would occur relative to the amount of available nesting habitat in the sloughs. Nesting birds would be expected to nest elsewhere in the slough or habituate to the noise as they have for existing operations, and the use of motorized farm equipment and vehicles associated with farming in the vicinity of the sloughs. As discussed above under the California red-legged frog analysis, lighting for the Project components would be required to comply with the California Green Building Standards Code 5.106.8 Light pollution reduction.<sup>85</sup> Therefore, potential habitat changes, noise and lighting resulting from Project operations would result in a *less than significant* impact on special-status and MBTA-protect nesting birds and raptors.

Potential operational impacts on native resident and migratory bird movement, corridors, and nursery sites are discussed in Impact BR-7.

### Special-Status Roosting Bats

Suitable roosting habitat for western red bat is present among tree and shrub foliage edge habitat. The projected increase in riparian habitat over time would be expected to increase roosting habitat for western red bat. The primary noise sources during operation of the Projects would be the new onsite pumps at the Struve Slough pump station and replacement pumps and an enclosed blower

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<sup>84</sup> KEC, personal observation, 2020.

<sup>85</sup> 2019 California Green Building Standards Code, Title 24, Part 11. Chapter 5 – Non-residential Mandatory Measures. Available online at <https://codes.iccsafe.org/content/CAGBSC2019/chapter-5-nonresidential-mandatory-measures>. Accessed on May 19, 2020.

at the expanded Harkins Slough filter plant, which would be designed to meet Santa Cruz County noise standards. The noise associated with operations at the Harkins Slough filter plant and Struve Slough pump station is not expected to impact roosting bats due to the small, focused area where the noise would occur relative to the amount of available roosting habitat in the sloughs. Roosting bats would be expected to roost elsewhere in the sloughs or habituate to the noise as they have for existing operations, and the use of motorized farm equipment and vehicles associated with farming in the vicinity of the sloughs. Therefore, potential habitat changes and noise resulting from Project operations would result in a *less than significant* impact on special-status roosting bats.

### Impact Conclusion

Implementation of adopted Mitigation Measure BR-1b, presented under Impact BR-1, and NOI-2 would effectively reduce operational impacts to CRF to *less than significant with mitigation*.

#### Mitigation Measure BR-1b: Compensate for Temporary and Permanent Impacts to CRF Critical Habitat (Refer to Impact BR-1)

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### Impact BR-6: Project operations could result in a substantial adverse effect on special-status fish species. (*Less than Significant*)

#### Harkins and Struve Sloughs

As described above, special-status fish species have not been documented in the Project area and are unlikely to occur there. Moreover, the Project area is excluded from federally designated critical habitat for tidewater gobies and S-CCC steelhead. Nevertheless, special-status fish species are known or assumed to occur downstream of the project area in the Pajaro River Lagoon and lower Watsonville Slough. There are currently no permanent barriers to fish movement between the lagoon and sloughs Project area, and therefore the potential for occasional straying of special-status fish species into the project area exists. As discussed under Impact BR-4 above, project operations are modelled to result in an approximately 1.5- to 2-foot decrease in WSEs in the sloughs between February and October, a combined 18.6 acres of wetland habitat loss, and the potential conversion of up to 200 acres of open water habitat to mudflat, seasonal wetland, and possibly riparian vegetation. However, water depths will remain at or above 4.5 feet NAVD88 and approximately 259 acres of open water habitat will remain. Given the generally unsuitable habitat conditions (e.g., warm summer water temperatures, muddy bottom) in the project area for special-status species, the potential loss in habitat extent and depth are not expected to adversely affect individual fish that may, on occasion, stray into the project area. Moreover, the intakes within Harkins and Struve Sloughs would be screened in accordance with current CDFW fish screening requirements to prevent entrainment and impingement of any special-status fish that may be present in the vicinity of the diversions at the time of operation. As such, operational impacts of the project on special-status fish species within Harkins Slough and Struve Slough area would be *less than significant*.

### **Pajaro River Lagoon**

Beach berm-built estuaries such as the Pajaro River Lagoon typically support a wide diversity of habitats and microhabitats and are known to be highly productive. Juvenile steelhead in particular have been shown to benefit from significant growth rates when rearing in estuaries and lagoons, and tidewater gobies are endemic to those ecosystems. Juvenile steelhead are currently not known to utilize Pajaro River Lagoon for extended rearing, and the estuary is assumed to function largely as a migratory corridor for adult and smolt steelhead when the sandbar is open. Tidewater gobies have been documented to occur in the Pajaro River Lagoon and lower Watsonville Slough in low numbers. As described in Section 3.3, Surface Water, Groundwater, and Water Quality, the Project would affect freshwater inflows to the Pajaro River Lagoon. Based on the results of an updated quantified conceptual model for the study area (Appendix HYD), the Sloughs complex contributes a relatively small amount of inflow to the lagoon compared to inflows from the mainstem Pajaro River. The updated model results conclude that the Project would have negligible effects on water levels in the Pajaro River Lagoon. Similarly, effects of Project on the timing and duration of seasonal beach berm closure events would be minimal (i.e., potentially a few days earlier) and within the expected uncertainty of model predictions and natural interannual hydrologic variations. As such, the hydrology and habitat conditions of the lagoon are not expected to change appreciably and impacts on special-status fish species utilizing the lagoon would be *less than significant*.

**Mitigation:** None required.

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### **Impact BR-7: Project operations could interfere substantially with the movement of native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. (*Less than Significant*)**

As described in Impact BR-3, the Watsonville Slough complex is an important site for migratory birds overwintering in the slough complex, and for birds resting and feeding at the slough complex during spring migration. These migrants depend on open water habitat, shallow emergent marsh, mudflats, and riparian vegetation for resting and feeding.

Open water habitat is used by waterfowl as a resting place that is relatively safe from predators, as well as for foraging on aquatic plants and invertebrates. The reduction in the overall area of open water aquatic habitat, as well as shallower aquatic habitat conditions throughout the slough complex in years when diversions are made, could affect the type and productivity of forage and prey for overwintering waterfowl. For example, as the volume of habitat for aquatic plants and invertebrates would decrease, warmer water temperatures and corresponding decreases in dissolved oxygen in shallower water could impact primary productivity. The filling of the Watsonville Slough complex in late fall and winter is dependent on rainfall runoff, and would remain unchanged from current conditions. Effects on the arrival timing for wintering waterfowl that use the Slough are, therefore, not expected. As described in Impact BR-4, project operations would result in a decrease of about 200 acres of open water habitat in years when water is diverted during the agricultural growing season (approximately February through October). Departure times of wintering waterfowl vary by species, but local eBird data and data from the



2014 to 2018 College Lake Waterfowl Studies, a waterfowl overwintering site approximately 5 miles from the Watsonville Slough complex, indicates that the majority of wintering ducks leave the sloughs and College Lake by late April to early May, which means open water habitat will begin to decrease for several months prior to waterfowl leaving the site.

Although project operations will result in a large decrease in surface area of open water habitat, 259 acres of open water habitat in the Watsonville Slough complex will remain to support overwintering waterfowl. In addition, the lower WSE in the slough complex will likely be an overall benefit to these species. The Watsonville Slough complex has been in a state of flux for many decades due to increased deposition of sediment from adjacent upland agricultural lands into the agricultural ditches and main Watsonville Slough outlet channel downstream of the Santa Cruz Branch Rail culvert crossing, resulting in a rising WSE in all sloughs upstream. As a result, a succession from croplands, to seasonal wetland, to open water has occurred in the sloughs upstream of San Andreas Road and along the Sloughs' margins. Current spring and summer standing water levels in the Watsonville Slough complex are similar to the peak water levels during 1982, an El Niño year that was the wettest on record prior to 2017. Rising, and sustained WSE has resulted in deeper aquatic habitat over mudflats, dieback of seasonally flooded riparian areas in middle Harkins Slough and Hanson Slough and expansion of water smartweed (*Persicaria amphibian*) throughout Harkins Slough, which has resulted in decreased habitat quality for overwintering waterfowl. The lowering of the WSE as a result of project operations will result in shallower water levels that support emergent seasonal wetland, and more diverse vegetation suitable for waterfowl forage.

Project operations would also result in changes to the types of wetland vegetation within an estimated 14.0 acres in Harkins Slough and 4.6 acres in Struve Slough along the slough margins. Variable WSE conditions are less conducive to the currently dominant coastal freshwater bur-reed (*Sparganium* sp.), and more conducive to mudflats, seasonal wetland, and riparian vegetation. The resulting habitat conversion would result in mudflats in summer and fall, and the potential expansion of more diverse seasonal wetland and willow riparian habitat over time. Coastal freshwater marsh is expected to decrease. Therefore, bird species that forage on mudflats, in seasonal wetland and in riparian habitat may benefit from project operations, and bird species that forage in coastal freshwater marsh could see foraging opportunities decrease. Some species may also have the flexibility to forage in several habitats, such as seasonal wetland and coastal freshwater marsh, in which case foraging opportunities could be unchanged under project operations. Overall, project operations will have a *less than significant* impact on migrating birds.

Operational impacts on breeding CRF and their habitat, and MBTA-protect nesting birds, are analyzed under Impact BR-5. No other nursery sites, such as egret or heron rookeries, are known from the study area; therefore, no operational impacts are expected to avian nursery sites.

**Mitigation:** None required.

**Impact BR-8: Implementation of the Project could conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. (*Less than Significant*)**

Installation of the pipelines using open trenching across ditches D1 through D4, D6 and D7, and crossing Struve Slough (intake pipeline) and Watsonville Slough is anticipated, within sensitive habitat and the riparian corridor as defined in Santa Cruz County Code, Chapter 16.30 Riparian Corridor and Wetland Protection. As discussed in Section 3.4.2.3, California Government Code Section 53091 exempts agencies like PV Water from complying with local building and zoning ordinances when locating or constructing facilities for the production, generation, storage, treatment, or transmission of water. This discussion is intended to support City and County consideration of Project consistency with general plans as well as issuance of a Coastal Development Permit for the Watsonville Slough System Managed Aquifer Recharge pipeline.

Implementation of mitigation measures discussed in Impacts BR-1 through BR-7 would limit the Project's potential conflicts with local policies or ordinances by reducing the Project's impacts on biological resources. Implementation of adopted Mitigation Measure BIO-1b and revised adopted Mitigation Measures BIO-1c (Revised) and BIO-1d (Revised) would reduce impacts on sensitive habitats and riparian corridors, and potential conflict with local policies and codes to less than significant. In accordance with adopted Mitigation Measure BIO-1b, PV Water would implement measures to maintain water quality and to control erosion and sedimentation such as restricting trenching across all waterways to low-flow periods, diverting water around work areas, and placing sediment curtains downstream of the construction zone. In accordance with revised adopted Mitigation Measures BIO-1c and BIO-1d, PV Water would ensure that temporarily impacted sensitive natural communities are restored to pre-construction conditions and provide compensation for permanent loss of sensitive natural communities.

There is a potential conflict with Santa Cruz County General Plan/Local Coastal Plan Policy 5.6.1, which states, "pending a determination based on a biological assessment, preserve perennial stream flows at 95 percent of normal levels during summer months and at 70 percent of the normal winter baseflow levels. Oppose new water rights which would diminish the instream flows necessary to maintain anadromous fish runs and riparian vegetation below the 97 percent/70 percent standard." Project operations may conflict with this policy, although downstream flows are already highly diminished due to high deposition of sediment throughout the slough complex from adjacent agricultural lands. Biological Assessments would be prepared to support federal consultation under Section 7 of FESA. The Project would comply with any conditions of the Section 7 consultation and would ensure consistency with FESA requirements for the protection of federally listed threatened and endangered species and critical habitat.

Chapter 16.34 of the Santa Cruz County Code restricts actions that would cause adverse effects to significant trees within the Coastal Zone.<sup>86</sup> A group of mature trees on the north edge of the proposed southeast recharge basin is planned for removal and is within the Coastal Zone; these may be significant trees according to the County Code. If so, removing the significant trees would require prior approval pursuant to Chapter 18.10 (Permit and Approval Procedures). Compliance with Chapter 16.34 of the Santa Cruz County Code would result in impacts that are *less than significant*.

**Mitigation:** None required.

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### ***Cumulative Impacts***

**Impact C-BR-1: The Projects, in combination with past, present, and probable future projects in the Project area, could result in significant adverse impacts on special-status species, sensitive natural communities and wetlands, wildlife corridors or nursery sites, or conflicts with local plans and policies. (*Less than Significant with Mitigation*)**

The geographic scope of analysis for cumulative impacts on sensitive biological resources includes the project site and Watsonville Slough complex. The cumulative impact analysis considers whether the incremental effects of the Project, when combined with the effects of past, present, and reasonably foreseeable projects (as listed in Table 3.1-1 and shown on Figure 3.1-1 in Section 3.1, Overview), would result in cumulatively considerable impacts on special-status species and sensitive natural communities, including wetlands or other waters of the U.S. or state, or on wildlife movement corridors or nursery sites.

### **Special-Status Species**

#### **Construction**

Construction activities may impact special-status species in Harkins Slough and Struve Slough including special-status plants (Congdon's tarplant and Santa Cruz tarplant), special-status fish, CRF, WPT, and western red bat during open trenching pipeline installation and other ground disturbing activities; upgrades to the Harkins Slough filter plant, including installation of intake screens; construction of the Struve Slough pump station, screened intake and intake pipeline. Species could be impacted by direct impacts, such as mortality or injury caused by vehicles, equipment, or ground disturbance, or indirect impacts, such as water quality impacts associated

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<sup>86</sup> Significant trees are defined in the County Code as any tree, sprout clump, or group of trees that is (A) Within the urban services line or rural services line, any tree which is equal to or greater than 20 inches diameter at breast height (d.b.h.) (approximately five feet in circumference); any sprout clump of five or more stems each of which is greater than 12 inches d.b.h. (approximately three feet in circumference); or any group consisting of five or more trees on one parcel, each of which is greater than 12 inches d.b.h. (approximately three feet in circumference); or (B) outside the urban services line or rural services line, where visible from a scenic road, any beach, or within a designated scenic resource area, any tree which is equal to or greater than 40 inches d.b.h. (approximately 10 feet in circumference); any sprout clump of five or more stems, each of which is greater than 20 inches d.b.h. (approximately five feet in circumference); or, any group consisting of 10 or more trees on one parcel, each greater than 20 inches d.b.h. (approximately five feet in circumference).

with this work and general habitat degradation (e.g., trash, invasive plant seeds) during the construction period as well.

As with the Project, the following other projects may similarly impact these special-status species during construction:

- PV Water College Lake Integrated Resources Management Project (special-status fish, CRF, WPT);
- PV Water Murphy Crossing with Recharge Basins (CRF, WPT, nesting birds, steelhead);
- Recharge Net Metering Pilot Program (CRF);
- USACE Pajaro River Flood Risk Management Study Project (CRF and steelhead); and
- City of Watsonville Lee Road Trail Connector (possible impacts on CRF).

The combined effects of the Project and the cumulative projects listed above could result in a cumulatively significant impact on special-status fish, CRF, and WPT; therefore, these are the only special-status species evaluated further in the section. These cumulative projects would be required to comply with applicable regulatory requirements protecting biological resources and project-specific mitigation measures (where applicable) similar to those of the Project.

As discussed in Impact BR-1, implementation of adopted Mitigation Measures BIO-1b, BIO-2a through BIO-2h, and HWQ-1, supplemented by Mitigation Measures BR-1a, BR-1b, and AES-1 would reduce, avoid or minimize the project's impacts on special-status fish, CRF, and WPT. These protective requirements would avoid or minimize the project's contribution to significant cumulative impacts on special-status species and their habitat such that the Project's contribution to cumulative impacts would not be cumulatively considerable.

### Operational Impacts on Fish

#### *Pajaro Lagoon*

Implementation of the Projects would have negligible effects on water surface elevations and Pajaro River Lagoon closure timing and duration. However, flood control and water supply projects throughout the Pajaro Valley Groundwater Basin could affect water levels and mouth closure timing in the Pajaro Lagoon. Modeling of the cumulative project conditions (Appendix HYD) indicates a potential increase in the likelihood of the lagoon mouth being closed during spring, but otherwise would not alter the likelihood of breaching the lagoon. The modelled effects of the cumulative projects are driven primarily by the College Lake Integrated Resources Management Project, which will eliminate the existing practice of artificial pumping of College Lake water into Salsipuedes Creek, and ultimately the Pajaro River Lagoon, during the spring. The effects of the College Lake project's reduction in artificial inflows on lagoon closure depend largely on the relative annual wetness of conditions. Differences in closure timing and water levels were modelled to be negligible in above-normal water years (e.g., 2016 and 2017) as well as in a very dry water year (e.g., 2014). However, in the spring of below-average water year 2015, reduced flows to the lagoon during the last rainstorm of the year under future cumulative conditions allowed waves to close the lagoon earlier by about five to six weeks. Given the small

sample size (2014 to 2017), it is unclear how relevant these results are. While the predicted changes in closure timing in 2015 are within the expected uncertainty of model predictions for number of closure days per month (10 to 20 percent), it may be possible that during especially dry years, lower inflows could allow waves to close the mouth sooner in the year than would occur under the existing conditions of artificial pumping to drain College Lake. The Projects, however, would have a minimal effect on the predicted cumulative changes to water levels in the lagoon and seasonal mouth closure timing and duration.

### Operational Impacts on Special-Status Terrestrial Species

Project operations would potentially change the composition of some habitat types that support special-status fish, CRF and WPT, as described above under Impact BR-4. These changes include:

- Within the elevation ranges of 7.24 feet to 7.70 feet NAVD88 in Harkins Slough and 8.67 feet to 8.98 feet NAVD88 in Struve Slough wetland conditions may no longer be present. The areas within these narrow elevation bands include 14.0 acres in Harkins Slough and 4.6 acres in Struve Slough.
- Within the elevation ranges that will continue to support wetland conditions with proposed project operations (below 7.24 feet in Harkins Slough, and below 8.67 feet in Struve Slough), the main effect is likely to be an increase in the variability in WSE between years. This is shown in the modeling to occur due to these factors:
  - In years where water diversions are not made due to water quality constraints, wetland hydrology conditions will be the same as existing.
  - In years where water diversions do occur, WSEs will be lower than existing conditions during the growing season (approximately February through October) by around 1.5 to 2 feet in normal and wet years, and less than a foot in dry years for Harkins Slough. For Struve Slough WSEs will be lower than existing conditions during the growing season by 2 feet in normal and wet years, and around 1.5 feet in dry years (Appendix HYD).

The overall effects of project operations in Harkins and Struve Sloughs include a small shift downslope in the upper limit of wetland conditions, combined with an increase in the WSE range that will support wetland conditions over time (i.e., an extension of the range to lower elevations in years when water is diverted). This will likely result in a greater area of mudflat and seasonal wetland habitat, and possible colonization of willows at lower elevations, and in locations that are no longer able to support emergent marsh vegetation (comprised of cattails, tules, and bur-reed) due to the year to year variability. The shift and expansion of wetland conditions to lower elevations along the slough banks will change the character of aquatic habitats in the 4.5 feet to approximately 6 to 7 feet NAVD88 elevation band, resulting in less area of permanently inundated open water aquatic habitat, and a greater area of mudflat, seasonal wetland, and riparian habitat. The analysis of potential impacts concluded that this habitat conversion would result in less-than-significant impacts on special-status fish species and WPT due to the similar function and value for these species that the converted habitats provide compared with baseline conditions. The analysis concluded that this habitat conversion would result in a less-than-significant-with-mitigation impact on breeding CRF due to a reduction in breeding habitat in diversion years, the potential for egg

desiccation and larval stranding during spring drawdown, concentration of predatory fish and birds by lowering WSE levels in CRF breeding areas.

As with the Project, operation of the following other projects may impact these special-status terrestrial species through habitat conversion:

PV Water College Lake Integrated Resources Management Project (steelhead impacted by longer inundation season that allows populations of non-native predatory fish to increase; and, CRF and WPT injured or killed by maintenance equipment)

Although impacts from the current Project and the College Lake Integrated Resources Management Project could cumulatively impact CRF, the College Lake Integrated Resources Management Project would be required to comply with applicable regulatory requirements protecting biological resources and project-specific mitigation measures (where applicable) similar to those of the Project.

These combined operational effects of the Project and the cumulative project with similar impacts on CRF would result in a cumulatively significant impact. As discussed in Impact BR-5, the Project would implement Mitigation Measure BR-1b to reduce impacts on CRF by requiring restoration, enhancement, or creation of CRF breeding habitat. This measure would avoid or minimize the Project's operational impacts on CRF such that the Project's contribution to the cumulative impacts would not be cumulatively considerable.

### **Sensitive Natural Communities and Potentially Jurisdictional Wetlands and Waters**

Construction activities could affect sensitive natural communities and wetlands within Harkins Slough, Watsonville Slough, Struve Slough, the Land Trust parcel (APN 052-221-25), and agricultural ditches through direct habitat removal, habitat conversion, or degradation of water quality. Installation of screens on the existing Harkins Slough intake and construction of the Struve Slough screened intake, including installation of cofferdams and dewatering, would result in temporary and permanent impacts on coastal freshwater marsh and floating pennywort in Harkins Slough, and open water in Struve Slough. Construction of the Struve Slough to filter plant pipeline through the Land Trust parcel shown on Figures BIO-1e and BIO-1f in Appendix BIO would result in temporary and permanent impacts to riparian forest. Installation of the Struve Slough intake pipeline, including installation of cofferdam and dewatering, as well as installation of the pipelines connecting the Struve Slough pump station, Harkins Slough filter plant, recharge basins and sewer pipeline along West Beach Street, would result in temporary impacts on the open water of Struve Slough, coastal freshwater marsh, agricultural wetland, and agricultural ditches.

Other projects that may affect sensitive natural communities and wetlands and waters in the same area include:

- PV Water's College Lake Integrated Resources Management Project (temporary and permanent impacts on the Salsipuedes Creek open water channel, riparian forest, seasonal wetland, and farmed wetland, and temporary impacts on Pinto Creek),
- PV Water's Murphy Crossing with Recharge Basins Project (construction impacts on riparian habitat), and

- USACE Pajaro River Flood Risk Management Study Project (possible impacts on riparian habitat)

As with the Projects, these impacts are primarily related to the construction phases, which are temporary. Cumulative projects would be required to comply with applicable regulatory requirements protecting biological resources and project-specific mitigation measures (where applicable) similar to those of the Projects.

Construction of the Projects along with construction of the cumulative projects would result in a cumulatively significant impact. Implementation of adopted Mitigation Measures BIO-1b and HWQ-1, revised adopted Mitigation Measures BIO-1c, BIO-1d, and Mitigation Measure BR-1b would reduce the project's contribution to cumulative impacts on sensitive natural communities through standard measures to maintain water quality and to control erosion and sedimentation during construction, protection and avoidance of existing riparian and wetland vegetation from indirect impacts during construction, and compensatory revegetation of impacted riparian habitat and wetlands and waters at a 3:1 ratio. These protective requirements and compensatory revegetation would avoid or minimize the project's contribution to cumulative impacts on sensitive natural communities and wetlands and waters.

As discussed in Impact BR-4, project operation would result in lower WSE and habitat conversion at Harkins Slough and Struve Slough resulting in a small shift downslope in the upper limit of wetland conditions, combined with an increase in the WSE range that will support wetland conditions over time, in the sloughs. As discussed in Impact BR-5, the Projects would implement revised adopted Mitigation Measure BIO-1c to reduce impacts on operational impacts on sensitive natural communities and jurisdictional wetland and water by requiring an Adaptive Management Plan for waterfowl management and multi-species mitigation at Struve Slough and Harkins Slough that includes developing multi-year baseline waterfowl data, and integrates hydrologic and fisheries data, for future project design, environmental permitting and CEQA impact analysis if project-level alternatives such that the Projects' contribution to the cumulative impacts would not be cumulatively considerable.

### **Wildlife Corridors or Nursery Sites**

Harkins Slough and Struve Slough support a variety of waterfowl when filled in winter and spring and provides wintering habitat for many migratory bird species. Other projects that may impact wildlife corridors or nursery sites in the same geographic scope include the several Watsonville Wetlands Watch restoration projects (West Struve Slough Habitat Enhancement and Climate Change Adaptation Pilot Project, Upper Struve Slough Habitat Enhancement Project, Middle Watsonville Slough Upland Enhancement Project, Lower Harkins Slough Habitat Restoration Project, and Bryant Habert Ecological Restoration Project) which would restore or enhance wetlands that could support migrating waterfowl. Impact BR-7 evaluates the Projects' impacts on wildlife corridors and nursery sites; as discussed there, wildlife movement would be temporarily impacted during construction.

Although project operations would result in a large decrease in surface area of open water habitat, approximately 259 acres of open water habitat in the Watsonville Slough complex would remain

to support overwintering waterfowl. Additionally, the lower WSE in the slough complex would likely be an overall benefit to these species. As described under Impact BR-7, the Watsonville Slough complex has been in a state of flux for many decades due to increased deposition of sediment from adjacent upland agricultural lands, resulting in a rising WSE in all sloughs upstream causing a succession from croplands, to seasonal wetland, to open water in the sloughs. Rising, and sustained WSE has resulted in deeper aquatic habitat over mudflats, dieback of seasonally flooded riparian areas in middle Harkins Slough and Hanson Slough and expansion of water smartweed (*Persicaria amphibian*) throughout Harkins Slough, which has resulted in decreased habitat quality for overwintering waterfowl. The lowering of the WSE as a result of operation of the Projects would result in shallower water levels that support emergent seasonal wetland, and more diverse vegetation suitable for waterfowl forage.

Operation of the Projects would also result in changes to wetland vegetation that would lead to a decrease in coastal freshwater marsh and a corresponding expansion of mudflats, seasonal wetland and riparian habitats. Therefore, bird species that forage on mudflats, in seasonal wetland and in riparian habitat may benefit from project operations, and bird species that forage in coastal freshwater marsh could see foraging opportunities decrease. Some species may also have the flexibility to forage in several habitats, such as seasonal wetland and coastal freshwater marsh, in which case foraging opportunities could be unchanged under project operations. As discussed in Impact BR-7, overall, Project operations would have a less than significant impact on migrating birds; therefore, the Project's contribution to the cumulative impacts would not be cumulatively considerable.

Because the impact conclusions for the cumulative project are less than significant (College Lake) or result in habitat creation or enhancement for migrating waterfowl, the Projects in combination with the cumulative project's incremental contribution to potential impacts on wildlife corridors and nursery sites, in combination with other past, present and future projects *would not be cumulatively considerable*.

**Mitigation Measure BR-1a: Frac-out Contingency Plan and Mitigation Measure BR-1b: Compensate for Temporary and Permanent Impacts to CRF Critical Habitat** (Refer to Impact BR-1)

**Mitigation Measure AES-1: Construction Lighting** (refer to Section 3.13, Aesthetics)



## 3.5 Air Quality and Greenhouse Gases

This section presents an analysis of potential impacts related to air quality and greenhouse gases that would result from implementation of the proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects). Information from the 2014 Basin Management Plan Update Program Environmental Impact Report (2014 BMP Update PEIR) that remains relevant and accurate for the purposes of describing the physical or regulatory setting of air quality and greenhouse gases has been incorporated as appropriate. The Projects include incorporation of the 2014 BMP Update PEIR mitigation measures adopted by the Board of Directors to reduce the severity and magnitude of potential environmental effects.

### 3.5.1 Setting

#### 3.5.1.1 Background

##### ***Criteria Air Pollutants***

The United States Environmental Protection Agency (USEPA) has identified six criteria air pollutants that are a threat to public health and welfare. These pollutants are called “criteria” air pollutants because standards have been established for each of them to meet specific public health and welfare criteria (see Regulatory Framework, below). The following criteria pollutants are a concern in the Project area.

##### **Ozone**

Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and can also cause substantial damage to vegetation and other materials. Ozone is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) and nitrogen oxides (NO<sub>x</sub>). ROG and NO<sub>x</sub> are known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours.

Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of ROG and NO<sub>x</sub> under the influence of wind and sunlight. Ozone concentrations tend to be higher in the late spring, summer, and fall, when the long sunny days combine with regional subsidence inversions to create conditions conducive to the formation and accumulation of secondary photochemical compounds like ozone.

Ozone poses a health threat to those who already suffer from respiratory diseases as well as to healthy people. It is a respiratory irritant that can cause severe ear, nose, and throat irritation and increased susceptibility to respiratory infections. Ozone can cause the muscles in the airways to constrict, potentially leading to wheezing and shortness of breath.<sup>1</sup> Ozone can make it more difficult to breathe deeply and vigorously; cause shortness of breath and pain when taking a deep

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<sup>1</sup> USEPA, Health Effects of Ozone Pollution, last updated October 10, 2018. Available online at <https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution>. Accessed January 2019.

breath; cause coughing and sore or scratchy throat; inflame and damage the airways; aggravate lung diseases such as asthma, emphysema, and chronic bronchitis; increase the frequency of asthma attacks; make the lungs more susceptible to infection; continue to damage the lungs even when the symptoms have disappeared; and cause chronic obstructive pulmonary disease.<sup>2</sup> Long-term exposure to ozone is linked to aggravation of asthma, and is likely to be one of many causes of asthma development, and long-term exposures to higher concentrations of ozone may also be linked to permanent lung damage, such as abnormal lung development in children.<sup>3</sup>

Exposure to ozone is associated with “symptoms such as coughing, chest tightness, and worsening of asthma symptoms.”<sup>4</sup> The greatest risk for harmful health effects belongs to outdoor workers, athletes, children and others who spend greater amounts of time outdoors during smoggy periods. Inhalation of ozone causes inflammation and irritation of the tissues lining human airways, causing and worsening a variety of symptoms, and exposure to ozone can reduce the volume of air that the lungs breathe in and cause shortness of breath.<sup>5</sup> People most at risk from breathing air containing ozone include people with asthma, children, older adults, and people who are active outdoors, especially outdoor workers.<sup>6</sup> Children are at greatest risk from exposure to ozone because their lungs are still developing and they are more likely to be active outdoors when ozone levels are high, which increases their exposure.<sup>7</sup> Studies show that children are no more or less likely to suffer harmful effects than adults; however, children and teens may be more susceptible to ozone and other pollutants because they spend nearly twice as much time outdoors and engaged in vigorous activities compared to adults.<sup>8</sup> Children breathe more rapidly than adults and inhale more pollution per pound of their body weight than adults and are less likely than adults to notice their own symptoms and avoid harmful exposures. Further research may be able to better distinguish between health effects in children and adults.<sup>9</sup>

### Nitrogen Dioxide

Nitrogen dioxide (NO<sub>2</sub>) is an air quality pollutant of concern because it acts as a respiratory irritant. NO<sub>2</sub> is a major component of the group of gaseous nitrogen compounds commonly referred to as NO<sub>x</sub>. A precursor to ozone formation, NO<sub>x</sub> is produced by fuel combustion in motor vehicles, industrial stationary sources (such as refineries, power plants, and chemical manufacturing facilities), ships, aircraft, and rail transit. Typically, NO<sub>x</sub> emitted from fuel

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<sup>2</sup> USEPA, Health Effects of Ozone Pollution, last updated October 10, 2018. Available online at <https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution>. Accessed January 2019.

<sup>3</sup> USEPA, Health Effects of Ozone Pollution, last updated October 10, 2018. Available online at <https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution>. Accessed January 2019.

<sup>4</sup> CARB, Ozone & Health, Health Effects of Ozone, Available online at <https://ww2.arb.ca.gov/resources/ozone-and-health>. Accessed January 2019.

<sup>5</sup> CARB, Ozone & Health, Health Effects of Ozone, Available online at <https://ww2.arb.ca.gov/resources/ozone-and-health>. Accessed January 2019.

<sup>6</sup> USEPA, Health Effects of Ozone Pollution, last updated October 10, 2018. Available online at <https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution>. Accessed January 2019.

<sup>7</sup> USEPA, Health Effects of Ozone Pollution, last updated October 10, 2018. Available online at <https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution>. Accessed January 2019.

<sup>8</sup> CARB, Ozone & Health, Health Effects of Ozone, Available online at <https://ww2.arb.ca.gov/resources/ozone-and-health>. Accessed January 2019.

<sup>9</sup> CARB, Ozone & Health, Health Effects of Ozone, Available online at <https://ww2.arb.ca.gov/resources/ozone-and-health>. Accessed January 2019.

combustion is in the form of nitric oxide (NO) and NO<sub>2</sub>, with the vast majority (95 percent) of the NO<sub>x</sub> emissions being comprised of NO. NO is converted to NO<sub>2</sub> in the atmosphere when it reacts with ozone or undergoes photochemical reactions.

NO<sub>x</sub> acts as an acute respiratory irritant and increases susceptibility to respiratory pathogens.<sup>10</sup> Short-term exposures to NO<sub>2</sub> can potentially aggravate respiratory diseases, particularly asthma, leading to respiratory symptoms (such as coughing, wheezing, or difficulty breathing), hospital admissions, and visits to emergency rooms, while longer exposures to elevated concentrations of NO<sub>2</sub> may contribute to the development of asthma and potentially increase susceptibility to respiratory infections.<sup>11</sup> Controlled human exposure studies show that NO<sub>2</sub> exposure can intensify responses to allergens in allergic asthmatics.<sup>12</sup> In addition, a number of epidemiological studies have demonstrated associations between NO<sub>2</sub> exposure and premature death, cardiopulmonary effects, decreased lung function growth in children, respiratory symptoms, emergency room visits for asthma, and intensified allergic responses.<sup>13</sup> Infants and children are particularly at risk from exposure to NO<sub>2</sub> because they have disproportionately higher exposure to NO<sub>2</sub> than adults due to their greater breathing rate for their body weight and their typically greater outdoor exposure duration; in adults, the greatest risk is to people who have chronic respiratory diseases, such as asthma and chronic obstructive pulmonary disease.<sup>14</sup> Much of the information on distribution in air, human exposure and dose, and health effects is specifically for NO<sub>2</sub>, and there is only limited information for NO and NO<sub>x</sub>, as well as large uncertainty in relating health effects to NO or NO<sub>x</sub> exposure.<sup>15</sup>

### Carbon Monoxide

Carbon monoxide (CO) is a non-reactive pollutant that is a product of incomplete combustion and is mostly associated with motor vehicle traffic. High CO concentrations develop primarily during winter when periods of light winds combine with the formation of ground-level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures.

The primary adverse health effect associated with CO is interference with normal oxygen transfer to the blood, which may result in tissue oxygen deprivation.<sup>16</sup> Breathing air with a high concentration of CO reduces the amount of oxygen that can be transported in the blood stream to

<sup>10</sup> CDC (Centers for Disease Control), *Air Pollutants*, 2014. Available online at <http://www.cdc.gov/air/pollutants.htm>. Accessed on February 6, 2020.

<sup>11</sup> USEPA, Nitrogen Dioxide Pollution, last updated September 8, 2016. Available online at <https://www.epa.gov/no2-pollution/basic-information-about-no2>. Accessed February 6, 2020.

<sup>12</sup> CARB, Nitrogen Dioxide & Health, Available online at <https://ww2.arb.ca.gov/resources/nitrogen-dioxide-and-health>. Accessed on February 6, 2020.

<sup>13</sup> CARB, Nitrogen Dioxide & Health, Available online at <https://ww2.arb.ca.gov/resources/nitrogen-dioxide-and-health>. Accessed on February 6, 2020.

<sup>14</sup> CARB, Nitrogen Dioxide & Health, Available online at <https://ww2.arb.ca.gov/resources/nitrogen-dioxide-and-health>. Accessed on February 6, 2020.

<sup>15</sup> CARB, Nitrogen Dioxide & Health, Available online at <https://ww2.arb.ca.gov/resources/nitrogen-dioxide-and-health>. Accessed on February 6, 2020.

<sup>16</sup> CDC (Centers for Disease Control), *Air Pollutants*, 2014. Available online at <http://www.cdc.gov/air/pollutants.htm>. Accessed on February 6, 2020.

critical organs like the heart and brain, and at very high levels, which are possible indoors or in other enclosed environments, CO can cause dizziness, confusion, unconsciousness, and death.<sup>17</sup> Very high levels of CO are not likely to occur outdoors; however, when CO levels are elevated outdoors, they can be of particular concern for people with cardiovascular diseases, chronic lung disease, or anemia since these people already have a reduced ability for getting oxygenated blood to their hearts and are especially vulnerable to the effects of CO when exercising or under increased stress.<sup>18</sup> The most-common effects of CO exposure are fatigue, headaches, confusion, and dizziness due to inadequate oxygen delivery to the brain.<sup>19</sup> For people with cardiovascular disease, short-term CO exposure can further reduce their body's already compromised ability to respond to the increased oxygen demands of exercise, exertion, or stress; inadequate oxygen delivery to the heart muscle leads to chest pain and decreased exercise tolerance.<sup>20</sup> Unborn babies, infants, elderly people, and people with anemia or with a history of heart or respiratory disease are most likely to experience health effects with exposure to elevated levels of CO.<sup>21</sup>

### **Particulate Matter**

Particulate matter less than 10 microns in diameter (PM<sub>10</sub>) and particulate matter less than 2.5 microns in diameter (PM<sub>2.5</sub>) represent fractions of particulate matter that can be inhaled into air passages and the lungs and can cause adverse health effects. Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, fuel combustion, and atmospheric photochemical reactions. Some sources of particulate matter, such as demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect.

Very small particles of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. Particulate matter also can damage materials and reduce visibility.

Both PM<sub>10</sub> and PM<sub>2.5</sub> may adversely affect the human respiratory system, especially in people who are naturally sensitive or susceptible to breathing problems.<sup>22</sup> Both PM<sub>10</sub> and PM<sub>2.5</sub> can be inhaled, with some depositing throughout the airways; PM<sub>10</sub> is more likely to deposit on the surfaces of the larger airways of the upper region of the lung while PM<sub>2.5</sub> is more likely to travel

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<sup>17</sup> USEPA, Carbon Monoxide (CO) Pollution in Outdoor Air, last updated September 8, 2016. Available online at <https://www.epa.gov/co-pollution/basic-information-about-carbon-monoxide-co-outdoor-air-pollution>. Accessed on January 8, 2019.

<sup>18</sup> USEPA, Carbon Monoxide (CO) Pollution in Outdoor Air, last updated September 8, 2016. Available online at <https://www.epa.gov/co-pollution/basic-information-about-carbon-monoxide-co-outdoor-air-pollution>. Accessed on January 8, 2019.

<sup>19</sup> CARB, Carbon Monoxide & Health, Available online at <https://ww2.arb.ca.gov/resources/carbon-monoxide-and-health>. Accessed February 6, 2020.

<sup>20</sup> CARB, Carbon Monoxide & Health, Available online at <https://ww2.arb.ca.gov/resources/carbon-monoxide-and-health>. Accessed February 6, 2020.

<sup>21</sup> CARB, Carbon Monoxide & Health, Available online at <https://ww2.arb.ca.gov/resources/carbon-monoxide-and-health>. Accessed February 6, 2020.

<sup>22</sup> CDC (Centers for Disease Control), *Air Pollutants*, 2014. Available online at <http://www.cdc.gov/air/pollutants.htm>. Accessed on February 6, 2020.

into and deposit on the surface of the deeper parts of the lung, which can induce tissue damage and lung inflammation.<sup>23</sup>

Particulate matter generally is “associated with increased risk of hospitalization for lung and heart-related respiratory illness, including emergency room visits for asthma. Particulate matter exposure is also associated with increased risk of premature deaths, especially in the elderly and people with pre-existing cardiopulmonary disease. In children, studies have shown associations between particulate matter exposure and reduced lung function and increased respiratory symptoms and illnesses.”<sup>24</sup> Short-term (up to 24 hours) exposure to PM<sub>10</sub> has been associated primarily with worsening of respiratory diseases, including asthma and chronic obstructive pulmonary disease, leading to hospitalization and emergency department visits.<sup>25</sup> The effects of long-term (months or years) exposure to PM<sub>10</sub> are less clear, although studies suggest a link between long-term PM<sub>10</sub> exposure and respiratory mortality. The International Agency for Research on Cancer published a review in 2015 that concluded that particulate matter in outdoor air pollution causes lung cancer.<sup>26</sup> Short-term exposure to PM<sub>2.5</sub> has been associated with premature mortality, increased hospital admissions for heart or lung causes, acute and chronic bronchitis, asthma attacks, emergency room visits, respiratory symptoms, and restricted activity days; long-term exposure to PM<sub>2.5</sub> has been linked to premature death, particularly in people who have chronic heart or lung diseases, and reduced lung function growth in children.<sup>27</sup> Populations most likely to experience adverse health effects with exposure to PM<sub>10</sub> and PM<sub>2.5</sub> include older adults with chronic heart or lung disease, children, and asthmatics, and children and infants are more susceptible to harm from inhaling pollutants such as PM<sub>10</sub> and PM<sub>2.5</sub> compared to healthy adults because they inhale more air per pound of body weight than do adults, spend more time outdoors, and have developing immune systems.<sup>28</sup> According to a study prepared by the California Air Resources Board (CARB), exposure to ambient PM<sub>2.5</sub>, particularly diesel particulate matter (DPM), can be associated with approximately 14,000 to 24,000 premature annual deaths statewide.<sup>29</sup>

### Other Criteria Pollutants

Sulfur dioxide (SO<sub>2</sub>) is produced through combustion of sulfur or sulfur-containing fuels such as coal. SO<sub>2</sub> is also a precursor to the formation of atmospheric sulfate and particulate matter (both PM<sub>10</sub> and PM<sub>2.5</sub>) and can contribute to sulfuric acid formation in the atmosphere that could precipitate downwind as acid rain. Lead has a range of adverse neurotoxin health effects, and was

<sup>23</sup> CARB, Inhalable Particulate Matter and Health (PM<sub>2.5</sub> and PM<sub>10</sub>). Available online at <https://www.arb.ca.gov/research/aaqs/common-pollutants/pm/pm.htm>. Accessed on February 6, 2020.

<sup>24</sup> CARB, Inhalable Particulate Matter and Health (PM<sub>2.5</sub> and PM<sub>10</sub>). Available online at <https://www.arb.ca.gov/research/aaqs/common-pollutants/pm/pm.htm>. Accessed on February 6, 2020.

<sup>25</sup> CARB, Inhalable Particulate Matter and Health (PM<sub>2.5</sub> and PM<sub>10</sub>). Available online at <https://www.arb.ca.gov/research/aaqs/common-pollutants/pm/pm.htm>. Accessed on February 6, 2020.

<sup>26</sup> CARB, Inhalable Particulate Matter and Health (PM<sub>2.5</sub> and PM<sub>10</sub>). Available online at <https://www.arb.ca.gov/research/aaqs/common-pollutants/pm/pm.htm>. Accessed on February 6, 2020.

<sup>27</sup> CARB, Inhalable Particulate Matter and Health (PM<sub>2.5</sub> and PM<sub>10</sub>). Available online at <https://www.arb.ca.gov/research/aaqs/common-pollutants/pm/pm.htm>. Accessed on February 6, 2020.

<sup>28</sup> CARB, Inhalable Particulate Matter and Health (PM<sub>2.5</sub> and PM<sub>10</sub>). Available online at <https://www.arb.ca.gov/research/aaqs/common-pollutants/pm/pm.htm>. Accessed on February 6, 2020.

<sup>29</sup> CARB, Methodology for Estimating Premature Deaths Associated with Long Term Exposure to Fine Airborne Particulate Matter in California, Draft Staff Report, October 24, 2008.

formerly released into the atmosphere primarily via leaded gasoline. The phase-out of leaded gasoline in California resulted in decreasing levels of atmospheric lead.

### **Toxic Air Contaminants**

Toxic Air Contaminants (TACs) are airborne substances that are capable of causing short-term (acute) and/or long-term (chronic or carcinogenic, i.e., cancer-causing) adverse human health effects (i.e., injury or illness). TACs include both organic and inorganic chemical substances. They may be emitted from a variety of common sources including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations. The current California list of TACs includes approximately 200 compounds, including DPM emissions from diesel-fueled engines, which was identified as a TAC by CARB in 1998.<sup>30</sup>

### **Climate Change**

According to the USEPA, the term “climate change” refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (over several decades or longer). There is scientific consensus that climate change is occurring and that human activity contributes in some measure (perhaps substantially) to that change. Gases that trap heat in the atmosphere are often called greenhouse gases (GHGs). Emissions of GHGs, if not sufficiently curtailed, are likely to contribute further to increases in global temperatures. The potential effects of climate change in California include sea level rise and reductions in snowpack, as well as an increased number of extreme-heat days per year, high ozone days, large forest fires, and drought years.<sup>31</sup> Globally, climate change could affect numerous environmental resources through potential, though uncertain, changes in future air temperatures and precipitation patterns. According to the International Panel on Climate Change, the projected effects of climate change are likely to vary regionally, but are expected to include the following direct effects:<sup>32</sup>

- Higher maximum temperatures and more hot days over nearly all land areas;
- Higher minimum temperatures (fewer cold days and frost days over nearly all land areas);
- Reduced diurnal temperature range over most land areas;
- Increase in heat index over most land areas; and
- More intense precipitation events.

In addition, many secondary effects are projected to result from climate change, including a global rise in sea level, ocean acidification, changes in disease vectors, and changes in habitat and biodiversity. The possible outcomes and feedback mechanisms involved are not fully understood, and much research remains to be done; however, over the long term, the potential exists for substantial environmental, social, and economic consequences.

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<sup>30</sup> CARB, Toxic Air Contaminant Identification List, July, 2011. Available online at <https://www.arb.ca.gov/toxics/id/taclist.htm>. Accessed on February 26, 2019.

<sup>31</sup> CARB, First Update to the Climate Change Scoping Plan, Building on the Framework Pursuant to AB 32, the California Global Warming Solutions Act of 2006, May 15, 2014.

<sup>32</sup> Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2014, Impacts, Adaptation, and Vulnerability*, Summary for Policymakers, 2014.

## **Greenhouse Gas Emissions**

GHG emissions that result from human activities primarily include carbon dioxide (CO<sub>2</sub>), with much smaller amounts of nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>, often from unburned natural gas), sulfur hexafluoride (SF<sub>6</sub>) from high-voltage power equipment, and hydrofluorocarbons and perfluorocarbons from refrigeration/chiller equipment. Because these GHGs have different warming potentials (i.e., the amount of heat trapped in the atmosphere by a certain mass of the gas), and CO<sub>2</sub> is the most common reference gas for climate change, GHG emissions are often quantified and reported as CO<sub>2</sub>-equivalent (CO<sub>2</sub>e) emissions. For example, while SF<sub>6</sub> represents a small fraction of the total annual GHGs emitted worldwide, this gas is very potent, with 23,900 times the global warming potential of CO<sub>2</sub>. Therefore, an emission of 1 metric ton of SF<sub>6</sub> would be reported as 23,900 metric tons CO<sub>2</sub>e. The global warming potential of CH<sub>4</sub> and N<sub>2</sub>O are 25 times and 298 times that of CO<sub>2</sub>, respectively.<sup>33</sup> The principal GHGs resulting from human activity that enter and accumulate in the atmosphere are described below.

### **Carbon Dioxide**

CO<sub>2</sub> is a naturally occurring gas that enters the atmosphere through natural as well as anthropogenic (human) sources. Key anthropogenic sources include the burning of fossil fuels (e.g., oil, natural gas, and coal), solid waste, trees, wood products, and other biomass, as well as industrially relevant chemical reactions such as those associated with manufacturing cement. CO<sub>2</sub> is removed from the atmosphere when it is absorbed by plants as part of the biological carbon cycle.

### **Methane**

Like CO<sub>2</sub>, CH<sub>4</sub> is emitted from both natural and anthropogenic sources. Key anthropogenic sources of CH<sub>4</sub> include gaseous emissions from landfills, releases associated with mining and materials extraction industries (in particular coal mining), and fugitive releases associated with the extraction and transport of natural gas and crude oil. CH<sub>4</sub> emissions also result from livestock and agricultural practices. Small quantities of CH<sub>4</sub> are released during fossil fuel combustion.

### **Nitrous Oxide**

N<sub>2</sub>O is also emitted from both natural and anthropogenic sources. Key anthropogenic sources include industrial activities, agricultural activities (primarily the application of nitrogen fertilizer), the use of explosives, combustion of fossil fuels, and decay of solid waste.

### **Fluorinated Gases**

Hydrofluorocarbons, perfluorocarbons, and SF<sub>6</sub> are synthetic gases emitted from a variety of industrial processes, and they contribute substantially more to the greenhouse effect on a pound for pound basis than the GHGs described previously. Fluorinated gases are often used as substitutes for ozone-depleting substances (i.e., chlorofluorocarbons, hydrochlorofluorocarbons, and halons). These gases are typically emitted in small quantities, but because of their potency they are sometimes referred to as “high global warming potential gases.”

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<sup>33</sup> CARB, Global Warming Potentials, last reviewed June 22, 2018. Available online at <http://www.arb.ca.gov/cc/inventory/background/gwp.htm>. Accessed on February 6, 2020.

### 3.5.1.2 Regional Topography, Meteorology, and Climate

The Projects are located within the North Central Coast Air Basin (NCCAB). The NCCAB is comprised of Monterey, Santa Cruz, and San Benito counties and covers 5,159 square miles along the central coast of California. The NCCAB is generally bounded by the Monterey Bay to the west, the Santa Cruz Mountains to the northwest, the Diablo Range on the northeast, with the Santa Clara Valley between them. The service area of Pajaro Valley Water Management Agency (PV Water) lies within the northern portion of the NCCAB, and is bounded by the Santa Cruz range to the north and northeast, the Monterey Bay to the west, and the Salinas Valley to the south.

The potential for high pollutant concentrations developing at a given location depends upon the quantity of pollutants emitted into the atmosphere in the surrounding area and/or upwind, the capacity of the atmosphere to disperse the contaminated air, and the presence / intensity of sunlight. The atmospheric pollution potential is independent of the location of emission sources and is instead a function of factors such as topography and meteorology. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants.

The semi-permanent high-pressure cell over the eastern Pacific Ocean is the basic controlling factor in the climate of the NCCAB. In the summer, the high-pressure cell is dominant and causes persistent west and northwest winds over the entire California coast. The onshore air currents pass over cool ocean waters and bring fog and relatively cool air into the coastal valleys. The warmer air acts as a lid, inhibiting vertical air movement. The generally northwest-southeast orientation of mountainous ridges tends to restrict the summer onshore air currents. Typically, during the fall, when surface winds become weak, north or east winds develop and can transport pollutants from either the San Francisco Bay Area or the Central Valley into the NCCAB.

During the winter, the Pacific high-pressure area has less influence on the NCCAB. Air frequently flows in a southeasterly direction out of the Salinas and San Benito valleys, especially during night and morning hours. Northwest winds are still dominant in the winter, but easterly flow is more frequent. The absence of deep, persistent inversions and the occasional storm systems usually result in good air quality for the basin as a whole in winter and early spring.

The presence and intensity of sunlight is another important factor that affects air pollution as ozone is formed at higher temperatures. Since temperatures in many of the NCCAB inland valleys are so much higher than near the coast, these inland areas are much more prone to photochemical air pollution.

The climate in the NCCAB is characterized by cool, wet winters and warm, dry summers. Over 90 percent of the yearly precipitation falls from November through April, and coastal fog is common in the summer and fall months. The mean annual temperature is 57 degrees Fahrenheit; the mean monthly maximum temperature is 74 degrees Fahrenheit in September; and the mean monthly minimum temperature is 39 degrees Fahrenheit in January.<sup>34</sup>

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<sup>34</sup> Western Regional Climate Center (WRCC), 2020. Period of Record Monthly Climate Summary for Santa Cruz (047916), period of Record: 01/01/1893 to 06/09/2016. Accessed webpage (<https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7916>) February 2020.



### 3.5.1.3 Existing Air Quality

#### Criteria Air Pollutants

The Monterey Bay Air Resources District (MBARD) operates seven air quality monitoring stations in the NCCAB that provide information on ambient concentrations of criteria air pollutants. The Santa Cruz station is located at 2544 Soquel Avenue in Santa Cruz (approximately 11 miles northwest of the Project sites) and measures concentrations of ozone and PM<sub>2.5</sub>. The Salinas station is located at 867 East Laurel Drive in Salinas (approximately 17 miles southeast of the Project sites) and measures ozone, PM<sub>2.5</sub>, and NO<sub>2</sub>. **Table 3.5-1** shows a five-year (2014 through 2018) summary of air quality data from these stations. The table also compares the data to the California Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS). As indicated in Table 3.5-1, there was just one exceedance of the 8-hour ozone State and federal standards and no exceedances of the 1-hour ozone State standard during the five-year period. The PM<sub>2.5</sub> federal standard was exceeded twice in 2017 and nine times in 2018, primarily due to wild fires in the region. There were no recorded violations of the State annual average standard for PM<sub>2.5</sub> during the five years of available data, and no measured exceedances of the federal 1-hour NO<sub>2</sub> standard during the five-year period. CO was not monitored at either station over the five-year study period; however, CO concentrations have continued to decline in the region and are expected to be well below standards in the project area.

**TABLE 3.5-1**  
**AMBIENT AIR QUALITY MONITORING SUMMARY FOR THE PROJECT AREA (2014–2018)**

Pollutant	Standard	Monitoring Data by Year				
		2014	2015	2016	2017	2018
Ozone <sup>a</sup>						
Maximum 1-hour concentration (ppm)	0.09 ppm	0.076	0.076	0.064	0.082	0.075
Days over State Standard		0	0	0	0	0
Maximum 8-Hour Average (ppm)	0.070 ppm	0.068	0.060	0.057	0.075	0.061
Days over State Standard		0	0	0	1	0
Days over National Standard		0	0	0	1	0
Fine Particulate Matter (PM <sub>2.5</sub> ) <sup>a</sup>						
Maximum 24-Hour Average (µg/m <sup>3</sup> )	35 µg/m <sup>3</sup>	15.7	20.5	12.7	47.3	92.0
Estimated Days over National Standard		0	0	0	2	9
State Annual Average (µg/m <sup>3</sup> )	12 µg/m <sup>3</sup>	5.7	5.3	5.6	NA	8.2
Nitrogen Dioxide (NO <sub>2</sub> ) <sup>b</sup>						
Maximum 1-Hour Average (µg/m <sup>3</sup> )	0.18 ppm	0.038	0.033	0.033	0.034	0.047
Estimated Days over National Standard		0	0	0	0	0

NOTES:

NA = Not Available

ppm = parts per million; µg/m<sup>3</sup> = micrograms per cubic meter.

<sup>a</sup> Emissions data collected at the Santa Cruz-2544 Soquel Avenue Monitoring Station.

<sup>b</sup> Emissions data collected at the Salinas-East Laurel Drive Monitoring Station.

SOURCE: California Air Resources Board, iADAM: Air Quality Data Statistics, 2014 - 2018. Available online at: <http://www.arb.ca.gov/adam/>. Accessed on January 11, 2020.

### 3.5.1.4 Greenhouse Gas Sources

Anthropogenic GHG emissions in the United States are derived mostly from the combustion of fossil fuels for transportation and power production. Energy-related CO<sub>2</sub> emissions resulting from fossil fuel exploration and use account for approximately three-quarters of the human-generated GHG emissions in the United States, primarily in the form of CO<sub>2</sub> emissions from burning fossil fuels. More than half of the energy-related emissions come from large stationary sources, such as power plants; over one-quarter derive from transportation; and a majority of the remaining sources include industrial and agricultural activities, and commercial and residential sources.<sup>35</sup>

Statewide emissions of GHG from relevant source categories for 2011 through 2017 are summarized in **Table 3.5-2**. Specific contributions from individual air basins, such as the NCCAB, which encompasses the Project area, are included in the emissions inventory but are not itemized by air basin. In 2017, California produced 424 million gross metric tons of CO<sub>2</sub>e emissions. Transportation was the source of 41 percent of the state's GHG emissions, followed by industrial sources at 24 percent, electricity generation at 15 percent, commercial and residential sources at 12 percent, and agricultural and forestry related sources comprised the remaining 8 percent.<sup>36</sup>

**TABLE 3.5-2**  
**CALIFORNIA GHG EMISSIONS (MILLION METRIC TONS CO<sub>2</sub>E)**

Emission Inventory Category	2011	2012	2013	2014	2015	2016	2017	
Transportation	161.76	161.31	160.91	162.53	166.18	168.76	169.86	40.1%
Electric Power	87.97	95.52	89.40	88.46	83.82	68.59	62.39	14.7%
Commercial and Residential	46.37	43.76	44.42	38.25	38.82	40.62	41.14	9.7%
Industrial	90.17	91.08	93.69	94.02	91.48	89.49	89.40	21.1%
Recycling and Waste	8.47	8.49	8.52	8.59	8.73	8.81	8.89	14.5%
High Global Warming Potential Gases	14.53	15.54	16.75	17.73	18.60	19.26	19.99	
Agriculture	34.34	35.46	33.99	35.06	33.75	33.51	32.42	
<b>Total Gross Emissions</b>	<b>443.61</b>	<b>451.16</b>	<b>447.69</b>	<b>444.65</b>	<b>441.37</b>	<b>429.04</b>	<b>424.10</b>	<b>100%</b>

SOURCE: California Air Resources Board, California Greenhouse Gas Inventory for 2000–2017 – by Category as Defined in the 2008 Scoping Plan, 2017.

### 3.5.1.5 Sensitive Receptors

For the purposes of air quality analyses, sensitive receptors are defined as facilities and land uses where people spend extended amounts of time or that include members of the population that are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with respiratory medical conditions and other illnesses. Examples of sensitive uses include residences, schools, hospitals, and daycare centers. The reasons for greater than average sensitivity include

<sup>35</sup> USEPA, Sources of Greenhouse Gas Emissions, October 9, 2018. Available online at <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>. Accessed on February 6, 2020.

<sup>36</sup> CARB, California Greenhouse Gas Inventory for 2000–2017 – by Sector and Activity, last updated in 2019.

pre-existing health conditions, proximity to emissions sources, and/or duration of exposure to air pollutants. Schools, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because children, elderly people, and the infirm are more susceptible to respiratory distress and other air quality-related health problems than the general public. Residential areas are considered sensitive to poor air quality because people usually stay home for extended periods of time, which results in greater exposure to ambient air quality.

The area surrounding the Project sites primarily consists of agricultural uses, including croplands and low-lying agricultural buildings. Residences in the area tend to be single-family, ranch-style homes. Sensitive receptors located within the vicinity of the various Project components are discussed below. Refer to Chapter 2, *Project Description*, for the location and description of Project components.

### ***Harkins Slough Project Components***

#### **Filter Plant Upgrades**

The sensitive receptor nearest to the Harkins filter plant is the single family residence located approximately 150 feet to the west of the filter plant boundary.

#### **Backwash and Raw Water Pipeline**

The closest sensitive receptor to the backwash and raw water pipeline alignment is the same single-family residence identified above under Filter Plant Upgrades and would be located approximately 250 feet west of the western end of the alignment.

#### **Southwest Recharge Basin, Recovery Wells, Monitoring Wells, and Pipelines**

The closest sensitive receptor to the Southwest recharge basin are single-family residences located approximately 1,400 feet northwest of the recharge basin and could be located as close as 900 feet from the recovery and monitoring wells.

#### **Southeast Recharge Basin, Recovery Wells, Monitoring Wells, and Pipelines**

The closest sensitive receptor is a single-family residence located approximately 40 feet from the boundary of the basin.

### ***Struve Slough Project Components***

#### **Screened Intake**

The nearest noise sensitive receptor to the screened intake is a single-family residence located approximately 750 feet to the north.

#### **Pump Station**

The sensitive receptor closest to the pump station would be the same single-family residence identified above for the screened intake and would be located approximately 500 feet to the north of the pump station.

### **Struve Slough to Filter Plant Pipeline**

The Struve Slough to filter plant pipeline alignment at the Watsonville/Struve Slough crossing would be located approximately 500 feet from the nearest sensitive receptor, the same single family residence identified under the screened intake and pump station above. Beyond the Watsonville Slough crossing, the pipeline alignment traverses agricultural lands with no sensitive receptors in the vicinity, except the single-family residence located adjacent to the filter plant and approximately 150 feet west of this pipeline alignment.

### **Filter Plant to Recharge Basins Pipeline**

The nearest sensitive receptor is the single-family residence to the west of the Harkins filter plant and is located approximately 175 feet from the eastern end of the pipeline alignment.

### **North Recharge Basin, Recovery Wells, Monitoring Wells, and Pipelines**

Assuming that the recovery and monitoring wells associated with the North recharge basin would be located 500 feet from the boundary of the recharge basin, the nearest sensitive receptors would be the single family residences located approximately 1,330 feet and 830 feet northeast of the North recharge basin and recovery well respectively.

## **3.5.2 Regulatory Framework**

### **3.5.2.1 Federal and State**

Federal, state, and regional regulations provide the framework for analyzing and controlling air pollutant emissions and thus general air quality. The USEPA is responsible for implementing the programs established under the federal Clean Air Act, such as establishing and reviewing the NAAQS and reviewing State Implementation Plans (SIPs), described further below. However, the USEPA has delegated the authority to implement many of the federal programs to the states while retaining an oversight role to ensure that the programs continue to be implemented.

In California, CARB is responsible for establishing and reviewing the state ambient air quality standards, developing and managing the California SIP, securing approval of this plan from the USEPA, and identifying TACs. CARB also regulates mobile emissions sources in California, such as construction equipment, trucks, and automobiles, and oversees the activities of air quality management districts, which are organized at the county or regional level. The MBARD is the regional agency primarily responsible for regulating stationary emission sources at facilities within its geographic area (i.e., Monterey, Santa Cruz, and San Benito counties) and for preparing the air quality plans that are required under the Federal Clean Air Act and the California Clean Air Act.

The Federal Clean Air Act Amendments of 1977 established the NAAQS, and individual states retained the option to adopt more stringent standards and to include other pollution sources. California had already established its own air quality standards when federal standards were established, and because of the unique meteorological problems in California, there are considerable differences between some of the state and federal standards. As shown in **Table 3.5-3**, the CAAQS standards tend to be at least as protective as NAAQS, and are often more stringent.

**TABLE 3.5-3  
AMBIENT AIR QUALITY STANDARDS AND AIR BASIN ATTAINMENT STATUS**

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

## NOTES:

PPM = parts per million; µg/m<sup>3</sup> = micrograms per cubic meter; --- = no applicable standard.

SOURCES: CARB, Ambient Air Quality Standards, May 4, 2016. Available online at <https://ww3.arb.ca.gov/research/aaqs/aaqs2.pdf>. Accessed on January 11, 2020; CARB, Area Designation Maps for State and Federal Ambient Air Quality Standards. Available online at <https://www.arb.ca.gov/desig/adm/adm.htm>. Accessed on February 6, 2020.

Federal ambient air quality standards (federal standards) exist for seven criteria air pollutants: ozone, CO, NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, and lead. In addition, California has established State standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. The ambient air quality standards are intended to protect public health and welfare, and they specify the concentration of pollutants (with an adequate margin of safety) to which the public can be exposed without adverse health effects. They are designed to protect those segments of the public most susceptible to respiratory distress, referred to as sensitive receptors, including people with asthma, the very young, elderly, people weak from other illness or disease, and/or people engaged in strenuous work or exercise. Healthy adults can tolerate occasional short-term exposure to air

pollution levels that are somewhat above the ambient air quality standards before adverse health effects are observed.

Areas with air quality that exceed federal or state air quality standards are designated as “non-attainment” areas for the relevant air pollutants. Designations are made for each criteria pollutant according to the categories listed below. Designations in relation to state standards are made by the CARB, while designations in relation to national standards are made by the USEPA. State designations are updated annually, while the national designations are updated either when the standards change or when an area requests re-designation due to changes in air quality. Non-attainment designations are of most concern because they indicate that unhealthy levels of the pollutant exist in the area, which typically triggers a need to develop a plan to achieve the applicable standards. The NCCAB as a whole is considered by the USEPA as attainment or unclassified for all regulated criteria pollutants relative to the NAAQS. At the state level, the region is designated as non-attainment-transitional for the 8-hour ozone standard and non-attainment for the 24-hour PM<sub>10</sub> standard. Non-attainment-transitional is designated when, during a single calendar year, the CAAQS is not exceeded more than three times at any one monitoring location within the NCCAB. The region is attainment for all other CAAQS.<sup>37</sup>

### **Federal Clean Air Act**

The 1977 federal Clean Air Act (last amended in 1990; Title 42 United States Code Section 7401 et seq.) requires regional planning and air resource agencies to prepare a regional air quality plan to outline the measures by which both stationary and mobile sources of pollutants will be controlled to achieve all standards within the specified deadlines.

The USEPA is responsible for implementing programs developed under the federal Clean Air Act, such as establishing and reviewing the federal standards for CO, ozone, NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, and lead. The federal Clean Air Act also requires the USEPA to designate areas (counties or air basins) as attainment or non-attainment with respect to each criteria pollutant, depending on whether the area meets the federal standards. If an area is designated as non-attainment, it does not meet a federal standard and is required to create and maintain a SIP for achieving compliance with the applicable federal standard. Conformity to the SIP is defined under the 1990 Clean Air Act amendments as conformity with the plan’s purpose in eliminating or reducing the severity and number of violations of the federal standards and achieving expeditious attainment of these standards.

On April 2, 2007, in *Massachusetts v. USEPA* (549 US 497), the U.S. Supreme Court found that GHGs are air pollutants covered by the Clean Air Act. The Court held that the USEPA must determine whether emissions of GHGs from new motor vehicles cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision.

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<sup>37</sup> CARB, Area Designation Maps for State and Federal Ambient Air Quality Standards, October 24, 2019. Available online at <https://www.arb.ca.gov/desig/adm/adm.htm>. Accessed on February 6, 2020.

On April 17, 2009, the USEPA Administrator signed proposed “endangerment” and “cause or contribute” findings for GHGs under Section 202(a) of the Clean Air Act. The USEPA found that six GHGs, taken in combination, endanger both the public health and the public welfare of current and future generations. The USEPA also found that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the greenhouse effect as air pollution that endangers public health and welfare under Clean Air Act Section 202(a). Pursuant to 40 CFR Part 52, *Proposed Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule*, USEPA has mandated that Prevention of Significant Deterioration and Title V requirements apply to facilities whose stationary source CO<sub>2</sub>e emissions exceed 100,000 tons per year.<sup>38</sup> The Projects would not trigger Prevention of Significant Deterioration or Title V permitting under this regulation because they would generate substantially less than 100,000 tons of CO<sub>2</sub>e emissions per year.

### **California Clean Air Act**

The California Clean Air Act was approved in 1988 and required each local air district in the state to prepare an air quality plan to achieve compliance with the State standards. CARB is the agency delegated responsibility for preparing and submitting the SIP to the USEPA. CARB also oversees air quality policies in California and has established State standards for NO<sub>2</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, ozone, lead, sulfates, hydrogen sulfide, vinyl chloride, and visibility reducing particles. Similar to the USEPA, CARB designates counties or air basins in California as attainment or non-attainment with respect to the CAAQS.

### **Regulations for Mobile Sources of Air Pollutants**

The following air quality regulations apply to mobile sources and are directly relevant to the Projects. Idling of commercial vehicles with a gross vehicular weight rating of 10,000 pounds or greater and off-road equipment over 25 horsepower is limited to a maximum of two minutes at any location (Title 13 California Code of Regulations Section 2449). This restriction does not apply when vehicles remain motionless during traffic or when vehicles are queuing. Off-road equipment engines shall not idle for longer than five minutes (Title 13 California Code of Regulations Section 2449(d)(3)). Exceptions to this rule include: idling when queuing; idling to verify that the vehicle is in safe operating condition; idling for testing, servicing, repairing or diagnostic purposes; idling necessary to accomplish work for which the vehicle was designed (such as operating a crane); and idling required to bring the machine to operating temperature as specified by the manufacturer.

### **Executive Order S-3-05**

Executive Order S-3-05 was established by former Governor Arnold Schwarzenegger in June 2006, and establishes statewide emission reduction targets through the year 2050 as follows:

1. By 2010, reduce GHG emissions to 2000 levels;
2. By 2020, reduce GHG emissions to 1990 levels; and

<sup>38</sup> USEPA, Clean Air Act Permitting for Greenhouse Gas Emissions, last updated December 10, 2019. Available online at <https://www.epa.gov/nsr/clean-air-act-permitting-greenhouse-gases>. Accessed on February 20, 2020.

3. By 2050, reduce GHG emissions to 80 percent below 1990 levels.

This executive order establishes GHG emissions goals only and does not include any specific requirements that pertain to the Projects; however, future actions taken by the State to implement these goals may affect the Projects, depending on the specific implementation measures that are developed.

### ***Assembly Bill 32***

California Assembly Bill (AB) 32,<sup>39</sup> the Global Warming Solutions Act of 2006, is the cornerstone of state efforts to reduce GHG emissions. As described below, the law required CARB to establish a statewide GHG emissions cap for 2020 based on 1990 emission levels, develop a mandatory reporting program of GHG emissions, adopt regulations for discrete early actions to reduce GHG emissions, prepare a scoping plan to identify how emissions reductions will be achieved, and adopt a regulation that establishes a market-based compliance mechanism (also referred to as “Cap and Trade”).

### ***Statewide GHG Emissions Cap***

In 2007, CARB established the statewide GHG emissions limit that had to be achieved by 2020, equivalent to the statewide GHG emissions levels in 1990, at 427 million metric tons of CO<sub>2</sub>e. This figure is approximately 30 percent below projected “business-as-usual” emissions of 596 million metric tons of CO<sub>2</sub>e for 2020, and about 10 percent below average annual GHG emissions during the period of 2002 through 2004.<sup>40</sup> As described in Table 3.5-2, California’s GHG emissions achieved the emissions reduction limit in 2017, three years prior to the established goal.

### ***Climate Change Scoping Plan***

In December 2008, CARB approved the AB 32 Climate Change Scoping Plan (Scoping Plan) outlining the state’s strategy to achieve the 2020 GHG emissions limit.<sup>41</sup> The Scoping Plan estimated a reduction of 174 million metric tons CO<sub>2</sub>e from the transportation, energy, agriculture, forestry, and high climate-change-potential sectors, and proposed a comprehensive set of actions designed to reduce overall GHG emissions in California, improve the environment, reduce dependence on oil, diversify California’s energy sources, save energy, create new jobs, and enhance public health. The Scoping Plan must be updated every five years to evaluate the mix of AB 32 policies to ensure that California is on track to achieve the 2020 GHG reduction goal. CARB released the First Update to the Scoping Plan in May 2014.<sup>42</sup>

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<sup>39</sup> AB 32 is codified in California Health and Safety Code Division 25.5, Sections 38500 et seq.

<sup>40</sup> CARB, Climate Change Scoping Plan: A Framework for Change, December 2008, amended version included errata and Board requested modifications posted May 11, 2009.

<sup>41</sup> CARB, Climate Change Scoping Plan: A Framework for Change, December 2008, amended version included errata and Board requested modifications posted May 11, 2009.

<sup>42</sup> CARB, First Update to the Climate Change Scoping Plan, Building on the Framework Pursuant to AB 32, the California Global Warming Solutions Act of 2006, May 2014.



Executive Order B-30-15 (see below) and Senate Bill 32 extended the goals of AB 32 and set a 2030 goal of reducing emissions 40 percent from 2020 levels. The most recent update to the Scoping Plan was adopted in 2017 and establishes a path that will get California to its 2030 target. The Plan includes economically viable and technologically feasible actions to not just keep California on track to achieve its 2030 target, but to stay on track for a low- to zero-carbon economy by involving every part of the state. The Plan relies on a balanced mix of strategies to economically achieve the GHG target while also improving public health, investing in disadvantaged and low-income communities, protecting consumers, and supporting economic growth, jobs, and energy diversity.<sup>43</sup>

### **Senate Bill 97<sup>44</sup>**

In 2007, the California State Legislature passed Senate Bill 97, which required amendment of the California Environmental Quality Act (CEQA) *Guidelines* to incorporate analysis of, and mitigation for, GHG emissions from projects subject to CEQA. The amendments took effect March 18, 2010. The amendments add Section 15064.4 to the CEQA *Guidelines*, specifically addressing the potential significance of GHG emissions. Section 15064.4 neither requires nor recommends a specific analytical methodology or quantitative criteria for determining the significance of GHG emissions. Rather, the section calls for a “good faith effort” to “describe, calculate or estimate” GHG emissions and indicates that the analysis of the significance of any GHG impacts should include consideration of the extent to which the project would:

- Increase or reduce GHG emissions;
- Exceed a locally applicable threshold of significance; or
- Comply with “regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions.”

The CEQA *Guidelines* also state that a project may be found to have a less-than-significant impact related to GHG emissions if it complies with an adopted plan that includes specific measures to sufficiently reduce GHG emissions (Section 15064(h)(3)).

### **Executive Order B-30-15**

In April 2015, former Governor Edmund G. Brown Jr. issued an executive order to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. Reaching this emission reduction target will help make it possible for California to reach its ultimate goal of reducing emissions 80 percent under 1990 levels by 2050, as identified in Executive Order S-3-05. In 2016, the Legislature passed Senate Bill 32, which codifies a 2030 GHG emissions reduction target of 40 percent below 1990 levels. Executive Order B-30-15 also specifically addresses the need for climate adaptation and directs state government to:

- Incorporate climate change impacts into the State's 5-Year Infrastructure Plan;

<sup>43</sup> CARB, The 2017 Climate Change Scoping Plan Update – The Proposed Strategy for Achieving California’s 2030 Greenhouse Gas Target, last updated June 6, 2017. Available online at [https://www.arb.ca.gov/cc/scopingplan/2030sp\\_pp\\_final.pdf](https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf). Accessed on January 20, 2017.

<sup>44</sup> Codified in Section 15064.4 of the CEQA *Guidelines*.

- Update the Safeguarding California Plan, the state climate adaption strategy to identify how climate change will affect California infrastructure and industry and what actions the state can take to reduce the risks posed by climate change;
- Factor climate change into state agencies' planning and investment decisions; and
- Implement measures under existing agency and departmental authority to reduce GHG emissions.<sup>45</sup>

Executive Order B-30-15 requires CARB to update the AB 32 Scoping Plan to incorporate the 2030 target. The 2030 Draft Scoping Plan will serve as the framework to define California's climate change priorities for the next 15 years and beyond. In June 2016, CARB released the 2030 Target Scoping Plan Update Concept Paper to describe potential policy concepts to achieve the 2030 target that can be incorporated in the 2030 Draft Scoping Plan and the 2030 Scoping Plan was adopted in 2017, which established a path that will get California to its 2030 target.<sup>46</sup>

### 3.5.2.2 Regional and Local

Table 2-9 in Chapter 2, *Project Description*, identifies the approvals that would be required from Santa Cruz County for the Project. **Table 3.5-4** presents pertinent local plans and policies regarding air quality and greenhouse gas emissions to support County consideration of project consistency with general policies.<sup>47</sup> In some cases, local policies are used in this EIR as criteria to determine the significance of physical effects on the environment.

**TABLE 3.5-4**  
**LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT**

<b>SANTA CRUZ COUNTY GENERAL PLAN/LOCAL COASTAL PROGRAM POLICIES</b>	
<b>Objective 5.18, Air Resources.</b>	To improve the air quality of Santa Cruz County by meeting or exceeding state and federal ambient air quality standards, protect County residents from the health hazards of air pollution, protect agriculture from air pollution induced crop losses and prevent degradation of the scenic character of the area.
<b>Policy 5.18.1, New Development.</b>	Ensure new development projects are consistent at a minimum with the Monterey Bay Unified Air Pollution Control District [now known as the Monterey Bay Air Resources District] Air Quality Management Plan and review such projects for potential impact on air quality.
SOURCE: County of Santa Cruz, 1994 General Plan/Local Coastal Program, Chapter 5 - Conservation and Open Space, Effective December 19, 1994.	

<sup>45</sup> Office of the Governor, Governor Brown Establishes Most Ambitious Greenhouse Gas Reduction Target in North America, April 29, 2015. Available online at <https://www.gov.ca.gov/2015/04/29/news18938>. Accessed on February 21, 2018.

<sup>46</sup> CARB, 2030 Target Scoping Plan Update Concept Paper, June 17, 2016; CARB, The 2017 Climate Change Scoping Plan Update – The Proposed Strategy for Achieving California's 2030 Greenhouse Gas Target, last updated June 6, 2017.

<sup>47</sup> California Government Code Section 53091 exempts agencies like PV Water from complying with local building and zoning ordinances when locating or constructing facilities for the production, generation, storage, treatment, or transmission of water. California Government Code Section 65402(c) requires that PV Water notify cities and counties of its plans to construct projects or to acquire or dispose of property. The planning agency then has 40 days to determine project consistency with its general plan. If the planning agency disapproves, the disapproval may be overruled by PV Water.

### ***Monterey Bay Air Resources District***

The MBARD is the regional agency responsible for air quality regulation within the NCCAB. The MBARD regulates air quality through its planning and review activities. The MBARD has permit authority over most types of stationary emission sources and can require stationary sources to obtain permits, impose emission limits, set fuel or material specifications, and establish operational limits to reduce air emissions. The MBARD regulates new or expanding stationary sources of criteria pollutants and toxic air contaminants.

State law assigns local air districts the primary responsibility for control of air pollution from stationary sources, under CARB's oversight. The MBARD is responsible for developing regulations governing emissions of air pollution, permitting and inspecting stationary sources of air pollution, monitoring of ambient air quality, and air quality planning activities, including implementation of transportation control measures.

### **Air Quality Management Plan for the Monterey Bay Region**

In 1991, the MBARD adopted the Air Quality Management Plan (AQMP) for the Monterey Bay Region in response to the California Clean Air Act of 1988, which established specific planning requirements to meet the ozone standards. The California Clean Air Act requires that air quality management plans be updated every three years. The MBARD has updated the air quality management plan seven times. The most recent update, the 2012-2015 AQMP, was adopted in 2017. The 2012-2015 AQMP relies on a multi-level partnership of federal, State, regional, and local governmental agencies. These agencies, including USEPA, CARB, local governments, Association of Monterey Bay Area Governments, and the MBARD, are the primary agencies that implement the air quality management plan programs. The MBARD's focus continues to be on achieving the 8-hour ozone CAAQS, as the region has already attained the 1-hour standard. The 2012-2015 AQMP builds on information developed in past air quality management plans. Consequently, some sections of the 2008 AQMP and 2012 Triennial Plan are incorporated by reference for those elements that have not been updated; however, due to continued progress toward attaining the 8-hour ozone standard, the 2012-2015 AQMP recommends that control measures presented in the 2008 AQMP continue not to be implemented.<sup>48</sup>

### ***County of Santa Cruz Climate Action Strategy***

The Climate Action Strategy (CAS) serves as a framework for the actions that the unincorporated communities of the County of Santa Cruz can take to both lessen its contribution to climate change and prepare for the impacts when they do occur. In addition to guiding County government actions, the CAS is intended to inspire non-government community organizations in their efforts to address climate change, and to identify opportunities for partnerships with other government agencies and community groups. The CAS outlines a course of action to reduce GHG emissions produced by governmental operations and community activities within unincorporated Santa Cruz County. Implementation of the CAS is intended to build on the fact that Santa Cruz County has already met

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<sup>48</sup> MBARD, 2012-2015 Air Quality Management Plan, Adopted March 15, 2017.

the 2020 emissions reduction target recommended by the state and will set the County on a path toward reducing emissions to 59 percent below 2009 levels by 2050.<sup>49</sup>

### 3.5.3 Impacts and Mitigation Measures

#### 3.5.3.1 Significance Criteria

In accordance with the CEQA statute, CEQA *Guidelines* (including Appendix G), relevant plans, policies, and/or guidelines, and agency recommendations, the Projects could have a significant impact if they were to:<sup>50</sup>

- Conflict with or obstruct implementation of the applicable air quality plan;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard;
- Expose sensitive receptors to substantial pollutant concentrations; or
- Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.
- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; and/or
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions.

#### 3.5.3.2 Methodology

As described in Section 3.1, this EIR provides an independent analysis of the potential environmental impacts of the Projects. **Table 3.5-5** presents measures from the 2014 BMP Update PEIR adopted by the Board of Directors (Resolution 2014-05) for the purpose of reducing impacts related to air quality and GHGs. The impact analysis assumes these adopted measures would be implemented as part of the proposed Projects. Potential impacts are evaluated below.

#### ***Guidelines and Methodologies Used***

For the purposes of this EIR, the thresholds of significance established by the MBARD in its *CEQA Air Quality Guidelines* were applied. MBARD has adopted two different sets of guidelines: *CEQA Air Quality Guidelines*<sup>51</sup> that provide guidance for lead agencies that prepare project-specific CEQA documentation for projects within the NCCAB and *Guidelines for Implementing the California Environmental Quality Act*<sup>52</sup> for the MBARD's implementation of CEQA as a lead or responsible agency. The *Guidelines for Implementing the California Environmental Quality Act* establish criteria pollutant significance thresholds for construction emissions, which were not included in the *CEQA Air Quality Guidelines*.

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<sup>49</sup> County of Santa Cruz, Climate Action Strategy, approved by the Board of Supervisors on February 26, 2013.

<sup>50</sup> Refer also to Appendix NOP for additional topics that were addressed in the Notice of Preparation.

<sup>51</sup> MBUAPCD, *CEQA Air Quality Guidelines*, revised February 2008.

<sup>52</sup> MBUAPCD, *Guidelines for Implementing the California Environmental Quality Act*, Adopted 1996, Revised February 2016.

**TABLE 3.5-5**  
**2014 BMP UPDATE PEIR MEASURES – AIR QUALITY AND GREENHOUSE GASES**

**AQ-1:** The construction contractor shall implement a dust program that includes the following elements:

- Water all active construction sites at least twice daily;
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard;
- Pave, apply water three times daily, or apply (non- toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites;
- Sweep daily (with water sweepers) all paved access roads, paved parking areas and paved staging areas at construction sites;
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets;
- Hydroseed or apply (non-toxic) soil binders to inactive construction areas. However, do not apply these measures in operating agricultural fields under cultivation unless requested by the grower;
- Enclose, cover, water twice daily or apply (non- toxic) soil binders to exposed stockpiles (dirt, sand, etc.);
- Limit traffic on unpaved roads to 15 mph;
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways;
- Replant vegetation in disturbed areas as quickly as possible; and
- The contractor or builder shall designate a person or persons to monitor the fugitive dust emissions and enhance the implementation of the measures as necessary to minimize dust complaints. The name and telephone number of such persons shall be provided to the [air pollution control district] APCD Compliance Division prior to the start of any grading, earthwork or demolition.

SOURCE: Pajaro Valley Water Management Agency, Resolution No. 2014-05, adopted April 16, 2014.

Although the MBARD is not the lead agency for the environmental review of the Projects, since the majority of Project-related emissions would be associated with construction activities that would occur within the NCCAB, the criteria pollutant mass emissions significance thresholds identified in the MBARD's *Guidelines for Implementing the California Environmental Quality Act* have been used to evaluate the regional air quality impacts that would be associated with the Projects.

The *Guidelines for Implementing the California Environmental Quality Act* state that a project would not have a significant air quality effect on the environment if construction or operation of the project would emit less than 137 pounds per day of NO<sub>x</sub> and ROG, 82 pounds per day of PM<sub>10</sub>, 55 pounds per day of PM<sub>2.5</sub>, and 550 pounds per day of CO.<sup>53</sup>

### Health Risk

This EIR uses methodology provided by the Office of Environmental Health Hazard Assessment,<sup>54</sup> coupled with a significance threshold from the MBARD, in evaluating the potential for the Projects to expose sensitive receptors to substantial levels of toxic air contaminants. The MBARD considers temporary emissions of a carcinogenic TAC that can result in a hazard index greater than 1 for acute or chronic impacts and/or a cancer risk greater than 10 incidents per population of 1,000,000 to be significant.

<sup>53</sup> MBUAPCD, Guidelines for Implementing the California Environmental Quality Act, Adopted 1996, Revised February 2016.

<sup>54</sup> Office of Environmental Health Hazard Assessment, *Air Toxics Hot Spots Program Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments*, adopted February, 2015.

## Greenhouse Gases

MBARD does not have established project-specific thresholds of significance for the analysis of GHG emissions from land use projects or non-stationary source projects. For such projects, the MBARD recommends that lead agencies use either the Bay Area Air Quality Management District (BAAQMD) GHG significance threshold of 1,100 metric tons CO<sub>2</sub>e per year<sup>55</sup> or the San Luis Obispo County Air Pollution Control District (SLOAPCD) GHG significance threshold of 1,150 CO<sub>2</sub>e per year.<sup>56</sup> Since the BAAQMD's significance threshold is lower and hence, more conservative than the SLOAPCD significance threshold, and for the reasons set forth below, this EIR uses the BAAQMD significance threshold of 1,100 metric tons CO<sub>2</sub>e per year to evaluate whether the Projects emissions could have a significant impact on the environment.

Use of this threshold results in approximately 59 percent of all non-stationary source projects subject to CEQA review in the Bay Area being above the significance threshold and having to implement feasible mitigation measures to meet their CEQA obligations. These projects account for approximately 92 percent of all GHG emissions anticipated to occur between now and 2020 from new land use development in the Bay Area.<sup>57</sup> If all land use-project emissions are mitigated to below this threshold, it would represent an overall reduction in new land use project-related emissions of up to 92 percent.

This significance threshold was developed to focus on emissions reductions by 2020; the BAAQMD, MBARD, and CARB have not yet provided guidance or recommendations for CEQA significance thresholds to evaluate consistency with emissions reduction goals for years beyond 2020. However, since (a) the Executive Order B-30-15 emissions reductions goal of lowering GHG emissions to 40 percent below 1990 levels by 2030 is roughly equivalent to reducing emissions by 42 percent below current levels and (b) the Executive Order S-3-05 emissions reductions goal of lowering GHG emissions to 80 percent below 1990 levels by 2050 is roughly equivalent to reducing emissions by 81 percent below current levels, the 1,100 metric tons CO<sub>2</sub>e per year threshold can be used as a rough gauge to determine if the Project would be consistent with these post-2020 goals.

Neither the MBARD or BAAQMD have identified a specific significance threshold for short-term construction-related GHG emissions. Therefore, GHG emissions from construction of the Projects are evaluated based on guidance developed by the SLOAPCD. For construction-related GHGs, the SLOAPCD recommends that total emissions from construction be amortized over a period equal to the estimated life of the project and added to operational emissions, and then compared to the operational significance threshold.<sup>58</sup> The SLOAPCD recommends using a project life of 50 years for residential projects and 25 years for commercial projects. There is no recommendation for public infrastructure projects such as the Projects; therefore, a conservative project life of 25 years is used in this analysis.

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<sup>55</sup> BAAQMD, *California Environmental Quality Act Air Quality Guidelines*, adopted June 2, 2010, updated May 2017.

<sup>56</sup> SLOAPCD, *CEQA Air Quality Handbook*, April 2012, last updated November 2017.

<sup>57</sup> BAAQMD, *California Environmental Quality Act Air Quality Guidelines*, adopted June 2, 2010, updated May 2017.

<sup>58</sup> SLOAPCD, *CEQA Air Quality Handbook*, April 2012, last updated November 2017.

### ***Estimating Air Emissions for the Project***

**Appendix AIR** details all of the emission factors and assumptions used to estimate construction and operational emissions that would be associated with the Projects.

The California Emissions Estimator Model (CalEEMod) version 2016.3.2 was used to estimate regional criteria air pollutant emissions associated with construction of the Projects, including emissions from off-road construction equipment and vehicle trips associated with worker commutes and material hauling. The Projects would include construction of the following proposed components:

- Harkins Slough filter plant upgrades;
- Several new pipelines;
- Recharge basins, recovery wells, and monitoring wells; and
- Struve Slough screened intake and pump station.

Construction of the Harkins Slough Project components would occur in stages with an estimated total construction time of approximately 30 months over a three-year period between 2022 and 2025 based on project needs. Construction of the Struve Slough Project is expected to last approximately one year between 2022 and 2023, with the exception of the North recharge basin, recovery wells, and associated pipelines, the construction of which is expected to occur over nine months between 2027 and 2028. Tables 2-4A and 2-4B in Chapter 2, *Project Description* show the currently anticipated construction schedule and duration of each activity for the Projects.

Off-road equipment exhaust and vehicle trip emissions (both exhaust and fugitive dust) were estimated using CalEEMod, with assumptions for construction equipment inventories and use rates, haul truck and vehicle trips, and construction phasing developed by Carollo Engineers for this EIR analysis. CalEEMod default trip lengths for worker trips, material delivery trips, and haul truck trips were used to estimate the on-road vehicle emissions. Other CalEEMod defaults were used where project specific data were not available. As discussed above, the estimated total construction GHG emissions from the Projects were amortized over a 25-year project life and added to the operational emissions estimates for comparison with the operational threshold.<sup>59</sup>

Although operation of the Projects would not require any additional employees, maintenance activities at the Harkins Slough filter plant and proposed Struve Slough intake and pump station would include routine inspections conducted by existing employees (e.g., for visual signs of wear and tear, obstructions, or leakage) and the performance of scheduled maintenance of the facilities and pipelines. Maintenance activities and delivery of water treatment chemicals to the filter plant would generate approximately four new one-way trips (two round trips) per week (208 annual one-way trips). The Projects would not include any direct sources of criteria pollutant or GHG emissions at any of the sites. Emissions generated by these trips would be minimal and expected to be well below operational thresholds. Therefore, direct emissions of operational criteria air pollutant and GHG emissions are not discussed further in this section.

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<sup>59</sup> SLOAPCD, *CEQA Air Quality Handbook*, April 2012, last updated November 2017.

However, operational GHG emissions would be indirectly emitted from the generation of electricity that would be required to operate the Project components. Indirect GHG emissions that would be associated with the Projects electricity use were estimated using emissions factors for electricity generation in California from USEPA's Emissions and Generation Resource Integrated Database summary tables.<sup>60</sup> GHG emissions were estimated for CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub>, and the total CO<sub>2</sub>e associated with the Projects' power demand was calculated by multiplying the N<sub>2</sub>O and CH<sub>4</sub> emissions by their respective global warming potential, and then those values were added to the CO<sub>2</sub> emissions. Criteria air pollutant emissions associated with the generation of electricity are typically not considered in the air quality emissions inventory for projects as it is not possible to determine if the electricity used for the Project would be generated within the air basin or how it would be generated.

### 3.5.3.3 Impacts and Mitigation Measures

#### **Impact AIR-1: Construction and operational activities associated with the Projects could generate criteria air pollutant emissions that would conflict with implementation of the Clean Air Plan. (*Less than Significant*)**

The Projects would not lead to an increase in population and would therefore not generate any population-related emissions (e.g., motor vehicles, residential heating and cooling emissions) that would need a consistency determination with the applicable AQMPs. Consistency of direct emissions associated with equipment or process operations of a commercial, industrial, or institutional facility subject to MBARD permit authority is determined by assessing whether the emission source complies with all applicable MBARD rules and regulations, including emission offset and emission control requirements, and/or whether or not Project emissions are accommodated in the AQMPs. Emissions from sources not subject to MBARD permit authority may be deemed consistent with the AQMP if such emissions are forecasted in the AQMP emission inventories. The Projects would not include any stationary sources of air pollutant emissions. Therefore, if the Projects would result in emissions less than the quantitative thresholds of significance during both construction and operation, it would be considered to be accounted for in regional air quality planning and would be considered to be consistent with the goals of the AQMPs. As discussed earlier, the Projects would generate minimal operational air quality emissions. Construction emissions are discussed below.

Construction activities are short term and typically result in combustion exhaust emissions (e.g., vehicle and equipment tailpipe emissions), including ozone precursors (ROG and NO<sub>x</sub>), and PM in the form of dust (fugitive dust). Emissions of ozone precursors and PM are primarily a result of the combustion of fuel from on-road vehicles and off-road equipment. However, ROG<sub>s</sub> are also emitted from activities that involve painting, other types of architectural coatings, or asphalt paving.

Pollutant emissions associated with construction of the Projects would be generated from the following general construction activities: (1) ground disturbance from grading, excavation, etc.; (2) vehicle trips from workers traveling to and from the construction areas; (3) trips associated

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<sup>60</sup> USEPA, eGRID2014v2 Summary Tables, February 27, 2017.



with delivery of construction supplies to, and hauling debris from, the construction areas; (4) fuel combustion by on-site construction equipment; and (5) paving and architectural coatings. These construction activities would temporarily generate air pollutant emissions, including dust and fumes. The amount of emissions that would be generated on a daily basis would vary, depending on the intensity and types of construction activities that would occur simultaneously. Overall, construction activities associated with the Projects components would occur intermittently over a period of 6 years between 2022 and 2028.

Though construction emissions are considered short term and temporary, they have the potential to represent a significant impact with respect to air quality, particularly when construction extends over a long period of time and/or when sensitive receptors are located close by.

Particulate matter (i.e., PM<sub>10</sub> and PM<sub>2.5</sub>) are among the pollutants of greatest localized concern with respect to construction activities. Particulate emissions from construction activities can lead to adverse health effects and nuisance concerns, such as reduced visibility and soiling of exposed surfaces. Particulate emissions can result from a variety of construction activities, including excavation, grading, vehicle travel on paved and unpaved surfaces, and vehicle and equipment exhaust. Construction emissions of PM can vary greatly depending on the level of activity, the specific operations taking place, the number and types of equipment operated, local soil conditions, weather conditions, and the amount of earth disturbance.

Emissions of ozone precursors ROG and NO<sub>x</sub> are primarily generated from construction equipment and mobile source exhaust and vary as a function of the number of daily vehicle trips, and the types and number of heavy-duty, off-road equipment used and the intensity and frequency of their operation. Additionally, construction-related ROG emissions would also result from the application of asphalt and architectural coatings and the amount of these emissions would vary depending on the amount of paving or coating that would occur each day.

Project construction emissions were estimated using CalEEMod version 2016.3.2 and are presented in **Table 3.5-6**. The table shows maximum daily emissions by construction year and compares them to the MBARD significance thresholds for construction.

As shown in Table 3.5-6, the maximum daily construction emissions of ROG, NO<sub>x</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub> would not exceed the MBARD significance thresholds for construction. The 2014 BMP Update PEIR included adopted Mitigation Measure AQ-1 to reduce fugitive dust emissions from construction activities, which would be implemented as part of the Projects and would further reduce fugitive PM emissions by approximately 35 percent. Therefore, this impact would be *less than significant* for construction.

Given that the Projects would result in emissions less than the quantitative thresholds of significance during both construction and operation, the Projects would be considered to be accounted for in regional air quality planning and would be considered to be consistent with the goals of the AQMPs. This impact would be *less than significant*.

**Mitigation:** None required.

**TABLE 3.5-6  
PROJECT CONSTRUCTION EMISSIONS**

Project Construction Activities	Estimated Maximum Daily Construction Emissions <sup>a</sup> (pounds/day)			
	ROG	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
2022	6.2	60.5	4.9	3.2
2023	2.6	27.9	3.8	1.8
2024	7.0	73.2	5.2	2.9
2025	2.7	33.5	5.3	1.9
2027	4.3	34.7	1.8	1.4
Maximum Daily Emissions	5.9	63.9	5.3	2.8
MBARD Significance Threshold	137	137	82	55
Exceed Threshold?	No	No	No	No

NOTES:

<sup>a</sup> Estimated maximum daily emissions shown are for summer conditions and do not represent emissions throughout the year.

SOURCE: Appendix AIR of this EIR.

## Impact AIR-2: The Projects could expose sensitive receptors to substantial levels of pollutants. (*Less than Significant*)

### Toxic Air Contaminants

#### Construction

Construction of the Projects would result in the short-term generation of DPM emissions from the use of off-road diesel equipment and from construction material deliveries and debris removal using on-road heavy-duty trucks. DPM is a complex mixture of chemicals and particulate matter that has been identified by the State of California as a TAC with potential cancer and chronic non-cancer effects. The dose to which receptors are exposed is the primary factor affecting health risk from TACs. Dose is a function of the concentration of a substance in the environment and the duration of exposure to the substance. According to the Office of Environmental Health Hazard Assessment (OEHHA), health risk assessments (HRAs), which determine the exposure of sensitive receptors to TAC emissions, should be based on a 30-year exposure period when assessing TACs (such as DPM) that have only cancer or chronic non-cancer health effects.<sup>61</sup> However, assumed exposure in such health risk assessments should be limited to the duration of the emission-producing activities associated with the Projects. OEHHA recommends that short-term projects (such as construction activities) lasting more than 2 months conduct a HRA to evaluate health risks to nearby sensitive receptors.<sup>62</sup>

<sup>61</sup> Office of Environmental Health Hazard Assessment, *Air Toxics Hot Spots Program Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments*, adopted February, 2015.

<sup>62</sup> Office of Environmental Health Hazard Assessment, *Air Toxics Hot Spots Program Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments*, adopted February, 2015.

Construction activities associated with the various components of the Projects would take place intermittently over a 6-year period from 2022 to 2028, although the level of activity would vary both temporally and spatially. The construction schedule and duration of construction of each Project component are detailed in Appendix AIR. Duration of construction activities associated with individual Project components are expected to last between 6 to 12 months. Therefore, the same set of receptors would not be exposed to Project DPM emissions for more than a period of 12 months. Even within the 12 months, construction activities would take place intermittently with varying intensity. Though there would be times when multiple Project components are under construction concurrently, the same set of receptors would not be exposed to emissions from all components.

**Table 3.5-7** shows average daily exhaust emissions of PM<sub>10</sub>, duration of emissions, and distance to the nearest sensitive receptor for each Project component. The nearest receptors to each Project component are shown in Figure 3.8-2 of Section 3.8, Noise and Vibration. Construction of the different pipeline alignments is expected to take a maximum of 6 months each. Within the 6 months, construction would only take place intermittently and not over the entire duration. Further, pipeline construction would advance linearly at a rate of 100 to 250 feet per day (depending on the type of construction employed), so any receptors in the vicinity of the alignment would not be exposed to diesel exhaust from pipeline construction for more than a few days. Well construction is expected to take approximately 10 days at each location and due to the short duration of exposure, health risks to any sensitive receptors in the vicinity would be less than significant. While neither OEHHA nor MBARD provide any guidance regarding the zone of influence to be considered around sources of TACs, the Bay Area Air Quality Management District recommends that health risks be evaluated when sensitive receptors are located within 1,000 feet of a source. Based on this guidance, health risk impacts from the construction of the Southwest and North recharge basins are not expected to lead to significant health risks. Construction activities associated with the Struve Slough screened intake would last only 40 workdays over a period of 12 months. This level of intermittent construction activity would not result in significant health risks to nearby receptors. At the Southeast recharge basin, the filter plant and the Struve Slough pump station construction activities would take place over 180 to 200 workdays over a 12-month period at each location. In addition, sensitive receptors are located within 1,000 feet of these components.

As shown in the table, of these three Project components (Southeast recharge basin, the filter plant and the Struve Slough pump station), the residential receptor located 40 feet from the southeast recharge basin would be exposed to the highest exhaust PM<sub>10</sub> emission levels from construction and is likely to experience the highest health risk. As detailed earlier, receptors in the vicinity of all other Project components would be located farther away from construction activities, would be exposed to a shorter duration of exposure, or a lower level of exposure and hence health risk impacts to these receptors would be less than significant.

**TABLE 3.5-7  
SUMMARY OF CONSTRUCTION EMISSIONS BY PROJECT COMPONENT**

<b>Project Component</b>	<b>Duration of Construction (workdays/months)</b>	<b>Distance to Nearest Sensitive Receptor (feet)</b>	<b>Average Daily Exhaust PM<sub>10</sub> Emissions<sup>a</sup> (lbs/workday)</b>
<b>Harkins Slough Project</b>			
Filter Plant Upgrades <sup>b</sup>	180 days/12 months	150	<0.1
Backwash and Raw Water Pipeline	50 days/6 months	150	0.57
Southwest Recharge Basin and Pipelines	180 days/12 months	1,390	0.86
Recovery Wells around Southwest Recharge Basin	100 days/12 months	890	0.74
Southeast Recharge Basin and Pipelines <sup>b</sup>	180 days/12 months	40	0.15
Recovery Wells around Southeast Recharge Basin	100 days/12 months	50	0.96
<b>Struve Slough Project</b>			
Struve Slough Intake Cone Screen	40 days/12 months	750	0.52
Struve Slough Intake Pump Station <sup>b</sup>	200 days/12 months	500	0.03
Struve Slough Intake and Pipeline to Filter Plant	80 days/11 months	150	0.73
Filter Plant to Recharge Basins Pipeline	55 days/6 months	10	0.64
North Recharge Basin and Pipelines	120 days/9 months	1,330	0.72
Recovery Wells around North Recharge Basin	100 days/9 months	830	0.64

**NOTES:**

<sup>a</sup> Average daily emissions estimated by dividing total emissions over the phase from the CalEEMod annual output by the number of workdays in the phase.

<sup>b</sup> Because of the duration of construction and proximity to sensitive receptors, construction equipment assumptions (i.e., type, duration of use) for these Project components were refined to better inform the health risk assessment.

SOURCE: Table compiled by ESA, 2020.

A screening-level construction health risk assessment (HRA) was conducted for the southeast recharge basin using technical information from the BAAQMD, California Air Pollution Control Officer's Association (CAPCOA), CARB, Office of Environmental Health Hazard Assessment (OEHHA), and the U.S. EPA. DPM emissions were estimated using CalEEMod as detailed above, and concentration at the nearest off-site sensitive receptor was estimated using AERSCREEN, U.S. EPA's recommended screening level air quality dispersion model using source parameters for off-road equipment.

Health risks were calculated for the nearest off-site residential receptor located approximately 40 feet from the construction area for the southeast recharge basin. The estimated risks in this health risk assessment are based primarily on a series of conservative assumptions related to predicted environmental concentrations, exposure, and chemical toxicity, as recommended by BAAQMD and OEHHA. This includes the youngest potential age of exposure (beginning with the 3rd trimester of pregnancy for residential receptors), the highest potential frequency of exposure (e.g.,

child residents are exposed 24 hours per day, 350 days per year for residential receptors), the highest recommended breathing rates (e.g., 80th to 95th percentile breathing rates), and the maximum age sensitivity factors for vulnerable populations such as infants and children. In addition, as a screening model, AERSCREEN uses worst-case meteorology to estimate concentrations. The use of conservative assumptions in the health risk assessment is likely to result in overestimates of exposure and therefore risk, although it is difficult to quantify the uncertainties associated with all of the assumptions made in the health risk assessment. As such, the combination of several high-end and conservative estimates used as exposure parameters may substantially overestimate chemical intake, and the excess lifetime cancer risks calculated in the health risk assessment are therefore likely to be overestimated.

The increase in lifetime cancer risk and chronic non-cancer hazard index from exposure to DPM emissions generated by construction activities associated with the southeast recharge basin at the nearest off-site sensitive receptor are shown in **Table 3.5-8**. Table 3.5-8 also includes the thresholds of significance that the MBARD uses for evaluation of health risk impacts. Details of modeling assumptions and model outputs are included in Appendix AIR.

**TABLE 3.5-8**  
**UNMITIGATED CONSTRUCTION HEALTH RISKS AT NEAREST OFF-SITE SENSITIVE RECEPTOR TO THE**  
**SOUTHEAST RECHARGE BASIN**

Project Component	Lifetime Excess Cancer Risk (per million)	Chronic Non-Cancer Hazard Index
Residential Receptor	8.6	0.015
MBARD Significance Threshold	10	1.0
Significant Impact	No	No

SOURCE: Table compiled by ESA, 2020.

As shown in Table 3.5-8, increase in lifetime cancer risk and non-cancer hazard index from exposure to construction DPM emissions from the southeast recharge basin at the nearest receptor would be less than the respective MBARD thresholds. This impact would be *less than significant*.

### Operation

Once operational, the Projects would not include any sources of TAC emissions. Therefore, there would be *no impact*.

### Criteria Air Pollutants

#### Construction and Operation

The Projects would generate criteria pollutant emissions as discussed under Impact AIR-1; however, the health impacts of project-level criteria pollutant emissions on sensitive receptors are harder to quantify. Given that ozone formation occurs through a complex photo-chemical reaction between its precursors NO<sub>x</sub> and ROG in the atmosphere with the presence of sunlight, the impacts of ozone are typically considered on a basin-wide or regional basis instead of a localized basis. The health-based ambient air quality standards for ozone, therefore, are as concentrations

of ozone and not as the mass of their precursor pollutants (i.e., NO<sub>x</sub> and ROG). It is not necessarily the mass of precursor pollutants emitted that causes human health effects, but the concentration of resulting ozone or particulate matter. Because of the complexity of ozone formation and the non-linear relationship of ozone concentration with its precursor gases, and given the state of environmental science modeling in use at this time, it is infeasible to convert specific emissions levels of NO<sub>x</sub> or ROG emitted in a particular area to a particular concentration of ozone in that area. Meteorology, the presence of sunlight, seasonal impacts, and other complex chemical factors all combine to determine the ultimate concentration and location of ozone.<sup>63,64</sup> However, since the Project would not exceed the numeric significance indicators for ROG and NO<sub>x</sub> emissions during either construction or operation, it is not likely that Project ROG and NO<sub>x</sub> emissions could result in an increase in ground-level ozone concentrations in proximity to the Project sites or elsewhere in the air basin and impacts can be considered *less than significant*.

As expressed in the *amicus curiae* brief submitted for the *Sierra Club v. County of Fresno* case (also known as the *Friant Ranch Case*),<sup>65,66</sup> the CEQA criteria pollutants significance thresholds from the air district were set at emission levels tied to the region's attainment status, and are emission levels at which stationary pollution sources permitted by the air district must offset their emissions. The CEQA project must use feasible mitigations in order for the region to attain the health based ambient air quality standards. Therefore, given that the Project would not exceed the mass emissions thresholds established by MBARD, it is not likely that emissions from Project-related activities will cause or contribute to the exposure of sensitive receptors to ground-level concentrations in excess of health-protective levels.

The primary health concern with exposure to NO<sub>x</sub> emissions is the secondary formation of ozone. As the *amicus curiae* briefs submitted for the *Sierra Club v. County of Fresno* case suggested, and as was stated above, because of the complexity of ozone formation, and given the state of environmental science modeling in use at this time, it is infeasible to determine whether, or the extent to which, a single project's precursor (i.e., NO<sub>x</sub> and VOCs) emissions would potentially result in the formation of secondary ground-level ozone and the geographic and temporal distribution of such secondary formed emissions. Furthermore, available models today are designed to determine regional, population-wide health impacts, and cannot accurately quantify ozone-related health impacts caused by NO<sub>x</sub> or VOC emissions from the local level (project level). Due to these scientific constraints, the disconnect between Project-level NO<sub>x</sub> emissions and ozone-related health impacts cannot be bridged at this time. However, since the Project would not exceed MBARD's significance threshold for NO<sub>x</sub> emissions during either construction or operation, it is not likely to result in an increase in ground-level ozone concentrations in

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<sup>63</sup> SCAQMD, Application of the South Coast Air Quality Management District for Leave to File Brief of Amicus Curiae in Support of Neither Party and Brief of Amicus Curiae. In the Supreme Court of California. *Sierra Club, Revive the San Joaquin, and League of Women Voters of Fresno v. County of Fresno*, 2014.

<sup>64</sup> SJVAPCD, Application for Leave to File Brief of Amicus Curiae Brief of San Joaquin Valley Unified Air Pollution Control District in Support of Defendant and Respondent, County of Fresno and Real Party In Interest and Respondent, *Friant Ranch, L.P.* In the Supreme Court of California. *Sierra Club, Revive the San Joaquin, and League of Women Voters of Fresno v. County of Fresno*, 2014.

<sup>65</sup> SCAQMD, 2014 (see above).

<sup>66</sup> SJVAPCD, 2014 (see above).

proximity to the Project sites or elsewhere in the air basin and impacts can be considered *less than significant*.

**Mitigation:** None required.

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**Impact AIR-3: The Projects could create objectionable odors that would affect a substantial number of people. (*Less than Significant*)**

### **Construction**

Construction activities that would be associated with the Projects could result in temporary odors from use of diesel-fueled equipment. Diesel combustion odors would be temporary, would dissipate quickly, and are unlikely to create objectionable odors that would affect a substantial number of people. Therefore, the impact would be *less than significant*.

### **Operation**

There would be no operational sources of odor associated with the Projects. Chemical storage and chemical feed facilities at the filter plant would be closed systems that would generate no odorous emissions. Therefore, the Projects would not be expected to create objectionable odors that would affect a substantial number of people. The impact would be *less than significant*.

**Mitigation:** None required.

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**Impact AIR-4: The Projects could lead to an increase of GHG emissions that are associated with global climate change; however, not at a cumulatively considerable level. (*Less than Significant*)**

### **Construction**

Construction of the Projects would generate GHG emissions associated with the use of heavy-duty off-road construction equipment and automobile and truck trips required to transport workers, materials, and debris to and from the Project sites. As described above, construction GHG emissions were derived from the CalEEMod output and are presented in **Table 3.5-9**.

**TABLE 3.5-9  
ESTIMATED CONSTRUCTION GHG EMISSIONS**

Source	GHG Emissions as metric tons of CO <sub>2</sub> e
Off-road construction equipment & on-road construction vehicles	2,806
Assumed Project Life (years)	25
Amortized Annual Construction Emissions	112
SOURCE: Appendix AIR of this EIR.	

As recommended by MBARD and in accordance with the SLOAPCD CEQA *Guidelines*, the amortized annual construction emissions are added to the Projects operational emissions discussed below and considered in the impact evaluation.

## Operation

**Table 3.5-10** shows the Projects' operational emissions. As discussed earlier, the Projects' GHG emissions would be generated indirectly from the generation of electricity to power the Project components. The sum of these emissions and the amortized annual construction emissions is compared to the BAAQMD's 1,100 MT of CO<sub>2</sub>e per year threshold in Table 3.5-9.

**TABLE 3.5-10  
PROJECT GHG EMISSIONS**

Source	CO <sub>2</sub> e (metric tons/year)
Electricity Generation (Indirect)	255
Amortized Annual Construction Emissions	112
Total	367
Significance Threshold	1,100
Significant?	No
SOURCE: Appendix AIR of this EIR,	

Indirect emissions from the generation of electricity that would be required to operate the Projects were based on the Projects' projected net increase in operational demand of 1,000 MWh per year at the Harkins Slough facilities and 900 MWh per year at the Struve Slough facilities. Total Project emissions when combined with the amortized annual construction emissions would be well below the 1,100 tons per year threshold and the Projects would therefore not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment. This impact would be *less than significant*.

**Mitigation:** None required.

### **Impact AIR-5: The Projects would not conflict with the Executive Order B-30-15 Emissions Reduction Goal. (*Less than Significant*)**

As noted in Section 3.5.3.2, the threshold of 1,100 metric tons CO<sub>2</sub>e per year is used to assess the significance of Impact AIR-5. Use of this threshold effectively requires mitigation for the top 59 percent of emissions generated by new land use projects, which would represent an overall reduction in new land use project-related emissions of up to 92 percent. Since the issuance of Executive Order B-30-15, GHG emissions reductions goals of lowering GHG emissions to 40 percent below 1990 levels by 2030 is roughly equivalent to reducing emissions by 42 percent below current levels. This analysis uses the same significance threshold to determine if the Projects would generally be consistent with Executive Order B-30-15. As discussed under Impact



AIR-4, the Project impact associated with GHG emissions would be less than significant. Therefore, the Projects would not conflict with the Executive Order B-30-15 Emissions Reduction Goal and the associated impact would be *less than significant*.

**Mitigation:** None required.

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### ***Cumulative Impacts***

**Impact C-AIR-1: The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative air quality or greenhouse gas impacts. (*Less than Significant*)**

#### **Air Quality**

The contribution of an individual project's air emissions to regional air quality impacts is, by its nature, a cumulative effect. Emissions from past, present, and reasonably foreseeable future projects in the region also have or will contribute to adverse regional air quality impacts on a cumulative basis, resulting in a potentially significant cumulative air quality impact. No single project by itself would be sufficient in size to result in non-attainment of ambient air quality standards. Instead, a project's individual emissions contribute to existing cumulative air quality conditions.<sup>67</sup>

The project-level significance thresholds for criteria air pollutants established by MBARD are intended to address the incremental contributions of individual projects on the air quality of the entire NCCAB as a whole. The significance thresholds are levels below which new sources are not anticipated to contribute to an air quality violation and would be consistent with the assumptions in the regional air quality management plan. Therefore, conformance with the MBARD thresholds ensures that individual projects would also not have a cumulative impact with respect to overall air quality within the NCCAB. The Projects would not result in any growth-inducing impacts such as an increase in population and its related emissions. Therefore, as the Projects' criteria pollutant emissions of ROG, NO<sub>x</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> would not exceed the project-level thresholds as explained under Impact AIR-1, and because the Projects would comply with all applicable MBARD permitting requirements, the Projects would not result in a considerable contribution to cumulative regional air quality impacts, and the impact would be *less than significant*.

Unlike criteria air pollutants, with regard to impacts on sensitive receptors, the geographic context for exposure of sensitive receptors to DPM from construction equipment and odors would be more localized. Construction of the Projects would involve use of construction equipment that would emit DPM emissions and combustion odors over a period of 6 to 12 months at each location. A list of cumulative projects located in the vicinity of the Projects can be found on Figure 3.1-1. As shown on Figure 3.1-1, none of the cumulative projects would be located close

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<sup>67</sup> Bay Area Air Quality Management District, *California Environmental Quality Act – Air Quality Guidelines*, May 2017.

enough to the Project sites to contribute to cumulative impacts at the Projects' receptors. The closest cumulative project is the Lower Harkins Slough Habitat Restoration Project, which is located over 2,000 feet from the proposed pump station in Struve Slough. In addition, the construction schedule would not coincide with the Projects' construction schedule. Therefore, cumulative impacts to receptors from exposure to DPM emissions from construction activities and odors would be similar to Projects' impacts analyzed under Impacts AIR-2 and AIR-3. The Projects' contribution to the cumulative health risk and odors at nearby sensitive receptors would also be less than significant.

### **Greenhouse Gases**

Climate change is a global problem, and GHGs that contribute to climate change are considered global pollutants. Whereas pollutants with localized air quality effects have relatively short atmospheric lifetimes (about 1 day), GHGs have long atmospheric lifetimes (1 year to several thousand years). GHGs also persist in the atmosphere for long enough time periods and therefore can be dispersed around the globe, resulting in the effects of GHGs being experienced globally. The atmospheric concentration of GHGs determines the intensity of human-induced climate change, with current levels already leading to increases in global temperatures, sea level rise, severe weather, and other environmental impacts. The continued increase in atmospheric GHG concentrations will only worsen the severity and intensity of climate change, leading to irrevocable environmental changes. Therefore, from the standpoint of CEQA, GHG impacts to global climate change are inherently cumulative. No single project could generate enough GHG emissions to contribute noticeably to a change in the global average temperature. However, the combination of GHG emissions from past, present, and future projects contribute substantially to the phenomenon of global climate change and its associated environmental impacts.

As discussed under Impact AIR-4, GHG emissions from the construction and operation of the Project would be less than significant. The Projects would also comply with the goals and actions of applicable GHG reduction plans at the local and state levels that aim to achieve the 2030 target established by SB 32 for California to meet a 40 percent reduction in GHG emissions by 2030 compared to 1990 levels. Therefore, the Projects contribution to the global cumulative impact would not be considerable and the cumulative impact would be *less than significant*.

**Mitigation:** None required.

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## 3.6 Geology and Soils

This section presents an analysis of potential impacts related to geology, soils, paleontological resources, and geologic features that would result from implementation of the proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects). Information from the 2014 Basin Management Plan Update Program Environmental Impact Report (2014 BMP Update PEIR) that remains relevant and accurate for the purposes of describing the physical or regulatory setting of geology, soils, paleontological resources, and geologic features has been incorporated as appropriate. The Projects includes mitigation measures adopted by the Board of Directors to reduce the severity and magnitude of potential environmental effects.

### 3.6.1 Setting

The 2014 BMP Update PEIR Section 3.7.1 (p. 3.7-1 *et seq.*) describes existing geological, soils, and seismic conditions in the Project region. Regional environmental setting information from the 2014 BMP Update PEIR is summarized here. This section describes geology, soils, and seismicity information specific to the Project area.

Analysis within this section is based partly on the Preliminary Geotechnical and Geologic Site Assessments performed by Fugro.<sup>1</sup>

#### 3.6.1.1 Regional Setting

##### ***Regional Geology***

The Projects are located within the Pajaro Valley, a wide plain between the Coast Ranges and Monterey Bay. The Coast Ranges are defined by their northwest-trending mountains and valleys, created by the many active faults in the area. The southern Santa Cruz Mountains consist of Middle to Lower Pleistocene<sup>2</sup> marine sedimentary rocks and Early Miocene<sup>3</sup> marine deposits. The Pajaro Valley is underlain by Quaternary<sup>4</sup> alluvium from Aromas to Monterey Bay, and separates the southern Santa Cruz Mountains to the north from the Gabilan Range to the south.

<sup>1</sup> Fugro, *Preliminary Geotechnical and Geologic Site Assessments Phases 1 & 2, Pajaro Valley Water Management Agency 2017-2019 BMP Program Management Services for College Lake Integrated Resource Management Project, Harkins Slough Recharge Facility Upgrades, and Watsonville Slough with Recharge Basins*, April 2018.

<sup>2</sup> The Pleistocene Epoch is a length of geologic time spanning from 2.6 million years ago to 11,000 years ago.

<sup>3</sup> The Miocene Epoch is a length of geologic time spanning from 23 million years ago to 5.3 million years ago.

<sup>4</sup> The Quaternary Period is the geologic time period spanning from 2.58 million years ago to the present day; this period is divided into the Pleistocene (2.58 million years ago to 11.7 thousand years ago) and Holocene (11.7 thousand years ago to the present) epochs.

## **Seismicity**

The region is characterized by high seismic activity. The fault zones described below are shown on **Figure 3.6-1** and considered to be components of the larger San Andreas Fault system. While each of these are their own discrete fault zones, and each of them move independently of one another, they are considered to be extensions of the main San Andreas Fault, and they each have somewhat different characteristics. The fault zones below are designated as Earthquake Fault Zones under the Alquist-Priolo Act of 1972.

### **Zayante-Vergeles Fault zone**

The Zayante-Vergeles Fault (ZVF) zone, located approximately 3.5 miles northeast of the nearest Project component, is a northwest-trending, right-lateral, strike-slip fault and is considered active, showing Holocene displacement. Due to Holocene displacement, the ZVF zone has been delineated on an Alquist-Priolo Earthquake Fault Zone map as a Zone of Required Investigation.

### **San Andreas Fault zone (Santa Cruz Mountain section)**

The San Andreas Fault is a northwest-trending, right-lateral, strike-slip fault, approximately 5.8 miles northeast of the nearest Project component (i.e., the intake and pump station at Struve Slough).<sup>5</sup> The San Andreas Fault zone has produced many major earthquakes in the recent past, including the 1906 San Francisco earthquake and the 1989 Loma Prieta earthquake. The 1989 Loma Prieta earthquake, which was a magnitude 6.9 event, was responsible for numerous deaths and injuries, and millions of dollars in damage to the Bay Area. Although the epicenter of this earthquake was located in the Forest of Nisene Marks State Park, just north of the unincorporated community of Aptos in Santa Cruz County, the effects were felt throughout the Bay Area as far north as San Francisco.

### **Sargent-Beracol Fault zone**

The northwest-trending, right-lateral, strike-slip Sargent-Beracol Fault branches off of the San Andreas Fault and extends for approximately 34 miles from the Lexington Reservoir to Hollister. The fault is located approximately 8.4 miles northeast of the nearest Project components (the intake and pump station at Struve Slough), and is considered active.<sup>6</sup>

### **Calaveras Fault zone**

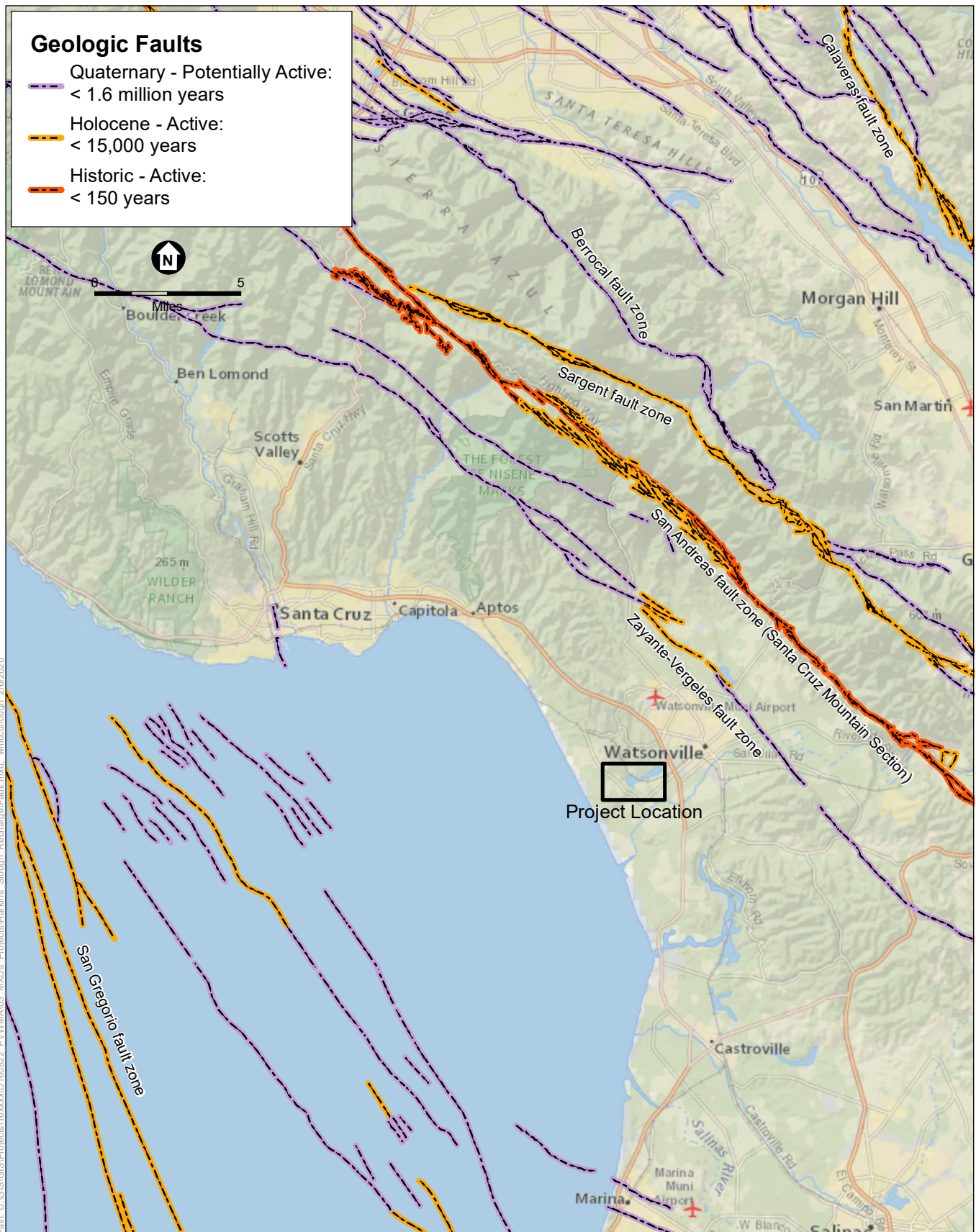
The Calaveras Fault is a major northwest-trending, right-lateral, strike-slip fault that extends for about 100 miles from Dublin to Hollister, where it merges with the San Andreas Fault. The southern portion, which is considered to be the most active segment, is located approximately 17.5 miles northeast of the nearest Project component (the intake and pump station at Struve Slough).<sup>7</sup>

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<sup>5</sup> Fugro, *Preliminary Geotechnical and Geologic Site Assessments Phases 1 & 2 Pajaro Valley Water Management Agency 2017-2019 BMP Program Management Services for College Lake Integrated Resource Management Project Harkins Slough Recharge Facility Upgrades, and Watsonville Slough with Recharge Basins*, April 2018.

<sup>6</sup> Fugro, *Preliminary Geotechnical and Geologic Site Assessments Phases 1 & 2 Pajaro Valley Water Management Agency 2017-2019 BMP Program Management Services for College Lake Integrated Resource Management Project Harkins Slough Recharge Facility Upgrades, and Watsonville Slough with Recharge Basins*, April 2018.

<sup>7</sup> Fugro, *Preliminary Geotechnical and Geologic Site Assessments Phases 1 & 2 Pajaro Valley Water Management Agency 2017-2019 BMP Program Management Services for College Lake Integrated Resource Management Project Harkins Slough Recharge Facility Upgrades, and Watsonville Slough with Recharge Basins*, April 2018.



SOURCE: USGS, 2010

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.6-1**  
Regional Faults

### San Gregorio Fault zone

The San Gregorio Fault is also a northwest-trending, right-lateral, strike-slip fault, as is characteristic of the many faults that are associated with the San Andreas Fault system. It is located approximately 18.5 miles offshore, northwest of the nearest Project component (the Southwest recharge basin), and is considered active.<sup>8</sup>

### 3.6.1.2 Local Setting

#### Local Geology

Holocene (Qb) and Pleistocene-age (Qt and Qes) deposits are present at the ground surface within the Project sites, as shown on **Figure 3.6-2**.<sup>9,10</sup> The proposed intake and pump station at Struve Slough is entirely underlain by the Pleistocene Terrace deposits (Qt), and the Harkins Slough filter plant is underlain by both the Holocene and Pleistocene deposits (Qb and Qt). The proposed recharge basins are entirely underlain by Pleistocene-age aeolian<sup>11</sup> deposits of Sunset Beach (Qes).

The Holocene-age basin deposits (Qb) generally consist of unconsolidated plastic clay and silty clay; they also contain upper layers of high organic content overlying interbedded silt and sandy silt deposits. The terrace deposits (Qt) consist of weakly- to semi-consolidated heterogeneous deposits of silt, clay, sand, and gravel, mostly deposited predominantly by fluvial processes. The aeolian deposits of Sunset Beach (Qes) are Pleistocene age and consist of weakly consolidated, well-sorted, fine-to medium-grained sand.

#### Geologic Hazards

The basin deposits that are present within the Project area are potentially susceptible to liquefaction-induced settlement and lateral spreading, due to the saturated and unconsolidated nature of the sediment. Harkins and Watsonville/Struve sloughs are areas susceptible to liquefaction.<sup>12</sup> The Qb deposits are susceptible to consolidation settlement, due to the saturated unconsolidated, wet nature of the soils.

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<sup>8</sup> Fugro, *Preliminary Geotechnical and Geologic Site Assessments Phases 1 & 2 Pajaro Valley Water Management Agency 2017-2019 BMP Program Management Services for College Lake Integrated Resource Management Project Harkins Slough Recharge Facility Upgrades, and Watsonville Slough with Recharge Basins*, April 2018.

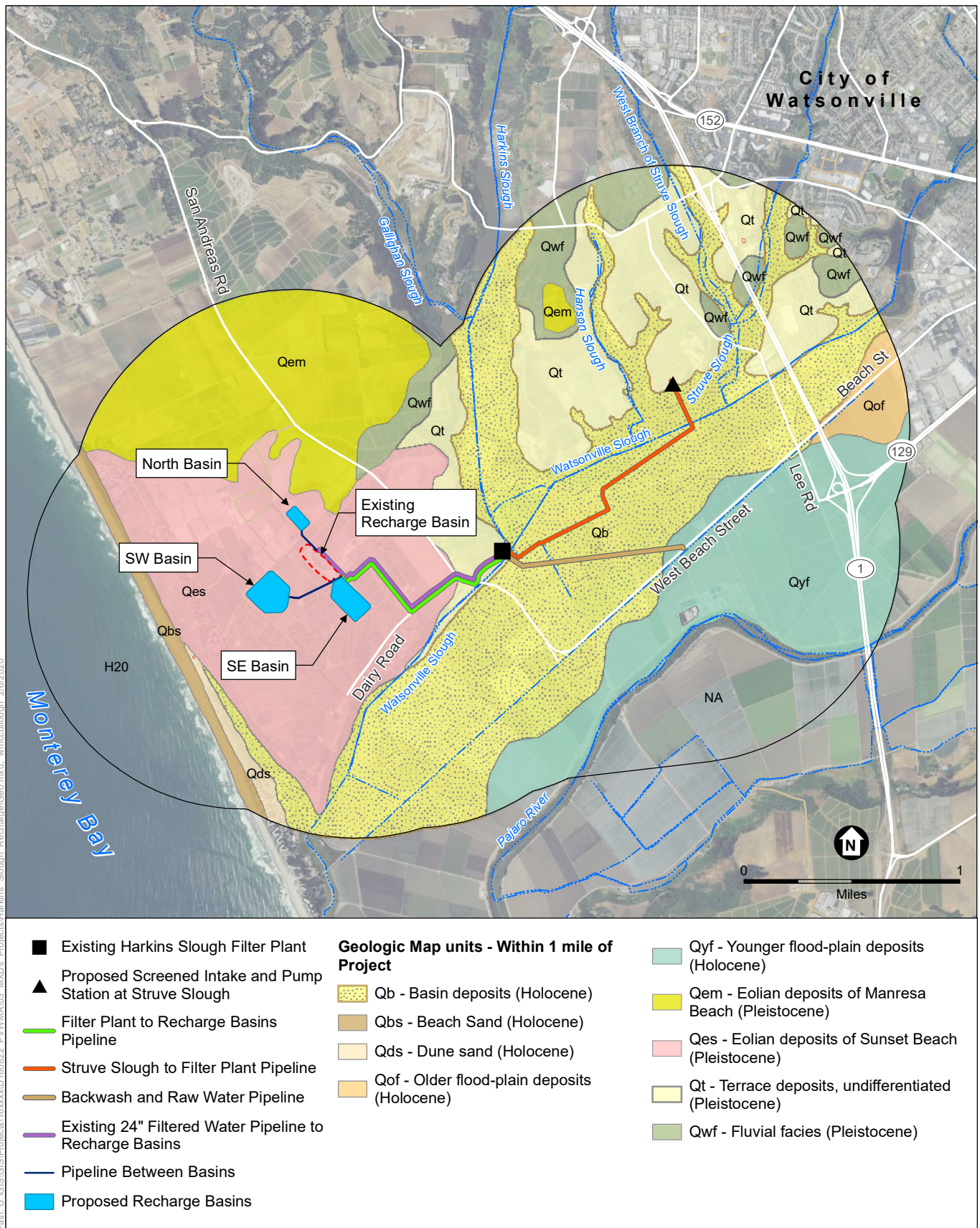
<sup>9</sup> Brabb, Earl E., 1997. Geologic Map of Santa Cruz County, California. United States Geological Survey (USGS). Open-File Report 97-489; Sheet 1 of 2. Map. Scale 1:625000.

<sup>10</sup> Fugro, *Preliminary Geotechnical and Geologic Site Assessments Phases 1 & 2 Pajaro Valley Water Management Agency 2017-2019 BMP Program Management Services for College Lake Integrated Resource Management Project Harkins Slough Recharge Facility Upgrades, and Watsonville Slough with Recharge Basins*, April 2018.

<sup>11</sup> Aeolian deposits refer to sediments transported and deposited via processes associated with wind.

<sup>12</sup> Fugro, *Preliminary Geotechnical and Geologic Site Assessments Phases 1 & 2 Pajaro Valley Water Management Agency 2017-2019 BMP Program Management Services for College Lake Integrated Resource Management Project Harkins Slough Recharge Facility Upgrades, and Watsonville Slough with Recharge Basins*, April 2018.





SOURCE: Carollo Engineers, 2019; USGS - Geologic Map of Santa Cruz County, 1989

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.6-2**  
Geologic Units

The Project sites are subject to strong seismic ground shaking.<sup>13</sup> Ground shaking poses a significant risk to the proposed and existing facilities in the area. The entire area is expected to experience ground shaking of severe intensity in the event of a major earthquake, with a 10 percent probability of ground accelerations reaching 0.8g<sup>14</sup> in 50 years,<sup>15</sup> although the actual ground surface acceleration might vary depending on the local characteristics of the bedrock and soils at the Project sites.

### **Soils**

Expansive soils are soils that possess a “shrink-swell” characteristic, also referred to as linear extensibility. Shrink-swell is the cyclic change in volume (expansion and contraction) that occurs in fine-grained clay sediments from the process of wetting and drying; the volume change is reported as a percent change for the whole soil. Expansive soils are typically very fine-grained and have a high to very high percentage of clay. Linear extensibility is used to determine the shrink-swell potential of soils. If the linear extensibility is more than 3 percent, shrinking and swelling may cause damage to building, roads, and other structures.<sup>16</sup>

The Natural Resources Conservation Service (NRCS) Web Soil Survey data indicates the soils present at the location of the proposed recharge basins have a low linear extensibility rating, the soils at the location of the facilities at Struve Slough have a moderate linear extensibility rating, and the soils that roughly correspond to the Holocene-age basin deposits (Qb) have a very-high linear extensibility rating.<sup>17</sup>

#### **3.6.1.3 Identification of Paleontological Resources and Geologic Features**

Paleontological resources are the fossilized remains or impressions of plants and animals, including vertebrates (animals with backbones; mammals, birds, fish, etc.), invertebrates (animals without backbones; starfish, clams, coral, etc.), and microscopic plants and animals (microfossils). They are valuable, non-renewable, scientific resources used to document the existence of extinct life forms and to reconstruct the environments in which they lived. Fossils can be used to determine the relative ages of the depositional layers in which they occur and of the geologic events that created those deposits. The age, abundance, and distribution of fossils depend on the geologic formation in which they occur and the topography of the area in which they are exposed. The geologic

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<sup>13</sup> Fugro, *Preliminary Geotechnical and Geologic Site Assessments Phases 1 & 2 Pajaro Valley Water Management Agency 2017-2019 BMP Program Management Services for College Lake Integrated Resource Management Project Harkins Slough Recharge Facility Upgrades, and Watsonville Slough with Recharge Basins*, April 2018.

<sup>14</sup> Peak ground acceleration is expressed as “g”, and is the acceleration due to Earth's gravity, equivalent to g-force.

<sup>15</sup> Fugro, *Preliminary Geotechnical and Geologic Site Assessments Phases 1 & 2 Pajaro Valley Water Management Agency 2017-2019 BMP Program Management Services for College Lake Integrated Resource Management Project Harkins Slough Recharge Facility Upgrades, and Watsonville Slough with Recharge Basins*, April 2018.

<sup>16</sup> NRCS, 2018. National Soil Survey Handbook. Title 430-VI. Part 618 – Soil Properties and Qualities. Subpart B, section 618.80 (Guides for Estimating Risk of Corrosion Potential for Uncoated Steel). pp 618-B. 1, 2018.

<sup>17</sup> NRCS, 2019. Web Soil Survey. Linear Extensibility—Santa Cruz County, California. Natural Resources Conservation Service. Map. Scale 1:23,500.



environments within which the plants or animals became fossilized usually were quite different from the present environments in which the geologic formations now exist.

As shown on Figure 3.6-2, the Struve Slough to Filter Plant pipeline and backwash and raw water pipeline are underlain by Holocene-aged basin deposits (Qb). While the uppermost layers may be too recent to have preserved fossils, they are underlain by sediments that exceed 5,000 years in age (early Holocene or older) and therefore may preserve fossil resources, as defined by the Society of Vertebrate Paleontology. While there is no record of vertebrate fossils recovered from Holocene-age deposits within the Project sites or in Santa Cruz County, there have been vertebrate fossils recovered from early to middle Holocene-age deposits in the Bay Area.<sup>18</sup> Additionally, according to the University of California Museum of Paleontology (UCMP) online records database, several invertebrate fossil specimens have been recovered from Holocene-age deposits in Santa Cruz and Monterey counties. The Pleistocene-age terrace deposits (Qt) and Pleistocene-age aeolian deposits of Sunset Beach (Qes) are present within the Project sites; and while there is no record of Pleistocene-age vertebrate fossil localities within the Project sites,<sup>19</sup> or in Santa Cruz County, there have been vertebrate fossils recovered from other Pleistocene deposits throughout California—in particular, from neighboring Monterey County<sup>20</sup> and from several locations throughout the San Francisco Bay Area.<sup>21,22</sup> Additionally, there are several Quaternary-age invertebrate and plant fossil localities throughout Santa Cruz County.<sup>23</sup> The Holocene-age deposits have a low-to high paleontological sensitivity, with the sensitivity increasing with depth. The Pleistocene-age deposits have a high paleontological sensitivity at all depths.

The Santa Cruz County General Plan (1994) has identified four areas with significant hydrological, geological and paleontological features that stand out as rare or unique and representative in the County because of their scarcity, scientific or educational value, aesthetic quality or cultural significance.<sup>24</sup> These areas include:

- **Majors Creek Canyon:** The cliffs and exposed rocks of this canyon to the east of State Route 1 are outstanding scenic features.
- **Martin Road:** East and west of Martin Road, encompassed in the botanical sites, are unusual sandhill outcroppings.
- **Wilder Creek:** This area contains a concentration of limestone caves worth protecting.

<sup>18</sup> CH2MHILL, 2004. *Application for Certification for the San Francisco Electric Reliability Project Volume I, Final*. Subsection 8.16 Paleontological Resources.

<sup>19</sup> UCMP, 2019. University of California Museum of Paleontology (UCMP) Locality Search. Accessed on January 9, 2019.

<sup>20</sup> UCMP, 2019. University of California Museum of Paleontology (UCMP) Locality Search. Accessed on January 9, 2019.

<sup>21</sup> CH2MHILL, 2004. *Application for Certification for the San Francisco Electric Reliability Project Volume I, Final*. Subsection 8.16 Paleontological Resources.

<sup>22</sup> Maguire, K., and Holroyd, P., 2016. *Pleistocene vertebrates of Silicon Valley (Santa Clara County, California)*. PaleoBios, 33. [ucmp\\_paleobios\\_31767](https://paleobios.org/ucmp_paleobios_31767)

<sup>23</sup> UCMP, 2019. University of California Museum of Paleontology (UCMP) Locality Search. Accessed on January 9, 2019.

<sup>24</sup> County of Santa Cruz, Geospatial Data, Geologic Paleontologic, February 5, 2019. Available online at [https://opendata-sccgis.opendata.arcgis.com/datasets/de093ade949749a396cb9fafc55d9307\\_59](https://opendata-sccgis.opendata.arcgis.com/datasets/de093ade949749a396cb9fafc55d9307_59). Accessed on April 10, 2019.

- **Table Rock:** Highly scenic coastal rock formations can be found in the vicinity of Table Rock and Yellow Bank Creek.

None of these features are present at the Project sites.

## 3.6.2 Regulatory Framework

### 3.6.2.1 Federal and State

There have been no substantial changes in the federal or state regulations, policies, or plans relevant to the Projects as set forth in the 2014 BMP Update PEIR, Section 3.7, Geology and Soils (page 3.7-1). This analysis incorporates 2014 BMP Update PEIR, Section 3.7, Geology and Soils (page 3.7-1) and relies on the summaries of federal or state regulations, policies, or plans set forth therein.

#### ***Paleontological Resources***

##### **California Environmental Quality Act**

The California Environmental Quality Act (CEQA) Guidelines (Title 14, Chapter 3 of the California Code of Regulations, Section 15000 *et seq.*), define the procedures, types of activities, individuals, and public agencies required to comply with CEQA. As part of the CEQA process, one of the questions that must be answered by the lead agency relates to paleontological resources: “Will the proposed project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?” (CEQA Guidelines Section 15023, Appendix G, Section XIV, Part a).

The loss of any identifiable fossil that could yield information important to prehistory, or that embodies the distinctive characteristics of a type of organism, environment, period of time, or geographic region, would be a significant environmental impact. Direct impacts to paleontological resources primarily concern the potential destruction of non-renewable paleontological resources and the loss of information associated with these resources. This includes the unauthorized collection of fossil remains. If potentially fossiliferous bedrock or surficial sediments are disturbed, the disturbance could result in the destruction of paleontological resources and subsequent loss of information (significant impact). At the project-specific level, direct impacts can be mitigated to a less than significant level through the implementation of paleontological mitigation.

##### **Public Resources Code Section 5097.5 and Section 30244**

California Public Resources Code Section 5097.5 and Section 30244 include state requirements for paleontological resource management. These statutes prohibit the removal of any paleontological site or feature from public lands without permission of the jurisdictional agency, define the removal of paleontological sites or features as a misdemeanor, and require reasonable mitigation of adverse impacts to paleontological resources from developments on public (state, county, city, district) lands.

##### **Society of Vertebrate Paleontologists Guidelines**

In addition to the laws, regulations, and policies described in the regulatory framework, the standard practice in analyzing paleontological resources includes using guidance from the Society

of Vertebrate Paleontology. Although not a law or regulation in the legal sense, these guidelines have become the standard in the industry. The Society of Vertebrate Paleontology defines the level of potential for sedimentary rocks based upon the potential for yielding fossils of certain types and the importance of recovered evidence for understanding the geologic record. The level of potential of geologic units in the Project area has not been evaluated. For purposes of analysis, it is assumed that all sedimentary units older than early Holocene (i.e., older than 5,000 years) may contain paleontological resources.

### 3.6.2.2 Local

Table 2-8 in Chapter 2, *Project Description*, identifies the approvals from Santa Cruz County required for the Projects. **Table 3.6-1** presents pertinent local plans and policies regarding geology and soils to support County consideration of the Projects' consistency with general policies.<sup>25</sup> In some cases, local policies are used in this EIR as criteria to determine the significance of physical effects on the environment (e.g., Impact NOI-1 in Section 3.8, Noise and Vibration).

**TABLE 3.6-1**  
**SANTA CRUZ COUNTY PLANS AND POLICIES RELEVANT TO THE PROJECT**

<i>Santa Cruz County General Plan/Local Coastal Program</i>
<b>Policy 5.9.1: Protection and Designation of Significant Resources.</b> Protect significant geological features such as caves, large rock outcrops, inland cliffs and special formations of scenic or scientific value, hydrological features such as major waterfalls or springs, and paleontological features, through the environmental review process. Designate such sites on the General Plan and Local Coastal Program Resources and Constraints Maps where identified.
<b>Policy 6.1.1: Geologic Review for Development in Designated Fault Zones.</b> Require a review of geologic hazards for all discretionary development projects, including the creation of new lots, in designated fault zones. Fault zones designated for review include the Butano, Sargent, Zayante, and Corralitos complexes, as well as the State designated Seismic Review Zones. Required geologic reviews shall examine all potential seismic hazards, and may consist of a Geologic Hazards Assessment and a more complete investigation where required. Such assessment shall be prepared by County staff under supervision of the County Geologist, or a certified engineering geologist may conduct this review at the applicant's choice and expense.
<b>Policy 6.1.3: Engineering Geology Report for Public Facilities in Fault Zones.</b> Require a full engineering geology report by a certified engineering geologist whenever a significant potential hazard is identified by a Geologic Hazards Assessment or Preliminary Geologic Report, and prior to the approval of any new public facility or critical structures within the designated fault zone.
<b>Policy 6.1.8: Design Standards for New Public Facilities.</b> Require all new public facilities and critical structures to be designed to withstand the expected groundshaking (specified in design standards) during an earthquake on the San Andreas Fault.
<b>Policy 6.3.5: Installation of Erosion Control Measures.</b> Require the installation of erosion control measures consistent with the Erosion Control Ordinance, by October 15, or the advent of significant rain, or project completion, whichever occurs first. Prior to October 15, require adequate erosion control to be provided to prevent erosion from early storms. For development activities require protection of exposed soil from erosion between October 15 and April 15 and require vegetation and stabilization of disturbed areas prior to completion of the project. For agricultural activities, require that adequate measures be taken to prevent excessive sediment from leaving the property.
SOURCE: Santa Cruz County, 1994 <i>General Plan and Local Coastal Program for the County of Santa Cruz, California</i> , 1994.

<sup>25</sup> California Government Code Section 53091 exempts agencies like PV Water from complying with local building and zoning ordinances when locating or constructing facilities for the production, generation, storage, treatment, or transmission of water. California Government Code Section 65402(c) requires that PV Water notify cities and counties of its plans to construct projects or to acquire or dispose of property. The planning agency then has 40 days to determine project consistency with its general plan. If the planning agency disapproves, the disapproval may be overruled by PV Water.

### 3.6.3 Impacts and Mitigation Measures

#### 3.6.3.1 Significance Criteria

In accordance with the CEQA, state CEQA *Guidelines* (including Appendix G), relevant plans, policies, and/or guidelines, agency standards, the Project could have a significant impact if it were to:<sup>26</sup>

- Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;
  - ii. Strong seismic ground shaking;
  - iii. Seismic-related ground failure, including liquefaction; and/or
  - iv. Landslides.
- Result in substantial soil erosion or the loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property;
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

The following topics are not analyzed further in this section for the reasons described below:

- ***Result in the loss of topsoil.*** Impacts related to topsoil are evaluated in Section 3.2, Land Use and Agricultural Resources and reduced through implementation of Mitigation Measure LU-1c, Replacement of Topsoil (refer to Impact LU-1).

#### 3.6.3.2 Methodology

As described in Section 3.1, this EIR provides an independent analysis of the Projects' potential environmental impacts. **Table 3.6-2** presents mitigation measures from the 2014 BMP Update PEIR adopted by the Board of Directors (Resolution 2014-05) for the purpose of reducing impacts related to geology and soils. These adopted mitigation measures are considered part of the Projects and thus are considered prior to any significance determinations. Potential impacts are evaluated in the following section. If warranted, additional mitigation is included and takes the form of (1) modifications to update the mitigation measures presented in Table 3.6-2 to reflect current conditions and site-specific impacts; or (2) new mitigation measures to replace or

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<sup>26</sup> Refer also to Appendix NOP for additional topics that were addressed in the Notice of Preparation.

augment an adopted mitigation measure. The basis for the evaluations below are compliance with state requirements and implementation of the recommendations of geotechnical evaluations.

**TABLE 3.6-2**  
**2014 BMP UPDATE PEIR MITIGATION MEASURES – GEOLOGY AND SOILS**

**GS-1:** Future construction of proposed BMP Update facilities shall be designed in accordance with design recommendations of geotechnical reports and in compliance with applicable policies and appropriate engineering investigation practices necessary to reduce the potential detrimental effects of ground shaking and liquefaction. Construction shall be in accordance with applicable City and County ordinances and policies regarding mitigation of seismic and geologic hazards, and appropriate geotechnical studies shall be conducted.

**GS-2:** Construction of future BMP Update facilities shall include preparation and implementation of erosion control plans to minimize erosion and inadvertent transport of sediments into water bodies during installation of facilities. Measures shall include, but not be limited to: limiting the area of ground disturbance and vegetation removal at any one time during construction; conducting work prior to the rainy season if possible and protecting disturbed areas during the rainy season; installing bales or other appropriate barriers adjacent to water bodies to prevent transport of sediments into sloughs and water courses; immediately revegetating disturbed areas; and other Best Management Practices during construction to protect water quality. All grading and construction shall conform to requirements of the Santa Cruz County Grading Ordinance. To the extent possible, grading activities in non-cropped areas shall be limited to the period between April 15 and October 31.

**GS-3:** All diversion and pipeline facilities shall be designed and engineered in accordance with recommendations of a geotechnical report and appropriate engineering designs to reduce the potential detrimental effects of expansive soils, corrosivity, and/or other identified soils constraints. A licensed geotechnical engineer shall prepare recommendations applicable to foundation design, earthwork, and site preparation prior to or during the project design phase. Recommendations will address mitigation of site-specific, adverse soil and bedrock conditions that could hinder development. Project engineers shall implement the recommendations. Geotechnical design and design criteria will comply with applicable codes and requirements of the California Building Code with California additions (CCR Title 24), applicable City and County construction and grading ordinances.

SOURCE: Pajaro Valley Water Management Agency, Resolution No. 2014-05, adopted April 16, 2014.

### ***Paleontological Resources***

The CEQA threshold of significance for a significant impact on paleontological resources is reached when a project is determined to “directly or indirectly destroy a significant paleontological resource or unique geologic feature.” In general, for projects that are underlain by paleontologically sensitive geologic units, the greater the amount of ground disturbance, the higher the potential for significant impacts to paleontological resources. For projects that are directly underlain by geologic units with no paleontological sensitivity, there is no potential for impacts on paleontological resources unless sensitive geologic units which underlie the non-sensitive unit are also affected.

### **3.6.3.3 Impact Evaluation**

**Impact GEO-1: The Projects could directly or indirectly cause potential substantial adverse effects, including risk of loss, injury, or death involving an exacerbation of existing risks related to earthquake rupture, strong seismic ground shaking, seismic related ground failure including liquefaction, and landslides. (*Less than Significant*)**

The Project components are not located within a Zone of Required Investigation as delineated on an Alquist-Priolo Earthquake Fault Zone map; there is a low to negligible potential for surface fault rupture at each of the Project sites.<sup>27</sup> While the Project sites are not within a Zone of

<sup>27</sup> Furgo, *Preliminary Geotechnical and Geologic Site Assessments Phases 1 & 2 Pajaro Valley Water Management Agency 2017-2019 BMP Program Management Services for College Lake Integrated Resource Management Project Harkins Slough Recharge Facility Upgrades, and Watsonville Slough with Recharge Basins*, April 2018.

Required Investigation, there are several active faults in the region (as shown on Figure 3.6-1), the closest being the Zayante-Vergeles Fault zone. As a result, the Project components are subject to strong seismic groundshaking, and subsequent seismic-related ground failures (including liquefaction and landslide).

In the event of a major earthquake in or around the Project area, these soils would be susceptible to liquefaction, lateral spreading, strength loss, and consolidation settlement.

The Board of Directors adopted Mitigation Measures GS-1 and GS-3 (presented above in Table 3.6-2) to reduce these potential risks by requiring that all Project components be designed in accordance with recommendations from a geotechnical report and in compliance with applicable policies and appropriate engineering investigations practices. Pajaro Valley Water Management Agency (PV Water) is currently implementing this measure and has conducted preliminary geotechnical site assessments<sup>28</sup> that have informed the designs presented in this EIR. PV Water would continue to implement this measure as design of the Project components progresses. In accordance with California Government Code Section 53091, adopted **Mitigation Measures GS-1** and **GS-3** have been revised as shown below.<sup>29</sup> Continued implementation of revised adopted Mitigation Measures GS-1 and GS-3 would ensure that design engineers incorporate the findings of geotechnical investigations into project design, reducing this impact to *less than significant*.

**Mitigation Measure GS-1 (Revised).**

Future construction of proposed BMP Update facilities shall be designed in accordance with design recommendations of geotechnical reports and in compliance with applicable policies and appropriate engineering investigation practices necessary to reduce the potential detrimental effects of ground shaking and liquefaction. Construction shall be in accordance with applicable requirements ~~City and County ordinances and policies~~ regarding mitigation of seismic and geologic hazards, and appropriate geotechnical studies shall be conducted.

**Mitigation Measure GS-3 (Revised).**

All diversion and pipeline facilities shall be designed and engineered in accordance with recommendations of a geotechnical report and appropriate engineering designs to reduce the potential detrimental effects of expansive soils, corrosivity, and/or other identified soils constraints. A licensed geotechnical engineer shall prepare recommendations applicable to foundation design, earthwork, and site preparation prior to or during the project design phase. Recommendations will address mitigation of site- specific, adverse soil and bedrock conditions that could hinder development. Project engineers shall implement the recommendations. Geotechnical design and design criteria will comply with applicable codes and requirements of the California Building Code ~~with California additions~~ (CCR Title 24), ~~applicable City and County construction and grading ordinances.~~

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<sup>28</sup> Fugro, *Preliminary Geotechnical and Geologic Site Assessments Phases 1 & 2 Pajaro Valley Water Management Agency 2017-2019 BMP Program Management Services for College Lake Integrated Resource Management Project Harkins Slough Recharge Facility Upgrades, and Watsonville Slough with Recharge Basins*, April 2018.

<sup>29</sup> Text that has been revised in adopted mitigation measures is indicated with underlining where text has been added, and ~~striketrough~~ where text has been deleted.

**Impact GEO-2: The Projects could result in substantial soil erosion. (*Less than Significant*)**

Construction activities associated with each Project component could result in erosion and discharge of sediment in water bodies. These activities include the demolition of an existing storage building and possibly unknown subterranean structures. Construction of Project components would involve dewatering, grading and excavation, landscaping, paving, and installing piping. The overall ground disturbance projected as part of the Projects is detailed in Table 2-7 in Chapter 2, *Project Description*.

The Board of Directors adopted **Mitigation Measure GS-2** (presented above in Table 3.6-2) to address erosion and discharge of sediment. In accordance with California Government Code Section 53091, adopted Mitigation Measure GS-2 has been revised as shown below. In accordance with revised adopted Mitigation Measure GS-2, PV Water would prepare and implement (or require the construction contractor to prepare and implement) an erosion control plan. The erosion control plan would include, but would not be limited to:

- Limiting the area of ground disturbance and vegetation removal at any one time during construction;
- Conducting work prior to the rainy season to the extent possible and protecting disturbed areas during the rainy season;
- Installing bales or other appropriate barriers adjacent to water bodies to prevent transport of sediments into sloughs and water courses;
- Immediately revegetating disturbed areas; and
- Implementing other Best Management Practices during construction to protect water quality.

Revised adopted Mitigation Measure GS-2 would also require that all grading and construction shall conform to applicable requirements, including the *General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (refer to Section 3.3, Surface Water, Groundwater and Water Quality, for more information). Implementation of revised adopted Mitigation Measure GS-2, including the erosion control plan, and compliance with applicable requirements would reduce impacts associated with erosion and loss of top soil to ***less than significant***.

**Mitigation Measure GS-2 (Revised).**

Construction of future BMP Update facilities shall include preparation and implementation of erosion control plans to minimize erosion and inadvertent transport of sediments into water bodies during installation of facilities. Measures shall include, but not be limited to: limiting the area of ground disturbance and vegetation removal at any one time during construction; conducting work prior to the rainy season if possible and protecting disturbed areas during the rainy season; installing bales or other appropriate barriers adjacent to water bodies to prevent transport of sediments into sloughs and water courses; immediately revegetating disturbed areas; and other Best Management Practices during construction to protect water quality. All grading and construction shall conform to applicable requirements of the Santa Cruz County Grading Ordinance. ~~To the extent possible, grading activities in non-cropped areas shall be limited to the period between April 15 and October 31.~~

**Impact GEO-3: The Projects could be located on a geologic unit or soil that becomes unstable as a result of the Projects or that could potentially result in landslide, lateral spreading, subsidence, liquefaction, or collapse for reasons caused or exacerbated by the Projects. (*Less than Significant*)**

As discussed in Impact GEO-1, basin deposits (Qb) present within the Project sites may be susceptible to liquefaction-induced settlement and lateral spreading. All of the Project components underlain by these basin deposits are susceptible to damage due to liquefaction. Additionally, compressible soils may be present in the Qb deposits, which may be susceptible to consolidation settlement under new loads from the Project components.<sup>30</sup> Because the area surrounding the Project sites is relatively flat, there is a low risk of landslide caused by Project activities.

Groundwater extraction would occur during construction dewatering, which would be required during construction of the Projects. However, it would be from the unconfined groundwater and temporary, and therefore not expected to result in subsidence.

The Board of Directors adopted Mitigation Measure GS-3 to address the risks associated with potentially unstable soils that could result in landslide, lateral spreading, subsidence, and liquefaction. Mitigation Measure GS-3 requires that all Project components be designed and engineered in accordance with recommendations of a geotechnical report and appropriate engineering designs to reduce the detrimental effects of any identified soil constraints. Also, geotechnical design and design criteria would comply with the most recent California Building Code specifications. In accordance with California Government Code Section 53091, Mitigation Measure GS-3 has been revised as shown in Impact GEO-1, above. Implementation of revised adopted Mitigation Measure GS-3 would ensure that impacts related to this criterion are *less than significant*.

**Mitigation Measure GS-3 (Revised)** (refer to Impact GEO-1)

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**Impact GEO-4: The Projects could be located on expansive soil, creating or exacerbating substantial risks to life and property. (*Less than Significant*)**

Soils near bodies of water tend to be expansive, or have a high “shrink-swell” potential. This is due to the high ratio of clay to sand present in the soils. This potential is measured by determining the linear extensibility. As discussed in Section 3.6.1.2, Local Setting, data provided by the NRCS Web Soil Survey indicates the linear extensibility of the soils at the Project sites is varied. The Project components that would be potentially impacted by the expansive soils are the Struve Slough to Filter Plant pipeline and backwash and raw water pipeline.

The 2014 BMP Update PEIR identified these potential risks and concluded that mitigation was necessary for the Projects. Adopted Mitigation Measure GS-3 requires that all components of the

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<sup>30</sup> Furgo, *Preliminary Geotechnical and Geologic Site Assessments Phases 1 & 2 Pajaro Valley Water Management Agency 2017-2019 BMP Program Management Services for College Lake Integrated Resource Management Project Harkins Slough Recharge Facility Upgrades, and Watsonville Slough with Recharge Basins*, April 2018.



Project shall be designed and engineered in accordance with recommendations from a site-specific geotechnical report and appropriate engineering designs to reduce the impacts associated with expansive soils.<sup>31</sup> Implementation of revised adopted Mitigation Measure GS-3 would ensure that the impacts related to this criterion are *less than significant*.

**Mitigation Measure GS-3 (Revised)** (refer to Impact GEO-1)

**Impact GEO-5: The Projects could directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. (*Less than Significant with Mitigation*)**

No unique geologic features would be adversely affected by the Projects, but there is a potential to impact a unique paleontological resource or site.

Holocene and Pleistocene-age deposits are mapped at the surface within the Project sites. The proposed recharge basins (as well as the recovery wells, monitoring wells, and associated pipelines) and the intake and pump station at Struve Slough, would be entirely within Pleistocene-age deposits (Qes and Qt, respectively). The proposed Struve Slough to filter plant pipeline and backwash and raw water pipeline would be constructed within Holocene-age deposits (Qb). The Holocene-age deposits have a low to high paleontological sensitivity, with the sensitivity increasing with depth. The Pleistocene-age deposits have a high paleontological sensitivity at all depths. Excavations are expected to reach up to approximately 5 feet below ground surface (bgs) for the Harkins Slough filter plant upgrades structures, 35 feet bgs at the proposed Struve Slough pump station, 13 feet bgs at the recharge basins, and 200 feet bgs at the recovery and monitoring wells. Refer to Table 2-2 in Chapter 2, *Project Description*, for estimated dimensions and maximum depth of excavation for Project components. The proposed pipelines would require both open trench installation and trenchless installation. Trenchless jack and bore method installation (discussed in detail in Chapter 2) would require excavation up to approximately 35 feet bgs. These excavations would occur in highly sensitive deposits and could disturb significant paleontological resources if such resources are present within the Project sites. Site disturbance could impair the ability of the Project sites to yield important scientific information.

Implementation of the Projects could impair the significance of unknown paleontological resources on the Project sites, a potentially significant impact. Implementation of **Mitigation Measure GEO-1** would require that if any significant fossil resources are encountered during Project activities, a paleontological monitor would ensure that the resources are salvaged and repositied with an appropriate institution, such that the Projects would not result in the loss or destruction of significant paleontological resources. With implementation of Mitigation Measures GEO-1, which includes procedures to follow in the event of a paleontological discovery, potential impacts to unique paleontological resources or sites would be reduces to *less than significant*.

<sup>31</sup> Fugro, *Preliminary Geotechnical and Geologic Site Assessments Phases 1 & 2 Pajaro Valley Water Management Agency 2017-2019 BMP Program Management Services for College Lake Integrated Resource Management Project Harkins Slough Recharge Facility Upgrades, and Watsonville Slough with Recharge Basins*, April 2018.

### **Mitigation Measure GEO-1: Paleontological Resources Monitoring and Mitigation Program.**

The Projects proponent shall retain a Qualified Paleontologist meeting the standards of the SVP (2010) to develop and implement a Paleontological Resources Monitoring and Mitigation Plan (PRMMP) for the Projects. The PRMMP shall include a Worker Environmental Awareness Program (WEAP) for all construction crew members involved in ground disturbing activities for the Project. The PRMMP shall include a description of when and where construction monitoring would be required; emergency discovery procedures; sampling and data recovery procedures; procedure for the preparation, identification, analysis, and curation of fossil specimens and data recovered; pre-construction coordination procedures; and procedures for reporting the results of the monitoring program. The PRMMP shall be consistent with the Society for Vertebrate Paleontology (SVP) Standard Guidelines for the mitigation of construction-related adverse impacts on paleontological resources and the requirements of the designated repository for any fossils collected.

- Full-time, part time, and/or spot check monitoring for paleontological resources, as applicable, pursuant to the PRMMP, shall be conducted for ground disturbing activities occurring in previously undisturbed Pleistocene deposits, as well as excavations that exceed 10 feet in Holocene-age deposits.
- In the event that paleontological resources are encountered during ground disturbance, all activity in the vicinity of the find shall cease (within 50 feet), and the protocols and procedures outlined in the PRMMP shall be implemented.

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### ***Cumulative Impacts***

**Impact C-GEO-1: The Projects, in combination with past, present, and probable future projects in the Project area, could have cumulatively considerable impacts on a unique paleontological resource. (*Less than Significant with Mitigation*)**

### **Geology and Soils**

Although the Projects are within a seismically active region with a wide range of geologic and soil conditions, these conditions can vary greatly within a short distance. Accordingly, impacts related to geology, soils, and seismicity tend to be site-specific and depend on the local geology and soil conditions. For these reasons, the geographic scope for potential cumulative impacts consists of the Project sites and the immediate vicinity. The Projects could contribute to a cumulative impact on geology, soils, and seismicity if the effects of the Projects overlapped in time and space with those of other projects in the area, producing similar effects. Significant cumulative impacts related to geology, soils, and seismicity could occur if the incremental impacts of the Projects combined with the incremental impacts of a cumulative project would directly or indirectly cause substantial adverse effects involving geologic, seismic, and soil hazards.

Projects listed in Table 3.1-1 that would be near the Projects or drain to the same areas could be constructed at the same time, which could cause significant cumulative erosion effects. However, as discussed in Section 3.3.2, Regulatory Framework, the National Pollutant Discharge

Elimination System Construction General Permit would require each project involving disturbance of one acre or more of land to prepare and implement a Storm Water Pollution Prevention Plan (SWPPP). The SWPPPs would describe Best Management Practices to control runoff and prevent erosion for each such project. Through compliance with this requirement, the potential for erosion impacts would be reduced. The Construction General Permit has been developed to address cumulative conditions arising from construction throughout the state, and is intended to maintain cumulative effects of projects subject to this requirement below levels that would be considered significant. For example, two adjacent construction sites would be required to implement Best Management Practices to reduce and control the release of sediment and/or other pollutants in any runoff leaving their respective sites. The runoff water from both sites would be required to achieve the same action levels, measured as a maximum amount of sediment or pollutant allowed per unit volume of runoff water. Thus, even if the runoff waters were to combine after leaving the sites, the sediments and/or pollutants in the combined runoff would still be at concentrations (amount of sediment or pollutants per volume of runoff water) below action levels and would not combine to be cumulatively significant. In addition to the SWPPP, Mitigation Measure GS-2 (described in detail in Table 3.6-2 and revised under Impact GEO-2) would require the preparation and implementation of an erosion control plan, which would further reduce the cumulative effects of the Projects. With implementation of revised adopted Mitigation Measure GS-2, the Projects would have a *less-than-significant* contribution to a cumulative impact with respect to soil erosion.

Seismically induced ground shaking, liquefaction and lateral spreading, and expansive or corrosive soils could cause structural damage or pipeline leaks or ruptures during construction and operations phases. However, state and local building regulations and standards have been established to address and reduce the potential for such impacts to occur. The Projects and cumulative projects would be required to comply with applicable provisions of these laws and regulations. Through compliance with these requirements, the potential for impacts would be reduced. The purpose of the California Building Code (and local ordinances) is to regulate and control the design, construction, quality of materials, use/occupancy, location, and maintenance of all buildings and structures within its jurisdiction; by design, it is intended to reduce the cumulative risks from buildings and structures. Based on compliance with these requirements, the incremental impacts of the Projects combined with impacts of other projects in the area would not combine to cause cumulatively considerable impacts related to seismically induced ground shaking, liquefaction and lateral spreading, or expansive or corrosive soils, and the impact would be *less than significant*.

### Paleontological Resources

As noted, multiple projects that would result in ground disturbance are proposed throughout the geographic scope of analysis (refer to Table 3.1-1 and Figure 3.1-1 for cumulative projects). Cumulative impacts to unique paleontological resources or sites or unique geologic features could occur if any of these projects, in conjunction with the Harkins Slough and Struve Slough Projects, would disturb paleontological resources that, when considered together, could yield important scientific information.

As described above under Impact GEO-5, there is the potential for deeper excavations to impact unique or important paleontological resource or sites. The surficial sediments of the Project area are unlikely to have preserved fossils, however, there is a potential for increased sensitivity with depth. Other projects in the cumulative scenario that include ground disturbance could result in similar impacts to paleontological resources. Due to the buried nature of paleontological resources, the extent to which these resources, together, could yield important scientific information is unknown, but could result in a cumulative impact on paleontological resources. However, Mitigation Measure GEO-1 (described above under Impact GEO-5) would ensure that the Project's contribution toward cumulative effects on paleontological resources would not be cumulatively considerable, and the Project's contribution to cumulative impacts would be *less than significant*.

**Mitigation Measure GS-2 (Revised)** (refer to Impact GEO-2)

**Mitigation Measure GEO-1: Inadvertent Discovery of Paleontological Resources**  
(refer to Impact GEO-5)

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## 3.7 Hazards and Hazardous Materials

This section presents an analysis of potential impacts related to hazards and hazardous materials that would result from implementation of the proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects). Information from the 2014 Basin Management Plan Update Program Environmental Impact Report (2014 BMP Update PEIR) that remains relevant and accurate for the purposes of describing the physical or regulatory setting of hazards and hazardous materials has been incorporated as appropriate. The Project includes mitigation measures adopted by the Board of Directors to reduce the severity and magnitude of potential environmental effects.

### 3.7.1 Setting

The 2014 BMP Update PEIR Section 3.8.1 generally describes existing hazardous materials in the Project region which likely include petroleum hydrocarbons and hazardous materials common to agriculture. 2014 BMP Update PEIR Section 3.8.1 is incorporated by reference and updated as provided below.

#### 3.7.1.1 Hazardous Materials at Nearby Sites

As shown in Figure 3.2-1 in Section 3.2, Land Use and Agricultural Resources, land uses in the vicinity of the Project sites include agricultural and natural areas.

A Cortese list database search for hazardous materials sites within one-quarter mile of the Project was performed on December 10, 2019 to update the setting.<sup>1</sup> There are no open or active sites listed in these databases within one-quarter mile of Project components.

#### 3.7.1.2 Emergency Response Plans

The Santa Cruz Operational Area Emergency Management Plan (EMP) addresses the planned response to extraordinary situations associated with large-scale emergency incidents affecting Santa Cruz County.<sup>2</sup> The EMP is reviewed, updated, republished, and redistributed by the Santa Cruz County Office of Emergency Services every four years in order to stay current. The Office of Emergency Services is responsible for ensuring that emergency response personnel can demonstrate and maintain, to the level deemed appropriate, the minimum National Incident Management System standards and Standardized Emergency Management System performance objectives. The EMP also addresses response levels, mutual aid, and federal, state, and local authorities for conducting and/or supporting emergency operations.

<sup>1</sup> Sites identified as meeting the Cortese List requirements are listed in the Department of Toxic Substances Control EnviroStor database, State Water Resources Control Board (State Water Board) GeoTracker database, State Water Board list of solid waste disposal sites with constituents above hazardous waste levels outside the waste management unit, State Water Board list of active Cease and Desist and Cleanup and Abatement Orders, and DTSC list of hazardous waste facilities subject to corrective action pursuant to California Health and Safety Code Section 25187.5.

<sup>2</sup> County of Santa Cruz, Office of Emergency Services, *Draft Operational Area Emergency Management Plan (EMP)*, October 2015.

## 3.7.2 Regulatory Framework

### 3.7.2.1 Federal

In California, federal regulations pertaining to the use and management of hazardous materials and wastes are largely enforced through state and local regulations. Relevant state and local regulations are discussed below.

#### ***Title 29 Code of Federal Regulations 1910.120***

Title 29 of the Code of Federal Regulations, Section 1910.120, Hazardous Waste Operations and Emergency Response, addresses employee exposure or the reasonable possibility for employee exposure to safety or health hazards, and requires that employers develop and implement a written safety and health program for their employees involved in hazardous waste operations. The program is designed to identify, evaluate, and control safety and health hazards, and provide for emergency response for hazardous waste operations.

### 3.7.2.2 State

#### ***California Fire Code***

The California Fire Code, Article 80, includes specific requirements for the safe storage and handling of hazardous materials. These requirements reduce the potential for a release of hazardous materials and for mixing of incompatible chemicals, and specify the following specific design features to reduce the potential for a release of hazardous materials that could affect public health or the environment:

- Separation of incompatible materials with a non-combustible partition, or appropriate distance separation;
- Spill control in all storage, handling, and dispensing areas; and
- Separate secondary containment for each chemical storage system. The secondary containment must hold the entire contents of the tank, plus the volume of water needed to supply the fire suppression system for a period of 20 minutes in the event of a catastrophic spill.

The California Fire Code, Article 79, includes specific requirements for the safe storage and handling of flammable and combustible liquids. Specific requirements address fire protection; prevention and assessment of unauthorized discharges; labeling and signage; protection from sources of ignition; specifications for piping, valving, and fittings; maintenance of aboveground tanks; requirements for storage vessels, vaults, and overfill protection; and requirements for dispensing, using, mixing, and handling of flammable and combustible liquids.

The California Fire Code, Chapter 33, specifies safety requirements to prevent fires during construction and demolition. This chapter specifies precautions that must be taken to protect against fire and procedures for management of flammable and combustible liquids as well as flammable gasses during construction. Requirements for providing a water supply for fire protection, portable fire extinguishers, and a means of egress are also addressed.

### ***Hazardous Materials Release Response Plans and Inventory Act***

The Hazardous Materials Release Response Plans and Inventory Act of 1985, codified in Health and Safety Code, Sections 25500 et seq., also known as the Business Plan Act, requires businesses using hazardous materials to prepare a Hazardous Materials Business Plan (HMBP) that describes their facilities, inventories, emergency response plans, and training programs. HMBPs contain basic information on the location, type, quantity, and health risks of hazardous materials stored, used, or disposed. This code and the related regulations in 19 California Code of Regulations (CCR) Sections 2620 et seq. require local governments to regulate local business storage of hazardous materials in excess of certain quantities. The law also requires that entities storing hazardous materials be prepared to respond to releases. Those using and storing hazardous materials are required to submit a HMBP to their local Certified Unified Program Agency (CUPA) and to report releases to their CUPA and the State Office of Emergency Services. The California Office of Emergency Services is responsible for implementing the accident prevention and emergency response programs established under the Act and implementing regulations. Refer to Unified Hazardous Waste and Hazardous Management Regulatory Program, below, for more information.

The HMBP would apply to the Project because contractors working on the Project that use hazardous materials would be required to comply with requirements for the use, handling, transportation, storage, and disposal of hazardous materials. The HMBP would include a spill response plan.

### ***Unified Hazardous Waste and Hazardous Materials Management Regulatory Program***

The Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program), codified in Health and Safety Code Sections 25404 et seq., requires the administrative consolidation of six hazardous materials and waste programs under one agency, a CUPA. The following programs are consolidated under the Unified Program:

1. Hazardous Waste Generator and On-Site Hazardous Waste Treatment Programs (a.k.a. Tiered Permitting);
2. Aboveground Petroleum Storage Tanks and SPCCs;
3. Hazardous Materials Release Response Plans and Inventory Program (a.k.a. Hazardous Materials Disclosure or “Community-Right-To-Know”);
4. California Accidental Release Prevention Program;
5. Underground Storage Tank Program; and
6. Uniform Fire Code Plans and Inventory Requirements.

The Unified Program is intended to provide relief to businesses complying with the overlapping and sometimes conflicting requirements of formerly independently managed programs. The Unified Program is implemented at the local government level by CUPAs. Most CUPAs have been established as a function of a local environmental health or fire department. As stated in the

2014 BMP Update PEIR, the County of Santa Cruz Environmental Health Services Department is the designated CUPA and is responsible for enforcing local ordinance and state laws pertaining to use and storage of hazardous materials.

### **California and Federal Hazardous Waste Criteria**

In accordance with Title 22 of CCR Section 66261.20 et seq., excavated soil is classified as a hazardous waste if it exhibits the characteristics of ignitability, corrosivity, reactivity, and/or toxicity. A waste is considered toxic in accordance with CCR 22 Section 66261.24 if it contains:

- Total concentrations of certain substances at concentrations greater than the total threshold limit concentrations;
- Soluble concentrations greater than the soluble threshold limit concentrations (STLCs);
- Soluble concentrations of certain substances greater than federal toxicity regulatory levels using the Toxic Characteristic Leaching Procedure (TCLP); or
- Specified carcinogenic substances at a single or combined concentration of 0.001 percent.

State and federal regulations consider waste to be hazardous if the soluble concentration exceeds the federal regulatory level as determined by the TCLP. Because the TCLP involves a 20-to-1 dilution of the sample, the total concentration of a substance in the soil would need to exceed 20 times the regulatory level for the soluble concentration to exceed the regulatory level in the extract. A waste is also considered hazardous under state regulations if the soluble contaminant concentration exceeds the STLC as determined by the waste extraction test method. Because the waste extraction test analysis is performed using a 10-to-1 dilution of the sample, the total concentration of a substance would need to exceed 10 times the STLC for the soluble concentration to possibly exceed the STLC in the extract. A waste may also be classified as toxic if testing indicates toxicity greater than the specified criteria. Soil that is not classified as a hazardous waste can be accepted at a Class II or Class III designated landfill, depending on the waste acceptance criteria for the specific landfill. This soil may also be reused on-site or sent to a recycling facility for reuse at another site if it is non-hazardous and meets specific criteria. Typically, the concentrations of all chemicals should be less than RWQCB Residential Environmental Screening Levels for unrestricted on-site reuse or off-site recycling.

### ***National Pollutant Discharge Elimination System Construction General Permit***

Refer to Section 3.3, Surface Water, Groundwater, and Water Quality, for a description of permitting needs in regard to the National Pollutant Discharge Elimination System General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order 2009-0009-DWQ, National Pollutant Discharge Elimination System No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ).

### ***Transportation of Hazardous Materials and Wastes***

The transport of hazardous materials is regulated by the California Highway Patrol under the California Vehicle Code. Specific requirements related to hazardous materials are specified in CCR Title 13, Division 2, Chapter 6. These regulations specify container types, packaging



requirements, and placarding requirements as well as requirements for licensing and training for truck operators and chemical handlers.

Regulatory requirements for the transport of hazardous wastes in California are specified in CCR Title 22, Division 4.5, Chapters 13 and 29. In accordance with these regulations, all hazardous waste transporters must have identification numbers, which are used to identify the hazardous waste handler and to track the waste from its point of origin to its final disposal disposition. This number, issued by either the USEPA or DTSC, depends on whether the waste is classified as hazardous by federal regulations or only under California regulations. Hazardous waste transporters must also comply with the California Vehicle Code, California Highway Patrol regulations (CCR Title 13). A hazardous waste manifest is required for transport of hazardous wastes. The hazardous waste manifest documents the legal transport and disposal of the waste, and is signed by the generator and transporter(s) of the waste as well as the disposal facility. California regulations specify cleanup actions that must be taken by a hazardous waste transporter in the event of a discharge or spill, and for the safe packaging and transport of hazardous wastes.

### ***Lead in Construction Standard***

Cal/OSHA's Lead in Construction Standard<sup>3</sup> requires project proponents to develop and implement a lead compliance plan when lead-based paint would be disturbed during construction. The plan must describe activities that could emit lead, methods for complying with the standard, safe work practices, and a plan to protect workers from exposure to lead during construction activities. Cal/OSHA requires 24-hour notification if more than 100 square feet of lead-based paint would be disturbed. This standard may apply to demolition of a storage building and other facilities to be demolished as part of the Projects.

### ***Asbestos-Containing Materials***

Contractors who conduct asbestos-related work activities (including abatement) in buildings and structures must follow state regulations where the work would involve 100 square feet or more of asbestos-containing material.<sup>4</sup> Specifically, under CCR Title 8 Section 341.6, the California Occupational Safety and Health Administration (Cal/OSHA) must be notified of asbestos-related work activities to be carried out. Contractors must be licensed as an Asbestos Qualified Contractor by the Contractors Licensing Board of the State of California and registered as such with Cal/OSHA. Section 1529 regulates asbestos exposure in construction work. In addition, a one-time report of the use of carcinogens must be made to Cal/OSHA under CCR Title 8 Chapter 4 Section 5203. The owner of the property where abatement is to occur must have a Hazardous Waste Generator Number assigned by and registered with DTSC. The contractor and hauler of the material are required to file a Hazardous Waste Manifest that details the hauling of the material from the site and its disposal.

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<sup>3</sup> CCR 8 Section 1532.1

<sup>4</sup> CCR 8 Sections 1529 and 341.6-341.14.

### 3.7.2.3 Local

Table 2-8 in Chapter 2, *Project Description*, identifies the approvals from Santa Cruz County or the City of Watsonville required for the Projects. **Table 3.7-1** presents pertinent local plans and/or policies regarding hazardous materials to support County consideration of project consistency with local policies.<sup>5</sup> In some cases, local policies are used in this EIR as criteria to determine the significance of physical effects on the environment (e.g., Impact NOI-1 in Section 3.8, Noise and Vibration).

**TABLE 3.7-1**  
**SANTA CRUZ COUNTY PLANS AND POLICIES RELEVANT TO THE PROJECT**

<b><i>Santa Cruz County General Plan/Local Coastal Program</i></b>
<b>Policy 6.6.1: Hazardous Materials Ordinance.</b> Maintain the County's Hazardous Materials ordinance, placing on users of hazardous and toxic materials the obligation to eliminate or minimize the use of such materials wherever possible, and in all cases to minimize the release, emission, or discharge of hazardous materials to the environment, and [to] properly handle all hazardous materials and to disclose their whereabouts. Further, maintain the County's ordinance relating to ozone-depleting compounds. Ensure that any amendment of existing ordinance provisions is based on a finding that the amendments will provide protection to the environment and the community against toxic hazards that is equal to or stronger than the existing provisions.
<b><i>Santa Cruz County Code</i></b>
Santa Cruz County Code, Title 7 Health and Safety, Chapter 7.100 Hazardous Materials – Hazardous Waste – Underground Storage Tanks: Chapter 7.1 of the Santa Cruz County Code provides definitions, permit requirements, standards for Hazardous Materials Management Plans, and uses, handling, and storage responsibilities of hazardous materials, hazardous waste, and underground storage tanks. The Health Officer of Santa Cruz County or his/her representative is responsible for enforcing the regulations in this chapter.
SOURCE: Santa Cruz County, 1994 General Plan and Local Coastal Program for the County of Santa Cruz, California, 1994.

## 3.7.3 Impacts and Mitigation Measures

### 3.7.3.1 Significance Criteria

In accordance with the California Environmental Quality Act (CEQA), state CEQA *Guidelines* (including Appendix G), relevant plans, policies, and/or guidelines, agency standards, and the Project's Notice of Preparation (refer to Appendix NOP), the Projects could have a significant impact if they were to:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;

<sup>5</sup> California Government Code Section 53091 exempts agencies like PV Water from complying with local building and zoning ordinances when locating or constructing facilities for the production, generation, storage, treatment, or transmission of water. California Government Code Section 65402(c) requires that PV Water notify cities and counties of its plans to construct projects or to acquire or dispose of property. The planning agency then has 40 days to determine project consistency with its general plan. If the planning agency disapproves, the disapproval may be overruled by PV Water.

- Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment;
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; and/or

The following topics are not analyzed further in this section for the reasons described below:

- ***Be located on a site which is included on a list of hazardous materials sites.*** As described in Section 3.7.1.1, none of the Project components are on a site that is included on a list of hazardous materials sites, there are no hazardous materials sites within one-quarter mile of the Project components. Therefore, this criterion is not applicable.

### 3.7.3.2 Methodology

As described in Section 3.1, this EIR provides an independent analysis of the Projects' potential environmental impacts. **Table 3.7-2** presents mitigation measures from the 2014 BMP Update PEIR adopted by the Board of Directors (Resolution 2014-05) for the purpose of reducing impacts related to hazards and hazardous materials. These adopted mitigation measures are considered part of the Projects, and thus are considered prior to any significance determinations. Potential impacts are evaluated in the following section. If warranted, additional mitigation is included and takes the form of (1) modifications to update the mitigation measures presented in Table 3.7-2 to reflect current conditions and site-specific impacts; or (2) new mitigation measures to replace or augment an adopted mitigation measure.

**TABLE 3.7-2**  
**2014 BMP UPDATE PEIR MITIGATION MEASURES – HAZARDS AND HAZARDOUS MATERIALS**

**HM-1:** Prior to initiation of earthwork activities, [PV Water] shall perform soil testing on agricultural sites proposed for development and analytically test for pesticide residuals and pesticide-related metals arsenic, lead, and mercury. If contamination is identified in the soil samples above applicable levels, [PV Water] shall prepare a Site Management Plan (SMP) to establish protocols/guidelines for the contractor including: identification of appropriate health and safety measures while working in contaminated areas; soil reuse; handling, and disposal of any contaminated soils; and agency notification requirements. The SMP shall be subject to the review and approval of the appropriate regulatory agency.

SOURCE: Pajaro Valley Water Management Agency, Resolution No. 2014-05, adopted April 16, 2014.

### 3.7.3.3 Impacts and Mitigation Measures

**Impact HAZ-1: Project construction and operation could result in a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials. (*Less than Significant*)**

#### Construction Impacts

Project construction would require the use of routine hazardous materials such as fuels, lubricants, and solvents for construction vehicles and equipment. Without adequate management, the storage and use of hazardous materials at the Project sites and staging areas could result in the accidental release of small quantities of hazardous materials, which could result in construction worker

exposure, degradation of soils, and/or entrainment in stormwater runoff affecting the downstream environment.

As shown in Figure 3.2-1 (in Section 3.2), most of the Project sites are used for agriculture. Implementation of adopted Mitigation Measure HM-1 would require the Pajaro Valley Water Management Agency (PV Water) or its contractor to test agricultural soil sites for pesticide residuals and metals prior to initiation of earthwork activities, and to implement a Site Management Plan if soil contamination is above applicable environmental screening levels. As described in Section 3.3, Surface Water, Groundwater, and Water Quality, the Construction General Stormwater Permit requires implementation of a Stormwater Pollution Prevention Plan for projects that disturb one or more acres of land. This plan would include best management practices to minimize the risk of a hazardous materials release during construction activities. The best management practices would include protection measures for the temporary on-site storage of fuel and other hazardous materials used during construction, including requirements for secondary containment and berming to prevent any release from reaching an adjacent waterway or stormwater collection system. All equipment and materials storage would be routinely inspected for leaks, and records would be maintained for documenting compliance with the storage and handling of hazardous materials. As the administering agency, PV Water would review and approve the plans prior to implementation, and would conduct periodic inspections to ensure compliance with the plans.

Regarding transport, the Projects would be required to comply with California Highway Patrol regulations related to the transportation of hazardous materials (refer to Section 3.7.2, Regulatory Framework). After compliance with state regulations and implementation of this adopted mitigation measure, this impact would be *less than significant*.

### **Operational Impacts**

As described in Chapter 2, *Project Description*, during operation of the Projects, the Harkins Slough filter plant would use and store up to 5,000 gallons of polyaluminum chloride coagulant for filtration. Polyaluminum chloride is not considered an extremely hazardous material, and would be handled and stored safely in accordance with Article 80 of the California Fire Code.

Compliance with the Hazardous Materials Release Response and Inventory Act, described in Section 3.7.2, would require PV Water to prepare a Hazardous Materials Business Plan that includes a training program for workers on the use, handling, transportation, storage, and disposal of hazardous materials. In addition, transportation of hazardous materials is regulated by the California Highway Patrol and the California Department of Transportation, as discussed in Section 3.7.2, Regulatory Framework, and operational transport of hazardous materials would be subject to these regulations. Therefore, with compliance with applicable hazardous materials regulations, the potential impacts related to the routine use, transport, and disposal of hazardous materials during operation of the Project would be *less than significant*.

**Mitigation:** None required.

**Impact HAZ-2: Project construction and operation could result in reasonably foreseeable conditions involving the release of hazardous materials to the environment. (*Less than Significant with Mitigation*)**

**Construction Impacts**

As indicated in Section 2.6.4, Demolition of Existing Structures, the Projects may include demolition of an existing approximately 70-foot by 70-foot storage building in the footprint of the Southeast recharge basin, as well as demolition and removal of unknown subterranean structures (such as irrigation infrastructure) during construction. Although the structure within the Southeast recharge basin boundary appears to be composed mostly of steel, it is currently unknown whether the structure contains hazardous building materials. If the structure contains hazardous materials, there is the potential for impacts to occur related releasing hazardous materials to the environment.

Implementation of **Mitigation Measure HAZ-1a** would require that a survey be completed prior to demolition of any existing structures to determine if hazardous building materials are present. Any hazardous building materials encountered during demolition would be removed and disposed of in accordance with the established regulatory framework described in Section 3.7.2. Additionally, implementation of adopted Mitigation Measure HM-1 would require PV Water or its contractor to test agricultural soil sites for pesticide residuals and metals prior to initiation of earthwork activities, and to implement a Site Management Plan if soil contamination is above applicable environmental screening levels. Implementation of a Health and Safety Plan pursuant to Mitigation Measure HAZ-1a would further reduce potentially significant impacts to a less-than-significant level by requiring appropriate health and safety measures for worker safety. Results from soil testing and the Site Management Plan from adopted Mitigation Measure HM-1 would inform the contents of the Health and Safety Plan. With compliance of state regulations and implementation of adopted Mitigation Measure HM-1 and Mitigation Measure HAZ-1a, potentially significant impacts related to the release of hazardous materials into the environmental during construction would be reduced to *less than significant with mitigation*.

**Operational Impacts**

As indicated in Impact HAZ-1, the Harkins Slough filter plant would use and store up to 5,000 gallons of polyaluminum chloride coagulant for filtration, which is not considered an extremely hazardous material, and would be handled and stored safely in accordance with Article 80 of the California Fire Code.

As described in Chapter 2, *Project Description*, the operation and maintenance of Project components would require occasional site visits using vehicles that would use fuel and oil. Similar to the use of equipment during construction activities described above, PV Water and its contractors would be required to comply with numerous hazardous materials and stormwater regulations designed to ensure that hazardous materials are transported, used, stored, and disposed of in a safe manner to protect worker safety, to reduce the potential for a release of operations-related fuels or other hazardous materials to affect stormwater and downstream receiving water bodies, and to respond to accidental spills, if any. With compliance with existing regulations, this impact would be *less than significant*.

**Mitigation Measure HAZ-1a: Health and Safety Plan (HASP).**

Prior to demolition of any existing structures, PV Water shall require that structures to be demolished be surveyed to determine if hazardous materials are present. Using information from the survey and the soil testing performed as part of adopted Mitigation Measure HM-1, PV Water shall require the construction contractor(s) to prepare and implement a site-specific HASP in accordance with 29 Code of Federal Regulations 1910.12 0 to protect construction workers and the public during all excavation, grading, and demolition activities. The HASP shall include, but is not limited to, the following elements:

1. Designation of a trained, experienced site safety and health supervisor who has the responsibility and authority to develop and implement the site HASP;
2. A summary of all potential risks to construction workers and maximum exposure limits for all known and reasonably foreseeable site chemicals based on the most recent data collection and reporting;
3. Specified personal protective equipment and decontamination procedures, if needed;
4. Emergency procedures, including route to the nearest hospital; and
5. Procedures to be followed in the event that evidence of potential soil or groundwater contamination (such as soil staining, noxious odors, debris or buried storage containers) is encountered

These procedures shall be in accordance with hazardous waste operations regulations and will specifically include, but are not limited to, the following: immediately stopping work in the vicinity of unknown discovered or suspected hazardous materials release and notifying the Santa Cruz County CUPA (415-473-7085).

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**Impact HAZ-3: Project construction and operation could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. (*Less than Significant with Mitigation*)**

**Construction Impacts**

Project construction would not conflict with the County of Santa Cruz EMP, because the plan does not designate emergency response or evacuation routes, and the Project would not otherwise impair implementation of this plan. However, the Project could have a significant impact on implementation of emergency response or emergency evacuation if construction activities interfered with emergency response vehicle travel or restricted access to critical facilities such as hospitals or fire stations.

As noted in Chapter 2, *Project Description*, Project construction would not require any full road closures. One travel lane of San Andreas Road and Dairy Road would be temporarily closed, with one-way traffic control, during installation of the Filter Plant to Recharge Basins pipeline. Additionally, one travel lane of West Beach Street would be closed, with one-way traffic control, during the connection of the proposed backwash pipeline with the existing gravity sewer line in

West Beach Street. Although the closure of these lanes has the potential to impede emergency response traffic, the lane closures would be temporary and construction workers, members of the public, and emergency providers would still have access to all of the roadways.

Refer to Section 2.6.3, Construction Traffic Routing, for the peak number of daily one-way truck trips for the Projects. As stated in Section 2.6.3, the construction work force would likely come from Santa Cruz, Monterey, and San Benito County areas via State Route (SR) 1 and/or SR 152. Construction vehicles would primarily use San Andreas Road and Dairy Road via SR 1 and West Beach Street, and Lee Road via SR 1 and Harkins Slough Road. Construction-related truck trips could impede emergency response traffic in the Project area. However, implementation of Mitigation Measure TRA-1b (Construction Traffic Control/Traffic Management Plan) introduced in Section 3.9, Transportation and Traffic, would require the construction contractor to establish methods for maintaining traffic flow in and along the subject roadway corridor and minimizing disruption to emergency vehicle access to land uses along the alignment. Specific requirements that may be included in the traffic control/traffic management plan regarding emergency access and access to public schools are identified under Mitigation Measure TRA-1b in Impact TRA-1. As a result, implementation of Mitigation Measure TRA-1b would provide adequate access such that Project construction would not interfere with emergency response or evacuation activities and this impact would be reduced to *less than significant with mitigation*.

### **Operational Impacts**

The Project would not introduce any uses to the Project area that would generate noticeable long-term changes in traffic or an emergency response plan. Upon completion of construction, the lanes of San Andreas Road, Dairy Road, and West Beach Street would be reopened. Occasional maintenance vehicles would access the Project sites to conduct routine inspections (e.g., for visual signs of wear and tear, obstructions or leakage) and perform scheduled maintenance of the facilities and pipelines; however, the vehicles would be parked off the streets, no lane closures would be required, and the potential impact related to emergency or evacuation plans would be *less than significant*.

#### **Mitigation Measure TRA-1b: Construction Traffic Control/Traffic Management Plan (Refer to Section 3.9, Transportation and Traffic)**

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### **Cumulative Impacts**

**Impact C-HAZ-1: The Projects, in combination with past, present, and probable future projects in the Project area, could result in significant adverse cumulative hazards and hazardous materials impacts. (*Less than Significant*)**

The geographic scope of analysis for cumulative hazards and hazardous materials impacts encompasses and is limited to the Project sites and their immediately adjacent areas. This is because impacts relative to hazards and hazardous materials are generally site-specific and depend on the nature and extent of the hazards and hazardous materials released, and existing and future soil and groundwater conditions. For example, hazardous materials incidents tend to be

limited to a smaller, more localized area surrounding the immediate spill location and extent of the release, and could only be cumulative if two or more hazardous materials releases spatially and temporally overlapped.

A significant cumulative impact related to hazards and hazardous material would occur if the incremental impacts of the project, combined in space and time with that of other projects cumulatively, would substantially increase risk that people or the environment would be exposed to hazards and hazardous materials. (As discussed in Appendix NOP, the Project would have no impact with respect to wildland fire hazards or being located on a site which is included on a list of hazardous materials sites.) Accordingly, the Project could not contribute to cumulative impacts related to these topics and these topics are not discussed further.

### **Cumulative Impacts during Project Construction**

There are numerous projects in the cumulative scenario near the Project that could be constructed at the same time (refer to Figure 3.1-1 in Section 3.1). Each project would be subject to the same regulatory requirements discussed in Section 3.7.2, Regulatory Framework, including the implementation of health and safety plans and soil and groundwater management plans, as needed. That is, cumulative projects involving releases of or encountering hazardous materials would all be required to remediate their respective sites to established regulatory standards. This would be the case regardless of the number, frequency, or size of the release(s), or the residual amount of chemicals present in the soil from previous spills. Therefore, while it is possible that the Projects and cumulative projects could result in releases of hazardous materials at the same location and time (e.g., during transport), the responsible party associated with each spill would be required to remediate site conditions to the same established regulatory standards. The potential residual effects of the project that would remain after compliance with regulatory requirements would not combine with the potential residual effects of cumulative projects to cause a significant cumulative impact because residual impacts would be highly site-specific. Accordingly, no substantial cumulative impact with respect to the use of hazardous materials would result. Compliance with existing regulations would ensure that any cumulative impacts related to exposure to hazardous materials during construction of the Projects would be *less than significant*.

As with the Projects, cumulative projects could also require temporary lane closures that could interfere with emergency plans or routes, which would be a significant cumulative impact. However, as discussed in Section 3.9, Transportation and Traffic, PV Water's construction contractor would prepare and implement a Construction Traffic Control/Traffic Management Plan that conforms to standards of the relevant local jurisdiction (Santa Cruz County). The Construction Traffic Control/Traffic Management Plan would require coordination of construction with emergency service providers, and all roads would be required to remain passable to emergency service vehicles at all times. Implementation of the Construction Traffic Control/Traffic Management Plan would provide adequate access such that project construction, in combination with other construction projects, would not interfere with emergency response or evacuation activities and this cumulative impact would be *less than significant*.



### **Cumulative Impacts during Project Operations**

During operation, the Project and several projects in the cumulative scenario would require the transport, use, storage, and disposal of chemicals that may be hazardous. All project facilities involving the transport, use, storage, and disposal of hazardous materials would be required to prepare and implement a Hazardous Materials Business Plan and comply with applicable regulations, including those governing containment, site layout, and emergency response and notification procedures in the event of a spill or release. Transportation and disposal of wastes, such as spent cleaning solutions, would also be subject to regulations for the safe handling, transportation, and disposal of chemicals and wastes. Such regulations include standards to which parties responsible for hazardous materials releases must return spill sites, regardless of location, frequency, or size of release, or existing background contaminant concentrations to their original conditions. Compliance with existing regulations regarding hazardous materials transport would reduce the risk of environmental or human exposure to such materials and the cumulative impacts would be *less than significant*.

**Mitigation:** None required.

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## 3.8 Noise and Vibration

This section presents an analysis of potential impacts related to noise and vibration that would result from implementation of the proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects). Information from the 2014 Basin Management Plan Update Program Environmental Impact Report (2014 BMP Update PEIR) that remains relevant and accurate for the purposes of describing the physical or regulatory setting of noise and vibration has been incorporated as appropriate.

### 3.8.1 Setting

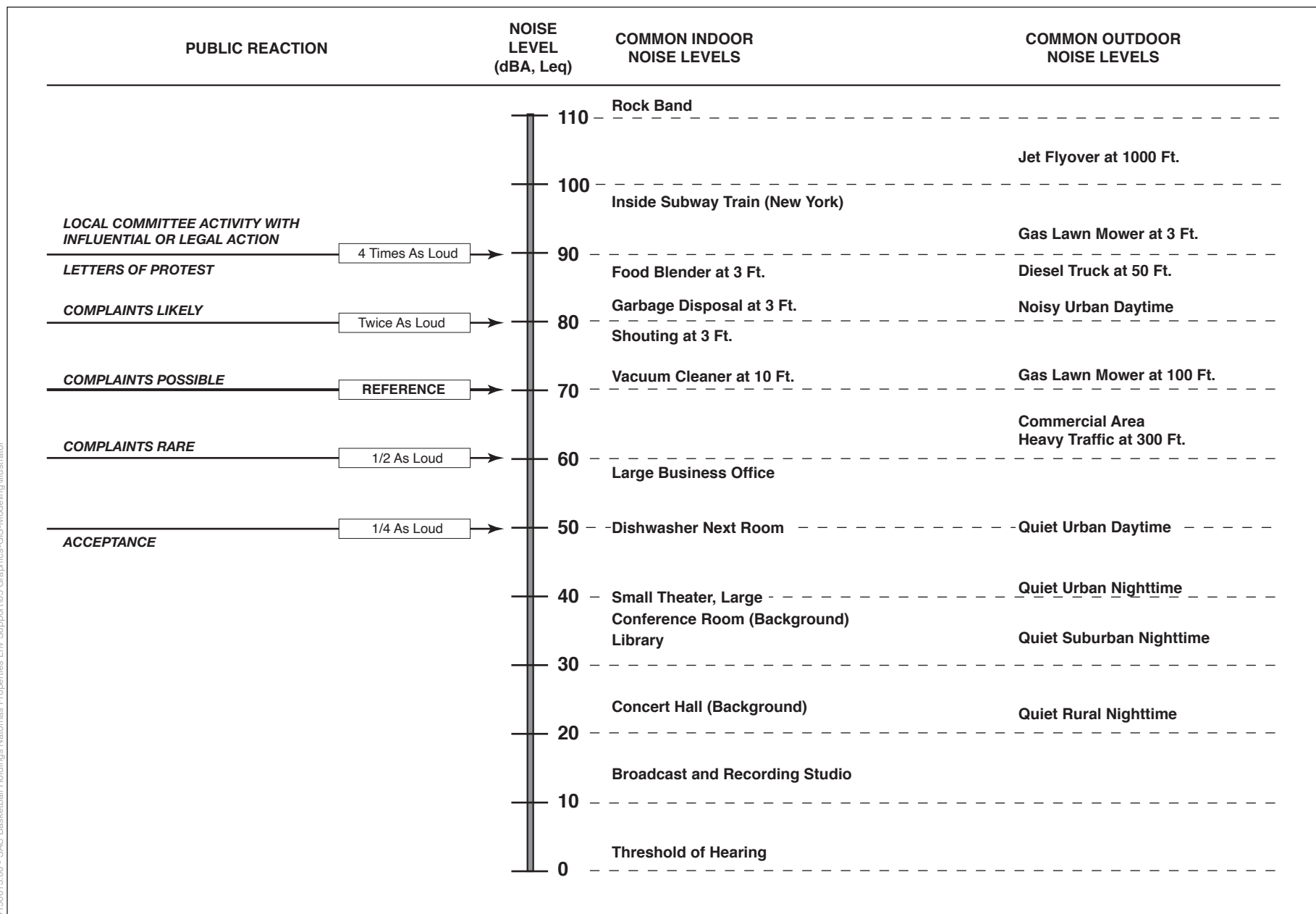
#### 3.8.1.1 Technical Background and Noise Terminology

Noise can be generally defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) that is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a result, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies instead of the frequency mid-range. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA). Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements. Some representative noise sources and their corresponding A-weighted noise levels are shown on **Figure 3.8-1**.

Noise exposure is a measure of noise over a period of time. Noise level is a measure of noise at a given instant in time. Community noise varies continuously over a period of time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic and atmospheric conditions. What makes community noise constantly variable throughout a day, besides the slowly changing background noise, is the addition of short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual receptor. These successive additions of sound to the community noise environment vary the community noise level from instant to instant, requiring the



SOURCE: Caltrans Transportation Laboratory Noise Manual, 1982;  
and modification by ESA

Watsonville Slough System Managed Aquifer Recharge and Recovery Project

**Figure 3.8-1**  
Typical Noise Levels

measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts.

This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

- $L_{eq}$ : the energy-equivalent sound level used to describe noise over a specified period of time, typically one hour. The  $L_{eq}$  is the constant sound level, which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).
- $L_{max}$ : the instantaneous maximum noise level for a specified period of time.
- $L_{dn}$ : a 24-hour day and night A-weighted noise exposure level, which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night (“penalizing” nighttime noises). Noise between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dB to take into account the greater annoyance of nighttime noises.

As a general rule, in areas where the noise environment is dominated by traffic, the  $L_{eq}$  during the peak-hour is generally within one to two dBAs of the  $L_{dn}$  at that location.<sup>1</sup>

### **Effects of Noise on People**

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance and dissatisfaction;
- Interference with activities such as speech, sleep, and learning; or
- Physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. Because the effects of noise on people vary from person to person, it is not possible to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists, and different tolerances to noise tend to develop based on an individual’s past experiences with noise. Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the baseline noise condition (typically the existing environment) to which one has adapted: the so-called “ambient noise” level. In general, the more a new noise exceeds the existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. Some examples of human perception of various noise levels are provided in Figure 3.8-1.

With regard to increases in A-weighted noise levels, the following relationships occur:

- Under controlled conditions in an acoustics laboratory, the trained healthy human ear is able to discern changes in sound levels of 1 dB;

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<sup>1</sup> California Department of Transportation (Caltrans), *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, September 2013.

- Outside of such controlled conditions, the trained ear can detect changes of 2 dB in normal environmental noise;
- It is widely accepted that the average healthy ear, however, can barely perceive noise level changes of 3 dB;
- A change in level of 5 dB is a readily perceptible increase in noise level; and
- A 10 dB change is recognized as twice as loud as the original source.<sup>2</sup>

These relationships occur in part because of the logarithmic nature of sound and the decibel system. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple linear fashion, but rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

### **Noise Attenuation**

Point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate between 6 dB for hard sites and 7.5 dB for soft sites for each doubling of distance from the source. Hard sites are those with a reflective surface between the source and the receiver such as parking lots or smooth bodies of water. No excess ground attenuation is assumed for hard sites and the changes in noise levels with distance (drop-off rate) is simply the geometric spreading of the noise from the source. Soft sites such as soft dirt, grass, or scattered bushes and trees have an absorptive ground surface. In addition to geometric spreading, an excess ground attenuation value of 1.5 dB (per doubling distance) is normally assumed for soft sites. Line sources (such as traffic noise from vehicles) attenuate at a rate between 3 dB for hard sites and 4.5 dB for soft sites for each doubling of distance from the source.<sup>3</sup> Noise levels may also be reduced by intervening structures, such as a row of buildings, a solid wall, or a berm located between the receptor and the noise source.

### **Fundamentals of Vibration**

As described in the Federal Transit Administration's (FTA's) *Transit Noise and Vibration Impact Assessment*, groundborne vibration can be a serious concern for nearby neighbors, causing buildings to shake and rumbling sounds to be heard.<sup>4</sup> In contrast to airborne noise, groundborne vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of groundborne vibration are trains, buses and heavy trucks on rough roads, and construction activities such as blasting, sheet pile-driving, and operation of heavy earth-moving equipment.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal, which is measured in inches per second (in/sec). The PPV is most frequently used to describe vibration impacts on buildings. The root mean square (RMS) amplitude is most frequently used to describe the effect

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<sup>2</sup> California Department of Transportation (Caltrans), *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, September 2013.

<sup>3</sup> California Department of Transportation (Caltrans), *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, September 2013.

<sup>4</sup> FTA, *Transit Noise and Vibration Impact Assessment (FTA-VA-90-1003-06)*, September 2018.

of vibration on the human body. The RMS amplitude is defined as the average of the squared amplitude of the signal. Decibel notation is commonly used to express RMS. The decibel notation acts to compress the range of numbers required to describe vibration. Typically, groundborne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receptors for vibration assessment include structures (especially older masonry structures), people who spend a lot of time indoors, and vibration sensitive equipment such as hospital analytical equipment and equipment used in computer chip manufacturing.

The effects of groundborne vibration include movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for most projects, with the occasional exception of blasting and pile-driving during construction. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by only a small margin.

### 3.8.1.2 Existing Noise-Sensitive Land Uses

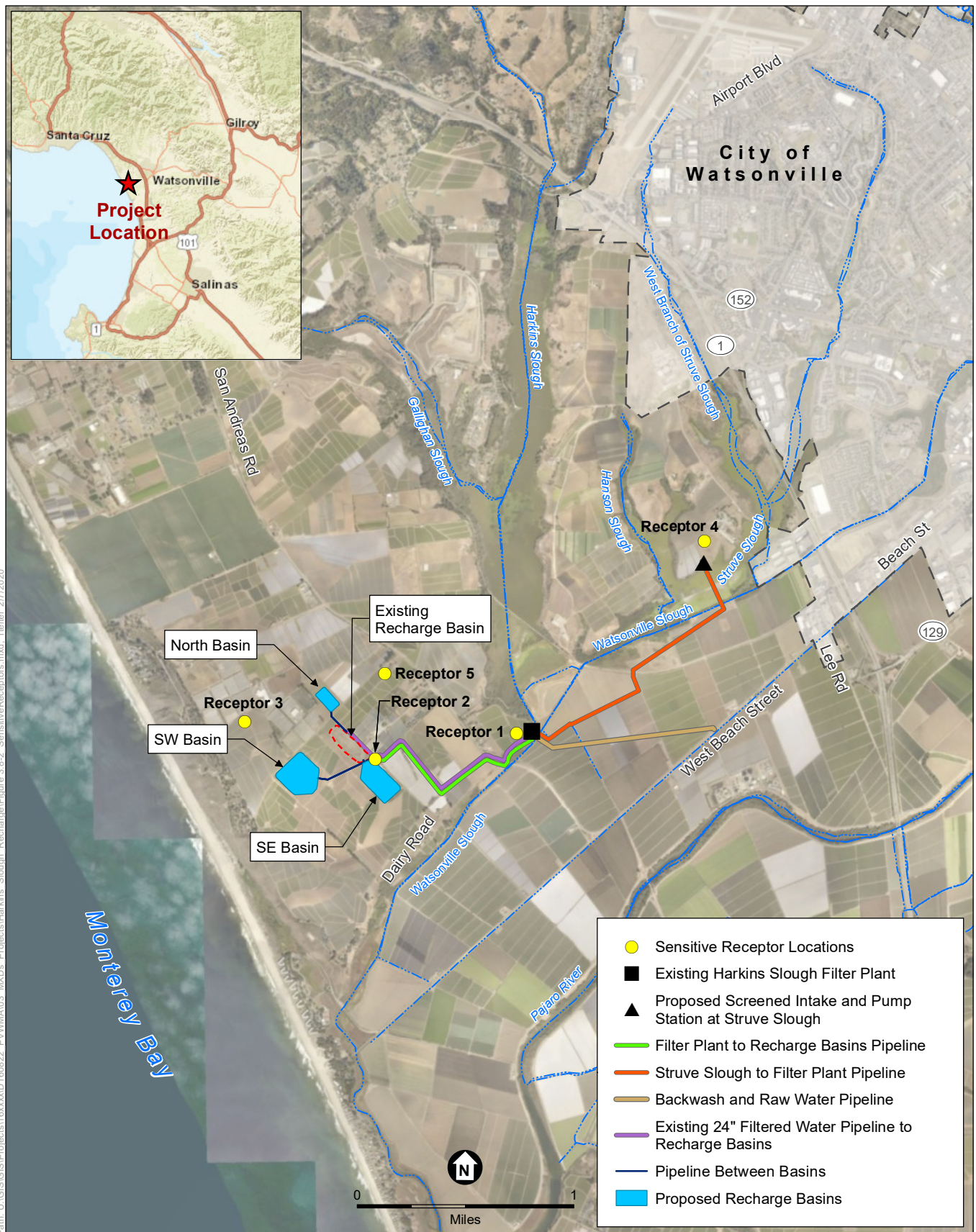
Human response to noise varies considerably from one individual to another. The effects of noise at various levels can include interference with sleep, concentration, and communication, may cause physiological and psychological stress, and hearing loss. Given these effects, some land uses are considered more sensitive to noise levels than others due to the duration and nature of time people spend at these uses. In general, residences are considered most sensitive to noise as people spend extended periods of time in them including the nighttime hours. Therefore, noise impacts on rest and relaxation, sleep, and communication are highest at residential uses. Schools, hotels, hospitals, nursing homes, and recreational uses are also considered to be more sensitive to noise as activities at these land uses involve rest and recovery, relaxation and concentration, and increased noise levels tend to disrupt such activities. Places such as churches, libraries, and cemeteries, where people tend to pray, study, and/or contemplate, are also sensitive to noise but due to the limited time people spend at these uses, noise increase impacts are usually tolerable. Commercial and industrial uses are considered the least noise-sensitive. Below is a description of the location of sensitive receptors near the Project sites. In general, the above noise-sensitive uses are also considered sensitive to vibration impacts.

**Figure 3.8-2** shows the location of sensitive receptors relative to the Project sites. Provided below are descriptions of the locations of sensitive receptors relative to each Project component.

#### ***Harkins Slough Project Components***

##### **Filter Plant Upgrades**

Upgrades to the Harkins Slough filter plant would include construction of coagulant addition facilities and the addition of new filters, replacement of three existing intermediate pumps with new pumps, replacement of two existing diversion pumps, and approximately 350 feet of new yard piping. The sensitive receptor nearest to the Harkins Slough filter plant is the single family residence (Receptor 1 in Figure 3.8-2) located approximately 150 feet to the west of the filter plant boundary.



SOURCE: Carollo Engineers, 2019;  
ESRI World Imagery, 7/23/2016; ESA

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.8-2**  
Location of Sensitive Receptors



### **Backwash and Raw Water Pipeline**

An approximately 4,600-foot-long backwash and raw water pipeline would be constructed between the Harkins Slough filter plant and the existing gravity sewer line under West Beach Street for discharge of filter backwash and to allow diversion of raw water from the sloughs to the City of Watsonville's Water Resources Center. The closest sensitive receptor to the backwash and raw water pipeline alignment is the same single-family residence (Receptor 1) identified above under Filter Plant Upgrades and is located approximately 250 feet west of the alignment.

### **Southwest Recharge Basin, Recovery Wells, Monitoring Wells, and Pipelines**

The Southwest recharge basin would be approximately 16.7 acres in area. Approximately ten recovery wells and ten monitoring wells would be placed within 500 feet of the recharge basin to extract water during the irrigation season. Pipelines associated with conveying water to the Southwest recharge basin would be 1,500 feet long. The closest sensitive receptor to the Southwest recharge basin are two single-family residences (Receptors 2 and 3 in Figure 3.8-2) located approximately 1,400 feet to the east and northwest of the recharge basin. These receptors could be located as close as 900 feet from the closest potential recovery well site.

### **Southeast Recharge Basin, Recovery Wells, Monitoring Wells, and Pipelines**

The Southeast recharge basin would be approximately 12.7 acres in area. Construction of the Southeast recharge basin would require the demolition of an existing structure and the construction of an approximately 15-foot by 10-foot equalization structure that would be approximately 10 feet deep. Approximately ten recovery wells and ten monitoring wells would be placed within 500 feet of the recharge basin to extract water during the irrigation season. Pipelines associated with conveying water to the Southwest recharge basin would be 200 feet long. The closest sensitive receptor is a single family residence (Receptor 2 in Figure 3.8-2) located approximately 40 feet from the proposed boundary of the basin. Santa Cruz County requires a minimum setback of 50 feet from property lines for wells. Therefore, this analysis assumes that the closest distance separating Receptor 2 from a recovery or monitoring well is 50 feet.

## ***Struve Slough Project Components***

### **Screened Intake**

The screened intake in Struve Slough would be installed on an approximately 25-foot by 15-foot pile-supported slab with an approximately 215-foot-long pipeline conveying water from the intake to the pump station. The nearest noise sensitive receptor to the screened intake site is a single family residence (Receptor 4 in Figure 3.8-2) located approximately 750 feet to the north.

### **Pump Station**

A pump station at the diversion point in Struve Slough would divert the water to the Harkins Slough filter plant. The sensitive receptor closest to the pump station would be the same single family residence (Receptor 4) identified above for the screened intake and would be located approximately 500 feet to the north of the pump station.

### **Struve Slough to Filter Plant Pipeline**

An approximately 6,360-foot long pipeline would be constructed to convey water from the proposed pump station at Struve Slough to the Harkins Slough filter plant. The pipeline alignment at the Watsonville Slough crossing would be located approximately 500 feet from the nearest sensitive receptor (Receptor 4), the same single family residence identified under screened intake and pump station above. Beyond the Watsonville Slough crossing, the pipeline alignment traverses agricultural lands with no sensitive receptors in the vicinity, except the single family residence (Receptor 1) located adjacent to the filter plant and approximately 150 feet from this pipeline alignment.

### **Filter Plant to Recharge Basins Pipeline**

An approximately 5,500-foot-long pipeline from the Harkins Slough filter plant to an existing pipeline adjacent to the existing recharge basin would be constructed. Approximately 4,800 feet of the pipeline would traverse agricultural land, while 700 feet would be along a paved section of a private farm road. Pipeline installation along this entire alignment would be conducted using open trench installation and would be restricted to the daytime hours. The nearest sensitive receptor is the single family residence (Receptor 2) that would be located as close as 20 feet from the alignment adjacent to the Southeast recharge basin. Receptor 1, to the west of the Harkins filter plant, is located approximately 175 feet from the eastern end of the pipeline alignment.

### **North Recharge Basin, Recovery Wells, Monitoring Wells, and Pipelines**

The North recharge basin would be approximately 3.9 acres in area, with a pipeline connecting it to the proposed or existing filtered water pipeline that delivers water from the Harkins Slough filter plant. As with the other two recharge basins, up to ten recovery wells would be installed within 500 feet of the recharge basin. Assuming that the recharge wells would be located as close as 500 feet from the boundary of the recharge basin, the nearest sensitive receptor (Receptor 5 in Figure 3.8-2) would be the single family residence located approximately 1,330 feet and 830 feet northeast of the North recharge basin and recovery well zone, respectively.

#### **3.8.1.3 Existing Noise Environment**

The noise environment surrounding the various Project sites is influenced by vehicular traffic, such as along State Route (SR) 1 and along local access roads such as West Beach Street, San Andreas Road, and Dairy Road. Other noise sources in the vicinity of the Project sites include occasional aircraft overflight noise from the Watsonville Municipal Airport, farming activities (e.g., tractors), and residential neighborhood activities. Typical noise levels in rural agricultural and residential areas range from the mid-40s to upper 50s dBA.<sup>5</sup>

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<sup>5</sup> Environmental Science Associates (ESA), *CalAm Monterey Peninsula Water Supply Project Final Environmental Impact Report/Environmental Impact Statement*, State Clearinghouse No. 2006101004, Section 3.12, Noise and Vibration, March 2018.

## 3.8.2 Regulatory Framework

### 3.8.2.1 Federal

Federal regulations establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 Code of Federal Regulations, Part 205, Subpart B. The federal truck pass-by noise standard is 80 dBA at 15 meters (approximately 50 feet) from the vehicle pathway centerline. These controls are implemented through regulatory requirements on truck manufacturers.

### 3.8.2.2 State

The State of California establishes noise limits for vehicles licensed to operate on public roads. For heavy trucks, the State pass-by standard is consistent with the federal limit of 80 dBA at approximately 50 feet from the centerline. The State pass-by standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle rating) is also 80 dBA at approximately 50 feet from the centerline. These standards are implemented through controls on vehicle manufacturers and by legal sanction of vehicle operators by State and local law enforcement officials.

### 3.8.2.3 Local

Table 2-8 in Chapter 2, *Project Description*, identifies the approvals from Santa Cruz County that would be required for the Projects. **Table 3.8-1** presents pertinent local plans and policies regarding noise to support consideration of project consistency with Santa Cruz County general policies.<sup>6</sup> Local policies are also used in this EIR as criteria to determine the significance of physical effects on the environment (e.g., Impact NOI-1, below).

The Public Safety and Noise element of the *General Plan and Local Coastal Program* (General Plan) for Santa Cruz County addresses noise issues in Santa Cruz County. **Figure 3.8-3** shows the community noise levels compatible for various land uses as prescribed by the General Plan. Santa Cruz County considers a noise level of up to 55 dBA  $L_{dn}$  as “satisfactory” for residential and commercial land uses. A noise level of up to 60 dBA  $L_{dn}$  is considered satisfactory for schools, libraries, churches, and hospitals. **Table 3.8-2** provides maximum noise levels allowed for stationary sources in Santa Cruz County as indicated in the General Plan and County Code. The General Plan does not contain policies or standards that specifically address construction noise.

Section 8.30.010(c) of the Santa Cruz County Code considers a noise level generated by any activity to cause a violation if the generated noise level is clearly discernable at 150 feet from the property line of the property generating the noise or if the noise level exceeds 75 dBA during daytime and 60 dBA during nighttime at the property line.

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<sup>6</sup> California Government Code Section 53091 exempts agencies like PV Water from complying with local building and zoning ordinances when locating or constructing facilities for the production, generation, storage, treatment, or transmission of water. California Government Code Section 65402(c) requires that PV Water notify cities and counties of its plans to construct projects or to acquire or dispose of property. The planning agency then has 40 days to determine project consistency with its general plan. If the planning agency disapproves, the disapproval may be overruled by PV Water.

**TABLE 3.8-1  
SANTA CRUZ COUNTY PLANS AND POLICIES RELEVANT TO THE PROJECT**

<b><i>Santa Cruz County General Plan/Local Coastal Program</i></b>
<p><b>Policy 6.9.1: Commercial and Industrial Development.</b> For all new commercial and industrial developments which would increase noise levels above the maximum allowable standards of the Land Use Guidelines on Figure 6-1 [presented below as <b>Figure 3.8-3</b>], or Figure 6-2 [presented below as <b>Table 3.8-2</b>], the best available control technologies will be used to minimize noise levels. In no case shall the noise levels exceed the standard of Figure 6-2 [presented below as Table 3.8-2].</p> <p><b>Policy 6.9.7: Construction Noise.</b> Require mitigation of construction noise as a condition of future project approvals. The County of Santa Cruz General Plan does not specify when construction mitigation measures would be required.</p>
<b><i>Santa Cruz County Code</i></b>
<p><b>Section 8.30.010(C).</b> The following factors shall be considered when determining whether a violation of the provisions of this section exists:</p> <p>(1) Loudness (Intensity) of the Sound</p> <p>a. Day and Evening Hours. For the purpose of this factor, a noise shall be automatically considered offensive<sup>a</sup> if it occurs between the hours of 8:00 a.m. and 10:00 p.m. and it is:</p> <ol style="list-style-type: none"> <li>Clearly discernible at a distance of 150 feet from the property line of the property from which it is broadcast; or</li> <li>In excess of 75 decibels at the edge of the property line of the property from which the sound is broadcast, as registered on a sound measuring instrument meeting the American National Standard Institute's Standard S1.4-1971 (or more recent revision thereof) for Type 1 or Type 2 sound level meters, or an instrument which provides equivalent data. For this analysis, it is assumed that the County's daytime construction exterior noise standard is an hourly <math>L_{eq}</math> (i.e., 75 dBA <math>L_{eq}</math>).</li> </ol> <p>b. Night Hours. For purposes of this factor, a noise shall be automatically considered offensive if it occurs between the hours of 10:00 p.m. and 8:00 a.m. and it is:</p> <ol style="list-style-type: none"> <li>Made within 100 feet of any building or place regularly used for sleeping purposes; or</li> <li>Clearly discernible at a distance of 100 feet from the property line of the property from which it is broadcast; or</li> <li>In excess of 60 decibels at the edge of the property line of the property from which the sound is broadcast, as registered on a sound measuring instrument meeting the American National Standard Institute's Standard S1.4-1971 (or more recent revision thereof) for Type 1 or Type 2 sound level meters, or an instrument which provides equivalent data. For this analysis, it is assumed that the County's nighttime construction exterior noise standard is an hourly <math>L_{eq}</math> (i.e., 60 dBA <math>L_{eq}</math>).</li> </ol>
<p>NOTES:</p> <p><sup>a</sup> "Offensive noise" means any noise which is loud, boisterous, irritating, penetrating, or unusual, or that is unreasonably distracting in any other manner such that it is likely to disturb people of ordinary sensitivities in the vicinity of such noise, and includes, but is not limited to, noise made by an individual alone or by a group of people engaged in any business, activity, meeting, gathering, game, dance, or amusement, or by any appliance, contrivance, device, tool, structure, construction, vehicle, ride, machine, implement, or instrument.</p> <p>SOURCE: Santa Cruz County, <i>1994 General Plan and Local Coastal Program for the County of Santa Cruz, California</i>, 1994; Santa Cruz County Code, Chapter 8.30 Noise, amended November 5, 2019.</p>

**TABLE 3.8-2  
COUNTY OF SANTA CRUZ  
MAXIMUM ALLOWABLE NOISE EXPOSURE STATIONARY NOISE SOURCES<sup>a</sup>**

<b>Category</b>	<b>Daytime<sup>b</sup> (7:00 a.m. to 10:00 p.m.)</b>	<b>Nighttime<sup>b,c</sup> (10:00 p.m. to 7:00 a.m.)</b>
Hourly $L_{eq}$ - average hourly noise level dBA <sup>d</sup>	50	45
Maximum level, dBA <sup>d</sup>	70	65
Maximum Level dBA - Impulsive Noise <sup>e</sup>	65	60

## NOTES:

- <sup>a</sup> As determined at the property line of the receiving land use. When determined the effectiveness of noise mitigation measures, the standards may be applied on the receptor side of the noise barriers or other property line noise mitigation measures.
- <sup>b</sup> Allowable levels shall be raised to the ambient noise levels where the ambient hourly  $L_{eq}$  is at least 10 dB lower than the allowable level. The definition of daytime and nighttime hours are different between the County of Santa Cruz's General Plan and municipal code.
- <sup>c</sup> Applies only where the receiving land use operates or is occupied during nighttime hours.
- <sup>d</sup> Sound level measurements shall be made with "slow" meter response.
- <sup>e</sup> Sound level measurements shall be made with "fast" meter response.

SOURCE: County of Santa Cruz, *Chapter 6: Public Safety and Noise of the County of Santa Cruz General Plan*, May 24, 1994.

LAND USE CATEGORY	COMMUNITY NOISE EXPOSURE - L <sub>dn</sub> or CNEL (dBA)																				
	50			55			60			65			70			75			80		
Residential, Hotel, and Motels																					
Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds																					
Schools, Libraries, Museums, Hospitals, Personal Care, Meeting Halls, Churches																					
Office Buildings, Business Commercial, and Professional																					
Auditoriums, Concert Halls, Amphitheaters																					
Industrial, Manufacturing, Utilities, and Agriculture.																					
	<b>Normally Acceptable</b> Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.																				
	<b>Conditionally Acceptable</b> Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design.																				
	<b>Unacceptable</b> New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies.																				

SOURCE: County of Santa Cruz, Chapter 6: Public Safety and Noise of the County of Santa Cruz General Plan. May 24, 1994.

**Figure 3.8-3**  
Land Use Compatibility for  
Community Noise Environment

### 3.8.3 Impacts and Mitigation Measures

#### 3.8.3.1 Significance Criteria

In accordance with the California Environmental Quality Act (CEQA), state CEQA *Guidelines* (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Projects would have a significant impact if they were to:<sup>7</sup>

- Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies; and/or
- Generate excessive groundborne vibration or groundborne noise levels.

<sup>7</sup> Refer also to Appendix NOP for additional topics that were addressed in the Notice of Preparation.

The following topics are not analyzed further in this section for the reasons described below:

- ***Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise during project operations.*** Project operations and routine maintenance would not expose people to, or generate, groundborne vibration. Groundborne noise occurs when vibrations transmitted through the ground result in secondary radiation of noise. Groundborne noise is generally associated with underground railway operations and with construction activities such as blasting, drilling, or pile driving, none of which would result during operation of the Projects. Operation of the Projects would not involve equipment that typically produce groundborne vibration. Therefore, the Projects would have no impact related to this criterion and this issue is not discussed further below.

### 3.8.3.2 Methodology

As described in Section 3.1, this EIR provides an independent analysis of the Projects' potential environmental impacts. Potential impacts associated with the Projects are identified below. The analysis included in this section was developed based on information and guidelines in the *County of Santa Cruz General Plan*, *Santa Cruz County Code*, the Federal Highway Administration (FHWA) *Road Construction Noise Model*,<sup>8</sup> and the FTA's *Transit Noise and Vibration Impact Assessment*.<sup>9</sup>

#### Noise

Analysis of the Projects' temporary construction noise effects is based on estimated types and numbers of construction equipment and duration of use provided by Carollo Engineers. The analysis accounts for attenuation of noise levels due to distances between the location where construction activity would occur and the nearest sensitive land uses. Construction noise levels at nearby sensitive land uses were estimated using the FHWA's *Roadway Construction Noise Model*. The General Plan does not contain noise policies or standards that apply specifically to construction noise. For this analysis, the daytime and nighttime exterior noise standards of 75 dBA  $L_{eq}$  and 60 dBA  $L_{eq}$ , respectively, found in Santa Cruz County Code were used to evaluate if the construction of the Projects would cause a substantial temporary or periodic increase in ambient noise levels at sensitive receptors near the Project sites. Sensitive receptors exposed to noise levels in excess of these standards could experience adverse reactions.

The primary noise sources during operation of the Projects would be the new onsite pumps at the proposed pump station at Struve Slough and the expanded Harkins Slough Filter Plant. Noise generated by these stationary sources was calculated using reference noise levels provided by Carollo Engineers.<sup>10</sup> Operational noise levels associated with the proposed equipment were attenuated to the nearest sensitive receptor locations and compared to local noise standards identified in Table 3.8-2.

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<sup>8</sup> FHWA, *FHWA Roadway Construction Noise Model User's Guide*, January 2006.

<sup>9</sup> FTA, *Transit Noise and Vibration Impact Assessment* (FTA-VA-90-1003-06), September 2018.

<sup>10</sup> Carollo Engineers, Response to Request for Information for the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects, January 2019.

## Vibration

For the purposes of assessing potential vibration impacts on nearby sensitive land uses, this analysis uses the methodology described in the California Department of Transportation's (Caltrans') *Transportation and Construction Vibration Guidance Manual*.<sup>11</sup> For adverse human reaction, the analysis applies the "severe" threshold of 0.4 in/sec PPV for continuous/frequent sources. There are no historic structures or buildings in the vicinity of the Project sites that might be affected by construction-related vibration. This analysis applies a threshold of 0.5 in/sec PPV to assess risk of damage for all other building types.<sup>12</sup>

### 3.8.3.3 Impacts and Mitigation Measures

**Impact NOI-1: Construction of the Projects would result in a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plans or noise ordinances. (*Less than Significant with Mitigation*)**

Figures 2-1 through 2-4 in Chapter 2, *Project Description*, show the location and layout of Project components. Construction of the Project components would take place over a 3-year period between 2022 and 2025 and then again between 2027 and 2028. Tables 2-4A and 2-4B in the *Project Description* show the currently anticipated construction schedule and duration of each activity for these projects. Standard hours for construction activities generating noise would be 8:00 a.m. to 6:00 p.m., Monday through Saturday. Exceptions to standard construction hours would occur during:

- Well installation would require continuous drilling for up to 24 hours per day and several days in a row.
- Trenchless pipeline construction which would require continuous tunneling at the locations indicated in Table 2-6 of the *Project Description*, for up to 24 hours per day and (for longer tunneling) several days in a row.

In general, construction of the Project components would involve dewatering; grading and excavation; pile-driving; erecting concrete structures; installing piping, pumps, electrical and mechanical equipment; testing and commissioning facilities; finish work such as erecting enclosures; installing flooring, and fencing; and painting and paving. Noise levels during construction of each component would fluctuate depending on the particular type, number, and duration of use of various pieces of construction equipment, and the distance of construction activities from sensitive receptors. The effect of construction noise would depend on how much noise would be generated by the equipment, the distance between construction activities, the distance to the nearest noise-sensitive uses, and the existing noise levels at those sensitive uses.

<sup>11</sup> Caltrans, *Transportation and Construction Vibration Guidance Manual*, September 2013.

<sup>12</sup> Caltrans, *Transportation and Construction Vibration Guidance Manual*, September 2013.

The majority of off-road equipment and vehicle usage would be associated with the intensive earthwork and the structural phases of construction. Large construction equipment such as drill rigs, backhoes, compactors, cranes, excavators, haul trucks, and pavers would be used during construction of the Project components. **Table 3.8-3** shows typical noise levels produced by the types of off-road equipment that would be used for Project construction activities.

**TABLE 3.8-3  
REFERENCE CONSTRUCTION EQUIPMENT NOISE LEVELS (50 FEET FROM SOURCE)**

Type of Equipment	$L_{max}$ , dBA	Hourly $L_{eq}$ , dBA/Percent Used <sup>a,b</sup>
Excavator	81	77/40
Backhoe	78	74/40
Air Compressor	78	74/40
Forklift	85	81/40
Crane	81	73/16
Pump	81	78/50
Generator Set	81	78/50
Off Highway Truck	77	73/40
Welder	74	70/40
Plate Compactor	83	76/20
Skip Loader	79	75/40
Drill Rig	84	84/100 <sup>b</sup>
Dozer	82	78/40
Scraper	84	80/40
Scissor Lift <sup>d</sup>	75	68/20
Paver	77	74/50
Vibratory Pile Driver	101	94/20

NOTES:

<sup>a</sup> "Percent used" were obtained from the FHWA Roadway Construction Noise Model User's Guide.

<sup>b</sup> Hourly  $L_{eq}$  calculated using the FHWA's Roadway Construction Noise Model.

<sup>c</sup> Usage factor for drill rig assumed to be 100 percent to account for continuous drilling proposed.

<sup>d</sup> Assumed to be similar to Man Lift in RCNM.

SOURCE: Table compiled by ESA, 2020.

The operation of each piece of equipment within the Project construction sites would not be constant throughout the day, as equipment would be turned off when not in use. Over a typical workday, the equipment would operate at different locations and all the equipment would not operate concurrently at the same location of any given Project construction area. However, for a conservative quantification of construction-related noise exposure that would occur at the nearest sensitive receptors, it was assumed that the two loudest pieces of construction equipment would operate at the location of the Project site closest to the nearest off-site sensitive receptors. **Table 3.8-4** presents the combined  $L_{eq}$  noise levels to which nearest sensitive receptors could be exposed near each of the Project sites.



**TABLE 3.8-4**  
**SUMMARY OF ESTIMATED NOISE LEVELS AT SENSITIVE RECEPTORS DURING PROJECT CONSTRUCTION**

Project Component	Construction Equipment Used <sup>a</sup>	Distance to nearest Sensitive Receptor (feet)	Attenuated Combined Noise Level of Two Loudest Equipment At Receptor (dBA L <sub>eq</sub> ) <sup>b</sup>
<b>Harkins Slough Project</b>			
Filter Plant Upgrades	Crane, Excavator, Concrete Delivery Truck, Backhoe, <b>Forklift</b> , Pumps, Air Compressor, <b>Generator Set</b> , Wire Pulling Machine	150	70.7
Backwash and Raw Water Pipeline	Excavator, Plate Compactors, Skip Loader, Sweeper, Backhoe, <b>Forklift</b> , Pumps, Air Compressor, Water Truck, <b>Generator Set</b> , Asphalt Truck	150	70.7
Southwest Recharge Basin and Associated Pipelines	Excavators, Skip Loader, Backhoes, <b>Forklift</b> , Scissor Lift, Wire Pulling Machine, Pumps, Air Compressors, Water Truck, <b>Generator Set</b>	1,400	51.3
Recovery and Monitoring Wells around Southwest Recharge Basin	<b>Drilling Rig</b> , Concrete Delivery Truck, Skip Loader, Backhoe, <b>Forklift</b> , Pumps, Air Compressor, Water Truck, Generator Set	900	55.0
Southeast Recharge Basin and Associated Pipelines	Excavators, Skip Loader, Backhoes, <b>Forklift</b> , Scissor Lift, Wire Pulling Machine, Pumps, Air Compressors, Water Truck, <b>Generator Set</b>	40	<b>82.1</b>
Recovery and Monitoring Wells around Southeast Recharge Basin	<b>Drilling Rig</b> , Concrete Delivery Truck, Skip Loader, Backhoe, <b>Forklift</b> , Pumps, Air Compressor, Water Truck, Generator Set	50	<b>85.8</b>
<b>Struve Slough Project</b>			
Struve Slough Screened Intake	<b>Vibratory pile driver</b> , Excavator, Skip Loader, Crane, Pumps, Air Compressor, <b>Generator Set</b> , Welding Machine	750	70.4
Struve Slough Intake Pipeline – Potential Trenchless Construction	<b>Drilling rig, crane</b>	650	56.3
Struve Slough Pump Station	Excavator, Backhoe, <b>Forklift</b> , Crane, Scissor Lift, Pumps, Air Compressor, Water Truck, <b>Generator Set</b> , Asphalt Truck, Wire Pulling Machine	500	60.2
Struve Slough to Filter Plant Pipeline	Excavator, Skip Loader, Backhoe, <b>Forklift</b> , Pumps, Water Truck, <b>Generator Set</b> , Mud Pumps, Crane	150	70.7
Struve Slough to Filter Plant Pipeline – Trenchless Construction	<b>Drilling rig, crane</b>	150	<b>69.1</b>
Filter Plant to Recharge Basins Pipeline	Excavator, Plate Compactors, Skip Loader, Sweeper, Backhoe, <b>Forklift</b> , Pumps, Air Compressor, Water Truck, <b>Generator Set</b> , Asphalt Truck	20	<b>88.2</b>
North Recharge Basin and Associated Pipelines	Excavators, Skip Loader, Backhoes, <b>Forklift</b> , Scissor Lift, Wire Pulling Machine, Pumps, Air Compressors, Water Truck, <b>Generator Set</b>	1,330	54
Recovery and Monitoring Wells around North Recharge Basin	<b>Drilling Rig</b> , Concrete Delivery Truck, Skip Loader, Backhoe, <b>Forklift</b> , Pumps, Air Compressor, Water Truck, Generator Set	830	55.7

## NOTES:

<sup>a</sup> Equipment in **bold** show the two highest noise generating equipment in terms of hourly L<sub>eq</sub> for each Project component.

<sup>b</sup> As calculated using FHWA *Roadway Construction Noise Level Model* (RCNM) using an attenuation rate of 6 dBA per doubling of distance.

SOURCE: Table compiled by ESA, 2020.

## Construction Impact by Project Component

### Harkins Slough Project Components

#### *Filter Plant Upgrades*

The construction activities associated with upgrades at the Harkins Slough filter plant would take place intermittently over a period 180 workdays over 12 months. Construction activities at the Harkins Slough filter plant would occur between the daytime hours of 8:00 a.m. to 6:00 p.m. Monday through Saturday.

The sensitive receptor nearest to the Harkins Slough filter plant is Receptor 1, located approximately 150 feet to the west of the filter plant boundary. Table 3.8-3 lists the noise levels associated with the operation of typical construction equipment that would be used. The two loudest pieces of off-road equipment that would operate at the site during construction of the Harkins Slough filter plant upgrades are a forklift and generator set (see Table 3.8-4). As shown in Table 3.8-4, Receptor 1 would be exposed to construction noise levels of 70.7 dBA  $L_{eq}$ , which would not exceed the County's daytime  $L_{eq}$  threshold of 75 dBA. Therefore, construction activities associated with the Harkins Slough filter plant upgrades would result in a ***less-than-significant*** impact with respect to exposure of sensitive land uses to noise levels in excess of applicable standards.

#### *Backwash and Raw Water Pipeline*

Construction of the backwash and raw water pipeline between the Harkins Slough filter plant and the existing gravity sewer line under West Beach Street would occur between 8:00 a.m. to 6:00 p.m., within the daytime hours identified in Section 8.30.010(C) of the County of Santa Cruz noise ordinance (see Table 3.8-1). Construction would be expected to begin in July 2024, and would entail construction over 50 working days spread out over 6 months. Pipeline construction would use open trench installation along the entire alignment and no trenchless installation would be anticipated to be needed for any portion of the alignment.

Receptor 1 is the closest sensitive receptor to the backwash and raw water pipeline alignment and would be located approximately 150 feet from the western end of this pipeline alignment. As shown in Table 3.8-4, Receptor 1 would be exposed to construction noise levels of 70.7 dBA  $L_{eq}$ , which would not exceed the County's daytime  $L_{eq}$  threshold of 75 dBA. Therefore, this would be a ***less-than-significant*** impact.

#### *Southwest Recharge Basin, Recovery Wells, Monitoring Wells, and Pipelines*

Construction of the Southwest recharge basin, recovery and monitoring wells, and associated pipelines would take place over a period of 12 months from July 2024 to June 2025. Most construction activities would occur between 8:00 a.m. to 6:00 p.m., within the daytime hours identified in Section 8.30.010(C) of the County of Santa Cruz noise ordinance. However, construction of the recovery wells would require continuous drilling using a rotary drill rig for up to 24 hours per day and several days in a row. Pipelines conveying water to the Southwest recharge basin would be constructed using open trench installation during daytime hours.

The closest sensitive receptor to the Southwest recharge basin are single-family residences located approximately 1,400 feet to the east and northwest (Receptors 2 and 3 on Figure 3.8-2). As shown in Table 3.8-4, during construction of the recharge basin, these receptors would be exposed to construction noise levels of 51.3 dBA  $L_{eq}$ , which would be well below the County's daytime threshold of 75 dBA  $L_{eq}$ . As recovery wells could be located up to 500 feet from the recharge basin boundary, drilling activities associated with the recovery wells could take place as close as 900 feet from these receptors. The attenuated noise level from the operation of a drill rig and forklift at this distance would be 55 dBA  $L_{eq}$ , which would be below the 75 dBA  $L_{eq}$  daytime and 60 dBA  $L_{eq}$  nighttime County thresholds for construction noise. Therefore, the impact associated with construction of the Southwest recharge basin, recovery and monitoring wells, and associated pipelines would be *less than significant*.

#### *Southeast Recharge Basin, Recovery Wells, Monitoring Wells, and Pipelines*

Construction of the Southeast recharge basin and associated pipelines would take place during the daytime hours; however, recovery well construction would be expected to take place 24 hours a day.

The closest sensitive receptor is a single family residence located approximately 40 feet from the boundary of the basin (Receptor 2). The exact locations of the recovery and monitoring wells are not known at this point but for this analysis it is assumed that the closest receptor would be as close as 50 feet from a recovery or monitoring well site, consistent with Santa Cruz County requirements. As shown in Table 3.8-4, Receptor 2 would be exposed to daytime construction noise levels of 82.1 dBA  $L_{eq}$  during recharge basin construction, which would exceed the County's daytime threshold for construction noise. At 85.8 dBA  $L_{eq}$ , nighttime construction noise at Receptor 2 from the continuous operation of the drill rig during construction of a well conservatively assumed to be located as close as 50 feet from the receptor would also exceed the County's nighttime threshold of 60 dBA  $L_{eq}$  for construction noise. Therefore, the impact from exposure of sensitive receptors to noise levels in excess of applicable standards during well construction would be significant. Implementation of **Mitigation Measures NOI-1a, NOI-1b and NOI-1c** would reduce daytime and nighttime impacts to *less than significant with mitigation*.

#### Struve Slough Project Components

##### *Screened Intake*

The nearest noise sensitive receptor to the screened intake at Struve Slough is a single family residence located approximately 750 feet to the north (Receptor 4). Construction activities would be restricted to daytime hours unless trenchless construction is determined to be necessary, which would require continuous drilling 24 hours a day. As shown in Table 3.8-4, attenuated noise levels at Receptor 4 from construction activities (including pile driving) would be 70.4 dBA  $L_{eq}$ . If trenchless construction is required for pipeline construction, the entry point at the slough crossing would be located approximately 650 feet from the Receptor 4 and would generate noise levels of 56.3 dBA,  $L_{eq}$ . Noise levels at Receptor 4 from the construction of the screened intake and pipeline would be below the County's thresholds for daytime and nighttime construction. Therefore, this impact would be *less than significant*.

#### *Pump Station*

Construction activities associated with the pump station would be restricted to the daytime hours. Receptor 4 would be the sensitive receptor closest to the pump station and would be located approximately 500 feet to the north.

As shown in Table 3.8-4, Receptor 4 would be exposed to daytime noise levels of 60.2 dBA  $L_{eq}$  during Project construction. Since construction activities would not exceed the County's daytime noise standards, impacts with respect to exposure of sensitive receptors to noise levels in excess of applicable standards would be *less than significant*.

#### *Struve Slough to Filter Plant Pipeline*

The pipeline from the proposed pump station at Struve Slough to the Harkins Slough filter plant would, for most of the alignment, be installed using open trench installation. Trenchless construction would be used where the alignment crosses the railroad and, potentially, where the pipeline crosses Watsonville Slough and Struve Slough, depending on water levels (i.e., if the water levels in the slough is too high for open trench, trenchless construction will be used).

The entry site for trenchless construction at the Struve slough crossing would be located approximately 650 feet from Receptor 4. Beyond this, the pipeline alignment traverses agricultural lands with no sensitive receptors in the vicinity. At the filter plant, Receptor 1 would be located approximately 150 feet from the pipeline alignment where trenchless construction could occur at the Watsonville Slough crossing.<sup>13</sup> Therefore, Receptor 1 would be the nearest sensitive receptor to this alignment. There are no sensitive receptors located within 2,000 feet of the pipeline's alignment at the railroad crossing, which is the other location along this alignment where trenchless construction would take place.

As shown in Table 3.8-4, during potential trenchless construction at the Watsonville Slough crossing, Receptor 1 would be exposed to construction noise levels of 69.7 dBA  $L_{eq}$ . While this noise level would be below the County's daytime threshold, given that trenchless construction would occur 24 hours a day, it would exceed the County's nighttime standard and lead to a significant impact.

Implementation of Mitigation Measures NOI-1a and NOI-c would reduce this impact to *less than significant with mitigation*.

#### *Filter Plant to Recharge Basins Pipeline*

There are no sensitive land uses along most of this alignment. Receptor 1 is to the west of the Harkins filter plant and is located approximately 175 feet from the eastern end of the pipeline alignment. The alignment runs along a portion of the Southeast recharge basin boundary with Receptor 2 as close as 20 feet. Pipeline installation along this entire alignment would be conducted using open trench installation and would be restricted to the daytime hours.

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<sup>13</sup> If Watsonville Slough is wet and dewatering is not feasible, pipeline would be installed under the slough via microtunneling. If the slough is dry or dewatering is feasible, PV Water proposes to install pipeline via open-trench construction with a 20-foot-wide construction corridor.

As shown in Table 3.8-4, Receptor 2 would be exposed to daytime noise levels of approximately 88.2 dBA  $L_{eq}$  during pipeline construction. This would exceed the County's daytime threshold of 75 dBA  $L_{eq}$ . Though pipeline construction would advance linearly at the rate of 100 to 250 feet per day, thereby exposing any receptors to this level of noise for no more than a few days, this impact would be considered significant. Implementation of Mitigation Measure NOI-1a would reduce noise exposure to Receptor 2 and reduce impacts with respect to exposure of receptors sensitive to noise levels in excess of standards to *less than significant with mitigation*.

#### *North Recharge Basin, Recovery Wells, Monitoring Wells, and Pipelines*

Construction activity associated with the recharge basin and pipelines would be limited to the daytime hours consistent with the Santa Cruz County noise ordinance. Installation of wells would take place over a period of 10 days at each well site and would involve continuous drilling 24 hours a day. As the recovery wells could be located up to 500 feet from the boundary of the recharge basin, the nearest sensitive receptor would be the single-family residence (Receptor 5) located approximately 1,330 feet from the North recharge basin, and approximately 830 feet from the nearest potential well.

As shown in Table 3.8-4, Receptor 5 would be exposed to daytime noise levels of 54 dBA  $L_{eq}$  and nighttime noise levels of 55.7 dBA  $L_{eq}$  during Project construction. Since construction activities would not exceed the County's daytime or nighttime noise standards, impacts related to exposure of sensitive receptors to noise levels in excess of applicable standards would be *less than significant*.

#### Impact Summary

Based on the analysis above, construction activities associated with most of the Project components would result in less-than-significant impacts with respect to exposure of sensitive receptors in excess of applicable noise standards. Impacts associated with construction of the Southeast recharge basin and surrounding wells, filter plant to recharge basin pipeline and trenchless construction at the Watsonville Slough crossing adjacent to the Harkins Slough filter plant would be significant.

Implementation of Mitigation Measures NOI-1a, NOI-1b and NOI-1c would reduce daytime and nighttime impacts from the Southeast recharge basin and well construction to a less-than-significant level. Implementation of Mitigation Measure NOI-1a and NOI-1c would reduce nighttime impacts from trenchless construction at the Watsonville Slough crossing near the filter plant to a less-than-significant level.

#### **Mitigation Measure NOI-1a: Construction Noise Management Plan**

PV Water shall develop and implement a Construction Noise Reduction Plan prior to initiating construction activities. A disturbance coordinator shall be designated for the Project to implement the provisions of the plan. At a minimum, the Construction Noise Reduction Plan shall implement the following measures:

- Distribute to the potentially affected residences and other sensitive receptors within 200 feet of the Project construction site boundaries notice including a "hotline" telephone number, which shall be attended during active construction working hours,

for use by the public to register complaints. The notice shall identify the noise disturbance coordinator who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator would determine the reason for the noise complaints and institute actions warranted to correct the problem, if any. All complaints shall be logged noting date, time, complainant's name, nature of complaint, and any corrective action taken. The notice shall also include the construction schedule.

- Equipment and trucks used for construction activities shall utilize the best available noise control techniques (including mufflers, use of intake silencers, ducts, engine enclosures and acoustically attenuating shields or shrouds) in order to minimize construction noise impacts.
- Impact equipment (e.g., jack hammers, pavement breakers, and rock drills) used for construction activities shall be hydraulically- or electrically-powered whenever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatically powered tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used where feasible, and this could achieve a reduction of 5 dBA. Quieter procedures shall be used (such as drilling rather than impact equipment) whenever feasible.
- Maintain maximum physical separation, as far as practicable, between noise sources (construction equipment) and sensitive noise receptors. Separation may be achieved by locating stationary equipment (such as generators) in areas that would minimize noise impacts on the community. If they must be located near existing receptors, they shall be adequately muffled.
- When construction activities take place within 50 feet of receptors, use construction noise barriers such as paneled noise shields, blankets, and/or enclosures adjacent to noisy stationary and off-road equipment. Noise control shields, blankets and/or enclosures shall be made featuring a solid panel and a weather-protected, sound-absorptive material on the construction-activity side of the noise shield.

#### **Mitigation Measure NOI-1b: Location of Recovery and Monitoring Wells**

PV Water shall locate recovery and monitoring wells at a distance of at least 200 feet from existing residences to avoid noise impacts to the residences. If this is found to be not feasible, PV Water shall implement Mitigation Measure NOI-1c for residences located less than 200 feet from well sites where 24-hour construction is required.

#### **Mitigation Measure NOI-1c: Off-site Accommodations for Substantially Affected Nighttime Receptors**

To reduce nighttime impacts to receptors, PV Water shall offer to provide temporary hotel accommodations for all residents within 200 feet of where recovery well drilling (if Mitigation Measure NOI-1b is not feasible) and trenchless pipeline construction activities would occur. The accommodations shall be provided for the duration of nighttime drilling activities. PV Water shall provide accommodations reasonably similar to those of the impacted residents (e.g., in terms of number of beds).

**Impact NOI-2: Operation of the Projects could result in a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance. (*Less than Significant with Mitigation*)**

The primary noise sources associated with operation of the Projects would be the new pumps installed at the proposed Struve Slough intake and pump station and as part of upgrades at the Harkins Slough Filter Plant. As indicated in Section 2.5, Project Components, the Struve Slough pump station would house two duty and one standby 200 horsepower (hp) pumps, which would be designed to maintain noise levels at nearby residences at or below applicable local noise limits. Upgrades to the Harkins Slough filter plant would include replacement of two existing diversion pumps with two 30 hp pumps, replacement of three existing intermediate pumps with new 200 hp pumps and installation of two 50 hp blowers. All proposed equipment upgrades would be designed to meet Santa Cruz County noise standards.

It is anticipated that the facilities would operate seven months per year at the Struve Slough pump station and any time throughout the years for the Harkins Slough pump station. The facilities could operate at any time of the day at both sites. Therefore, this analysis assumes that all pumps would operate during both daytime and nighttime hours. Operational noise from the Struve Slough intake and pump station and Harkins Slough filter plant could result in the exposure of nearby off-site sensitive receptors to noise levels that could exceed local noise standards in Table 3.8-2.

**Table 3.8-5** presents the potential Project-related noise levels that sensitive receptors could be exposed to during the operation of stationary noise sources at the pump station and filter plant.

**TABLE 3.8-5  
SUMMARY OF OPERATIONAL NOISE EXPOSURE AT SENSITIVE RECEPTORS LOCATIONS – STATIONARY SOURCES**

Noise Source	Noise Level at 3 feet (dBA L <sub>eq</sub> ) <sup>a</sup>	Number of pumps	Distance to nearest Sensitive Receptor (feet) <sup>b</sup>	Attenuated Noise Level (dBA L <sub>eq</sub> ) <sup>c</sup>
<b>Struve Slough Pump Station</b>				
200 hp pump	80	2	500	27.5
County of Santa Cruz Stationary Nighttime noise Standard				45
Exceed Threshold (Yes or No)?				No
<b>Harkins Slough Filter Plant</b>				
200 hp pump	80	3	175	40.7
30 hp pump	80	2	240	35.4
50 hp blower <sup>d</sup>	92 <sup>e</sup>	2	150	52.5
Combined Noise Level				<b>53.1</b>
County of Santa Cruz Stationary Nighttime noise Standard				45
Exceed Threshold (Yes or No)?				<b>Yes</b>

NOTES:

<sup>a</sup> Pump reference noise levels and conceptual site plans provided by Carollo Engineers.

<sup>b</sup> Measured distance from the nearest sensitive receptor to the Project site to the proposed onsite pump station location.

<sup>c</sup> Assumed an attenuation rate of 7.5 dB per doubling of distance (i.e., soft site).

<sup>d</sup> The blowers would be part of the synthetic medium filter equipment, if that type of filter is used for the new filters, and would be located north of the new filters within an enclosure.

<sup>e</sup> Noise levels for blowers at the filter plant based on data from PD Blowers, available at <https://www.pdblowers.com/air-backwash-blower-system-for-water-treatment-plant/>.

SOURCE: Carollo Engineers, Request for Information, email from R. Gutierrez, February 10, 2019; ESA, 2020.

As shown in Table 3.8-2, the General Plan limits stationary noise sources (such as pumps) to 50 dBA  $L_{eq}$  during the daytime hours and 45 dBA  $L_{eq}$  during the nighttime hours. Since all of the proposed pumps are assumed to operate during both the daytime and nighttime hours, the County Santa Cruz nighttime noise standard of 45 dBA  $L_{eq}$  is used to evaluate whether the Projects would generate noise levels in excess of standards establishes in the County's general plan.

As shown in Table 3.8-5, the sensitive receptors near the Struve Slough intake and pump station would not be exposed to noise levels that exceed the stationary nighttime noise standard found in the County of Santa Cruz General Plan. However, combined noise level from the operation of the two diversion pumps, three intermediate pumps, and two blowers at the Harkins Slough filter plant would exceed the nighttime noise standard. Project facilities would be designed to be consistent with the Santa Cruz County noise standards. Additionally, **Mitigation Measure NOI-2** specifies noise reduction requirements for equipment at the Harkins Slough filter plant. Implementation of Mitigation Measure NOI-2 would reduce operational impacts related to exposure of persons to, or generation of, noise levels in excess of the local general plan standards to *less than significant*.

#### **Mitigation Measure NOI-2: Acoustical Enclosures for Stationary Equipment**

Enclose all blowers, if installed, within acoustical enclosures to reduce noise impacts to nearby uses. Enclosures shall be rated for a noise reduction sufficient to ensure that the attenuated noise level at nearby receptors would be below the County standard of 45 dBA.

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#### **Impact NOI-3: Project construction could generate excessive groundborne vibration. (*Less than Significant*)**

As discussed in Section 3.10, Cultural Resources, there are no recorded structures of historic significance in the vicinity of the Project sites. Therefore, human annoyance is the primary vibration issue of concern from construction. Construction activities that typically result in temporary vibration impacts include the use of pile drivers, large bulldozers, loaded trucks, and auger drills. **Table 3.8-6** shows vibration levels generated by such equipment at a reference distance of 25 feet. Vibration levels generated by other construction equipment would be lower and result in reduced vibration levels.

For adverse human reaction, this analysis applies the “severe” threshold of 0.4 in/sec PPV for continuous/frequent intermittent sources.<sup>14</sup> According to the Caltrans' *Transportation and Construction Vibration Manual*, continuous/frequent intermittent sources include compactors and vibratory compaction equipment. A higher threshold of 0.5 in/sec PPV is used to assess damage risk to buildings.<sup>15</sup> Therefore, if vibration impacts relative to human annoyance are less than significant, impacts with respect to building damage of non-historical structures would also be less than significant. Table 3.8-6 also shows the distances within which the human annoyance and building damage thresholds would be exceeded.

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<sup>14</sup> Caltrans, *Transportation and Construction Vibration Guidance Manual*, September 2013.

<sup>15</sup> Caltrans, *Transportation and Construction Vibration Guidance Manual*, September 2013.



**TABLE 3.8-6  
SUMMARY OF DISTANCES TO NEAREST VIBRATION SENSITIVE USES DURING CONSTRUCTION**

Type of Equipment	Vibration level (PPV) at 25 Feet	Vibration Impact Contours (Feet)	
		Strongly Perceptible (0.4 PPV)	Older Residential Structures (0.5 PPV)
Excavator <sup>a</sup>	0.035	5	4
Backhoe <sup>a</sup>	0.035	5	4
Crane <sup>b</sup>	0.003	1	1
Fork Lift <sup>b</sup>	0.003	1	1
Vibratory Pile Driver	0.17	14	12
Drilling Rig	0.089	9	8

## NOTES:

**Bold** = Exceeds applied building damage or human perception threshold.

PPV = Peak Particle Velocity

<sup>a</sup> Assumed the same vibration level as a jack hammer.

<sup>b</sup> Assumed the same vibration level as a small dozer.

SOURCE: FTA, *Transit Noise and Vibration Impact Assessment (FTA-VA-90-1003-06)*, September 2018; Caltrans, *Transportation and Construction Vibration Guidance Manual*, September 2013.

Table 3.8-4, discussed under Impact NOI-1, summarizes the distance between construction activities associated with the Project components and the nearest sensitive receptors. Table 3.8-4 shows that there would be no receptors located within the distances shown in Table 3.8-6 at which human annoyance or building thresholds would be exceeded. The nearest receptors at all Project sites are located farther than the reference distance of 25 feet from construction activities. As potentially affected receptors are located outside the vibration impact contours for both human annoyance and building damage, the attenuated vibration levels at the nearest receptors and structures at all Project sites would be less than the thresholds. Therefore, construction activities associated with the Projects would not generate vibration levels at sensitive receptors that would exceed the applied human annoyance or building damage thresholds. This impact would be ***less than significant***.

However, the exact locations of the recovery wells are not known at this point and they could be located anywhere within a 500-foot radius around the recharge basins. Construction of the recovery wells would involve the use of a drill rig that would generate vibration and would need to be operated 24 hours a day for several days continuously. While there are no residential receptors or structures within a 500-foot radius around the Southwest and North recharge basins, recovery wells around the Southeast recharge basin could potentially be located close enough to Receptor 2 to cause vibration impacts. As shown in Table 3.8-6, vibration from construction equipment would attenuate to less than the vibration thresholds if construction activities take place beyond the distances to vibration contours presented in the table. There are no receptors within these distances from Project sites and hence vibration impacts from construction associated with most Project components would be less than significant. Recharge and monitoring wells would be located at a minimum of 50 feet from receptors as required by the County; therefore, vibration levels from

construction of recovery and monitoring wells would be less than the vibration thresholds at Receptor 2. This impact would be *less than significant*.

**Mitigation:** None required.

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### ***Cumulative Impacts***

**Impact C-NOI-1: The Projects, in combination with past, present, and probable future projects in the site vicinity, would have a cumulatively considerable impact associated with construction noise. (*Less than Significant with Mitigation*)**

The geographic context for changes in the noise and vibration environment due to construction and operation of the Project components would be localized in a rural area of Santa Cruz County. In order to contribute to a cumulative noise and vibration impact, another project in close proximity would have to be constructed or operational at the same time as the Projects. There are numerous projects in several locations near the Project sites that are currently in the planning stages and could be constructed and operational in the foreseeable future. A list of cumulative projects located in the vicinity of the Projects can be found on Figure 3.1-1. As shown on Figure 3.1-1, none of the cumulative projects would be located close enough to the Project sites to contribute to cumulative noise levels at the Projects' receptors. The Lower Harkins Slough Habitat Restoration Project, the closest project to the Project sites, is located over 2,000 feet from the proposed pump station in Struve Slough, and the construction schedule would not coincide with the Projects' construction schedule. Therefore, cumulative noise impacts would be similar to the Projects' impacts analyzed under Impacts NOI-1, NOI-2 and NOI-3. With the implementation of Mitigation Measures NOI-1a, NOI-1b, NOI-1c, and NOI-2, the Projects' contribution to the cumulative noise and vibration environment at affected receptors would also be *less than significant with mitigation*.

**Mitigation Measures NOI-1a: Construction Noise Management Plan, NOI-1b: Location of Recovery and Monitoring Wells, and NOI-1c: Off-site Accommodations for Substantially affected Nighttime receptors (refer to Impact NOI-1)**

**Mitigation Measure NOI-2: Acoustical Enclosures for Stationary Equipment (refer to Impact NOI-2)**

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## 3.9 Transportation and Traffic

This section presents an analysis of potential impacts related to transportation and traffic that would result from implementation of the proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects). Information from the 2014 Basin Management Plan Update Program Environmental Impact Report (2014 BMP Update PEIR) that remains relevant and accurate for the purposes of describing the physical or regulatory setting of transportation and circulation has been incorporated as appropriate. The Projects include mitigation measures adopted by the Board of Directors to reduce the severity and magnitude of environmental effects.

### 3.9.1 Setting

Section 3.11.1 of the 2014 BMP Update PEIR describes existing transportation and circulation conditions in the Project region. Regional environmental setting information from the 2014 BMP Update PEIR is summarized here. This section also describes transportation and traffic information specific to the Project area.

#### 3.9.1.1 Regional and Local Roadways

The Projects would be located in unincorporated Santa Cruz County (see Figure 2-1 in Chapter 2, *Project Description*). Regional access to the various Project components would be provided via State Route (SR) 1, SR 152, and SR 129, all of which are designated as truck routes by the California Department of Transportation (Caltrans).<sup>1</sup> Traffic volumes and other roadway characteristics for regional roadways are provided below.<sup>2</sup> Refer to Figure 2-1 in Chapter 2 for the locations of roadways described in this section.

**SR 1** is a four-lane divided freeway in the Project area. Direct access to SR 1 is provided by SR 129 and SR 152. SR 1 in the vicinity of the Project carried between 41,600 and 45,000 average daily traffic (ADT) in 2017. According to Caltrans, peak-hour congestion levels are low on SR 1 in the vicinity of the Project.<sup>3</sup>

**SR 129** (Riverside Drive/Chittenden Road) provides east-west access through the Project area, providing connection between SR 1 (in Watsonville) and US 101. Approximately 2,000 feet east of Murphy Crossing Road (near Graniterock A.R. Wilson Quarry and Chittenden Pass), SR 129 is characterized by numerous curves, frequent changes in elevation, and narrow shoulders. In winter, rockfalls and mudslides commonly result in temporary closure of SR 129 in Chittenden Pass. The majority of SR 129 is two lanes, except in downtown Watsonville, where it is four lanes. SR 129 carried approximately 16,000 ADT in the vicinity of the Project in 2017. According to Caltrans, peak hour congestion levels are low to moderate on SR 129 in the vicinity of the Project.<sup>4</sup>

<sup>1</sup> Caltrans, *California Truck Network Map*, 2018.

<sup>2</sup> Caltrans, *2017 Traffic Volumes on California State Highways*, 2018.

<sup>3</sup> Caltrans, *State Route 1 Transportation Concept Report*, June 2017.

<sup>4</sup> Caltrans, *State Route 129 Transportation Concept Report*, October 2015.

**SR 152** provides east-west access through the Project area, stretching east from SR 1 to the Central Valley. In the western portion of the Project area, SR 152 runs through Watsonville (along Main Street, East Beach Street, Lincoln Street, and East Lake Avenue) to Hecker Pass and Santa Clara County. Due to the winding nature of SR 152 over Hecker Pass, signs are posted prohibiting trucks over 45 feet in length from using that portion of the highway. The majority of SR 152 is two lanes, except in downtown Watsonville, where it is four lanes. SR 152 carried approximately 26,000 ADT in the vicinity of the Project in 2017. According to Caltrans, peak hour congestion levels are moderate to high on SR 152 in the vicinity of the Project.<sup>5</sup>

Local access to the proposed screened intake and pump station at Struve Slough would be provided primarily by Lee Road, a two-lane road. Lee Road is accessed from the north by Harkins Slough Road with extends east into the City of Watsonville. The existing Harkins Slough filter plant is accessed by a private single lane gravel road off of the eastern side of San Andreas Road, and the recharge basin sites are accessed by Dairy Road, a private road off of the western side of San Andreas Road, and private farm roads. The filter plant to recharge basins pipeline would be constructed under San Andreas Road and within portions of Dairy Road. The backwash and raw water pipeline would connect to an existing gravity sewer main located within the West Beach Street right-of-way. Refer to Figure 2-1 for the locations of the mentioned roads and Project components.

### ***Bicycle and Pedestrian Facilities***

Bicycle lanes are currently present on San Andreas Road adjacent to existing and proposed pipelines that connect the existing Harkins Slough filter plant to the existing and proposed recharge basins.<sup>6</sup> There are no existing pedestrian facilities in the vicinity of any of the Project components.

### ***Public Transit***

The Santa Cruz Metropolitan Transit District (Santa Cruz Metro) provides public transit service in the Project area. Santa Cruz Metro operates fixed-route bus service and Paratransit service throughout Santa Cruz County. Due to the rural nature of the Project sites, Santa Cruz Metro does not provide any service to any of the project components, as service is concentrated in the urbanized area of Watsonville to the east of SR 1.

## **3.9.2 Regulatory Framework**

### **3.9.2.1 Federal**

#### ***Federal Aviation Administration***

All airports and navigable airspace not administered by the United States Department of Defense are under the jurisdiction of the Federal Aviation Administration (FAA). Federal Regulation Title 14 Section 77 establishes the standards and required notification for objects affecting

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<sup>5</sup> Caltrans, *State Route 152 Transportation Concept Report*, June 2017.

<sup>6</sup> Santa Cruz County Regional Transportation Commission, *Santa Cruz County Bike Map*, 2016.

navigable airspace. In general, projects involving features exceeding 200 feet in height above ground level or extending at a ratio greater than 50:1 (horizontal to vertical) from a public or military airport runway less than 3,200 feet long out to a horizontal distance of 20,000 feet are considered potential obstructions, and require notification to the FAA. In addition, the FAA requires a congested area plan for operating a helicopter (with external load) near residential dwellings.

### ***Transportation of Hazardous Materials***

The U.S. Department of Transportation is the administering agency for the following regulations:

- Title 49 Code of Federal Regulations (CFR) Sections 171 through 177 (49 CFR 171–177), which govern the transportation of hazardous materials, the types of materials defined as hazardous, and the marking of transportation vehicles.
- Title 49 CFR 350–399 and Appendices A through G, Federal Motor Carrier Safety Regulations, which address safety considerations for the transport of goods, materials, and substances over public highways.
- Title 49 CFR 397.9, the Hazardous Materials Transportation Act of 1974, which directs the U.S. Department of Transportation to establish criteria and regulations for the safe transportation of hazardous materials.

### **3.9.2.2 State**

#### ***California Department of Transportation***

Caltrans is responsible for planning and maintaining state routes, highways, and freeways. Caltrans maintains jurisdictional authority of SR 1, SR 129, and SR 152 in the Project area. Caltrans has developed the *Guide for the Preparation of Traffic Impact Studies*<sup>7</sup> for use when assessing potential traffic impacts on state facilities. This guide identifies peak hour trip generation thresholds for state facilities that, if triggered, would require the preparation of a Traffic Impact Study, the scope of which would be established in consultation with Caltrans. Since the Project would not generate a substantial number of peak hour construction or operational trips in relation to existing volumes on state facilities (refer to Impact TRA-1 discussion), it does not meet the criteria established by Caltrans to prepare a Traffic Impact Analysis. Therefore, a detailed analysis of traffic impacts on state facilities, other than that presented in the discussion of Impact TRA-1 below, is not required.

#### ***Senate Bill 743***

With the adoption of the Senate Bill 375 in 2008, the State Legislature signaled its commitment to encourage land use and transportation planning decisions and investments to reduce vehicle miles traveled and thereby contribute to the reduction of greenhouse gas emissions, as required by the California Global Warming Solutions Act of 2006 (Assembly Bill 32).

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<sup>7</sup> Caltrans, *Guide for the Preparation of Traffic Impact Studies*, December 2002.

On September 27, 2013, Senate Bill 743 was signed into law. Senate Bill 743 started a process that has fundamentally changed transportation impact analysis as part of California Environmental Quality Act (CEQA) compliance. These changes include the elimination of auto delay, Level of Service, and other similar measures of vehicular capacity or traffic congestion as a basis for determining significant impacts in many parts of California (if not statewide). Senate Bill 743 required the Office of Planning and Research to propose revisions to the CEQA *Guidelines* establishing new criteria to “promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses.” (Public Resources Code Section 21099(b)(1).)

The new CEQA *Guidelines* section 15064.3, subdivision (b) was adopted in December 2018 by the California Natural Resources Agency. These revisions to the CEQA *Guidelines* criteria for determining the significance of transportation impacts are primarily focused on projects within transit priority areas, and shifts the focus from driver delay to reduction of greenhouse gas emissions, creation of multimodal networks, and promotion of a mix of land uses (which in turn reduces vehicle trips). Vehicle miles traveled, or VMT, is a measure of the total number of miles driven to or from a development and is sometimes expressed as an average per trip or per person.

The newly adopted guidance provides that a lead agency may elect to be governed by the provisions of this section immediately. As of July 1, 2020, the provisions of this section shall apply statewide. Santa Cruz County is currently engaged in this process and has not yet formally adopted its updated transportation significance thresholds or its updated transportation impact analysis procedures. Since the regulations of SB 743 have not been finalized or adopted by the County or the City, automobile delay remains the measure used to determine the significance of a traffic impact. As a lead agency, Pajaro Valley Water Management Agency (PV Water) may elect to develop its own significance thresholds or may opt to use the thresholds of “host” jurisdictions (i.e., for projects within the City of Watsonville, PV Water would use the City’s thresholds).

### 3.9.2.3 Local

Table 2-8 in Chapter 2, *Project Description*, identifies the approvals from Santa Cruz County required for the Projects. **Table 3.9-1** presents pertinent local plans and policies regarding transportation and traffic to support County consideration of project consistency with general policies.<sup>8</sup> In some cases, local policies are used in this EIR as criteria to determine the significance of physical effects on the environment (e.g., Impact NOI-1 in Section 3.8, Noise and Vibration).

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<sup>8</sup> California Government Code Section 53091 exempts agencies like PV Water from complying with local building and zoning ordinances when locating or constructing facilities for the production, generation, storage, treatment, or transmission of water. California Government Code Section 65402(c) requires that PV Water notify cities and counties of its plans to construct projects or to acquire or dispose of property. The planning agency then has 40 days to determine project consistency with its general plan. If the planning agency disapproves, the disapproval may be overruled by PV Water.

**TABLE 3.9-1**  
**SANTA CRUZ COUNTY PLANS AND POLICIES RELEVANT TO THE PROJECT**

***Santa Cruz County Code***

Title 9 (Roads, Vehicles, and Traffic), Chapter 9.7 (Streets and Roads) of the Santa Cruz County Municipal Code details the County's regulations regarding the use of roads and the construction of utilities infrastructure, including encroachments. Numerous regulations may be applicable to the Project via the encroachment permit process, including regulations regarding the use of roadways, the type of vehicles and load sizes allowable on given roadways, encroachment on private property, and the construction of utilities infrastructure. The County Code applies to all roads within the County's jurisdiction, and project construction must adhere to all ministerial regulations presented in the County Code.

SOURCE: Santa Cruz County Code, Title 9, Chapter 9.7.

***Santa Cruz County Bicycle Plan***

The Santa Cruz County Bicycle Plan consolidates into one document all bicycle-related County plans and projects that are currently identified in the County's General Plan, the Santa Cruz County Regional Transportation Plan, and other local documents.<sup>9</sup> Bicycle facilities are defined in these two planning documents using three different classifications as follows:

**Class I Bikeway:** A dedicated off-road bicycle and/or pedestrian path (typically multi-use path), which provides for bicycle travel on a paved right-of-way completely separated from any street or highway.

**Class II Bikeway:** A dedicated bike lane on a street and/or highway (not a sidewalk), with signing and pavement markings separating the bicycle lane from adjacent traffic flow.

**Class III Bikeway:** Dedicated bike routes that provide for shared use with pedestrian or motor vehicle traffic and are identified by signing.

Bicycle facilities in the Project area are identified above in Section 3.9.1.1.

### 3.9.3 Impacts and Mitigation Measures

#### 3.9.3.1 Significance Criteria

In accordance with the CEQA, state CEQA *Guidelines* (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project could have a significant impact if it were to:<sup>10</sup>

- Result in inadequate emergency access;
- Substantially increase traffic safety hazards due to increased traffic volumes; or
- Cause substantial damage or wear of public roadways by increased movement of heavy vehicles.

<sup>9</sup> County of Santa Cruz, *Santa Cruz County Bicycle Plan*, March 2011.

<sup>10</sup> Refer also to Appendix NOP for additional topics that were addressed in the Notice of Preparation.

### 3.9.3.2 Methodology

As described in Section 3.1, this EIR provides an independent analysis of the Projects' potential environmental impacts. **Table 3.9-2** presents mitigation measures from the 2014 BMP Update PEIR adopted by the Board of Directors (Resolution 2014-05) for the purpose of reducing impacts related to transportation and traffic. These adopted mitigation measures are considered part of the Projects, and thus are considered prior to any significance determinations. Potential impacts are evaluated in the following section. If warranted, additional mitigation is included and takes the form of (1) modifications to update the mitigation measures presented in Table 3.9-2 to reflect current conditions and site-specific impacts; or (2) new mitigation measures to replace or augment an adopted mitigation measure.

**TABLE 3.9-2**  
**2014 BMP UPDATE PEIR MITIGATION MEASURES – TRANSPORTATION AND TRAFFIC**

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**TR-1:** Conduct a preconstruction survey of road conditions on key access routes to the project sites (e.g., San Andreas Road). The pavement conditions of local streets judged to be in good condition for use by heavy truck traffic shall be monitored. Roads damaged by construction shall be repaired to a structural condition equal to, or better than, that which existed prior to construction activity.

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SOURCE: Pajaro Valley Water Management Agency, Resolution No. 2014-05, adopted April 16, 2014.

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The evaluation of transportation and traffic impacts is based on the development assumptions for the Projects, as described in Chapter 2, *Project Description*. The number of construction trips associated with the Projects was quantified, taking into account the estimated construction schedule and the number of truck trips and worker trips assumed to occur in each construction phase.

While operation of the Projects is not expected to add any new employees, existing employees would conduct routine inspections, receive deliveries of water treatment chemicals, and perform scheduled maintenance of the facilities and pipelines, which would generate approximately four new one-way trips (two round trips) per week (208 annual one-way trips). Because only two new round-trip vehicle trips would be generated weekly by operational and maintenance activities, roadway operating conditions on roadways serving the Project sites would remain substantially similar to current conditions. The Projects' operational impact to transportation and traffic would be less than significant and no further evaluation of Project operations is necessary.

Construction of the Harkins Slough Project components would occur in stages with an estimated total construction time of approximately 30 months over a four-year period between 2021 and 2025 based on Project needs. Construction of the Struve Slough Project is expected to last approximately one year between 2022 and 2023, with the exception of the North recharge basin and associated recovery wells, monitoring wells, and pipelines, the construction of which is expected to occur over nine months between 2027 and 2028. Refer to Tables 2-4A and 2-4B in Chapter 2, *Project Description*, for more detail about construction schedule. Construction work would typically occur during normal working hours Monday through Saturday between the hours of 8:00 a.m. and 5:00 p.m. Exceptions would include activities that require continuous drilling and/or tunneling, such as construction of wells and trenchless pipelines, which could occur for up to 24 hours per day and several days in a row.



The construction workforce would likely come from Santa Cruz, Monterey, and San Benito County areas via SR 1, SR 129, and/or SR 152. Vehicle trips would originate from a variety of locations and distances, but the primary vehicle access route for construction haul trucks and deliveries to the recharge basins and Harkins Slough filter plant would be via San Andreas Road and Dairy Road. Trucks are anticipated to travel to and from San Andreas and Dairy Road to SR 1 using West Beach Street. Access to the Struve Slough intake and pump station site would be via Lee Road. Trucks are anticipated to travel to and from Lee Road to SR 1 using Harkins Slough Road. Delivery trucks would use streets in the immediate area of the Projects' pipeline installations to access the construction corridor.

Construction debris would be transported from the Project sites to Buena Vista Landfill. Trucks leaving the recharge basins or Harkins Slough filter plant would travel north on San Andreas Road and turn right on Buena Vista Drive to arrive at the landfill. Trucks leaving the Struve Slough intake and pump station would travel north on Lee Road, turn right on Harkins Slough Road, continue on to Green Valley Road, turn left on Main Street, merge onto SR 1 North, exit at Buena Vista Drive, and then turn left on Buena Vista Drive to arrive at the landfill.

Construction equipment and materials would be stored within the construction work areas to the extent feasible, though additional offsite laydown areas may be required. If required, the additional laydown area(s) would be located near the Project sites. Construction staging and laydown for the Harkins Slough filter plant upgrades would use the existing filter plant, which is owned by PV Water, for storage/staging of equipment and materials. Construction staging and laydown for the proposed Struve Slough intake and pump station would require a one-acre staging area near the 1,600 square-foot footprint of the proposed pump station. Staging and laydown for pipeline construction would occur primarily within the width of the construction corridor and along the pipeline route.

### 3.9.3.3 Impacts and Mitigation Measures

#### **Impact TRA-1: Construction of the Projects would have temporary and intermittent effects on traffic and transportation conditions in the Project area. (*Less than Significant with Mitigation*)**

The 2014 BMP Update PEIR identified short-term traffic increases associated with the following activities: trucks hauling equipment and materials to the site; trucks hauling excavated materials from the site; trucks importing new fill to the site; and the daily arrival/departure of construction workers to the sites. It concluded that construction of the proposed improvements would be temporary, and therefore, would not result in any long-term degradation in operating conditions or level of service for roadways. Furthermore, construction trucks hauling materials to and from the Project sites would result in short-term and intermittent reduction of roadway capacities due to slower movements and larger turning radii of the trucks compared to passenger vehicles. Overall, the 2014 BMP Update PEIR concluded that the Projects would result in a less-than-significant impact with regard to temporarily increased traffic on area roadways from project generated vehicle trips by construction workers and construction vehicular activities. As such, no mitigation measures were proposed. This impact determination assumed that PV Water would include Construction Traffic Minimization Practices into plans and contract specifications.

Because PV Water did not adopt Construction Traffic Minimization Practices, many of the standard practices have been included as part of Mitigation Measure TRA-1b, below.

The Projects would not introduce any uses to the Project area that would generate noticeable long-term changes in traffic; therefore, potential traffic and transportation effects would be confined to construction of the proposed facilities. Construction-generated traffic would be temporary and therefore would not result in any long-term degradation in operating conditions or level of service on any roadways in the Project area. The primary impacts from the movement of construction trucks would include short-term and intermittent lessening of roadway capacities due to slower movements and larger turning radii of the trucks compared to passenger vehicles.

Construction activities conducted for the Projects could result in increased traffic volumes on area roadways generated by the daily arrival and departure of construction workers, and by trucks hauling equipment and materials to and from the construction sites. Using construction phasing assumptions developed for the air quality analysis (refer to Appendix AIR), it was determined that the maximum number of construction vehicle trips would be generated by the Projects during a three-month period when the following three Harkins Slough Project construction phases would overlap:

- Backwash and raw water pipeline
- Southwest recharge basin
- Filter plant upgrades

In total, the overlap of these three construction phases would generate a maximum of 179 one-way vehicle trips, including 68 one-way worker trips, 99 one-way truck hauling trips, and 12 one-way material delivery truck trips per day.

However, given the different locations of the distinct Project components, increased traffic generated by construction activities associated with these temporarily overlapping construction phases generally would not use the same roadways. As such, the impact of increased traffic on traffic and transportation conditions for these Project components generally would not be additive. An exception would be the potential concurrent use of SR 1 and/or SR 152, which would be the primary routes used for regional access to all work sites by the construction workforce.

Based on the existing ADT volumes on SR 1 and SR 152 noted in Section 3.9.1 and the estimated number of construction-related Project trips described above, the concurrent construction activities would increase the ADT volume on regional roadways by no more than 0.01 percent (i.e., too small of a change to be perceived by the average motorist). Traffic increases on local roads would be more noticeable, but the roadways would continue to accommodate traffic within the roadways' carrying capacity with no discernable effect on level of service. Proposed hours of construction are generally between 8:00 a.m. and 5:00 p.m. Truck trips related to off-hauling of excavated material and deliveries of equipment and materials would be dispersed over the course of the day, thus lessening the effect on traffic flow conditions. Construction workers traveling to/from the Project sites on weekdays during the hours of 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m. would coincide with peak-period traffic, and therefore, would have the greatest potential to

impede traffic flow. While the construction contractor for each Project component would likely schedule truck trips to avoid peak traffic hours on area roadways, dispersion of the 179 one-way construction vehicle trips (68 worker trips and 111 truck trips) over the course of the nine-hour workday would cause less-than-significant impacts on traffic flow during any specific hour. Even if all construction vehicle trips were to occur on a single roadway segment, that would still only amount to an average of an additional 20 hourly vehicle trips, which would not result in any discernable effect on roadway operations. The primary impacts from the movement of construction trucks would include short-term and intermittent lessening of roadway capacities due to slower movements and larger turning radii of the trucks compared to passenger vehicles. In addition, drivers could experience delays if they were traveling behind a construction truck.

Implementation of **Mitigation Measures TRA-1a** and **TRA-1b**, as outlined below, would require compliance with local road encroachment permit conditions, preparation of a Traffic Control Plan, identification of roadways that require special construction techniques, and development of a circulation and detour plan. With implementation of Mitigation Measures TRA-1a and TRA-1b, impacts related to temporary and intermittent effects on traffic and transportation conditions in the Project area would be reduced to *less than significant*.

#### **Mitigation Measure TRA-1a: Encroachment Permits**

PV Water shall require the construction contractor to obtain any necessary road encroachment permits from Santa Cruz County prior to constructing each Project component and shall comply with the conditions of approval attached to all Project permits and approvals.

#### **Mitigation Measure TRA-1b: Construction Traffic Control/Traffic Management Plan**

PV Water shall require the construction contractor to prepare a Construction Traffic Control/Traffic Management Plan and submit it to Santa Cruz County for review and approval prior to construction. The plan shall be prepared in accordance with professional engineering standards and may include, but not be limited to, the following elements as appropriate:

- Identify hours of construction for each Project component.
- Schedule truck trips outside of peak morning and evening commute hours when feasible to minimize adverse impacts on traffic flow if agencies with jurisdiction over the affected roads identify highly congested roadway segments during their review of the encroachment permit applications. Haul routes that minimize truck traffic on local roadways and residential streets shall be used.
- Develop circulation and detour plans to minimize impacts on local street circulation. This may include the use of signing and flagging to guide vehicles, bicyclists, and pedestrians through and/or around the construction zone.
- Control and monitor construction vehicle movements by enforcing current standard construction specifications as defined by Santa Cruz County through periodic onsite inspections by the construction contractor.

- Install traffic control devices where traffic conditions warrant, as specified in the Santa Cruz County's standards (e.g., the *California Manual of Uniform Traffic Controls for Construction and Maintenance Work Zones*).
- Perform construction that crosses on-street and off-street bikeways, sidewalks, and other walkways in a manner that allows for safe access for bicyclists and pedestrians. Alternatively, provide safe detours to reroute affected bicycle/pedestrian traffic.
- Comply with roadside safety protocols to reduce the risk of accidents, as defined in the *Caltrans Division of Construction Code of Safe Practices* and the *California Manual of Uniform Traffic Controls for Construction and Maintenance Work Zones*. Provide "Road Work Ahead" warning signs and speed control (including signs informing drivers of state-legislated double fines for speed infractions in a construction zone) to achieve required speed reductions for safe traffic flow through the work zone.
- Store all equipment and materials in designated contractor staging areas.
- Encourage construction crews to park at staging areas to limit lane closures in the public rights-of-way.
- Include a plan and implementation process for notifications and a process for communication with affected residents and businesses prior to the start of construction. Advance public notification shall include posting of notices and appropriate signage of construction activities at least one week in advance. The written notification shall include the construction schedule, the exact location and duration of activities within each street (i.e., which lanes and access point/driveways would be blocked on which days and for how long), and a toll-free telephone number for receiving questions or complaints.
- Include a plan and implementation process to coordinate all construction activities with emergency service providers in the area at least one month in advance. Emergency service providers shall be notified of the timing, location, and duration of construction activities. All roads shall remain passable to emergency service vehicles at all times.
- Identify all roadway locations where special construction techniques (e.g., trenchless pipeline installation or night construction) will be used to minimize impacts on traffic flow. Require all open trenches and pits be covered with metal plates at the end of each workday to accommodate traffic and access.

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**Impact TRA-2: Construction of the Projects would temporarily disrupt circulation patterns near sensitive land uses (schools, hospitals, fire stations, police stations, and other emergency providers). (*Less than Significant with Mitigation*)**

The Projects would result in temporary effects on traffic flow, particularly with pipeline construction within a road right-of-way on West Beach Street and on San Andreas Road. Open-trench pipeline construction within road rights-of-way would require the closure of one travel lane and shoulder (or parking lane), with one-way traffic control around the construction area on

two-lane roads. Pipeline construction within or across streets could result in delays for vehicles (including emergency vehicles), and would also obstruct pedestrians and bicyclists.

Construction of the Projects would not directly interfere with circulation patterns near sensitive land uses (i.e., schools, hospitals, fire stations, police stations, or other emergency providers) because no such uses are located adjacent to these proposed facilities. However, construction could indirectly disrupt circulation patterns near sensitive land uses, as haul routes could pass by sensitive land uses, and traffic may divert to roadways with sensitive land uses due to construction activity.

As stated previously in the discussion of Impact TRA-1, implementation of Mitigation Measure TRA-1b would require PV Water to establish methods for maintaining traffic flow in and along the subject roadway corridor and minimizing disruption to emergency vehicle access to land uses along the alignment. Specific requirements that may be included in the traffic control/traffic management plan regarding emergency access are identified under Mitigation Measure TRA-1b. With implementation of Mitigation Measure TRA-1b, impacts related to temporary effects on emergency access would be mitigated to *less than significant*.

**Mitigation Measure TRA-1b: Construction Traffic Control/Traffic Management Plan** (refer to Impact TRA-1)

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**Impact TRA-3: Construction of the Projects would have temporary effects on alternative transportation or alternative transportation facilities in the Project area. (*Less than Significant with Mitigation*)**

The Projects would not result in any long-term impact on demand for alternative transportation or on alternative transportation facilities (i.e., for transit and bicyclists). However, pipeline construction along Project area roadways could disrupt bicycle facilities on San Andreas Road. Since there are no sidewalks or bus stops present near the Project sites, nor are there any transit lines operating on roadways that would be used by construction vehicles accessing the Project sites or affected by lane closures to accommodate pipeline construction, pedestrian and public transit facilities/operations would not be affected.

As stated previously in the discussion of Impact TRA-1, implementation of Mitigation Measure TRA-1b would require the construction contractor to establish methods for minimizing construction effects on alternative transportation. Specific requirements that may be included in the traffic control/traffic management plan are identified under Mitigation Measure TRA-1b. With implementation of Mitigation Measure TRA-1b, impacts related to effects on alternative transportation or alternative transportation facilities would be mitigated to *less than significant*.

**Mitigation Measure TRA-1b: Construction Traffic Control/Traffic Management Plan** (refer to Impact TRA-1)

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**Impact TRA-4: Construction of the Projects could temporarily increase the potential for accidents on Project area roadways. (*Less than Significant with Mitigation*)**

The Projects would not alter the permanent configuration (alignment) of project area roadways, and would not introduce types of vehicles that are not already traveling on area roads. However, construction zones in the public right-of-way and heavy equipment operating adjacent to or within a road right-of-way would increase the potential for accidents. Construction-generated trucks on Project area roadways could interact with other vehicles. Potential conflicts could also occur between construction traffic and alternative modes of transportation (e.g., bicyclists and buses).

As stated previously in the discussion of Impact TRA-1, implementation of Mitigation Measure TRA-1b requires the contractor to prepare a traffic control/traffic management plan in accordance with professional engineering standards prior to construction, including compliance with roadside safety protocols, so as to reduce the risk of accidents. Specific requirements that may be included in the traffic management plan are identified under Mitigation Measure TRA-1b. Thus, implementation of Mitigation Measure TRA-1b would ensure temporary increases in the potential for accidents would be mitigated to *less than significant*.

**Mitigation Measure TRA-1b: Construction Traffic Control/Traffic Management Plan (refer to Impact TRA-1)**

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**Impact TRA-5: Construction of the Projects could increase wear-and-tear on the designated haul routes used by construction vehicles to access the Project sites. (*Less than Significant*)**

This impact criterion was evaluated in the 2014 BMP Update PEIR. The 2014 BMP Update PEIR noted that local-serving roads, such as San Andreas Road, West Beach Street, and Lee Road, may not be built with a pavement thickness that would withstand large heavy truck volumes. The projected increase in use of this or other local roadways by heavy trucks could result in significant wear on these roadways. The impact analysis conducted in the 2014 BMP Update PEIR for this impact criterion adequately addresses potential wear-and-tear impacts that could occur to local roadways as a result of increased truck volumes associated with construction of the Projects. Implementation of adopted Mitigation Measure TR-1 from the 2014 BMP Update PEIR would reduce impacts to *less than significant*.

**Mitigation:** None required.

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## ***Cumulative Impacts***

**Impact C-TRA-1: The Projects, in combination with past, present, and probable future projects in the Project area, would have cumulatively considerable impacts on transportation and traffic. (*Less than Significant with Mitigation*)**

The cumulative analysis of transportation and traffic impacts uses a list-based approach and identifies probable future projects that could contribute to a cumulative impact. The geographic scope for this analysis is the roadway network in the vicinity of the Project sites that would be affected by the Projects.

### **Project Construction**

Impacts on traffic associated with construction (e.g., an intermittent reduction in street and intersection operating capacity, potential conflicts with pedestrians/bicyclists, overlap with construction of nearby related projects) are typically considered as potential short-term impacts. As noted above, the Projects would result in significant traffic impacts during construction activities. However, with implementation of Mitigation Measures TRA-1a, TRA-1b, and adopted Mitigation Measure TR-1 from the 2014 BMP Update PEIR, construction impacts on transportation and traffic would be reduced to less-than-significant levels. Each of the identified cumulative projects listed in Table 3.1-1 (see Section 3.1.3.2, Approach to Cumulative Impact Analysis in this EIR) would be required to comply with Santa Cruz County requirements regarding haul routes and would implement mitigation measures and/or include project characteristics, such as traffic controls and scheduling, notification, and safety procedures, to reduce potential traffic impacts during construction. In addition, many of the cumulative projects, like the Projects, would likely restrict construction truck traffic and deliveries to off-peak hours to the extent feasible. Accordingly, Project-related contributions to cumulative construction traffic conditions during construction would be *less than significant with mitigation*.

### **Project Operations**

As discussed above in the impact discussions, operation and maintenance associated with the Projects would result in minimal new daily vehicle trips (approximately four new one-way trips, or two round trips per week). This is due to the fact that the Projects, once constructed, would require infrequent and minor maintenance similar to what is necessary to operate and maintain existing facilities, and would therefore not result in any discernable effect on study area roadway operations. Additionally, operation of the Projects would not alter the permanent configuration (alignment) of area roadways or introduce any barriers to travel. For these reasons, the Projects would not result in any operational impacts and could not cause or contribute to any cumulative effects related to these transportation and traffic topics. Accordingly, Project-related contributions to cumulative construction traffic conditions during operation would be *less than significant*.

**Mitigation Measure TRA-1a: Encroachment Permits** (refer to Impact TRA-1)

**Mitigation Measure TRA-1b: Construction Traffic Control/Traffic Management Plan** (refer to Impact TRA-1)

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## 3.10 Cultural Resources

This section presents an analysis of potential impacts related to cultural resources that would result from implementation of the proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects). Information from the 2014 Basin Management Plan Update Program Environmental Impact Report (2014 BMP Update PEIR) that remains relevant and accurate for the purposes of describing the physical or regulatory setting of cultural resources has been incorporated as appropriate. The Projects include mitigation measures adopted by the Board of Directors to reduce the severity and magnitude of potential environmental effects.

### 3.10.1 Setting

The 2014 BMP Update PEIR Section 3.5.1 generally describes existing cultural resources in the region including archaeology and ethnography. This section describes aspects of the physical environmental setting salient to cultural resources for the Projects' area.

#### 3.10.1.1 Geologic Setting

The California coast has undergone dramatic landscape changes since humans began to inhabit the region more than 10,000 years ago. Rising sea levels and increased sedimentation into streams and rivers are among the changes.<sup>1</sup> In many places, the interface between older land surfaces and Holocene-age<sup>2</sup> landforms are marked by a well-developed buried soil profile (or "paleosol"). Paleosols preserve the composition and character of the earth's surface prior to subsequent sediment deposition; thus, paleosols have the potential to preserve archaeological resources if the area was occupied or settled by humans.<sup>3</sup> Because human populations have grown since the arrival of the area's first inhabitants, younger paleosols (ca. 4,000 years ago to present) are more likely to yield archaeological resources than older Quaternary paleosols.<sup>4</sup>

The Projects are located within the Pajaro Valley in southern Santa Cruz County, California. The basin is bounded on the west by Monterey Bay, on the east by the San Andreas Fault, on the north by hills composed of Pliocene-aged<sup>5</sup> marine sediments of the Purisima Formation, and on the south by hills composed of the Pleistocene-aged<sup>6</sup> Aromas Sands Formation. The basin is underlain by pre-Pliocene bedrock, which is covered in places by more than 1,200 meters (4,000 feet) of unconsolidated marine and terrestrial deposits that range in age from the Pliocene

<sup>1</sup> Helley, E., K. LaJoie, W. Spangle and M. Blair, *Flatland deposits of the San Francisco Bay Region, CA—their geology and engineering properties and their importance to comprehensive planning*. Geological Survey Professional Paper 943, United States Department of the Interior. Washington, D.C., 1979.

<sup>2</sup> The Holocene Epoch is a period of geologic time that spans from the end of the last Ice Age (approximately 11,000 years ago) up to the present time.

<sup>3</sup> Meyer, J., and J. Rosenthal, *Geoarchaeological Overview of the Nine Bay Area Counties in Caltrans District 4*. Prepared for Caltrans District 4, 2007.

<sup>4</sup> The Quaternary Period is a broad length of geologic time spanning from 2.6 million years ago up to the present time.

<sup>5</sup> The Pliocene Epoch is a period of geologic time that spans from 5.3 million to 2.6 million years ago.

<sup>6</sup> The Pleistocene Epoch is a period of geologic time that spans from 2.6 million to 11,000 years ago.

to recent.<sup>7</sup> The basin is characterized by the Pajaro River, its tributaries, and a series of sloughs and shallow lakes. The headwaters of the river are within the Diablo Range to the east, and the mainstem is joined by tributaries from the Gabilan Mountains in the south, including the San Benito River, and the Santa Cruz Mountains in the north. Historically, much of the Pajaro River floodplain was tidally influenced. Although some portions remain tidally influenced large areas of the slough system and floodplain have been channelized and drained to create farmland.

Three geologic deposits are present within the Project areas: Holocene-age basin deposits (*Qb*); Pleistocene-age aeolian deposits of Sunset Beach (*Qes*); and Pleistocene-age terrace deposits (*Qt*).<sup>8</sup> The proposed intake and pump station at Struve Slough is entirely underlain by the Pleistocene Terrace deposits (*Qt*), and the Harkins Slough filter plant is underlain by both the Holocene and Pleistocene deposits (*Qb* and *Qt*). The proposed recharge basins are entirely underlain by Pleistocene-age aeolian<sup>9</sup> deposits of Sunset Beach (*Qes*).

The Holocene-age basin deposits (*Qb*) generally consist of unconsolidated plastic clay and silty clay; they also contain upper layers of high organic content overlying interbedded silt and sandy silt deposits. The terrace deposits (*Qt*) consist of weakly- to semi-consolidated heterogeneous deposits of silt, clay, sand, and gravel, mostly deposited predominantly by fluvial processes. The aeolian deposits of Sunset Beach (*Qes*) are Pleistocene age and consist of weakly consolidated, well-sorted, fine-to medium-grained sand.

### 3.10.1.2 Prehistoric Setting

Archaeologists have developed individual, cultural, chronological sequences tailored to the archaeology and material culture of each subregion of California. Each of these sequences is based principally on the presence of distinctive cultural traits and stratigraphic separation of deposits. Jones, et al., in *Prehistoric California: Colonization, Culture, and Complexity*,<sup>10</sup> provide a framework for the interpretation of the Central Coast and the Monterey Bay Area. The authors divide human history on the Central Coast into six broad periods: the Paleo-Indian Period (pre-8000 B.C.), the Early Archaic Period (8000 to 3500 B.C.), the Early Period (3500 to 600 B.C.), the Middle Period (600 B.C. to A.D. 1000), the Middle/Late Transition Period (1000 to 1250 A.D.), and the Late Period (A.D. 1250–1769). The periods have been largely defined on the basis of distinctive bead types; typological analysis and radiocarbon dating of Olivella beads show the bead sequence in the Monterey Bay Area as generally similar to those of the California Central Valley and the Santa Barbara Coast. Economic patterns, stylistic aspects, and regional phases further subdivide cultural periods into shorter phases. This scheme uses economic and technological types, socio-politics, trade networks, population density, and variations of artifact types to differentiate between cultural periods.

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<sup>7</sup> Muir, K.S., *Preliminary Report on Geology and Ground Water of the Pajaro Valley Area*, Santa Cruz and Monterey Counties, California. Open-File Report 73-199. U.S. Geological Survey, Menlo Park, California, 1972.

<sup>8</sup> Brabb, Earl E., 1997. Geologic Map of Santa Cruz County, California. United States Geological Survey (USGS). Open-File Report 97-489; Sheet 1 of 2. Map. Scale 1:625000.

<sup>9</sup> Aeolian deposits refer to sediments transported and deposited via processes associated with wind.

<sup>10</sup> Jones, T.L., N.E. Stevens, D.A. Jones, R.T. Fitzgerald, and M.G. Hylkema, *The Central Coast: A Midlatitude Milieu*. In *Prehistoric California: Colonization, Culture, and Complexity*. Edited by T.L. Jones and K.A. Klar, pp. 125–146, AltaMira Press, 2007.

Evidence of human habitation during the Paleo-Indian Period, characterized by big-game hunters occupying broad geographic areas, has not yet been discovered in the Monterey Bay Area. The oldest known occupation of the Monterey Bay area dates from ca. 5000 B.C., however data representing this earliest occupation are limited. The Early Archaic Period is represented by the Millingstone Culture (8000 to 3500 B.C.) and is marked by large numbers of handstones and/or millingslabs, crude core and cobble-core tools, and less abundant flake tools and large side-notched projectile points. Millingstone components have been identified at locations in Monterey County near Elkhorn Slough and Monterey Peninsula. Faunal remains indicate that Millingstone people exploited shellfish, fish, birds, and mammals, and with a majority of Millingstone sites less than 25 kilometers from the shoreline there appears to have been a focus on shellfish consumption. Virtually all of the earliest known sites have been identified on the shore or in pericoastal valleys.

The Early and Middle Periods are represented by the Hunting Culture (3500 B.C. to A.D. 1250), which was marked by large quantities of stemmed and notched projectile points. During the Early Period (3500 to 600 B.C.), the first cut shell beads and the mortar and pestle are documented in burials, indicating the beginning of a shift from mobility to sedentism. During the Middle Period, (600 B.C. to A.D. 1000), geographic mobility may have continued, although groups began to establish longer-term base camps in localities from which a more diverse range of resources could be exploited. The first rich middens are recorded from this period. The addition of milling tools, obsidian and chert concave-base projectile points, and the occurrence of sites in a wider range of environments suggest that the economic base was more diverse and required logistical hunting techniques. Coastal habitation was still preferred but large Hunting Culture middens have also been identified in inland valleys.

The Late Period (A.D. 1250–1769) is distinguished from the Hunting Culture by large amounts of Desert side-notched and Cottonwood arrow points, small bifacial bead drills, bedrock mortars, hopper mortars, distinct Olivella bead types, and steatite disk beads. These assemblages represent social complexity developed toward lifeways of large, central villages with resident political leaders and specialized activity sites. This differs dramatically from the Hunting Culture materials and may represent developments associated with population increase, environmental changes, and ethnic migrations.

### 3.10.1.3 Historic Setting

Spanish incursions into the Monterey Bay region began in the early seventeenth century when the Sebastian Vizcaino expedition arrived at Monterey in 1602. It was not until over a century later that the Spanish government began to take an active interest in colonizing what was then known as Alta California. Captain Gaspar de Portola led a land expedition to Monterey by way of the coast in 1769.<sup>11</sup> The first Spanish exploration of the Salinas Valley followed in 1774, when

<sup>11</sup> Hoover, M. B., H. E. Rensch, E. G. Rensch, W. N. Abeloe, *Historic Spots in California*. Revised by Douglas E. Kyle. Stanford University Press, Palo Alto, CA, 2002.

Don Juan Bautista de Anza's expedition established a route through the valley to Monterey. This route was known as El Camino Real, or the Royal Road.<sup>12</sup>

Spanish control of California ended with Mexican independence in 1821. In 1834 the Mexican government secularized the Spanish missions. In Santa Cruz County, 21 land grants were made to Mexican settlers. Most grantees used their land to establish ranches with enormous free-ranging herds of horses and Spanish cattle, as it was cattle that powered the Californio<sup>13</sup> economy. Cattle hides and tallow were the medium of exchange in business transactions among the Californios and with many trading ships that came from the American east coast.<sup>14</sup>

The 1848 Treaty of Guadalupe Hidalgo brought Alta California under control of the United States of America. News of the Gold Rush that same year sparked a huge migration into California. Due to the rapid influx of settlers into the area, legal determinations of ownership of lands awarded by Spanish or Mexican authorities were often disputed. The new American government passed the Land Act of 1851, which placed the burden of proof-of-ownership to the grantees so that the few Native Americans who had received grants lost their title, as did many of the Hispanic owners. By congressional action, a board of Land Commissioners heard grant claims; their decision was then appealed in Federal Courts.<sup>15</sup>

### ***History of the Project Sites***

Cattle and sheep ranching dominated the area until the 1880s. During this time, free-range, comparatively wild Spanish cattle were replaced by American breeds of livestock and dairy cows. Fencing with wooden posts and barbed wire became a prominent feature across the landscape. Agriculture in the area became more intensive when farming shifted to wheat and barley cultivation. Early crops also included sugar beets and alfalfa. Apple orchards were the dominant crop in the Pajaro Valley for much of the 20th Century. While apple orchards remain, the majority of agriculture in the Pajaro Valley has been replaced by crops that can be harvested more than once a year, including berries and vegetables. After World War II, Watsonville also became a frozen-food processing center.<sup>16</sup>

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<sup>12</sup> Breschini, Gary S., and Trudy Haversat, *Preliminary Archaeological Report and Cultural Resources Management Plan for Two Proposed School Sites, Watsonville, Santa Cruz County, California*. Report on file at Northwest Information Center, 1989; Breschini, Gary S., and Trudy Haversat, *Archaeological Investigations at CA-SCR-44, Northeast of Watsonville, Santa Cruz County, California*. Report on file at Northwest Information Center, 1989.

<sup>13</sup> Spanish speaking, Catholic persons of Latin American descent born in Alta California between 1769 and 1848

<sup>14</sup> Hoover, M. B., H. E. Rensch, E. G. Rensch, W. N. Abeloe, *Historic Spots in California*. Revised by Douglas E. Kyle. Stanford University Press, Palo Alto, CA, 2002; Breschini, Gary S., and Trudy Haversat, *Preliminary Archaeological Report and Cultural Resources Management Plan for Two Proposed School Sites, Watsonville, Santa Cruz County, California*. Report on file at Northwest Information Center, 1989; Breschini, Gary S., and Trudy Haversat, *Archaeological Investigations at CA-SCR-44, Northeast of Watsonville, Santa Cruz County, California*. Report on file at Northwest Information Center, 1989.

<sup>15</sup> Hoover, M. B., H. E. Rensch, E. G. Rensch, W. N. Abeloe, *Historic Spots in California*. Revised by Douglas E. Kyle. Stanford University Press, Palo Alto, CA, 2002; Breschini, Gary S., and Trudy Haversat, *Preliminary Archaeological Report and Cultural Resources Management Plan for Two Proposed School Sites, Watsonville, Santa Cruz County, California*. Report on file at Northwest Information Center, 1989; Breschini, Gary S., and Trudy Haversat, *Archaeological Investigations at CA-SCR-44, Northeast of Watsonville, Santa Cruz County, California*. Report on file at Northwest Information Center, 1989.

<sup>16</sup> National Museum of American History, Delivering the Goods. Accessed on April 28, 2018. Available online at [http://amhistory.si.edu/onthemove/exhibition/exhibition\\_3\\_1.html](http://amhistory.si.edu/onthemove/exhibition/exhibition_3_1.html).

The development of railroads, including the Southern Pacific and regional lines such as the Monterey and Salinas Valley Railroad and the Pajaro Valley Consolidated Railroad, allowed for distribution and improved marketing for the Central Coast Region. By the 1890s, Watsonville had a thriving freight business, serving the needs of the Pajaro Valley's agricultural commerce. Local farmers and fruit packing houses shipped strawberries, apples, and other fruits and vegetables to market at San Francisco and beyond. The development of the refrigerator car allowed produce to be shipped as far as Chicago and New York, opening up new markets to Pajaro Valley's farmers.<sup>17</sup> By 1901, the coast route was open and running between San Francisco and Los Angeles, further opening up distribution routes.

A port was established in the Pajaro Valley for an 11-year-period from 1902 to 1913, with an associated double-track railroad running approximately along the present route of Beach Road. The port suffered extensive damage in 1904 and 1912, and by 1913 had completely folded.<sup>18</sup>

Numerous ethnic groups have called Watsonville and the Pajaro Valley home since the mid-1800s, including those of Slavic, Chinese, Japanese, Filipino, and Mexican descent. Slavic groups entered the area as agriculture boomed after development of the railroads, first meeting the need for field labor and later entering the buying, shipping, and farming markets. At one point they controlled at least one-third of the orchards in and around Watsonville.<sup>19</sup>

The Chinese entered the area after the Gold Rush and railroad-buildings eras, establishing fishing villages and providing field labor. By the mid-1880s, a Chinatown had been established in Watsonville along Main Street and Union Street to Maple Avenue.<sup>20</sup> After the Chinese exclusion Act of 1882, availability of Chinese labor declined.<sup>21</sup>

The Japanese first immigrated into the area around 1892 on lumber-cutting contracts, but soon began to fill the need of low cost farm labor left vacant by declining Chinese populations. The National Origins Act of 1924 restricted Japanese immigration, again leading to a decline in low cost farm labor.<sup>22</sup> In 1942, the Japanese were forcibly placed into internment camps for the duration of World War II. While many were reluctant to return to Pajaro Valley after the end of the war due to anti-Japanese sentiments, the establishment of a hostel at the first Buddhist Church

<sup>17</sup> National Museum of American History, Watsonville Railroad Freight Yards. Accessed April 28, 2018. Available online at [http://amhistory.si.edu/onthemove/collection/object\\_384.html](http://amhistory.si.edu/onthemove/collection/object_384.html).

<sup>18</sup> Edwards, Rob, and Mary Ellen Farley, *An Assessment of the Cultural Resources of the Lower Pajaro River Basin, California, with Selected Preliminary Field Study*. Prepared for the U.S. Army Corp of Engineers, San Francisco. Document on file at Northwest Information Center, 1974.

<sup>19</sup> Edwards, Rob, and Mary Ellen Farley, *An Assessment of the Cultural Resources of the Lower Pajaro River Basin, California, with Selected Preliminary Field Study*. Prepared for the U.S. Army Corp of Engineers, San Francisco. Document on file at Northwest Information Center, 1974.

<sup>20</sup> Sanborn Fire Insurance Maps, Watsonville, Sheet 2, 1886. Accessed on April 28, 2018. Available online at <https://www.lapl.org/collections-resources/research-and-homework#S>.

<sup>21</sup> National Museum of American History, Delivering the Goods. Accessed April 28, 2018. Available online at [http://amhistory.si.edu/onthemove/exhibition/exhibition\\_3\\_1.html](http://amhistory.si.edu/onthemove/exhibition/exhibition_3_1.html).

<sup>22</sup> National Museum of American History, Delivering the Goods. Accessed April 28, 2018. Available online at [http://amhistory.si.edu/onthemove/exhibition/exhibition\\_3\\_1.html](http://amhistory.si.edu/onthemove/exhibition/exhibition_3_1.html).

and Japanese Language Buildings encouraged them to return, and they established strawberry and flower growing industries.<sup>23</sup>

Filipino immigrants first entered Pajaro Valley in the 1920s after the expiration of Hawaiian sugar contracts and to fill the need for low cost farm labor. By January 1930, anti-Filipino sentiments prompted the Northern Monterey County Chamber of Commerce to publicly state that whites had a supreme right to inhabit the county, setting off a race riot. On January 22, a mob of 700 whites attacked Filipinos in their homes, killing one Filipino man. In 1934, a Repatriation Bill offered to pay Filipinos their passage back to the Philippines, but most declined the offer and stayed in Pajaro Valley. Many were later drafted in World War II.<sup>24</sup>

Mexican farm laborers became an increasingly important source of labor after the 1920s. During World War II, the United States encouraged Mexican immigration through the issuance of short-term agricultural labor contracts in anticipation of labor shortages due to the war. By the time the program ended in 1964, Mexicans had become the dominant source of farm labor in the Watsonville region. Today, Watsonville's population is approximately 70 percent Latino, and they continue to provide over 90 percent of the farm labor.<sup>25</sup>

During the Great Depression in the 1930s, many families migrated from the Dust Bowl of Oklahoma and the surrounding area to Pajaro Valley in search of work, establishing camps along the river banks. Competition between out-of-work white migrants and ethnic laborers led to an eruption of violence, and eventually more offers to provide free transport home to Mexicans and Filipinos who shared the same economic and labor profile.<sup>26</sup>

#### 3.10.1.4 Archaeological Setting

The Pajaro Valley has a rich archaeological record documenting much of the region's prehistory. The valley's unique location between the Santa Cruz Mountains to the east and the coastline to the west, as well as its varied ecological zones including its many sloughs and the Pajaro River, made the valley an attractive place for prehistoric settlement. The Pajaro River provided a source of fresh water and supported faunal and vegetal resources, while sloughs, beaches, and rocky intertidal areas provided an abundance of shellfish, fish, and other marine or estuarine resources, all within a catchment area that could be accessed easily from most of the valley.<sup>27</sup>

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<sup>23</sup> Edwards, Rob, and Mary Ellen Farley, *An Assessment of the Cultural Resources of the Lower Pajaro River Basin, California, with Selected Preliminary Field Study*. Prepared for the U.S. Army Corp of Engineers, San Francisco. Document on file at Northwest Information Center, 1974.

<sup>24</sup> Edwards, Rob, and Mary Ellen Farley, *An Assessment of the Cultural Resources of the Lower Pajaro River Basin, California, with Selected Preliminary Field Study*. Prepared for the U.S. Army Corp of Engineers, San Francisco. Document on file at Northwest Information Center, 1974.

<sup>25</sup> National Museum of American History, *Delivering the Goods*. Accessed April 28, 2018. Available online at [http://amhistory.si.edu/onthemove/exhibition/exhibition\\_3\\_1.html](http://amhistory.si.edu/onthemove/exhibition/exhibition_3_1.html).

<sup>26</sup> Edwards, Rob, and Mary Ellen Farley, *An Assessment of the Cultural Resources of the Lower Pajaro River Basin, California, with Selected Preliminary Field Study*. Prepared for the U.S. Army Corp of Engineers, San Francisco. Document on file at Northwest Information Center, 1974.

<sup>27</sup> Ehringer, Candace, Chris Lockwood, Michael Vader, and Fatima Clark, *Watsonville Slough System Managed Aquifer Recharge and Recovery Projects: Cultural Resources Assessment Report*, prepared for Pajaro Valley Water Management Agency, prepared by ESA, August 2020.

A number of prehistoric archaeological sites have been recorded in the vicinity of the Projects. The majority of these sites are located within agricultural fields on bluffs overlooking sloughs – areas ideal for exploiting the natural resources of the river, sloughs, and coastline. The sites generally consist of shell middens with lithic and ground stone scatters, and some with Native American burials. Previously excavated sites have produced an extensive and diverse artifact assemblage that includes: thousands of flaked stone artifacts (projectile points, bifaces, modified flakes, scrapers, cores, assayed cobbles, debitage); hundreds of ground stone and modified stone artifacts (milling slabs, hand stones, mortars, pestles, net weights, battered stones, hammerstones); modified bone tools (awls); shell beads; abundant vertebrate faunal remains, including marine and freshwater fish (sharks, skates, rays, carps, minnows, rockfish, perch), and terrestrial, estuarine, and marine animals/birds (deer, elk, duck, geese, seals, sea lions, snakes, rodents); shellfish remains, including estuarine, open beach, and rocky intertidal species (cockles, clams, barnacles, mussels, oysters); and a number of Native American burials. Previous excavations indicate that the Project vicinity was occupied as early as the latter half of the Early Archaic Period, and during the Early and Middle Periods, suggestive of long-term habitation or repeated seasonal use.<sup>28</sup>

### 3.10.1.5 Identification of Historical and Archaeological Resources

#### ***Previously Recorded Archaeological Resources***

Records searches for the Projects were conducted through the California Historical Resources Information System (CHRIS) Northwest Information Center (NWIC) housed at Sonoma State University on June 22, 2017 (File No. 16-2078) and August 4, 2017 (File No. 17-0246) and updated on September 19, 2017 (File No. 17-0246) and April 25, 2018 (File No. 17-2410).<sup>29</sup>

The records search results indicate that eight archaeological resources have been previously recorded within a one-half-mile radius of the Project sites. In addition, one informal resource consisting of Native American burials is located within the one-half-mile radius.<sup>30</sup> Of these resources, four overlap or are in within close proximity to (within 100 feet of) the Project sites (**Table 3.10-1**).

#### ***Previously Recorded Built Environment Resources***

No built environment resources have been recorded within or immediately adjacent to the Project sites.

<sup>28</sup> Ehringer, Candace, Chris Lockwood, Michael Vader, and Fatima Clark, *Watsonville Slough System Managed Aquifer Recharge and Recovery Projects: Cultural Resources Assessment Report*, prepared for Pajaro Valley Water Management Agency, prepared by ESA, August 2020.

<sup>29</sup> Ehringer, Candace, Chris Lockwood, Michael Vader, and Fatima Clark, *Watsonville Slough System Managed Aquifer Recharge and Recovery Projects: Cultural Resources Assessment Report*, prepared for Pajaro Valley Water Management Agency, prepared by ESA, August 2020.

<sup>30</sup> An informal resource is one that no one has filed DPR 523 forms with the CHRIS system to have a permanent number assigned.

**TABLE 3.10-1  
PREVIOUSLY RECORDED ARCHAEOLOGICAL RESOURCES WITHIN OR IMMEDIATELY ADJACENT TO THE PROJECTS**

Resource Number	Resource Type	Description	National Register/ California Register Eligibility Status	Notes
CA-SCR-60/130	Prehistoric archaeological site	Shell midden with flaked stone debitage and Native American burials	Determined eligible for National Register; Listed in California Register <sup>a,b</sup>	-
CA-SCR-61	Prehistoric archaeological site	Shell midden with flaked stone debitage and Native American burials	Not evaluated <sup>c</sup>	The portion of the site overlapping the Projects appears to be a secondary deposit. <sup>c</sup>
CA-SCR-155	Prehistoric archaeological site	Shell midden	Not evaluated <sup>d</sup>	Site boundaries not fully defined. <sup>d</sup>
CA-SCR-156	Prehistoric archaeological site	Shell midden and possible Native American burials	Not evaluated <sup>e</sup>	Site boundaries not fully defined. <sup>e</sup>

NOTES:

- <sup>a</sup> Culleton, Brendan J, Robert H. Gargett, and Thomas L. Jackson, *Data Recovery Excavations at CA-SCR-60/130 for the Pajaro Valley Water Management Agency Local Water Supply and Distribution Project*. Prepared for Pajaro Valley Water management Agency. Prepared by Pacific Legacy. Document on file at NWIC (S-37116). 2005.
- <sup>b</sup> Pursuant to California Public Resources Code Section 5024.1(d)(1), resources formally determined eligible for, or listed in, the National Register through National Historic Preservation Act Section 106 review of federal undertakings are automatically included in the California Register.
- <sup>c</sup> Morgan, Christopher, and Thomas L. Jackson, *Archaeological Test Excavations at CA-SCR-60 and CA-SCR-61 for the Pajaro Valley Water Management Agency Local Water Supply Project*. Prepared for Montgomery-Watson. Prepared by Pacific Legacy, Inc. Document on file at Pajaro Valley Water Management Agency. 1999.
- <sup>d</sup> Chavez, D., Department of Parks and Recreation 523 Forms for CA-SCR-155. Document on file at NWIC, 1977.
- <sup>e</sup> Chavez, D., Department of Parks and Recreation 523 Forms for CA-SCR-156. Document on file at NWIC, 1977.

### Phase I Cultural Resources Survey

A Phase I cultural resources survey of the Project sites was conducted February 18-20, 2020.<sup>31</sup> All resources meeting the California Office of Historic Preservation's 45-year-old age threshold for consideration as historical resources were documented on California Department of Parks and Recreation 523 series forms.

Approximately 85 percent of the Project sites were subject to systematic survey with transects spaced at 10-20 meters. Approximately 15 percent of the Project sites were not surveyed due to access restrictions (i.e., lack of landowner permission) or field conditions (e.g., dense vegetation, livestock, inundation). The areas that were not surveyed include: a portion of the filter plant to recharge basins pipeline between the Southeast recharge basin and Dairy Road (APNs 052-191-57 and 052-191-58); a western portion of the Struve Slough to filter plant pipeline (APNs 052-211-26 and 052-551-01); the northern portion of the Struve Slough to filter plant pipeline (APNs 052-221-24 and 052-081-38); the eastern portion of the backwash and raw water pipeline (APNs 052-211-26, 052-552-01, 052-551-03, 052-551-04, and 052-551-05); and the electrical control building and associated road, and Struve intake pump station (APN 052-081-38).

<sup>31</sup> Ehringer, Candace, Chris Lockwood, Michael Vader, and Fatima Clark, *Watsonville Slough System Managed Aquifer Recharge and Recovery Projects: Cultural Resources Assessment Report*, prepared for Pajaro Valley Water Management Agency, prepared by ESA, August 2020.



Two new resources were documented as a result of the survey: ESA-PVWA-MN-01 and ESA-PVWA-MN-02. ESA-PVWA-MN-01 is a prehistoric archaeological site that consists of a small, low density lithic scatter covering an approximate 1,600-square-meter area (0.4 acres). Cultural materials observed on the surface include 15 pieces of Monterey chert debitage (secondary and tertiary flakes), 1 unifacially retouched flake (same material), 2 shell fragments (clam), and 1 faunal bone fragment (mammal). ESA-PVWA-MN-02 is a built environment resource consisting of a segment of the abandoned Union Pacific Railroad (formerly the Southern Pacific Railroad). The railroad bed is composed of compacted basalt, granite gravel, and local dredged clay, and measures 62 inches wide. An access road on top of a levee is located on the south side of the rails. Markings observed on the rails indicate that some rail sections date to 1913. The Struve Slough to filter plant pipeline crosses the rail line.<sup>32</sup>

Additionally, two previously recorded resources were updated as a result of the survey: CA-SCR-60/130 and -155.

### **Extended Phase I/Phase II Testing**

An Extended Phase I/Phase II testing program was conducted at ESA-PVWA-MN-01 on May 19-20, 2020.<sup>33</sup> The investigation was focused on identifying the horizontal and vertical extent of subsurface cultural deposits within the Area of Direct Impact, and if present, the information potential of subsurface deposits. Fifteen 30-centimeter diameter shovel test probes (STPs) were excavated. Six STPs were positive for cultural materials and nine STPs were negative for cultural materials. A total of six pieces of Monterey chert debitage was encountered in the six positive STPs. No other artifacts or other indicators of cultural deposits, such as midden soils, were encountered in the STPs.

### **Significance Evaluation**

#### **Criterion A/1: Events**

Under Criterion A/1, a property is eligible for listing if it is associated with events that have made a significant contribution to the broad patterns of our history. This can include a specific event marking an important moment in history, or a pattern of events or a historic trend. Mere association with historic events or trends is not sufficient – the property’s specific association must be considered important as well. Archaeological properties that have yielded important information in the past and that no longer retain additional research potential are assessed under Criterion A/1. Under Criterion A/1, archaeological properties must have well-preserved features, artifacts, and intra-site patterning in order to illustrate a specific event or pattern of events. Often a comparative framework is necessary to determine if a site is considered an important example of an event or pattern of events.<sup>34</sup>

<sup>32</sup> Disturbance of the railroad would be avoided by using trenchless pipeline installation methods at the railroad crossing.

<sup>33</sup> Ehringer, Candace, Chris Lockwood, Michael Vader, and Fatima Clark, *Watsonville Slough System Managed Aquifer Recharge and Recovery Projects: Cultural Resources Assessment Report*, prepared for Pajaro Valley Water Management Agency, prepared by ESA, August 2020.

<sup>34</sup> Little, Barbara, Erika Martin Seibert, Jan Townsend, John H. Sprinkle, Jr., and John Knoerl, *National Register Bulletin: Guidelines for Evaluation and Registering Archaeological Properties*, U.S. Department of the Interior, National Park Service, Washington D.C., 2000.

Research did not reveal an association with important events. While ESA-PVWA-MN-01 represents lithic reduction, which is illustrative of Native American use of the landscape, as a small lithic scatter (22 pieces) it is not representative of an important property within this context. The larger sites in the vicinity of the Projects that contain well-developed midden, diverse and abundant artifact assemblages, and burials would be better representative of an important pattern of Native American habitation and settlement of the region. For example, other sites in the Project vicinity contain tens of thousands of lithic artifacts, including projectile points and other tools, ground stone implements, Native American burials, and shell midden, and are more representative of a pattern of regional prehistoric habitation and settlement. As such, ESA-PVWA-MN-01 does not appear to be eligible for listing in the National Register or California Register under Criterion A/1.

#### Criterion B/2: Persons

Under Criterion B/2, a property is eligible for listing if it is associated with the lives of persons significant in our past. Examples of archaeological properties that may qualify under this criterion include a village site associated with an important Native American individual or the birthplace of a prominent chief. The individual's association with the property must be documented and the person must be individually significant within the property's historic context. Under Criterion B/2, archaeological properties need to be in good condition with excellent preservation of features, artifacts, and spatial relationships. The importance or relevance of the property in comparison to other properties associated with the person should also be addressed.<sup>35</sup>

Research did not reveal an association with significant individuals. While ESA-PVWA-MN-01 is related to the Ohlone people, who occupied this region at the time of European contact, there is no information tying the site to a significant individual or individuals within this group. As such, ESA-PVWA-MN-01 does not appear to be eligible for listing in the National Register or California Register under Criterion B/2.

#### Criterion C/3: Design/Workmanship

Under Criterion C/3, a property is eligible for listing if it embodies the distinctive characteristics of a type, or period, or method of construction, or that represents the work of a master, or that possess high artistic value. For archaeological properties, a property could be significant as a human expression of culture or technology. Examples of archaeological properties that may qualify under this criterion include Native American designed village sites or irrigation systems, and rock art (petroglyphs, pictographs, geoglyphs). Under Criterion C/3, an archaeological property must have remains that are well-preserved and that clearly illustrate the design and construction of the structure. Comparison with other properties is usually required to make the case of eligibility under this criterion.<sup>36</sup>

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<sup>35</sup> Little, Barbara, Erika Martin Seibert, Jan Townsend, John H. Sprinkle, Jr., and John Knoerl, *National Register Bulletin: Guidelines for Evaluation and Registering Archaeological Properties*, U.S. Department of the Interior, National Park Service, Washington D.C., 2000.

<sup>36</sup> Little, Barbara, Erika Martin Seibert, Jan Townsend, John H. Sprinkle, Jr., and John Knoerl, *National Register Bulletin: Guidelines for Evaluation and Registering Archaeological Properties*, U.S. Department of the Interior, National Park Service, Washington D.C., 2000.

ESA-PVWA-MN-01 is representative of lithic reduction, and does not possess the qualities required to be considered for eligibility under Criterion C/3. As a small lithic reduction site, it does not embody the distinctive characteristics of a type, or period, or method of construction, nor represent the work of a master, nor possess high artistic value. As such, ESA-PVWA-MN-01 does not appear to be eligible for listing in the National Register or California Register under Criterion C/3.

#### Criterion D/4: Data Potential

Under Criterion D/4, a property is eligible for listing if it has yielded, or may be likely to yield, information important in history or prehistory. This is the criterion under which most archaeological properties are typically found eligible for listing. This criterion encompasses properties that have the potential to answer in whole or in part important research questions about human history, such as questions related to site type, lithic technology, chronology, subsistence, settlement patterns, and trade. Under Criterion D/4, an archaeological property must have deposits that are relatively intact and complete.<sup>37</sup> Data requirements would include the following archaeological components: deposits that can be securely dated; stratigraphic integrity of soil layers and features; discrete archaeological features; sufficient quantities and types of ecofacts and artifacts to allow for analysis and interpretation; exotic materials; and sufficient quantities of carbonaceous materials to conduct radiocarbon dating.

Artifacts within the site consist primarily of lithic debitage. No ground stone, midden, or human remains were observed, and no artifact class other than lithics was encountered subsurface. The site's data does not have the ability to answer most regional research questions, such as questions related to chronology, subsistence, settlement patterns, and trade. The subsurface component is sparse, and does not appear to represent an intact and complete deposit. The site lacks features, stratigraphy, exotic materials, and datable materials. There are insufficient quantities and types of artifacts present to allow for any meaningful analysis and interpretation. The site does not possess sufficient data potential to address relevant research questions, and it does not have the ability to yield information important in prehistory. As such, ESA-PVWA-MN-01 does not appear to be eligible for listing in the National Register or California Register under Criterion D/4.

### 3.10.1.6 Geoarchaeological Review

This review is based on a review of previously recorded archaeological sites obtained through a records search at the CHRIS-NWIC, and a review of geological maps, soils maps, archaeological reports, and historical aerial photos and maps covering the Project sites.<sup>38</sup>

<sup>37</sup> Little, Barbara, Erika Martin Seibert, Jan Townsend, John H. Sprinkle, Jr., and John Knoerl, *National Register Bulletin: Guidelines for Evaluation and Registering Archaeological Properties*, U.S. Department of the Interior, National Park Service, Washington D.C., 2000.

<sup>38</sup> Ehringer, Candace, Chris Lockwood, Michael Vader, and Fatima Clark, *Watsonville Slough System Managed Aquifer Recharge and Recovery Projects: Cultural Resources Assessment Report*, prepared for Pajaro Valley Water Management Agency, prepared by ESA, August 2020.

The Projects are situated within the Pajaro Valley basin in southern Santa Cruz County, California. The basin is bounded on the west by Monterey Bay, on the east by the San Andreas Fault, on the north by hills composed of Pliocene-aged marine sediments of the Purisima Formation, and on the south by hills composed of the Pleistocene-aged Aromas Sand Formation.<sup>39</sup> The basin is underlain by pre-Pliocene bedrock, which is covered in places by more than 1,219 meters (4,000 feet) of unconsolidated marine and terrestrial deposits that range in age from the Pliocene to Recent.<sup>40</sup> The basin is dominated by the Pajaro River, its tributaries, and a series of sloughs and shallow lakes. The headwaters of the river are within the Diablo Range to the east, and the mainstem is joined by tributaries from the Gabilan Mountains in the south and the Santa Cruz Mountains in the north. Historically, the Pajaro River floodplain was tidally-influenced, but much of the slough system and floodplain have been channelized and drained to create farmland.

The Project sites are situated on the floodplain and terraces north of the Pajaro River. Near surface deposits within the Project areas are relatively young, dating to the Pleistocene and Holocene. Previous archaeological research in the region has demonstrated the presence of large occupational midden sites, some with Native American burials, positioned near the edges of the terraces overlooking the Pajaro River.

### ***Floodplain***

The floodplain of the Pajaro River is underlain by basin deposits, consisting of organic-rich, plastic, silty clay and clay with local interbeds of silt and silty sand. The accumulation of silt, clay and organics resulted from a mosaic of low-energy depositional environments including estuary, sloughs, lakes, and marshes, that evolved during the Holocene. Basin deposits vary in thickness, exceeding tens but less than a hundred feet thick. Floodplain soils are mapped as Clear Lake clay, and the very fine grained texture of clay parent material is consistent with low-energy or slack water conditions along a slough.<sup>41</sup> Archaeological remains deposited along the floodplain have the potential to have been gently and deeply covered by sediments and preserved. Low-lying floodplain/slough areas likely offered key resources, but environmental conditions may not have attracted sustained occupation. When compared with occupation sites, temporary-use, resource procurement sites would be expected to contain sparser cultural remains, reflecting a smaller range of activities. The low-lying areas should be considered to have moderate to low sensitivity for archaeological sites. Since the landforms accumulated alluvial deposits during the later Holocene, it is possible that cultural remains (if present) became deeply buried (i.e., deeper than a meter) and remained below the depth of historic plowing. Therefore, archaeological sites in the floodplain/slough may have much less surface visibility than sites on the upland terraces.

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<sup>39</sup> Brabb, Earl E. 1997. Geologic map of Santa Cruz County, California: a digital database. Open File Report OF-97489. Sheet 1 of 2. Scale 1:62,500.

<sup>40</sup> Muir, K.S. 1972. Preliminary report on geology and ground water of the Pajaro Valley area, Santa Cruz and Monterey counties, California. Open-File Report 73-199. U.S. Geological Survey, Menlo Park, California.

<sup>41</sup> Natural Resources Conservation Service (NRCS). 2020. Web Soil Survey. Available online at <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>. Accessed February on 26, 2020.

## **Terrace**

The terraces north of the floodplain are part of a Pleistocene-aged coastal dune field with deposits consisting of weakly consolidated, well-sorted, fine- to medium-grained sand. While the dunes have been subject to long-term stability, localized mobilization of sand during the Holocene has the potential to caused localized deposition and deflation. Historically, the dune field has been subject to plow agriculture, which would tend to destabilize the ground surface and facilitate mobilization of sand. Additional possible effects of agriculture include disturbing the vertical provenience of artifacts, as well as attracting scavenging, burrowing animals.

Soils along the terraces within the Project sites are mapped primarily as Baywood loamy sand.<sup>42</sup> Baywood soils consist of deep, somewhat excessively drained soils formed in eolian parent material in old coastal dunes. Significantly, the typical pedon of Baywood soil contains a very thick (91 centimeters [36 inches]) A-horizon (“topsoil”) directly overlying multiple C-horizons (parent material). This sequence reflects a lack of substantial soil development, due perhaps in part to persistent natural and human disturbances to the soil weathering profile.

The terraces should be considered to have a very high sensitivity for archaeological resources, including occupation sites and human remains. Repeated and sustained occupation of the uplands overlooking the slough likely resulted in the accumulation of dense cultural remains. These remains may have stayed uncovered at the surface or have been shallowly buried (less than 1 meter [3.3 feet] deep) by windblown sand and other sediments deposited by people. Later, historic agricultural plowing and ripping may have re-exposed remains at the surface.

## **Sensitivity**

The Struve Slough to filter plant pipeline is located primarily on the floodplain, and has a moderate to low sensitivity for cultural resources. Portions of this element located closer to the upland terraces are anticipated to be more sensitive than portions in the valley bottom.

The backwash and raw water pipeline is located primarily on the floodplain, and has a moderate to low sensitivity for cultural resources. Portions of this element located closer to the upland terraces are anticipated to be more sensitive than portions in the valley bottom.

The filter plant to recharge basins pipeline is located on the terrace above the floodplain, and has a very high sensitivity for cultural resources. Based on previous archaeological work, these resources would be expected to occur primarily within approximately 1 meter of the ground surface.

The recharge basins and connecting pipelines are located on a terrace above the floodplain, and have a high sensitivity for cultural resources. Based on previous archaeological work, these resources would be expected to occur primarily within approximately 1 meter of the ground surface.

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<sup>42</sup> Natural Resources Conservation Service (NRCS). 2020. Web Soil Survey. Available online at <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>. Accessed on February 26, 2020.

## 3.10.2 Regulatory Framework

### 3.10.2.1 Federal and State

#### ***Historic Resources, Archaeological Resources, and Human Remains***

##### **National Historic Preservation Act**

The principal federal law addressing historic properties is the National Historic Preservation Act (NHPA), as amended (54 United States Code of Laws 300101 et seq.), and its implementing regulations (36 Code of Federal Regulations [CFR] Part 800). Section 106 requires a federal agency with jurisdiction over a proposed federal action (referred to as an “undertaking” under the NHPA) to take into account the effects of the undertaking on historic properties, and to provide the Advisory Council on Historic Preservation an opportunity to comment on the undertaking.

The term “historic properties” refers to “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register” (36 CFR Part 800.16(l)(1)). The implementing regulations (36 CFR Part 800) describe the process for identifying and evaluating historic properties, for assessing the potential adverse effects of federal undertakings on historic properties, and seeking to develop measures to avoid, minimize, or mitigate adverse effects. The Section 106 process does not require the preservation of historic properties; instead, it is a procedural requirement mandating that federal agencies take into account effects to historic properties from an undertaking prior to approval.

The steps of the Section 106 process are accomplished through consultation with the State Historic Preservation Officer, federally-recognized Indian tribes, local governments, and other interested parties. The goal of consultation is to identify potentially affected historic properties, assess effects to such properties, and seek ways to avoid, minimize, or mitigate any adverse effects on such properties. The agency also must provide an opportunity for public involvement (36 CFR 800.1(a)). Consultation with Indian tribes regarding issues related to Section 106 and other authorities (such as the National Environmental Policy Act and Executive Order No. 13007) must recognize the government-to-government relationship between the Federal government and Indian tribes, as set forth in Executive Order 13175, 65 FR 87249 (November 9, 2000), and Presidential Memorandum of November 5, 2009.

##### **National Register of Historic Places**

The National Register of Historic Places (National Register) was established by the NHPA of 1966, as “an authoritative guide to be used by federal, State, and local governments, private groups and citizens to identify the Nation’s historic resources and to indicate what properties should be considered for protection from destruction or impairment” (36 CFR 60.2).<sup>43</sup> The National Register recognizes a broad range of cultural resources that are significant at the national, state, and local levels and can include districts, buildings, structures, objects, prehistoric archaeological sites, historic-period archaeological sites, traditional cultural properties, and

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<sup>43</sup> U.S. Department of the Interior, National Park Service, *How to Apply the National Register Criteria for Evaluation*, National Register Publications, Washington D.C., 2002.

cultural landscapes. As noted above, a resource that is listed in or eligible for listing in the National Register is considered “historic property” under Section 106 of the NHPA.

To be eligible for listing in the National Register, a property must be significant in American history, architecture, archaeology, engineering, or culture. Properties of potential significance must meet one or more of the following four established criteria:

- A. Are associated with events that have made a significant contribution to the broad patterns of our history;
- B. Are associated with the lives of persons significant in our past;
- C. Embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- D. Have yielded, or may be likely to yield, information important in prehistory or history.

In addition to meeting one or more of the criteria of significance, a property must have integrity. Integrity is defined as “the ability of a property to convey its significance”.<sup>44</sup> The National Register recognizes seven qualities that, in various combinations, define integrity. The seven factors that define integrity are location, design, setting, materials, workmanship, feeling, and association. To retain historic integrity a property must possess several, and usually most, of these seven aspects. Thus, the retention of the specific aspects of integrity is paramount for a property to convey its significance.

Ordinarily religious properties, moved properties, birthplaces or graves, cemeteries, reconstructed properties, commemorative properties, and properties that have achieved significance within the past 50 years are not considered eligible for the National Register unless they meet one of the Criteria Considerations, in addition to meeting at least one of the four significance criteria above (A-D) and possessing integrity.<sup>45</sup>

### **California Environmental Quality Act**

CEQA is the principal statute governing environmental review of projects occurring in the state and is codified in Public Resources Code Section 21000 et seq. CEQA requires lead agencies to determine if a proposed project would have a significant effect on the environment, including significant effects on historical or unique archaeological resources. Under CEQA (Section 21084.1), a project that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment.

The CEQA *Guidelines* (California Code of Regulations Title 14, Section 15064.5) recognize that historical resources include: (1) a resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the California Register of Historical Resources (California Register); (2) a resource included in a local register of historical resources, as defined

<sup>44</sup> U.S. Department of the Interior, National Park Service, *How to Apply the National Register Criteria for Evaluation*, National Register Publications, Washington D.C., 2002.

<sup>45</sup> U.S. Department of the Interior, National Park Service, *How to Apply the National Register Criteria for Evaluation*, National Register Publications, Washington D.C., 2002.

in Public Resources Code Section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of Public Resources Code Section 5024.1(g); and (3) any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California by the lead agency, provided the lead agency's determination is supported by substantial evidence in light of the whole record. The fact that a resource does not meet the three criteria outlined above does not preclude the lead agency from determining that the resource may be a historical resource as defined in Public Resources Code Sections 5020.1(j) or 5024.1.

If a lead agency determines that an archaeological site is a historical resource, the provisions of Section 21084.1 of CEQA and Section 15064.5 of the CEQA *Guidelines* apply. If an archaeological site does not meet the criteria for a historical resource contained in the CEQA *Guidelines*, then the site may be treated in accordance with the provisions of Section 21083, which is as a unique archaeological resource. As defined in Section 21083.2 of CEQA a "unique" archaeological resource is an archaeological artifact, object, or site, about which it can be clearly demonstrated that without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information;
- Has a special and particular quality such as being the oldest of its type or the best available example of its type; or
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

If an archaeological site meets the criteria for a unique archaeological resource as defined in Section 21083.2, then the site is to be treated in accordance with the provisions of Section 21083.2, which state that if the lead agency determines that a project would have a significant effect on unique archaeological resources, the lead agency may require reasonable efforts be made to permit any or all of these resources to be preserved in place (Section 21083.1(a)). If preservation in place is not feasible, mitigation measures shall be required. The CEQA *Guidelines* note that if an archaeological resource is neither a unique archaeological nor a historical resource, the effects of the project on those resources shall not be considered a significant effect on the environment (CEQA *Guidelines* Section 15064.5(c)(4)).

A significant effect under CEQA would occur if a project results in a substantial adverse change in the significance of a historical resource as defined in CEQA *Guidelines* Section 15064.5(a). Substantial adverse change is defined as "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historical resource would be materially impaired" (CEQA *Guidelines* Section 15064.5(b)(1)). According to CEQA *Guidelines* Section 15064.5(b)(2), the significance of a historical resource is materially impaired when a project demolishes or materially alters in an adverse manner those physical characteristics that:



- A. Convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register;
- B. Account for its inclusion in a local register of historical resources pursuant to Section 5020.1(k) of the Public Resources Code or its identification in a historical resources survey meeting the requirements of Section 5024.1(g) of the Public Resources Code, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or
- C. Convey its historical significance and that justify its eligibility for inclusion in the California Register as determined by a Lead Agency for purposes of CEQA.

In general, a project that complies with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings*<sup>46</sup> is considered to have mitigated its impacts to historical resources to a less-than-significant level (CEQA *Guidelines* Section 15064.5(b)(3)).

### California Register of Historical Resources

The California Register is “an authoritative listing and guide to be used by State and local agencies, private groups, and citizens in identifying the existing historical resources of the State and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change” (Public Resources Code Section 5024.1(a)). The criteria for eligibility for the California Register are based upon National Register criteria (Public Resources Code Section 5024.1(b)). Certain resources are determined by the statute to be automatically included in the California Register, including California properties formally determined eligible for, or listed in, the National Register.

To be eligible for the California Register, a prehistoric or historic-period property must be significant at the local, state, and/or federal level under one or more of the following four criteria:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4. Has yielded, or may be likely to yield, information important in prehistory or history.

A resource eligible for the California Register must meet one of the criteria of significance described above, and retain enough of its historic character or appearance (integrity) to be recognizable as a historical resource and to convey the reason for its significance. It is possible that a historic resource may not retain sufficient integrity to meet the criteria for listing in the National Register, but it may still be eligible for listing in the California Register.

<sup>46</sup> U.S. Department of the Interior, National Park Service, Technical Preservation Services, *The Secretary of the Interior's Standards for the Treatment of Historic Properties*, authored by Kay D. Week and Anne E. Grimmer, 1995, revised by Anne E. Grimmer, 2017.

Additionally, the California Register consists of resources that are listed automatically and those that must be nominated through an application and public hearing process. The California Register automatically includes the following (California Public Resources Code Section 5024.1(d):

- California properties listed on the National Register and those formally determined eligible for the National Register;
- California Registered Historical Landmarks from No. 770 onward; and
- Those California Points of Historical Interest that have been evaluated by the State Office of Historic Preservation and have been recommended to the State Historical Commission for inclusion on the California Register.

Other resources that may be nominated to the California Register include:

- Historical resources with a significance rating of Category 3 through 5 (those properties identified as eligible for listing in the National Register, the California Register, and/or a local jurisdiction register);
- Individual historical resources;
- Historical resources contributing to historic districts; and
- Historical resources designated or listed as local landmarks, or designated under any local ordinance, such as a historic preservation overlay zone.

#### **California Health and Safety Code Section 7050.5**

California Health and Safety Code Section 7050.5 requires that in the event human remains are discovered, the County Coroner be contacted to determine the nature of the remains. In the event the remains are determined to be Native American in origin, the Coroner is required to contact the Native American Heritage Commission within 24 hours to relinquish jurisdiction.

#### **California Public Resources Code Section 5097.98**

California Public Resources Code Section 5097.98 provides procedures in the event human remains of Native American origin are discovered during project implementation. Public Resources Code Section 5097.98 requires that no further disturbances occur in the immediate vicinity of the discovery, that the discovery is adequately protected according to generally accepted cultural and archaeological standards, and that further activities take into account the possibility of multiple burials. Public Resources Code Section 5097.98 further requires the Native American Heritage Commission, upon notification by a County Coroner, designate and notify a Most Likely Descendant regarding the discovery of Native American human remains. Once the Most Likely Descendant has been granted access to the site by the landowner and inspected the discovery, the Most Likely Descendant then has 48 hours to provide recommendations to the landowner for the treatment of the human remains and any associated grave goods.

In the event that no descendant is identified, or the descendant fails to make a recommendation for disposition, or if the land owner rejects the recommendation of the descendant, the landowner may, with appropriate dignity, reinter the remains and burial items on the property in a location that will not be subject to further disturbance.

### California Government Code Sections 6254(r) and 6254.10

These sections of the California Public Records Act were enacted to protect archaeological sites from unauthorized excavation, looting, or vandalism. Section 6254(r) explicitly authorizes public agencies to withhold information from the public relating to “Native American graves, cemeteries, and sacred places maintained by the Native American Heritage Commission.” Section 6254.10 specifically exempts from disclosure requests for “records that relate to archaeological site information and reports, maintained by, or in the possession of the Department of Parks and Recreation, the State Historical Resources Commission, the State Lands Commission, the Native American Heritage Commission, another state agency, or a local agency, including the records that the agency obtains through a consultation process between a Native American tribe and a state or local agency.”

#### 3.10.2.2 Local

Table 2-10 in Chapter 2, *Project Description*, identifies the approvals from Santa Cruz County required for the Projects. **Table 3.10-2** presents pertinent local plans and policies regarding cultural resources to support County consideration of project consistency with general plan policies.<sup>47</sup> In some cases, local policies are used in this EIR as criteria to determine the significance of physical effects on the environment (e.g., Impact NOI-1 in Section 3.8, Noise and Vibration).

**TABLE 3.10-2  
SANTA CRUZ COUNTY PLANS AND POLICIES RELEVANT TO THE PROJECTS**

<i>Santa Cruz County General Plan/Local Coastal Program</i>
<b>5.19.1: Evaluation of Native American Cultural Sites.</b> Protect all archaeological resources until they can be evaluated. Prohibit any disturbance of Native American Cultural Sites without an appropriate permit. Maintain the Native American Cultural Sites ordinance.
<b>5.19.2; Site Surveys.</b> Require an archaeological site survey (surface reconnaissance) as part of the environmental review process for all projects with very high site potential as determined by the inventory of archaeological sites, within the Archaeological Sensitive Areas, as designated on General Plan and Local Coastal Program Resources and Constraints Maps filed in the Planning Department.
<b>5.19.3; Development Around Archaeological Resources.</b> Protect archaeological resources from development by restricting improvements and grading activities to portions of the property not containing these resources, where feasible, or by preservation of the site through project design and/or use restrictions, such as covering the site with earthfill to a depth that ensures the site will not be disturbed by development, as determined by a professional archaeologist.
<b>5.19.4: Archaeological Evaluations.</b> Require the applicant for development proposals on any archaeological site to provide an evaluation, by a certified archaeologist, of the significance of the resource and what protective measures are necessary to achieve General Plan and Local Coastal Program Land Use Plan objectives and policies.
<b>5.19.5: Native American Cultural Sites.</b> Prohibit any disturbance of Native American Cultural Sites without an archaeological permit.
<b>5.20.3: Development Activities.</b> For development activities on property containing historic resources, require protection, enhancement and/or preservation of the historic, cultural, architectural, engineering or aesthetic values of the resource as determined by the Historic Resources Commission. Immediate or substantial hardship to a project applicant shall be considered in establishing project requirements.
SOURCE: County of Santa Cruz, 1994 General Plan/Local Coastal Program, Chapter 5 – Conservation and Open Space, Effective December 19, 1994; County of Santa Cruz, Santa Cruz County Code, Chapter 16.40 Native American Cultural Sites, October 2, 2018.

<sup>47</sup> California Government Code Section 53091 exempts agencies like PV Water from complying with local building and zoning ordinances when locating or constructing facilities for the production, generation, storage, treatment, or transmission of water. California Government Code Section 65402(c) requires that PV Water notify cities and counties of its plans to construct projects or to acquire or dispose of property. The planning agency then has 40 days to determine project consistency with its general plan. If the planning agency disapproves, the disapproval may be overruled by PV Water.

### 3.10.3 Impacts and Mitigation Measures

#### 3.10.3.1 Significance Criteria

In accordance with the CEQA, state CEQA *Guidelines* (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Projects could have a significant impact if they were to:<sup>48</sup>

- Cause a substantial adverse change in the significance of a historical resource pursuant to in Section 15064.5;<sup>49</sup>
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5; and/or
- Disturb any human remains, including those interred outside of formal cemeteries.

#### 3.10.3.2 Methodology

As described in Section 3.1, this EIR provides an independent analysis of the Projects' potential environmental impacts. **Table 3.10-3** presents mitigation measures from the 2014 BMP Update PEIR that were adopted by the Board of Directors (Resolution 2014-05) for the purpose of reducing impacts related to cultural resources. These adopted mitigation measures are considered part of the Projects and thus are considered prior to any significance determinations. Potential impacts are evaluated in the following section. If warranted, additional mitigation is included and takes the form of (1) modifications to update the mitigation measures presented in Table 3.10-3 to reflect current conditions and site-specific impacts; or (2) new mitigation measures to replace or augment an adopted mitigation measure.

In accordance with adopted Mitigation Measure CR-1a, ESA conducted a cultural resources constraints analysis to identify cultural resources within or near the Project sites. The analysis was conducted to provide an initial assessment of Projects' potential to impact cultural resources and to provide recommendations to avoid or lessen impacts to known cultural resources under Section 106 of the National Historic Preservation Act of 1966 (Section 106) and CEQA, and also provides recommendations regarding future identification and evaluation of unknown resources. Pajaro Valley Water Management Agency (PV Water) used information from that analysis in identifying sites for the Project components in order to avoid or reduce potential impacts to known cultural resources to the extent feasible.<sup>50</sup>

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<sup>48</sup> Refer also to Appendix NOP for additional topics that were addressed in the Notice of Preparation.

<sup>49</sup> Refer to Section 3.10.2.1, above, for information about Section 15064.5.

<sup>50</sup> Ehringer, C. Letter to Brian Lockwood, Pajaro Valley Water Management Agency, July 2017.

**TABLE 3.10-3  
2014 BMP UPDATE PEIR MITIGATION MEASURES – CULTURAL RESOURCES**

**CR-1a:** Final pipeline and facility plans shall locate facilities and pipeline alignments away from identified and recorded archaeological sites in each component area based on a site reconnaissance and archaeological investigation conducted by a qualified archaeologist at the time site-specific construction plans are developed. The archaeologist shall identify the areal extent of potential recorded sites, assess potential significance to identified resources, recommend adjustment to siting of improvements, facilities and/or pipeline alignments, if necessary, and provide other recommendations to avoid impacts to identified significant resources. If a significant or potentially significant archaeological or historic resource is identified pursuant to the definitions in the State CEQA Guidelines as identified above, the consulting archaeologist shall develop an appropriate mitigation plan for the cultural resource. Possible mitigation measures for important cultural resources may include monitoring by a qualified archaeologist during construction at identified sensitive sites, documentation and recordation of the resource, recovery and relocation, or stabilization of the resource.

**CR-1b:** The cultural resource boundaries of potentially significant sites shall be marked as exclusion zones both on ground and on construction maps prior to the commencement of construction activities on component sites. Construction supervisory personnel shall be notified of the existence of cultural resources in each component area and will be required to keep personnel and equipment away from these cultural resources sites. During construction and operational phases, personnel and equipment will be restricted to each surveyed corridor for each component.

**CR-1c:** Should any as yet undiscovered cultural resources be uncovered at any component site, such as structural features, or unusual amounts of bone or shell, artifacts, human remains, or architectural remains be encountered during any development activities, work will be suspended and PV Water staff will be contacted. A qualified professional archaeologist shall be retained and will perform any necessary investigations to determine the significance of the find. PV Water will then implement any mitigation deemed necessary for the recordation and/or protection of the cultural resources. In addition, pursuant to Sections 5097.97 and 5097.98 of the State Public Resources Code and Section 7050.5 of the State Health and Safety Code, in the event of the discovery of human remains, all work must be halted and the County Coroner shall be immediately notified. If the remains are determined to be Native American, guidelines of the Native American Heritage Commission shall be adhered to in the treatment and disposition of the remains.

SOURCE: Pajaro Valley Water Management Agency, Resolution No. 2014-05, adopted April 16, 2014.

### 3.10.3.3 Impacts and Mitigation Measures

#### **Impact CUL-1: The Projects could cause a substantial adverse change in the significance of a historical resource pursuant to CEQA *Guidelines* Section 15064.5. (*No Impact*)**

The following discussion focuses on built environment resources. Archaeological resources, including archaeological resources that are potentially historical resources according to CEQA *Guidelines* Section 15064.5, are addressed under Impact CUL-2.

One built environment resource was identified within the Project sites: ESA-PVWA-MN-02. This resource consists of a segment of the former Union Pacific Railroad (formerly the Southern Pacific Railroad) that crosses the Struve Slough to filter plant pipeline. This resource has not been evaluated for listing in the National Register or California Register. PV Water has, for the purposes of this DEIR, determined in its discretion that the resource is a historical resource pursuant to CEQA *Guidelines* Section 15064.5(a)(4). The railroad would be avoided through the use of trenchless excavation methods and the Projects would not result in a substantial change in the significance of ESA-PVWA-MN-02. As such, there would be ***no impact*** to built environment resources qualifying as historical resources.

**Mitigation:** None required.

**Impact CUL-2: The Projects could cause a substantial adverse change in the significance of an archaeological resource, including those determined to be a historical resource defined in Section 15064.5 or a unique archaeological resource defined in Public Resources Code 21083.2. (*Less than Significant with Mitigation*)**

This section discusses archaeological resources that are potentially historical resources according to CEQA *Guidelines* Section 15064.5 as well as unique archaeological resources defined in Public Resources Code Section 21083.2(g).

A total of five archaeological resources were identified within or in close proximity to (within 100 feet) of the Project sites. **Table 3.10-4** provides a summary of the resources, impacts, and applicable mitigation measures.

CA-SCR-60/130 has been previously determined eligible for listing in the National Register through the Section 106 process with consensus from SHPO, and as such is listed in the California Register.<sup>51</sup> The site is significant under Criterion D/4 (data potential). CA-SCR-60/130 therefore qualifies as a historical resource as defined in CEQA *Guidelines* Section 15064.5(a)(1). The Projects would include ground disturbance in a portion of this resource that is known to contain significant archaeological materials and Native American burials. Therefore, the Projects could cause a substantial adverse change in the significance of CA-SCR-60/130. Mitigation Measures CUL-1a, CUL-1e, CUL-1f, CUL-1g, CUL-1h, CUL-1i, CUL-1j, CUL-1k, and CUL-1l would apply to this resource. The portion of the resource that would be subject to direct impacts (Area of Direct Impact) would be subject to data recovery efforts prior to construction, thereby recovering the scientifically consequential information contained in the resource. Portions of the resource that would not be directly impacted would be marked as exclusion zones during construction. All construction-related ground disturbance within or near the resource would be monitored by archaeological and Native American monitors. Disposition of all archaeological materials recovered from the resource would be determined through consultation between Native American representatives, the qualified archaeologist, and PV Water. With implementation of mitigation, impacts to CA-SCR-60/130 would be less than significant.

CA-SCR-61 has not been previously evaluated for listing in the National Register or California Register. PV Water has, for the purposes of this DEIR, determined in its discretion that the resource is a historical resource pursuant to CEQA *Guidelines* Section 15064.5(a)(4). The portion of the site within the Area of Direct Impact was subject to archaeological testing in 1999 and determined to be a secondary deposit of material that lacked integrity. As such, substantial adverse changes to this resource are not anticipated. With implementation of Mitigation Measures CUL-1a, CUL-1f, CUL-1g, CUL-1i, CUL-1j, CUL-1k, and CUL-1l, which would in part require archaeological and Native American monitoring during ground disturbance within the site's boundaries and treatment of any inadvertent discoveries, impacts to CA-SCR-61 would be less than significant.

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<sup>51</sup> Pursuant to California Public Resources Code Section 5024.1(d)(1), resources formally determined eligible for, or listed in, the National Register through National Historic Preservation Act Section 106 review of federal undertakings are automatically included in the California Register

**TABLE 3.10-4  
ARCHAEOLOGICAL RESOURCES WITHIN OR IMMEDIATELY ADJACENT TO THE PROJECT SITES**

Resource Number	Resource Type	Description	National Register/California Register Eligibility Status	Comments	Impact Determination	Applicable Mitigation Measures
CA-SCR-60/130	Prehistoric archaeological site	Shell midden with flaked stone debitage and Native American burials	Determined eligible for National Register; Listed in California Register	-	LTS with Mitigation	CUL-1a and CUL-1e through CUL-1i
CA-SCR-61	Prehistoric archaeological site	Shell midden with flaked stone debitage and Native American burials	*Not evaluated/ Discretionarily eligible	The portion of the site overlapping the Projects appears to be a secondary deposit	LTS with Mitigation	CUL-1a, CUL-1f, CUL-1g, and CUL-1i through CUL-1i
CA-SCR-155	Prehistoric archaeological site	Shell midden	Not evaluated	Site has not been tested; Site boundaries not fully defined	LTS with Mitigation	CUL-1a and CUL-1c through CUL-1i
CA-SCR-156	Prehistoric archaeological site	Shell midden with possible Native American burials	Not evaluated	Site has not been tested; Site boundaries not fully defined	LTS with Mitigation	CUL-1a and CUL-1c through CUL-1i
ESA-PVWA-MN-01	Prehistoric archaeological site	Flaked stone debitage and shell	Not eligible	Site was tested and found to lack a significant cultural deposit	No Impact	None required

## NOTES:

\* Denotes resource determined discretionarily eligible by PV Water for the purposes of this DEIR pursuant to CEQA Section 15064.5(a)(3)

CA-SCR-155 and -156 have not been previously tested to determine their horizontal and vertical extents, nor have they been previously evaluated for listing in the National Register or California Register. Landowner permission for access to conduct testing within the Area of Direct Impact was not granted for the Projects, and it is unknown if subsurface deposits related to either site extend into the Area of Direct Impact. Testing and evaluation of the Area of Direct impact will be required prior to construction. Mitigation Measures CUL-1a, CUL-1c, CUL-1d, CUL-1e, CUL-1f, CUL-1g, CUL-1h, CUL-1i, CUL-1j, CUL-1k, and CUL-1l would apply to these two resources. This would include testing to determine the presence/absence of subsurface cultural deposits in the Area of Direct Impact, and if present, the horizontal and vertical extents and significance of those deposits. If significant cultural deposits are identified, they would either be avoided and marked as exclusion areas, or subject to data recovery. Other portions of the resources that would not be directly impacted would be marked as exclusion zones during construction. All construction-related ground disturbance within or near the two resources would be monitored by archaeological and Native American monitors. Disposition of all archaeological materials recovered from the resources would be determined through consultation between Native American representatives, the qualified archaeologist, and PV Water. With implementation of mitigation, impacts to CA-SCR-155 and -156 would be less than significant.

ESA-PVWA-MN-01 is ineligible for listing in the National Register or California Register under Criteria A/1-D/4, and does not qualify as a historical resource pursuant to CEQA *Guidelines* section 15065.4(a). This resource also does not meet the definition of unique archaeological resource as provided in PRC section 21083.2 – it does not contain information needed to answer important scientific research questions, it is not the oldest or best example of its type, and it is not directly associated with important events or persons. As such, this resource does not require further consideration under CEQA (CEQA *Guidelines* section 15065.4(c)(4)).

There is also a potential for the Projects to encounter undocumented buried archaeological resources during Project-related ground disturbance. As indicated above in Section 3.10.1.6, Geoarchaeological Review, the Project sites are generally considered to have a low to moderate to very high sensitivity for buried prehistoric archaeological resources. The Struve Slough to filter plant pipeline is located primarily on the floodplain, and has a moderate to low sensitivity for cultural resources. Portions of this element located closer to the upland terraces are anticipated to be more sensitive than portions in the valley bottom. The backwash and raw water pipeline is located primarily on the floodplain, and has a moderate to low sensitivity for cultural resources. Portions of this element located closer to the upland terraces are anticipated to be more sensitive than portions in the valley bottom. The filter plant to recharge basins pipeline is located on the terrace above the floodplain, and has a very high sensitivity for cultural resources. Based on previous archaeological work, these resources would be expected to occur primarily within approximately 1 meter of the ground surface. The proposed recharge basins and connecting pipelines are located on a terrace above the floodplain, and have a high sensitivity for cultural resources. Based on previous archaeological work, these resources would be expected to occur primarily within approximately 1 meter of the ground surface.

The Projects have the potential to result in a substantial adverse change in the significance of archaeological resources since there will be direct impacts to known archaeological resources



through ground disturbance associated with Project construction. Since the entirety of the Project sites were not surveyed and since the geoarchaeological review indicated there could be shallow or deeply buried archaeological sites present, there is also a potential for unknown subsurface archaeological resources to be impacted through ground disturbance. With implementation of **Mitigation Measures CUL-1a through CUL-1i**, which require retention of a qualified archaeologist, pre-construction surveys, pre-construction testing, avoidance of resources if feasible, data recovery, development of a cultural resources monitoring and mitigation program, construction worker cultural resources sensitivity training, establishment of Environmentally Sensitive Areas, archaeological and Native American monitoring, treatment of inadvertent discoveries, and curation of recovered materials, impacts to archaeological resources would be reduced to *less than significant*.

#### **Mitigation Measure CUL-1a: Retention of a Qualified Archaeologist**

Prior to start of ground-disturbing activities (i.e., demolition, pavement removal, pot-holing or auguring, boring, drilling, grubbing, vegetation removal, brush clearance, weed abatement, grading, excavation, trenching, or any other activity that has potential to disturb soil), PV Water shall retain a qualified archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archaeology (codified in 36 CFR Part 61; 48 FR 44738-44739) to oversee and ensure that all mitigation related to archaeological resources is carried out.

#### **Mitigation Measure CUL-1b: Pre-Construction Phase I Cultural Resources Survey**

Prior to the start of ground-disturbing activity, a qualified archaeologist shall conduct a pre-construction Phase I Cultural Resources Survey of all areas that were not surveyed as part of the 2020 field effort. The survey shall document archaeological resources potentially qualifying as historical resources, unique archaeological resources, and/or tribal cultural resources under CEQA. The qualified archaeologist shall document the results of the survey in a Phase I Cultural Resources Survey Report that follows *Archaeological Resource Management Reports (ARMR): Recommended Contents and Format*.<sup>52</sup> The qualified archaeologist shall also prepare Department of Parks and Recreation 523 forms for resources encountered during the survey, which shall be appended to the report. If built environment resources are encountered that could potentially be impacted by the Projects, the qualified archaeologist shall consult with a Qualified Architectural Historian meeting the Secretary of the Interior's Professional Qualifications Standards for architectural history (codified in 36 CFR Part 61; 48 FR 44738-44739). The qualified archaeologist shall submit the draft Phase I Cultural Resources Survey Report to PV Water within 30 days of completion of the survey. The final report shall be approved by PV Water no later than 360 days prior to the start of ground disturbance. The qualified archaeologist shall submit the final Phase I Cultural Resources Survey Report to the Northwest Information Center.

<sup>52</sup> State Office of Historic Preservation. *Archaeological Resource Management Reports (ARMR): Recommended Contents and Format*, 1990.

### **Mitigation Measure CUL-1c: Pre-Construction Phase II Archaeological Testing and Evaluation**

Prior to start of ground ground-disturbing activity, the qualified archaeologist shall develop and implement an archaeological testing and evaluation program for resources CA-SCR-155 and CA-SCR-156, and any other potentially significant archaeological resources that are identified during the pre-construction survey. The testing program shall be aimed at determining the presence/absence of subsurface cultural deposits in the Area of Direct Impact, and if present, the horizontal and vertical extents and significance of those deposits. The qualified archaeologist shall prepare a work plan outlining the objectives, goals, research questions, and methods of the testing program and shall submit the work plan to PV Water for review and comment. The final approved work plan shall be prepared and implemented by the qualified archaeologist. Upon completion of testing, the qualified archaeologist shall prepare a Phase II Archaeological Testing and Evaluation Report for submittal to PV Water. The draft report shall be submitted within 30 days of completion of testing. The final report shall be approved by PV Water no later than 270 days prior to the start of ground disturbance. The qualified archaeologist shall also submit the final Phase II Archaeological Testing and Evaluation Report to the Northwest Information Center.

If potentially significant subsurface cultural deposits are identified in the Area of Direct Impact, the qualified archaeologist shall evaluate the resource(s) for significance to determine if it qualifies as a historical resource as defined in CEQA Guidelines Section 15064.5(a). This would include evaluation under all four National Register/California Register Criteria (A/1-D/4). If a resource does not meet the criteria under subdivision(a), then it shall be assessed to determine if it meets the definition of unique archaeological resource as provided in Public Resources Code Section 21083.2(g)). When assessing significance for resources that are Native American in origin, the qualified archaeologist and PV Water shall consult with one or more Native American representatives listed on the California Native American Heritage Commission's contact list for the Projects to ensure that cultural values ascribed to the resource, beyond those that are scientifically important, are considered to determine if it qualifies as a tribal cultural resource pursuant to Public Resources Code section 21074.

### **Mitigation Measure CUL-1d: Avoidance and Preservation in Place of Archaeological Resources**

PV Water shall make every effort to avoid and preserve in place archaeological sites that are determined to be historical resources, unique archaeological resources, and/or tribal cultural resources as a result of testing and evaluation efforts conducted under Mitigation Measure CUL-1c. Avoidance and preservation in place is the preferred manner of mitigating impacts to archaeological resources. Preservation in place maintains the important relationship between artifacts and their archaeological context and also serves to avoid conflict with traditional and religious values of groups who may ascribe meaning to the resource. Preservation in place may be accomplished by, but is not limited to, avoidance, incorporating the resource into open space, capping, or deeding the site into a permanent conservation easement. In the event that avoidance and preservation in place of a resource is determined by PV Water, in consultation with the qualified archaeologist, to be infeasible in light of factors such as Project design, costs, and other considerations, then Mitigation Measures CUL-1e shall be implemented for that resource. If avoidance and preservation in place of a resource is determined by PV Water to be feasible, then Mitigation Measures CUL-1h shall be implemented for that resource.

### **Mitigation Measure CUL-1e: Development of a Phase III Archaeological Resources Data Recovery and Treatment Plan**

The qualified archaeologist shall prepare a Phase III Archaeological Resources Data Recovery and Treatment Plan for all significant resources that will be impacted by the proposed Project, including those that qualify as historical resources, unique archaeological resources, and/or tribal cultural resources. When determining if data recovery is necessary, the qualified archaeologist shall first consider if the data potential of the impacted portion of the site has been exhausted through previous testing. The plan shall be submitted to PV Water for review and approval prior to the start of field work for data recovery efforts for resources that are eligible under Criterion D/4 (data potential). Data recovery field work shall be completed prior to the start of any Project-related ground-disturbing activity. Treatment for resources that are eligible under Criteria A/1 (events), B/2 (persons), and/or C/3 (design/workmanship) shall be completed within 3 years of completion of the Projects. The Phase III Archaeological Resources Data Recovery and Treatment Plan shall include:

- *Research Design.* The plan shall outline the applicable cultural context(s) for the region, identify research goals and questions that are applicable to each resource or class of resources, and list the data needs (types, quantities, quality) required to answer each research question. The research design shall address all four National Register/California Register Criteria (A/1-D/4) and identify the methods that will be required to inform treatment, such as subsurface investigation, documentary/archival research, and/or oral history, depending on the nature of the resource.
- *Data Recovery for Resources Eligible under Criterion D/4.* The plan shall outline the field and laboratory methods to be employed, and any specialized studies that will be conducted, as part of the data recovery effort for resources that are eligible under National Register/California Register Criterion D/4 (data potential). If a resource is eligible under additional criteria, treatment beyond data recovery shall be implemented.
- *Treatment for Resources Eligible under Criteria A/1, B/2, and/or C/3.* In the event a resource is eligible under National Register/California Register Criteria A/1 (events), B/2 (persons), or C/3 (design/workmanship), then resource-specific treatment shall be developed to mitigate Project-related impacts to the degree feasible. That could include forms of documentation, interpretation, public outreach, ethnographic and language studies, publications, and educational programs, depending on the nature of the resource, and may require the retention of additional technical specialists. Treatment measures shall be generally outlined in the plan based on existing information on the resource. Once data recovery is completed and the results are available to better inform resource-specific treatment, the treatment measures shall be formalized and implemented. Treatment shall be developed by the qualified archaeologist in consultation with PV Water and one or more Native American Tribal representatives listed on the California Native American Heritage Commission's contact list for the Projects for resources that are Native American in origin.
- *Security Measures.* The plan shall include recommended security measures to protect archaeological resources from vandalism, looting, and non-intentionally damaging activities during field work.
- *Procedures for Discovery of Human Remains and Associated Funerary Objects.* The plan shall outline the protocols and procedures to be followed in the event that human remains and associated funerary objects are encountered during field work. These

shall include stop-work and protective measures, notification protocols, and compliance with California Health and Safety Code section 7050.5 and PRC section 5097.98. See also CUL-2.

- *Reporting Requirements.* Upon completion of data recovery for resources eligible under Criterion D/4, the qualified archaeologist shall document the findings in a Phase III Archaeological Data Recovery Report. The draft Phase III Archaeological Data Recovery Report shall be submitted to PV Water within 360 days after completion of data recovery, and the final Phase III Archaeological Data Recovery Report shall be submitted to PV Water within 60 days after the receipt of PV Water comments. The qualified archaeologist shall also submit the final Phase III Archaeological Data Recovery Report to the Northwest Information Center.

Upon completion of all other treatment for resources eligible under Criteria A/1, B/2, and C/3, the qualified archaeologist shall document the resource-specific treatment that was implemented for each resource and verification that treatment has been completed in a technical document (report or memorandum). The document shall be provided to PV Water within 30 days after completion of treatment.

- *Curation Requirements.* The plan shall stipulate curation of cultural materials in accordance with Mitigation Measure CUL-11.
- *Protocols for Native American Monitoring and Input.* The plan shall outline the role and responsibilities of Native American Tribal representatives. It shall include communication protocols and an opportunity and timelines for review of cultural resources documents. The plan shall include provisions for full-time Native American monitoring during field work (see Mitigation Measure CUL-1j).

#### **Mitigation Measure CUL-1f: Development of a Cultural Resources Monitoring and Mitigation Program**

The qualified archaeologist shall prepare a Cultural Resources Mitigation and Monitoring Program (CRMMP) based on the final approved Project design plans. The CRMMP shall be submitted to PV Water at least 60 days prior to the start of any ground-disturbing activities. The CRMMP shall include:

- *Provisions for Archaeological Monitoring.* The CRMMP shall outline the archaeological monitor(s) responsibilities and requirements (refer to Mitigation Measure CUL-1i).
- *Procedures for Discovery of Archaeological Resources.* Procedures to be implemented in the event of an archaeological discovery shall be fully defined in the CRMMP, and shall include stop-work and protective measures, notification protocols, procedures for significance assessments, and appropriate treatment measures. The CRMMP shall state avoidance or preservation in place is the preferred manner of mitigating impacts to historical resources, unique archaeological resources, and tribal cultural resources, but shall provide procedures to follow should PV Water determine that avoidance is infeasible in light of factors such as the nature of the find, Project design, costs, and other considerations. See also Mitigation Measure CUL-1k.

If, based on the recommendation of the qualified archaeologist, it is determined that a discovered archaeological resource constitutes a historical resource, unique

archaeological resource, and/or tribal cultural resource pursuant to CEQA and data recovery through excavation is the only feasible mitigation available, a Phase III Archaeological Resources Data Recovery and Treatment Plan shall be prepared and implemented by the qualified archaeologist in coordination with PV Water that provides for the adequate recovery of the scientifically consequential information contained in the archaeological resource (see Mitigation Measure CUL-1e). PV Water, or its designee, shall consult with one or more Native American representatives listed on the California Native American Heritage Commission's contact list for the Projects in determining treatment of resources that are Native American in origin to ensure that cultural values ascribed to the resource, beyond those that are scientifically important, are considered.

- *Procedures for Discovery of Human Remains and Associated Funerary Objects.* The CRMMP shall outline the protocols and procedures to be followed in the event that human remains and associated funerary objects are encountered during construction. These shall include stop-work and protective measures, notification protocols, and compliance with California Health and Safety Code Section 7050.5 and Public Resources Code Section 5097.98 (refer to Mitigation Measure CUL-2).
- *Reporting Requirements.* The CRMMP shall outline provisions for weekly and final reporting. The qualified archaeologist shall prepare weekly status reports detailing activities and locations observed (including maps) and summarizing any discoveries for the duration of monitoring to be submitted to PV Water via e-mail for each week in which monitoring activities occur. Upon completion of ground disturbance, the qualified archaeologist shall prepare a draft Archaeological Resources Monitoring Report and submit it to PV Water within 60 days after completion of the monitoring program or of treatment for significant discoveries should treatment extend beyond the cessation of monitoring. The final Archaeological Resources Monitoring Report shall be submitted to PV Water within 30 days of receipt of PV Water comments. The qualified archaeologist shall also submit the final Archaeological Resources Monitoring Report to the Northwest Information Center. If human remains are encountered, a confidential report documenting all activities shall be submitted to the California Native American Heritage Commission within 90 days after completion of any treatment (refer to Mitigation Measure CUL-2).
- *Curation Requirements.* The CRMMP shall stipulate curation of cultural materials in accordance with Mitigation Measure CUL-11.
- *Protocols for Native American Monitoring and Input.* The CRMMP shall outline the role and responsibilities of Native American Tribal representatives. It shall include communication protocols, an opportunity and timelines for review of cultural resources documents related to discoveries that are Native American in origin, and provisions for Native American monitoring. The CRMMP shall include provisions for Native American monitoring of ground disturbance, as well as during any subsurface investigation and data recovery for discovered resources that are Native American in origin (refer to Mitigation Measures CUL-1j).

#### **Mitigation Measure CUL-1g: Construction Worker Cultural Resources Sensitivity Training Program**

A worker cultural resources sensitivity training program shall be implemented for the Projects. Prior to any ground-disturbing activity, an initial sensitivity training session shall be provided by the qualified archaeologist to all project employees, contractors,

subcontractors, and other professionals prior to their involvement in any ground-disturbing activities, with subsequent training sessions occurring on a monthly basis to accommodate new personnel becoming involved in the Projects (subsequent sessions can be coordinated with other Worker Environmental Awareness Program or safety training that may be required). Construction personnel shall be informed of the sensitivity of the Project sites and given a tutorial providing information on how to identify the types of resources that may be encountered. They shall be instructed on the proper procedures to be enacted in the event of an inadvertent discovery of archaeological resources or human remains, confidentiality of discoveries, and safety precautions to be taken when working with cultural resources monitors. PV Water shall make it a requirement that construction personnel are made available for and attend training sessions and retain documentation demonstrating attendance.

#### **Mitigation Measure CUL-1h: Designation of Environmentally Sensitive Areas**

Prior to the start of ground disturbance, the portion of any avoided archaeological resources nearest Project-related activities shall be marked as Environmentally Sensitive Areas (this includes archaeological resources that qualify as historical resources, unique archaeological resources and/or tribal cultural resources, or those that have not been evaluated). These areas shall not be marked as archaeological resources, but shall be designated as “exclusion zones” on Project plans and protective fencing in order to discourage unauthorized disturbance or collection of artifacts. The qualified archaeologist, or their designee, shall periodically inspect these areas for the duration of Project activities in the vicinity to ensure that protective fencing remains intact and no incursions into the exclusion zones have occurred. Upon completion of all Project-related activities in the vicinity, all protective fencing and signage shall be removed.

#### **Mitigation Measure CUL-1i: Archaeological Monitoring**

All Project-related ground disturbance that produces visible soils shall be subject to archaeological monitoring (i.e., horizontal directional drilling need not be monitored if the archaeologist would not be able to view soils or spoils piles). The archaeological monitor(s) shall be familiar with the types of resources that could be encountered and shall work under the direct supervision of the qualified archaeologist. The archaeological monitor(s) shall keep daily logs detailing the types of activities and soils observed, and any discoveries. Archaeological monitor(s) shall have the authority to halt and re-direct ground disturbing activities in the event of a discovery until it has been assessed for significance and treatment implemented, if necessary. In the event of a discovery, the archaeological monitor shall follow the notification protocols outlined in the CRMMP (refer to Mitigation Measures CUL-1f), including notifying the Construction Manager and qualified archaeologist. The qualified archaeologist shall determine if the discovery is significant, and if so, develop appropriate treatment (refer to Mitigation Measures CUL-1c, CUL-1d, and CUL-1e). PV Water and the qualified archaeologist shall consult with one or more Native American representatives listed on the California Native American Heritage Commission’s contact list for the Projects for resources that are Native American in origin, and in accordance with the protocols and procedures outlined in the CRMMP (refer to Mitigation Measure CUL-1f).

#### **Mitigation Measure CUL-1j: Native American Monitoring**

Prior to the start of any ground-disturbing activity, PV Water shall contact one or more of the Native American tribes listed on the California Native American Heritage

Commission's contact list for the Projects and offer to retain a monitor if the tribe wishes to participate in monitoring efforts. If resources of Native American origin are discovered, the retained Native American monitor shall provide monitoring services in accordance with protocols and procedures outlined in the CRMMP (refer to Mitigation Measure CUL-1f).

#### **Mitigation Measure CUL-1k: Inadvertent Discovery of Archaeological Resources**

In the event that archaeological resources are encountered during ground disturbance, all activity in the vicinity of the find shall cease (within 100 feet), and the protocols and procedures for discoveries outlined in the CRMMP shall be implemented (refer to Mitigation Measure CUL-1f). The discovery shall be evaluated for potential significance by the qualified archaeologist. If the qualified archaeologist determines that the resource may be significant, the qualified archaeologist shall develop an appropriate treatment plan for the resource in accordance with the CRMMP (refer to Mitigation Measure CUL-1f). When assessing significance and developing treatment for resources that are Native American in origin, the qualified archaeologist and PV Water shall consult with one or more Native American representatives listed on the California Native American Heritage Commission's contact list for the Projects to determine if it qualifies as a tribal cultural resource pursuant to Public Resources Code section 21074. The qualified archaeologist shall also determine if work may proceed in other parts of the Project areas while treatment (e.g., data recovery) for cultural resources is being carried out.

#### **Mitigation Measure CUL-1l: Curation**

Disposition of Native American archaeological materials shall be determined through consultation between one or more Native American representatives listed on the California Native American Heritage Commission's contact list for the Projects, the qualified archaeologist, and PV Water. Disposition of human remains and associated funerary objects shall be determined through consultation between the Most Likely Descendant, landowner, and PV Water (refer to Mitigation Measure CUL-2).

Any significant historic-period archaeological materials that are not Native American in origin shall be curated at a repository accredited by the American Association of Museums that meets the standards outlined in 36 CFR 79.9. If no accredited repository accepts the collection, then it may be curated at a non-accredited repository as long as it meets the minimum standards set forth by 36 CFR 79.9. If neither an accredited nor a non-accredited repository accepts the collection, then it may be offered to a public, non-profit institution with a research interest in the materials, or donated to a local school or historical society in the area for educational purposes, to be determined by the qualified archaeologist in consultation with PV Water.

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#### **Impact CUL-3: The Projects could disturb human remains, including those interred outside of formal cemeteries. (*Less than Significant with Mitigation*)**

The Projects could disturb human remains, including those interred outside of formal cemeteries. The Projects would directly impact archaeological sites known to contain Native American burials. With implementation of **Mitigation Measures CUL-1a, CUL-1f, CUL-1g, CUL-1i, and CUL-1j**, as outlined under Impact CUL-2, plus **Mitigation Measure CUL-2**, which require

retention of a qualified archaeologist, development of a cultural resources monitoring and mitigation program, construction worker cultural resources sensitivity training, archaeological and Native American monitoring, and halting work and complying with Public Resources Code Section 5097.98 and Health and Safety Code Section 7050.5, potentially significant impacts to human remains would be reduced to *less than significant*.

**Mitigation Measures CUL-1a: Retention of a Qualified Archaeologist, CUL-1f: Development of a Cultural Resources Monitoring Mitigation Program, CUL-1g: Construction Worker Cultural Resources Sensitivity Training Program, CUL-1i: Archaeological Monitoring, and CUL-1j: Native American Monitoring.** (refer to Impact CUL-2)

**Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains**

If human remains are encountered, then PV Water shall halt work in the vicinity (within 100 feet) of the discovery and contact the County Coroner in accordance with Public Resources Code Section 5097.98 and Health and Safety Code Section 7050.5. If the County Coroner determines the remains are Native American, then the Coroner shall notify the California Native American Heritage Commission in accordance with Health and Safety Code subdivision 7050.5(c), and Public Resources Code Section 5097.98. The California Native American Heritage Commission shall designate a Most Likely Descendant for the remains pursuant to Public Resources Code Section 5097.98. Until the landowner has conferred with the Most Likely Descendant, the contractor shall ensure the immediate vicinity where the discovery occurred is not disturbed by further activity, is adequately protected according to generally accepted cultural or archaeological standards or practices, and that further activities take into account the possibility of multiple burials. If human remains are encountered, the qualified archaeologist, in consultation with the Most Likely Descendant shall prepare a confidential report documenting all activities and it shall be submitted to the California Native American Heritage Commission within 90 days after completion of any treatment.

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***Cumulative Impacts***

**Impact C-CUL-1: The Projects, in combination with past, present, and probable future projects in the area, could have cumulatively considerable impacts on cultural resources. (*Less than Significant with Mitigation*)**

This section presents an analysis of the cumulative effects of the Projects in combination with other past, present, and probable future projects that could cause cumulatively considerable impacts. Related projects in the vicinity of the Projects are presented in Table 3.1-1 and Figure 3.1-1 in Section 3.1 of this EIR.

The geographic scope for cumulative impacts to cultural resources (i.e., historical resources, unique archaeological resources, and human remains) consists of the Pajaro Valley. This geographic scope of analysis is appropriate because the historical resources, unique archaeological resources, and human remains within this area are similar and share a common heritage with the resources in the vicinity of the Projects. The temporal scope for cumulative



impacts to cultural resources encompasses both the short-term and long-term cumulative impacts of the Projects, in conjunction with other cumulative projects in the area.

### **Historical Resources (not including archaeological resources)**

Cumulative impacts to historical resources evaluate whether impacts of the Projects and related projects, when taken as a whole, substantially diminish the number of historical resources within the same or similar context or property type. Although impacts to historical resources tend to be site specific, cumulative impacts may involve resources that are examples of the same style or property type as those within the Project areas. Cumulative impacts would also occur if the Projects and related projects cumulatively affect historical resources in the immediate vicinity.

No built environment resources qualifying as historical resources would be impacted by the Projects. As such, the Projects could not cause or contribute to any potential significant cumulative impact to such resources.

### **Archaeological Resources**

Table 3.1-1 and Figure 3.1-1 present multiple projects that would result in ground disturbance, including those within areas of high archaeological sensitivity, are proposed throughout the geographic scope of analysis. Cumulative impacts to archaeological resources could occur if any of these projects, in conjunction with the Projects, would have impacts on archaeological resources that, when considered together, would be significant.

As described above under Impact CUL-2, five archaeological resources (CA-SCR-60/130, -61, -155, -156, and ESA-PVWA-MN-01) overlap with the proposed Project components and would be directly or potentially directly impacted through Project-related ground disturbing activities. In addition, portions of the Project sites have high potential to contain subsurface, buried archaeological resources.

Other projects described in Table 3.1-1 that include ground disturbance could result in similar impacts to known and unknown archaeological resources. The incremental impact of the Projects combined with those of the cumulative projects could result in a significant cumulative impact on archaeological resources. However, Mitigation Measures CUL-1a through CUL-1l (described above) would ensure that the Projects' contribution toward cumulative effects on archaeological resources would not be cumulatively considerable.

### **Human Remains**

As noted, multiple projects that would result in ground disturbance are proposed throughout the geographic scope of analysis (refer to Table 3.1-1 and Figure 3.1-1 for projects). Cumulative impacts to human remains could occur if any of these projects, in conjunction with the Projects, would have impacts on human remains that, when considered together, would be significant.

As described above under Impact CUL-3, the Projects would include ground disturbance within a resource known to contain human remains, and the Projects have a high likelihood of disturbing human remains. Other projects in the cumulative scenario that include ground disturbance could result in similar impacts to human remains. The incremental impact of the Projects combined

with those of the cumulative projects could result in a cumulative impact on human remains. However, Mitigation Measures CUL-1a, CUL-1f, CUL-1g, CUL-1i, and CUL-1j, which require retention of a qualified archaeologist, development of a cultural resources monitoring and mitigation program, construction worker cultural resources sensitivity training, archaeological and Native American monitoring, and Mitigation Measure CUL-2, which requires halting work and complying with Public Resources Code Section 5097.98 and Health and Safety Code Section 7050.5, would ensure that the Projects' contribution toward cumulative effects on human remains would not be cumulatively considerable.

**Mitigation Measures CUL-1a: Retention of a Qualified Archaeologist, CUL-1b: Pre-Construction Phase I Cultural Resources Survey, CUL-1c: Pre-Construction Phase II Archaeological Testing and Evaluation, CUL-1d: Avoidance and Preservation in Place of Archaeological Resources, CUL-1e: Development of a Phase III Archaeological Resources Data Recovery and Treatment Plan, CUL-1f: Development of a Cultural Resources Monitoring and Mitigation Program, CUL-1g: Construction Worker Cultural Resources Sensitivity Training Program, CUL-1h: Designation of Environmentally Sensitive Areas, CUL-1i: Archaeological Monitoring, CUL-1j: Native American Monitoring, CUL-1k: Inadvertent Discovery of Archaeological Resources, CUL-1l: Curation (refer to Impact CUL-2)**

**Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains (refer to Impact CUL-3)**

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## 3.11 Tribal Cultural Resources

This section presents an analysis of potential impacts related to tribal cultural resources that would result from implementation of the proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects). The analysis is based on a Sacred Lands File (SLF) search through the Native American Heritage Commission (NAHC) and outreach with California Native American tribes. Because Tribal Cultural Resources were not analyzed in the 2014 Basin Management Plan Update Program Environmental Impact Report (2014 BMP Update PEIR), there are no adopted mitigation measures to be considered part of the Projects for this environmental resource.

### 3.11.1 Setting

#### 3.11.1.1 Ethnographic Setting

Based on a compilation of ethnographic, historic, and archaeological data, Milliken et al.<sup>1</sup> describes a group known as the Ohlone, who once occupied the general vicinity of the Project sites. While traditional anthropological literature portrayed the Ohlone peoples as having a static culture, it is now better understood that many variations of culture and ideology existed within and between villages. California's Native Americans saw themselves as members of specific villages, perhaps related to others by marriage or kinship ties, but viewing the village as the primary identifier of their origins.

Levy<sup>2</sup> describes the language group spoken by the Ohlone, known as "Costanoan." This term is originally derived from a Spanish word designating the coastal peoples of Central California. Today Costanoan is used as a linguistic term that references to a larger language family spoken by distinct sociopolitical groups that spoke at least eight languages (as different as Spanish is from French) of the same Penutian language group. The Ohlone once occupied a large territory from San Francisco Bay in the north to the Big Sur and Salinas Rivers in the south. The Projects are in the greater Rumsen-speaking tribal area; their territory extended from Point Sur northward to the lower Pajaro River, and included the present-day cities of Monterey, Seaside, Marina, and Carmel. Dialects of the Rumsen language were spoken by four independent local tribes, including Rumsen in Monterey, Ensen of the Salinas vicinity, Calenda Ruc of the central shoreline of Monterey Bay, and Sargentaruc of the Big Sur Coast. Five villages were present in Rumsen territory at the time of Spanish contact: Achasta, Tucutnut, Soccorronda, Echilat and Ichxenta.<sup>3</sup>

Ohlone engaged in hunting and gathering. Their territory encompassed both coastal and open valley environments that contained a wide variety of resources, including grass seeds, acorns, bulbs and tubers, bear, deer, elk, antelope, a variety of bird species, and rabbit and other small

<sup>1</sup> Milliken, Randall; Shoup, Laurence H., and Beverly R. Ortiz, Ohlone/Costanoan Indians of the San Francisco Peninsula and their Neighbors, Yesterday and Today. Report prepared by: Archaeological and Historical Consultants. Prepared for National Park Service, 2009.

<sup>2</sup> Levy, R., Costanoan. In California, edited by R.F. Heizer, pp. 485–495. Handbook of North American Indians, Volume 8. William G. Sturtevant, general editor. Smithsonian Institution, Washington D.C., 1978.

<sup>3</sup> Milliken, Randall; Shoup, Laurence H., and Beverly R. Ortiz, Ohlone/Costanoan Indians of the San Francisco Peninsula and their Neighbors, Yesterday and Today. Report prepared by: Archaeological and Historical Consultants. Prepared for National Park Service, 2009.

mammals. The Ohlone acknowledged private ownership of goods and songs, and village ownership of rights to land and/or natural resources; they appear to have aggressively protected their village territories, requiring monetary payment in the form of clamshell beads for access rights, and even shooting trespassers if caught. After European contact, Ohlone society was severely disrupted by missionization, disease, and displacement. Today, the Ohlone, while not federally recognized, still have a strong presence in the Monterey Bay Area.

### **3.11.1.2 Identification of Tribal Cultural Resources**

#### ***Tribal Cultural Resources Definition***

According to Public Resources Code Section 21074, tribal cultural resources are:

Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are any of the following:

- A. Included or determined to be eligible for inclusion in the California Register of Historical Resources (California Register)
- B. Included in a local register of historical resources
- C. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant.

A cultural landscape that meets these criteria is a tribal cultural resource to the extent that the landscape is geographically defined in terms of the size and scope of the landscape. Historical resources, unique archaeological resources, or non-unique archaeological resources may also be tribal cultural resources if they meet these criteria.

Refer also to Section 3.11.3.1, Significance Criteria, for additional detail regarding this definition.

#### ***Native American Heritage Commission***

The NAHC maintains a confidential file that contains sites of traditional, cultural, or religious value to the Native American community. The NAHC was contacted on February 11, 2020 to request a search of the SLF for the Projects. The NAHC responded to the request in a letter dated February 13, 2020 indicating that a search of the SLF returned positive results and that the Costanoan Ohlone Rumsen-Mutsun Tribe should be contacted for more information. Additionally, the NAHC provided a list of Native American tribes to be contacted as these tribes may also have knowledge of cultural resources in the Project sites.

#### ***Native American Outreach***

No California Native American tribes have requested notification of projects under the jurisdiction of Pajaro Valley Water Management Agency (PV Water) as required by Public Resources Code Section 21080.3.1(b),<sup>4</sup> and formal consultation was not conducted. However, PV Water conducted

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<sup>4</sup> Section 3.11.2.1 summarizes the consultation requirements of Public Resources Code Section 21080.3 and related code sections.

Native American outreach in the form of certified letters, phone calls, and e-mail to solicit information and concerns about the Projects and sensitive resources in the vicinity.

Letters were sent via certified mail on February 13, 2020 and by e-mail on February 14, 2020 to all individuals listed on the NAHC contact list for the Projects. Follow-up phone calls were conducted on February 24, 2020.

The respondents generally expressed concerns about prehistoric archaeological resources and human remains in the area (see below for a discussion of prehistoric or Native American archaeological resources identified within or adjacent to the Project sites). Respondents requested a records search, construction worker training, archaeological and Native American monitoring of ground disturbance, and avoidance of archaeological resources and human remains. Aspects of their requests (such as worker training, avoidance where feasible, and archaeological and Native American monitoring) have been incorporated into the mitigation measures outlined in Section 3.10, Cultural Resources. None of the respondents specifically identified a tribal cultural resource as defined by Public Resources Code Section 21074 within the Project sites. **Table 3.11-1** summarizes the results of all outreach and specific comments provided by each respondent.

**TABLE 3.11-1  
NATIVE AMERICAN OUTREACH**

Individual	Title	Tribe	Date(s) Letter Sent	Date(s) E-Mail Sent	Date(s) of Follow-up Phone Call	Comments
Monica Arellano	Vice Chairwoman	Muwekma Ohlone Indian Tribe of the San Francisco Bay Area	02/13/20	02/14/20	02/24/20	Vice Chairwoman Arellano's voicemail was full. No response to the certified letter or e-mail were received.
Valentin Lopez	Chairperson	Amah Mutsun Tribal Band	02/13/20	02/14/20	02/24/20	Chairperson Lopez's voicemail was full. No response to the certified letter or e-mail were received.
Patrick Orozco	Chairman	Costanoan Ohlone Rumsen-Mutsun Tribe	02/13/20	02/14/20	02/24/20	Chairman Orozco expressed concern regarding the Projects because he knows that one archaeological site with human burials is within the Projects' footprint. The Chairman stated that there are additional archaeological sites (CA-SCR-60, -61, -101, -151, -155, -156) that contain burials. Additionally, the Chairman knows that there are unrecorded archaeological sites nearby. Chairman Orozco stated that these areas should not be disturbed.
Ann Marie Sayers	Chairperson	Indian Canyon Mutsun Band of Costanoan	02/13/20	02/14/20	02/24/20	Chairperson Sayers recommended archaeological and Native American monitoring for all Project-related earth moving.
Irene Zwierlein	Chairperson	Amah Mutsun Tribal Band of Mission San Juan Bautista	02/13/20	02/14/20	02/24/20	Chairperson Zwierlein recommended the following: 1) that a search be conducted through the state clearinghouse (not the NAHC); 2) that crew members/equipment operators on site undergo training on how to identify archaeological resources and what to do when they are identified; and 3) that an archaeological or Native American monitor be present on site during Project-related construction activities.

### Prehistoric Archaeological Resources

Records search conducted in 2017 through the California Historical Resources Information System (CHRIS) Northwest Information Center (NWIC) housed at Sonoma State University and a cultural resources survey conducted in 2020 identified five Native American prehistoric archaeological resources within or immediately adjacent to (within 150 feet of) the Projects (Table 3.11-2). These resources include sites with shell middens, flaked stone debitage, ground stone, and Native American burials.

**TABLE 3.11-2**  
**PREHISTORIC ARCHAEOLOGICAL RESOURCES WITHIN OR IMMEDIATELY ADJACENT TO THE PROJECTS**

Resource Number	Resource Type	Description	National Register/California Register Eligibility Status
CA-SCR-60/130	Prehistoric archaeological site	Shell midden with flaked stone debitage and Native American burials	Determined eligible for National Register; Listed in California Register <sup>a,b</sup>
CA-SCR-61	Prehistoric archaeological site	Shell midden with flaked stone debitage and Native American burials	Not evaluated <sup>c</sup>
CA-SCR-155	Prehistoric archaeological site	Shell midden	Not evaluated <sup>d</sup>
CA-SCR-156	Prehistoric archaeological site	Shell midden and possible Native American burials	Not evaluated <sup>e</sup>
ESA-PVWA-MN-01	Prehistoric archaeological site	Flaked stone debitage and shell	Not eligible <sup>f</sup>

**NOTES:**

- <sup>a</sup> Culleton, Brendan J., Robert H. Gargett, and Thomas L. Jackson, *Data Recovery Excavations at CA-SCR-60/130 for the Pajaro Valley Water Management Agency Local Water Supply and Distribution Project*. Prepared for Pajaro Valley Water management Agency. Prepared by Pacific Legacy. Document on file at NWIC (S-37116). 2005.
- <sup>b</sup> Pursuant to California Public Resources Code Section 5024.1(d)(1), resources formally determined eligible for, or listed in, the National Register through National Historic Preservation Act Section 106 review of federal undertakings are automatically included in the California Register.
- <sup>c</sup> Morgan, Christopher, and Thomas L. Jackson, *Archaeological Test Excavations at CA-SCR-60 and CA-SCR-61 for the Pajaro Valley Water Management Agency Local Water Supply Project*. Prepared for Montgomery-Watson. Prepared by Pacific Legacy, Inc. Document on file at Pajaro Valley Water Management Agency. 1999.
- <sup>d</sup> Chavez, D., Department of Parks and Recreation 523 Forms for CA-SCR-155. Document on file at NWIC, 1977.
- <sup>e</sup> Chavez, D., Department of Parks and Recreation 523 Forms for CA-SCR-156. Document on file at NWIC, 1977.
- <sup>f</sup> Ehringer, Candace, Chris Lockwood, Michael Vader, and Fatima Clark, *Watsonville Slough System Managed Aquifer Recharge and Recovery Projects: Cultural Resources Assessment Report*, prepared for Pajaro Valley Water Management Agency, prepared by ESA, August 2020.

## 3.11.2 Regulatory Framework

### 3.11.2.1 Federal and State

#### **Assembly Bill 52 and Related Public Resources Code Sections**

Assembly Bill (AB) 52 was approved in September 2014 to amend California Public Resources Code Section 5097.94, and add Public Resources Code Sections 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2, and 21084.3. The primary intent of AB 52 is to include California Native American Tribes early in the environmental review process and to establish a new category of resources related to Native Americans that require consideration under the California Environmental Quality Act (CEQA), known as tribal cultural resources. Public Resources Code Section 21074(a)(1) and (2) defines tribal cultural resources as “sites, features,

places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe” that are either included or determined to be eligible for inclusion in the California Register or included in a local register of historical resources, or a resource that is determined to be a tribal cultural resource by a lead agency, in its discretion and supported by substantial evidence. On July 30, 2016, the California Natural Resources Agency adopted the final text for tribal cultural resources update to Appendix G of the CEQA *Guidelines*, which was approved by the Office of Administrative Law on September 27, 2016.

Pursuant to Public Resources Code Section 21080.3.1(d), within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, the lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American Tribes that have requested notice and who are also affiliated with the geographic area of the proposed project (as defined in Public Resources Code Section 21073). Tribes interested in consultation must respond in writing within 30 days from receipt of the lead agency’s formal notification, and the lead agency must begin consultation within 30 days of receiving the tribe’s request for consultation (Public Resources Code Sections 21080.3.1(d) and 21080.3.1(e)).

Public Resources Code Section 21080.3.2(a) identifies the following as potential consultation discussion topics: the type of environmental review necessary; the significance of tribal cultural resources; the significance of the project’s impacts on the tribal cultural resources; project alternatives or appropriate measures for preservation; and mitigation measures. Consultation is considered concluded when either: (1) the parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or (2) a party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached (Public Resources Code Section 21080.3.2(b)).

If a California Native American tribe has requested consultation pursuant to Section 21080.3.1 and has failed to provide comments to the lead agency, or otherwise failed to engage in the consultation process, or if the lead agency has complied with Section 21080.3.1(d) and the California Native American tribe has failed to request consultation within 30 days, the lead agency may certify an EIR or adopt a Mitigated Negative Declaration (Public Resources Code Section 21082.3(d)(2) and (3)).

Public Resources Code Section 21082.3(c)(1) states that any information, including, but not limited to, the location, description, and use of the tribal cultural resources, that is 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 without the prior consent of the tribe that provided the information. If the lead agency publishes any information submitted by a California Native American tribe during the consultation or environmental review process, that information 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.

### **California Government Code Sections 6254(r) and 6254.10**

Section 6254(r) explicitly authorizes public agencies to withhold information from the public relating to “Native American graves, cemeteries, and sacred places maintained by the Native American Heritage Commission.” Section 6254.10 specifically exempts from disclosure requests for “records that relate to archaeological site information and reports, maintained by, or in the possession of the Department of Parks and Recreation, the State Historical Resources Commission, the State Lands Commission, the Native American Heritage Commission, another state agency, or a local agency, including the records that the agency obtains through a consultation process between a Native American tribe and a state or local agency.”

#### **3.11.2.2 Local**

Table 2-8 in Chapter 2, *Project Description*, identifies the approvals from Santa Cruz County required for the Projects. **Table 3.11-3** presents pertinent local plans and policies regarding tribal cultural resources to support County consideration of project consistency with general policies.<sup>5</sup> In some cases, local policies are used in this EIR as criteria to determine the significance of physical effects on the environment (e.g., Impact NOI-1 in Section 3.8, Noise and Vibration).

### **3.11.3 Impacts and Mitigation Measures**

#### **3.11.3.1 Significance Criteria**

In accordance with the CEQA, state CEQA *Guidelines* (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Projects could have a significant impact if they were to:

- Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:
  - Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or
  - A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

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<sup>5</sup> California Government Code Section 53091 exempts agencies like PV Water from complying with local building and zoning ordinances when locating or constructing facilities for the production, generation, storage, treatment, or transmission of water. California Government Code Section 65402(c) requires that PV Water notify cities and counties of its plans to construct projects or to acquire or dispose of property. The planning agency then has 40 days to determine project consistency with its general plan. If the planning agency disapproves, the disapproval may be overruled by PV Water.



**TABLE 3.11-3  
SANTA CRUZ COUNTY PLANS AND POLICIES RELEVANT TO THE PROJECTS**

<b><i>Santa Cruz County General Plan/Local Coastal Program</i></b>
<b>5.19.1 Evaluation of Native American Cultural Sites.</b> Protect all archaeological resources until they can be evaluated. Prohibit any disturbance of Native American Cultural Sites without an appropriate permit. Maintain the Native American Cultural Sites ordinance.
<b>5.19.5 Native American Cultural Sites.</b> Prohibit any disturbance of Native American Cultural Sites without an archaeological permit.
<b><i>Santa Cruz County Municipal Code</i></b>
<b>16.40 Native American Cultural Sites</b>
<b>16.40.030 Archaeological assessments required.</b>
<p>A. Archaeological Survey. An archaeological survey shall be required for any discretionary project which will result in ground disturbance and which will be located within a mapped archaeological sensitive area. In addition, an archaeological survey shall be required for any project which will result in ground disturbance within 500 feet of a recorded Native American cultural site. The archaeological survey shall be prepared according to procedures established by the Planning Director.</p> <p>B. Archaeological Report. An archaeological report shall be required prior to the issuance of any project permits when a project site contains a culturally significant Native American cultural site and when development of the project will result in the disturbance of that site. In some cases, an archaeological report may be required before an archaeological site development permit is issued, pursuant to SCCC 16.40.050.</p>
<b>16.40.040 Site discovered during excavation or development.</b>
<p>A. Presence of Artifacts and/or Human Remains. Any property owner who, at any time in the preparation for or process of excavating or otherwise disturbing the ground, discovers any human remains of any age, or any artifact or other evidence of a Native American cultural site which reasonably appears to exceed 100 years of age, shall:</p> <ol style="list-style-type: none"> <li>1. Cease and desist from all further excavations and disturbances within 200 feet of the discovery.</li> <li>2. Arrange for staking completely around the area of discovery by visible stakes no more than 10 feet apart, forming a circle having a radius of no less than 100 feet from the point of discovery; provided, however, that such staking need not take place on adjoining property unless the owner of the adjoining property authorizes such staking.</li> <li>3. Notify the Sheriff-Coroner of the discovery if human remains have been discovered. Notify the Planning Director if the discovery contains no human remains.</li> <li>4. Grant all duly authorized representatives of the Coroner and the Planning Director permission to enter onto the property and to take all actions consistent with this chapter.</li> </ol> <p>B. Recent Human Remains. If the Coroner determines that the remains are of recent origin, and that they are not a part of a site, then the provisions of this chapter shall no longer apply, and the Coroner shall notify the property owner when excavation or development may proceed. If the Coroner determines that the remains are not obviously of recent origin, the Coroner shall forthwith notify the Planning Director of the discovery of said remains.</p> <p>C. Property Inspection. Upon notification of the discovery, the Planning Director shall arrange for an inspection of the property. Said inspection shall take place within 72 hours of notice to the Director of the discovery. A representative of local Native California Indian groups, such as N.I.C.P.A., and the property owner shall be notified of the time of the inspection and both may accompany the Director and his/her representative at all times on the property. The purpose of the inspection shall be to determine whether the discovery is a site of cultural significance.</p>
<p>SOURCE: County of Santa Cruz, <i>1994 General Plan/Local Coastal Program, Chapter 5 – Conservation and Open Space</i>, Effective December 19, 1994; County of Santa Cruz, <i>Santa Cruz County Code, Chapter 16.40 Native American Cultural Sites</i>, October 2, 2018.</p>

### 3.11.3.2 Methodology

As described in Section 3.1, this EIR provides an independent analysis of the Projects' potential environmental impacts. Because Tribal Cultural Resources were not analyzed in the 2014 BMP Update PEIR, there are no adopted mitigation measures to be considered part of the Projects for this environmental resource. The following methodology was used in assessing impacts to tribal cultural resources.

According to the PRC Section 21084.2, 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. While what constitutes a “substantial adverse change” to a tribal cultural resource is not defined in the section, guidance on what constitutes a substantial adverse change under CEQA can be drawn from *CEQA Guidelines* Section 15064.5(b). Although applicable specifically to historical resources (as defined in 15064.5(a)), an analogy can be drawn when assessing if there has been a substantial adverse change to a tribal cultural resource. *CEQA Guidelines* Section 15064.5(b)(1) defines a substantial adverse change as the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings, resulting in material impairment of the historical resource. According to *CEQA Guidelines* Section 15064.5(b)(2), the significance of a historical resource is materially impaired when a project:

- Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register; or
- Demolishes or materially alters in an adverse manner those physical characteristics that account for its inclusion in a local register of historical resources pursuant to Section 5020.1(k) of the PRC or its identification in an historical resources survey meeting the requirements of Section 5024.1(g) of the PRC, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or
- Demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its eligibility for inclusion in the California Register of Historical Resources as determined by a lead agency for purposes of CEQA.

In drawing an analogy, a substantial adverse change to a tribal cultural resource could be considered to be the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings, resulting in material impairment of the tribal cultural resource. Similarly, material impairment could include:

- Demolition or material alteration in an adverse manner to those characteristics of a tribal cultural resource that convey its significance and that justify its inclusion in or eligibility for listing in the California Register, or in a local register of historical resources as defined in PRC section 5020.1(k); or
- Demolition or material alteration in an adverse manner to those characteristics of a tribal cultural resource that convey its significance and that justify its eligibility for inclusion in the California Register pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, as determined by a lead agency in its discretion and supported by substantial evidence for purposes of CEQA.

PRC Section 21084.3 provides guidance on addressing impacts to tribal cultural resources and states that:

- (a) Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.
- (b) If the lead agency determines that a project may cause a substantial adverse change to a tribal cultural resource, and measures are not otherwise identified in the consultation process

provided in Section 21080.3.2, the following are examples of mitigation measures that, if feasible, may be considered to avoid or minimize the significant adverse impacts:

- (1) Avoidance and preservation of the resources in place, including, but not limited to, planning and construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
- (2) Treating the resource with culturally appropriate dignity taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
  - (A) Protecting the cultural character and integrity of the resource.
  - (B) Protecting the traditional use of the resource.
  - (C) Protecting the confidentiality of the resource.
- (3) Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
- (4) Protecting the resource.

CEQA *Guidelines* Section 15370 provides additional guidance on the types of mitigation that may be considered, and includes: avoiding impacts altogether; minimizing impacts; rectifying impacts through repair, rehabilitation, or restoration; reducing impacts through preservation; and compensating for impacts by providing substitute resources.

PRC Section 21082.3(b) indicates that if a project may have a significant impact on a tribal cultural resource, the agency's environmental document shall discuss whether the proposed project has a significant impact on an identified tribal cultural resource and whether feasible alternatives or mitigation measures avoid or substantially lessen the impact on the identified tribal cultural resource.

PRC Section 21080.3.2 indicates that as part of the consultation pursuant to Section 21080.3.1, California Native American Tribes may propose mitigation measures, including, but not limited to, those recommended in Section 21084.3, capable of avoiding or substantially lessening potential significant impacts to a tribal cultural resource or alternatives that would avoid significant impacts to a tribal cultural resource. Also, the lead agency may incorporate changes or additions to a project even if not legally required to do so.

### 3.11.3.3 Impacts and Mitigation Measures

**Impact TCR-1: The Projects could cause a substantial adverse change in the significance of a tribal cultural resource that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k). (*No impact*)**

Outreach to Native American tribal members did not result in the identification of tribal cultural resources as defined in Public Resources Code Section 21074(a)(1) and listed or eligible for

listing in the California Register or local register within the Project sites. One resource (CA-SC-60/130) listed in the California Register was identified in the Project sites. Although CA-SCR-60/130 has been previously listed in the California Register for its archaeological data potential (Criterion 4), it has not been evaluated for its eligibility for listing in the California Register under Criteria 1-3 or a local register for its significance and cultural value to a California Native American tribe as a tribal cultural resource pursuant to PRC Section 21074(a)(1). Rather, pursuant to PRC Section 21074(a)(2), CA-SCR-60/130 is being treated as a tribal cultural resource at the discretion of the lead agency based on substantial evidence (see Impact TCR-2 below). Three resources (CA-SCR-61, -155, and -156) have not been evaluated for their archaeological data potential nor for their significance and cultural value to a California Native American tribe as tribal cultural resources pursuant to PRC Section 21074(a)(1), but are also being treated as tribal cultural resource at the discretion of the lead agency based on substantial evidence (see Impact TCR-2 below). One resource (ESA-PVWA-MN-01) was evaluated for listing in the California Register under Criteria 1-4 and was found ineligible under all four criteria, and is not considered a tribal cultural resource. Therefore, no tribal cultural resources listed or eligible for listing in the California Register or a local register as defined in PRC Section 21074(a)(1) would be impacted by the Projects.

**Mitigation:** None required.

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**Impact TCR-2: The Projects could cause a substantial adverse change in the significance of a tribal cultural resource that has been determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. (*Less than significant with Mitigation*)**

Archival research, including a CHRIS-NWIC records search and SLF search, and outreach to California Native American tribal members resulted in the identification of four archaeological sites potentially qualifying as tribal cultural resources within or near the Project sites (CA-SCR-60/130, -61, -155, and -156). Based on previous investigations, accounts, and the geoarchaeological review (refer to Section 3.10, Cultural Resources), these four archaeological sites are known or assumed to contain Native American cultural deposits and burials that are of value to California Native American tribes, as indicated by consultation with the Costanoan Ohlone Rumsen-Mutsun Tribe. Therefore, PV Water, as the lead agency and in its discretion and as supported by substantial evidence, is treating CA-SCR-60/130, -61, -155, and -156 as tribal cultural resources pursuant to PRC Section 21074(a)(2) for the purposes of the Projects.<sup>6</sup> PV Water has considered the significance of these resources to California Native American tribes in making this

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<sup>6</sup> ESA-PVWA-MN-01 was investigated through subsurface excavation and was not found to contain a substantial cultural deposit or human remains, and as such does not appear to meet the threshold of substantial evidence as required by CEQA Guidelines Section 15384.

discretionary determination, including the Costanoan Ohlone Rumsen-Mutsun Tribe who named these four archaeological sites during outreach efforts.<sup>7</sup>

As noted in Section 3.10.3.3 under Impact CUL-2, CA-SCR-60/130 would be adversely impacted. The portion of CA-SCR-61 that would be impacted was subject to previous archaeological testing in 1999 and determined to be a secondary deposit of material, and adverse impacts to this site are not anticipated. CA-SCR-155 and -156 have not been previously tested, and whether portions of these sites would be adversely impacted is currently unknown.<sup>8</sup>

As indicated by the Costanoan Ohlone Rumsen-Mutsun Tribe, avoidance of archaeological sites would be preferred.<sup>9</sup> Under the Reduced Impacts to Cultural and Biological Resources Alternative, impacts to CA-SCR-60/130 and avoid CA-SCR-155 and -156 would be avoided. Additionally, Mitigation Measure CUL-1d requires PV Water to make every effort to avoid and preserve in place significant archaeological sites, including those that qualify as tribal cultural resources.

The Indian Canyon Mutsun Band of Costanoan requested archaeological and Native American monitoring for all Project-related earth moving, which is required by Mitigation Measures CUL-1i and CUL-1j.

The Amah Mutsun Tribal Band of Mission San Juan Bautista requested that a search be conducted through the state clearinghouse (i.e., CHRIS-NWIC, which was completed in 2017). The tribe also requested that onsite crew members and equipment operators undergo training on how to identify archaeological resources and what to do when they are identified, which is required by Mitigation Measure CUL-1g, and archaeological and Native American monitoring, which is required by Mitigation Measures CUL-1i and CUL-1j.

Additionally, other mitigation measures outlined in Section 3.10, Cultural Resources, would be applicable to tribal cultural resources. These include: CUL-1a, which requires retention of a qualified archaeologist to ensure that all mitigation related to archaeological resources is implemented; CUL-1b, which requires a pre-construction cultural resources survey of all areas that were not surveyed as part of the 2020 field effort to identify previously undocumented archaeological resources, including those that could qualify as tribal cultural resources; CUL-1c, which requires testing and evaluation for resources CA-SCR-155 and CA-SCR-156, and any other potentially significant archaeological resources that are identified during the pre-construction survey (under this measure PV Water and the qualified archaeologist would also be required to consult with Native American representatives to determine if a prehistoric resource qualifies as a tribal cultural resource pursuant to Public Resources Code section 21074); CUL-1e, which requires data recovery and treatment for all significant resources that will be impacted by the proposed Project (under this measure PV Water and the qualified archaeologist would consult with Native American

<sup>7</sup> The remaining sites mentioned by the Costanoan Ohlone Rumsen-Mutsun Tribe are not within close proximity to the Projects.

<sup>8</sup> Landowner permission for access to conduct testing was not granted for the Projects, and it is unknown if subsurface deposits related to CA-SCR-155 and -156 extend into the Area of Direct Impact.

<sup>9</sup> As indicated in PRC Section 21084.3(a), public agencies shall, when feasible, avoid damaging effects to tribal cultural resources

representatives in determining treatment for prehistoric resources, including those that qualify as tribal cultural resources); CUL-1f, which requires development of a plan to guide the archaeological and Native American monitoring required by Mitigation Measures CUL-1i and CUL-1j; CUL-1h, which requires avoided archaeological resources to be designated as Environmentally Sensitive Areas and protected during Project implementation, including those that qualify as tribal cultural resources; CUL-1k, which requires evaluation and treatment of significant archaeological discoveries, including those that are determined to be tribal cultural resources as a result of consultation with Native American representatives; CUL-1l, which requires that PV Water and the qualified archaeologist consult with Native American representatives regarding the final disposition of Native American archaeological materials (e.g., curation, reburial); and CUL-2, which requires consultation with the Most Likely Descendant regarding the treatment and disposition of Native American human remains. With implementation of these mitigation measures, impacts to tribal cultural resources would be less than significant.

**Mitigation Measures CUL-1a: Retention of a Qualified Archaeologist, CUL-1b: Pre-Construction Phase I Cultural Resources Survey, CUL-1c: Pre-Construction Phase II Archaeological Testing and Evaluation, CUL-1d: Avoidance and Preservation in Place of Archaeological Resources, CUL-1e: Development of a Phase III Archaeological Resources Data Recovery and Treatment Plan, CUL-1f: Development of a Cultural Resources Monitoring and Mitigation Program, CUL-1g: Construction Worker Cultural Resources Sensitivity Training Program, CUL-1h: Designation of Environmentally Sensitive Areas, CUL-1i: Archaeological Monitoring, CUL-1j: Native American Monitoring, CUL-1k: Inadvertent Discovery of Archaeological Resources, CUL-1l: Curation** (refer to Section 3.10, Cultural Resources)

**Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains** (refer to Section 3.10, Cultural Resources)

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### ***Cumulative Impacts***

**Impact C-TCR-1: The Projects, in combination with past, present, and probable future projects at the Project sites, could result in significant adverse cumulative tribal cultural resources impacts. (*Less than significant impact with mitigation*)**

This section presents an analysis of the cumulative effects of the Projects in combination with other past, present, and probable future projects that could cause cumulatively considerable impacts. Related projects in the vicinity of the Projects are presented in Table 3.1-1 and Figure 3.1-1 in Section 3.1 of this EIR.

The geographic scope for cumulative impacts for tribal cultural resources encompasses the Pajaro Valley and the ethnographic territory of the Rumsen-speaking tribal area of the Ohlone, which extended from Point Sur northward to the lower Pajaro River. The groups occupying this area focused to a large degree on littoral and immediately inland areas, particularly those associated with the estuaries and marshes at the mouths of the coastal drainages or along sloughs. This

geographic scope of analysis is appropriate for tribal cultural resources because the types of resources within this area are expected to be similar and related to those that occur within the Project sites. The temporal scope for cumulative impacts to tribal cultural resources encompasses both short-term and long-term cumulative impacts of the Projects, in conjunction with other cumulative projects in the area.

Table 3.1-1 and Figure 3.1-1 present multiple projects that would result in ground disturbance, including those within areas of high cultural sensitivity, that are proposed throughout the geographic scope of analysis. Cumulative impacts to tribal cultural resources could occur if any of these projects, in conjunction with the Projects, would have impacts on tribal cultural resources that, when considered together, would be significant. As described under Impact TCR-2, four tribal cultural resources (CA-SCR-60/130, -61, -155, and -156) overlap with or are in close proximity to the proposed Project components and would be directly or potentially directly impacted through Project-related ground disturbing activities. Additionally, there is a potential for as yet unidentified prehistoric archaeological sites on the surface or subsurface within the Project sites that may also qualify as tribal cultural resources and that could be impacted by the Projects. Other projects described in Table 3.1-1 that include ground disturbance could result in similar impacts to known and unknown tribal cultural resources of an archaeological nature. The incremental impact of the Projects combined with those of the cumulative projects could result in a significant cumulative impact on tribal cultural resources.

Many of the known or potential tribal cultural resources within the geographic scope have already been subjected to impacts as a result of past projects, including transportation projects, recreational projects, water treatment projects, and other infrastructure projects. Projects undertaken before environmental laws, such as CEQA, were in place may not have considered, or mitigated, significant impacts to tribal cultural resources, and may have resulted in damage to important tribal cultural resources, including Native American or prehistoric archaeological resources and human remains. Projects that have recently been completed, are currently under construction, or are foreseeable at or near the Project sites, may impact tribal cultural resources. Most of the projects listed in Table 3.1-1 would include some level of ground disturbance and would have the potential to impact tribal cultural resources of an archaeological nature. A number of Native American prehistoric archaeological resources and human remains have been documented within the geographic scope of this analysis. The areas adjacent to the sloughs and coastline contain known sites with significant cultural constituents and human remains, some of which may be impacted by past, present, and future projects. There is also the potential for unknown Native American or prehistoric archaeological resources and human remains to be disturbed during project-related ground disturbance of past, present, and future projects. These projects may also bring additional people (*e.g.*, work crews, residents, tourists) into the area that may result in increased rates of vandalism that may directly or indirectly impact tribal cultural resources.

The Projects' impacts to tribal cultural resources would be reduced to less than significant with the implementation of Mitigation Measures CUL-1a through CUL-1l and CUL-2, which are described in detail in Section 3.10, Cultural Resources. Since it can reasonably be presumed other current and foreseeable projects would be subject to CEQA and lead agencies would conduct consultation with California Native American tribes pursuant to AB 52 to identify and develop

similar mitigation to lessen impacts to tribal cultural resources within the geographic scope of this analysis, the incremental contribution of the Projects on impacts to tribal cultural resources would not be cumulatively considerable.

**Mitigation Measures CUL-1a: Retention of a Qualified Archaeologist, CUL-1b: Pre-Construction Phase I Cultural Resources Survey, CUL-1c: Pre-Construction Phase II Archaeological Testing and Evaluation, CUL-1d: Avoidance and Preservation in Place of Archaeological Resources, CUL-1e: Development of a Phase III Archaeological Resources Data Recovery and Treatment Plan, CUL-1f: Development of a Cultural Resources Monitoring and Mitigation Program, CUL-1g: Construction Worker Cultural Resources Sensitivity Training Program, CUL-1h: Designation of Environmentally Sensitive Areas, CUL-1i: Archaeological Monitoring, CUL-1j: Native American Monitoring, CUL-1k: Inadvertent Discovery of Archaeological Resources, CUL-1l: Curation (refer to Section 3.10, Cultural Resources)**

**Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains (refer to Section 3.10, Cultural Resources)**



## 3.12 Energy, Utilities, Public Services, and Recreation

This section presents an analysis of potential impacts related to energy, utilities, public services, and recreation that would result from implementation of the proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects). Information from the 2014 Basin Management Plan Update Program Environmental Impact Report (2014 BMP Update PEIR) that remains relevant and accurate for the purposes of describing the physical or regulatory setting of energy, utilities, public services, and recreation has been incorporated as appropriate. The Projects include mitigation measures adopted by the Board of Directors to reduce the severity and magnitude of potential environmental effects. For impacts regarding emergency access, refer to Section 3.9, Transportation and Traffic.

### 3.12.1 Setting

#### 3.12.1.1 Energy

Pacific Gas & Electric Co. (PG&E) provides gas and electric service to the Pajaro Valley area. The PG&E power mix for 2018 was as follows: 39 percent eligible renewables, 34 percent nuclear, 15 percent natural gas, and 13 percent large hydroelectric.<sup>1</sup> Natural gas is measured in British thermal units (BTUs), while electricity is measured in kilowatt hours (kWh). In 2018, total natural gas consumption in Santa Cruz County was 51.87 million BTUs, and total energy electricity consumption in Santa Cruz County was 1,207.15 million kWh.<sup>2</sup>

While PG&E delivers power and maintains electric infrastructure, Monterey Bay Community Power is a Community Choice Energy agency established by local communities to source carbon-free electricity for Monterey, San Benito and Santa Cruz counties and parts of San Luis Obispo county. As a locally controlled not-for-profit, Monterey Bay Community Power is not taxpayer funded and has been supporting Tri-County economic vitality by providing cleaner energy at a lower cost, supporting low-income rate payers, and funding local renewable energy projects since 2018.<sup>3</sup>

#### 3.12.1.2 Utilities

##### ***Water, Wastewater, and Stormwater***

Six water districts supply water in the Pajaro Valley: City of Watsonville, Pajaro/Sunny Mesa Community Services District, California Water Service, Pajaro Valley Water Management Agency

<sup>1</sup> PG&E, Delivering low-emission energy, 2019. Available online at [https://www.pge.com/en\\_US/about-pge/environment/what-we-are-doing/clean-energy-solutions/clean-energy-solutions.page](https://www.pge.com/en_US/about-pge/environment/what-we-are-doing/clean-energy-solutions/clean-energy-solutions.page). Accessed on December 17, 2019.

<sup>2</sup> California Energy Commission (CEC), Electricity Consumption by County, Santa Cruz County, Total, 2018. Available online at <http://www.ecdms.energy.ca.gov/elecbycounty.aspx>. Accessed on December 17, 2019; CEC, Gas Consumption by County, Santa Cruz County, Total, 2018. Available online at <http://www.ecdms.energy.ca.gov/gasbycounty.aspx>. Accessed on December 17, 2019.

<sup>3</sup> Monterey Bay Community Power, About Us, 2020. Available online at <https://www.mbcommunitypower.org/about-us/>. Accessed on March 23, 2020.

(PV Water), Aromas Water District, and the Soquel Creek Water District.<sup>4</sup> The City of Watsonville Wastewater Treatment Facility collects and treats wastewater for the southern portion of Santa Cruz County (Watsonville, Freedom, and parts of Corralitos) and the northern portion of Monterey County (Pajaro), and has the capacity to treat 12 million gallons per day (mgd) average dry weather flow of wastewater to a secondary level of treatment. PV Water, in collaboration with the City of Watsonville, treats up to 4,000 acre-feet per year (approximately 7.5 mgd) to tertiary, Title 22 standards for recycled water. Santa Cruz County and the City of Watsonville maintain pipelines for stormwater drainage throughout the Pajaro Valley. Refer also to Section 3.6.1 of the 2014 BMP Update PEIR, incorporated by reference, for additional environmental setting information related to water, wastewater, and storm drains in the Project area.

### **Solid Waste**

Solid waste generated during Project construction (described in Chapter 2, *Project Description*), would be disposed of at Buena Vista Landfill, which is operated by Santa Cruz County and located at 1231 Buena Vista Drive in Watsonville, or an appropriate recycling facility. The Buena Vista Landfill is a Class II and III landfill operating under State of California Solid Waste Facilities Permit, and accepts a maximum of 838 tons of solid waste per day. The landfill has a maximum permitted capacity of approximately 7.5 million cubic yards, and remaining capacity of approximately 2.2 million cubic yards, or 10 to 12 years of continued use.<sup>5</sup>

### **Other Utilities**

As described in the 2014 BMP Update PEIR beginning on page 3.6-2, AT&T, Pacific Gas and Electric Company, Caltrans, and Union Pacific Railroad maintain utilities within the PV Water service area.

## **3.12.1.3 Public Services**

### **Fire Protection and Emergency Services**

The Watsonville Fire Department services the City of Watsonville and areas around Watsonville, with a total service area of approximately 14 square miles and 60,000 residents.<sup>6</sup> The Watsonville Fire Department has two stations: Station 1 is located at 115 2<sup>nd</sup> Street in Watsonville, approximately 1.7 mile east of the proposed intake and pump station at Struve Slough and 3.8 miles east of the proposed recharge basins. Station 2 is located at 370 Airport Boulevard in Watsonville, approximately 2.2 miles north of the proposed intake and pump station at Struve Slough and 3.7 miles northeast of the proposed recharge basins.

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<sup>4</sup> Although the majority of Soquel Creek Water District's service area is outside of PV Water's Statutory Boundary, it provides water service to an area within the PV Water boundary.

<sup>5</sup> California Department of Resources Recycling and Recovery (CalRecycle), SWIS Facility Detail, Buena Vista Drive Sanitary Landfill (44-AA-0004), 2019. Available online at <https://www2.calrecycle.ca.gov/swfacilities/Directory/44-AA-0004/>. Accessed on December 17, 2019.

<sup>6</sup> Watsonville Fire Department, Area We Serve, 2018. Available online at <https://cityofwatsonville.org/470/Area-We-Serve>. Accessed April 25, 2018.

Portions of unincorporated Santa Cruz County north of the City of Watsonville are also served by Pajaro Valley Fire Protection District. The Pajaro Valley Fire Protection District has two type 1 engines, one type 1 water tender, and one station located at 562 Casserly Road, approximately 5.7 northeast of the proposed intake and pump station at Struve Slough and 7.4 miles northeast of the proposed recharge basins.<sup>7</sup>

The California Department of Forestry and Fire Protection (CAL FIRE) is the State of California's agency responsible for fire protection in State Responsibility Areas of California. Because the Project area is not within a State Responsibility Area, it would not directly be served by CAL FIRE.

### ***Police and Criminal Justice Services***

The Watsonville Police Department is staffed with 68 sworn police officers and 20 professional staff.<sup>8</sup> The police station is located at 215 Union Street in Watsonville. The Project sites, which are in unincorporated Santa Cruz County, are under the jurisdiction of the Santa Cruz County Sheriff's Office. The closest office to the Projects is the South County Sheriff's Service Center at 790 Green Valley Road, approximately 4.6 miles northeast of the proposed intake and pump station at Struve Slough and 6.3 miles northeast of the proposed recharge basins.<sup>9</sup>

### ***Public Education Services***

The nearest school district to the Projects is the Pajaro Valley Unified School District, which serves the City of Watsonville and the surrounding unincorporated areas of Santa Cruz County. There are 16 public elementary schools, 9 secondary schools, and 9 charter schools in the District.<sup>10</sup> The closest school to the Projects is Pajaro Valley High School, approximately one mile north of the proposed intake and pump station at Struve Slough.

### ***Parks and Recreational Facilities***

Watsonville, the closest city to the Project sites, has 26 parks, totaling 143 acres of park land.<sup>11</sup> The closest park to the Projects is Seaview Ranch Park, approximately .75 miles east of the proposed intake and pump station at Struve Slough. The City of Watsonville also provides public access to more than 7 miles of trail with 29 entrances.<sup>12</sup>

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<sup>7</sup> Pajaro Valley Fire Protection District, Serving the greater Pajaro Valley, November 2013. Available online at <http://pajarovalleyfire.com/>. Accessed on April 25, 2018.

<sup>8</sup> Watsonville Police Department, Department Structure & Facts, 2018. Available online at <https://www.cityofwatsonville.org/210/Department-Structure-Facts>. Accessed on April 26, 2018.

<sup>9</sup> County of Santa Cruz, Santa Cruz County Sheriff's Office, 2019. Available online at <http://www.scssheriff.com/Home/MyCommunity/SouthCounty.aspx>. Accessed on April 4, 2019.

<sup>10</sup> Pajaro Valley Unified School District, Schools, 2018. Available online at <http://www.pvUSD.net/>. Accessed on April 27, 2018.

<sup>11</sup> City of Watsonville, Parks & Community Services, City Parks, no date. Available online at <https://www.cityofwatsonville.org/1207/City-Parks>. Accessed on May 16, 2018.

<sup>12</sup> City of Watsonville, Parks & Community Services, Watsonville Slough Trails, March 23, 2018. Available online at <https://www.cityofwatsonville.org/DocumentCenter/View/2912/Watsonville-Slough-Trails-Map-PDF>. Accessed on May 16, 2018.

## 3.12.2 Regulatory Framework

### 3.12.2.1 Federal and State

There have been no substantial changes in the federal or state regulations, policies, or plans relevant to the Project from the discussion set forth in the 2014 BMP Update PEIR, Section 3.6, Energy, Utilities, and Services (p. 3.6-2), which is incorporated by reference. The following descriptions supplement the information provided in the 2014 BMP Update PEIR.

#### ***Energy and Utilities***

##### **National Energy Conservation Policy Act**

The National Energy Conservation Policy Act serves as the underlying authority for federal energy management goals and requirements. Signed into law in 1978, it has been regularly updated and amended by subsequent laws and regulations. This act is the foundation of most federal energy requirements.

##### **National Energy Policy Act of 2005**

The National Energy Policy Act of 2005 sets equipment energy efficiency standards and seeks to reduce reliance on non-renewable energy resources and provide incentives to reduce current demand on these resources. For example, under the act, consumers and businesses can attain federal tax credits for purchasing fuel-efficient appliances and products, including hybrid vehicles; constructing energy-efficient buildings; and improving the energy efficiency of commercial buildings. Additionally, tax credits are available for the installation of qualified fuel cells, stationary microturbine power plants, and solar power equipment.

Executive Order 13423 (Strengthening Federal Environmental, Energy, and Transportation Management), signed in 2007, strengthens the key energy management goals for the federal government and sets more challenging goals than the Energy Policy Act of 2005. Executive Order 13693, which revoked Executive Order 13423, continued to promulgate the policy of the United States that agencies shall increase efficiency and improve their environmental performance, and requires principal federal agencies to ensure regional agency actions consider and are consistent with, sustainability and climate preparedness priorities of States, local governments, and tribal communities where agency facilities are located.

##### **California Energy Action Plan**

The State of California's *2008 Energy Action Plan Update*<sup>13</sup> updates the *2005 Energy Action Plan II*.<sup>14</sup> The plan maintains the goals of the original *Energy Action Plan*, describes a coordinated implementation plan for state energy policies, and identifies specific action areas to ensure that California's energy is adequate, affordable, technologically advanced, and environmentally sound. First-priority actions to address California's increasing energy demands are to promote energy efficiency, demand response (i.e., reducing customer energy usage during peak periods to address power system reliability and support the best use of energy infrastructure), and use of renewable

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<sup>13</sup> CEC, *2008 Update Energy Action Plan*, February 2008.

<sup>14</sup> CEC, California Public Utilities Commission, *Energy Action Plan II*, September 21, 2005.

power sources. To the extent that these strategies are unable to satisfy increasing energy and capacity needs, the plan supports clean and efficient fossil fuel-fired generation. Passage of Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006, substantially influences the state's energy policies; for that reason, the Energy Action Plan has not been updated since 2008.

### **Assembly Bill 32**

California AB 32,<sup>15</sup> the Global Warming Solutions Act of 2006, is the cornerstone of state efforts to reduce greenhouse gas (GHG) emissions. As described in greater detail in Section 3.5, Air Quality and Greenhouse Gases, the law requires the California Air Resources Board to establish a statewide GHG emissions cap for 2020 based on 1990 emission levels, develop a mandatory reporting program of GHG emissions, adopt regulations for discrete early actions to reduce GHG emissions, prepare a scoping plan to identify how emissions reductions will be achieved, and adopt a regulation that establishes a market-based compliance mechanism (also referred to as "Cap and Trade").

### **2016 California Green Building Standards Code**

The provisions of the 2016 California Green Building Standards Code apply to the planning, design, operation, construction, use and occupancy of every newly constructed building or structure, unless otherwise indicated in the code, throughout the State of California. Section 5.408, Construction Waste Reduction, Disposal, and Recycling, of the 2016 California Green Building Standards Code requires nonresidential development to meet a local construction and demolition waste management ordinance or recycle and/or salvage for reuse a minimum of 65 percent of the nonhazardous construction and demolition waste in accordance with one of the following:

- **Construction waste management plan.** The construction waste management plan must identify the construction and demolition waste materials to be diverted and how they will be sorted, the amount of construction and demolition waste materials diverted (calculated by weight or volume), and diversion facilities where construction and demolition waste materials will be taken.
- **Waste management company.** A waste management company that can provide verifiable documentation that the percentage of construction and demolition waste material diverted from the landfill complies with this section may be utilized.
- **Waste stream reduction alternative.** The combined weight of new construction disposal that does not exceed two pounds per square foot of building area may be deemed to meet the 65 percent minimum requirement as approved by the enforcing agency.

Santa Cruz County's Building Regulations (Santa Cruz County Code, Chapter 12.10) adopts the 2016 California Green Building Standards Code, with exceptions, additions, and deletions as provided in Santa Cruz County Code Section 12.10.250.

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<sup>15</sup> AB 32 is codified in California Health and Safety Code Division 25.5, Sections 38500 et seq.

### **California Integrated Waste Management Act – Waste Diversion**

The California Integrated Waste Management Act of 1989,<sup>16</sup> enacted through AB 939 and modified by subsequent legislation, requires all California cities and counties to implement programs to divert at least 50 percent of all solid waste generated by the year 2000 and establishes the goal of diverting at least 75 percent of generated waste (based on per capita disposal rates) by 2020. A jurisdiction's diversion rate is the percentage of its total waste that it diverts from disposal through reduction, reuse, recycling, and composting programs. The law requires all California counties in coordination with their respective cities to develop and implement integrated waste management plans. As part of their integrated waste management plans, counties must ensure that a minimum of 15 years of disposal capacity is available to serve the county and its cities. Since 2007, the achievement of waste diversion rates has been measured based on per capita disposal rates, expressed in pounds per person per day of wastes disposed of in landfills.

### **California Energy Commission**

The California Energy Commission (CEC) was established by the Warren-Alquist Act in 1974 and is the State's primary energy policy and planning agency.<sup>17</sup> The CEC has five major responsibilities: forecasting future energy needs and keeping historical energy data; licensing thermal power plants 50 megawatts or larger; promoting energy efficiency through appliance and building standards; developing energy technologies and supporting renewable energy; and planning for and directing state response to energy emergencies.

Administered by the CEC, the California Energy Action Plan (EAP) was adopted in 2003 and a second EAP was adopted by both the CEC and the California Public Utilities Commission (CPUC) in 2005.<sup>18</sup> The EAP established shared goals and specific actions to ensure that adequate, reliable, and reasonably priced electrical power and natural gas supplies are achieved and provided through policies, strategies, and actions that are cost-effective and environmentally sound for California's consumers and taxpayers. Also, incorporated in the EAP are specific actions reflecting the importance of transportation fuels to California's economy and the need to mitigate the environmental impacts caused by their use, as well as the importance of taking actions in the near term to mitigate California's contributions to climate change from the electricity, natural gas, and transportation sectors. In 2008, the EAP was updated to expand on the State's actions in the context of global climate change and include the passage of AB 32, the California Global Warming Solutions Act of 2006.<sup>19</sup>

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<sup>16</sup> California Public Resources Code Division 30, Sections 40000-49620.

<sup>17</sup> CEC, *The California Energy Commission Core Responsibilities*, 2015. Available online at [http://www.energy.ca.gov/commission/fact\\_sheets/documents/core/CEC-Core\\_Responsibilities.pdf](http://www.energy.ca.gov/commission/fact_sheets/documents/core/CEC-Core_Responsibilities.pdf). Accessed on September 1, 2017.

<sup>18</sup> CEC, *State of California Energy Action Plan*, 2017. Available online at [http://www.energy.ca.gov/energy\\_action\\_plan/](http://www.energy.ca.gov/energy_action_plan/). Accessed on September 6, 2017.

<sup>19</sup> CEC, *State of California Energy Action Plan*, 2017. Available online at [http://www.energy.ca.gov/energy\\_action\\_plan/](http://www.energy.ca.gov/energy_action_plan/). Accessed on September 6, 2017.

### **California Public Utilities Commission**

The CPUC was established in 1911 as the Railroad Commission and was expanded in 1912 to regulate privately owned electric, natural gas, telecommunications, water, railroad, and marine transportation companies, including PG&E. The CPUC's mission is to ensure that consumers receive safe and reliable utility services at reasonable rates, protect against fraud, and promote the health of California's economy.<sup>20</sup>

### **California Independent System Operator**

The California Independent System Operator was established in 1998 and is a non-profit organization that independently manages the flow of electricity in California. It provides open access to the grid, ensuring equal access and a competitive energy market. In addition, it facilitates over 28,000 market transactions each day to ensure that enough power is available to meet demands.<sup>21</sup>

### **Utility Notification Requirements**

The regulations in Title 8 California Code of Regulations Section 1541 require excavators to determine the approximate locations of subsurface installations, such as sewer, telephone, fuel, electric, and water lines (or any other subsurface installations that may reasonably be encountered during excavation work) prior to opening an excavation. The California Government Code (Sections 4216 *et seq.*) requires owners and operators of underground utilities to become members of and participate in a regional notification center. According to Section 4216.1, operators of subsurface installations who are members of, participate in, and share in the costs of a regional notification center, such as Underground Services Alert of Southern California, more commonly referred to as DigAlert, are in compliance with this section of the code. DigAlert receives planned excavation reports from public and private excavators and transmits those reports to all participating members that may have underground facilities at the location of excavation. Members will mark or stake their facilities, provide information, or give clearance to dig. This notification requirement would apply to the Projects because of the proposed excavation activities.

### **Public Services**

#### **California Master Mutual Aid Agreement**

The California Master Mutual Aid Agreement is a framework agreement between the State of California and local governments for aid and assistance by the interchange of services and facilities, including but not limited to fire, police, medical and health, communication, and transportation services and facilities to cope with the problems of rescue, relief, evacuation, rehabilitation, and reconstruction.

<sup>20</sup> California Public Utilities Commission (CPUC), *About the California Public Utilities Commission*, 2017. Available online at <http://www.cpuc.ca.gov/aboutus/>. Accessed on September 6, 2017.

<sup>21</sup> California Independent System Operator, *Understanding the ISO*, 2017. Available online at <https://www.caiso.com/about/Pages/OurBusiness/Default.aspx>. Accessed on September 12, 2017.

### California Fire Code

State fire regulations are set forth in Sections 13000, et seq. of the California Health and Safety Code, which includes regulations concerning building standards (as set forth in Title 24 of the California Code of Regulations, the California Building Code), fire protection and notification systems, fire protection devices (such as fire extinguishers and smoke alarms), high-rise building and child care facility standards, and fire suppression training.

#### 3.12.2.2 Local

Table 2-8 in Chapter 2, *Project Description*, identifies the approvals from Santa Cruz County required for the Projects. **Table 3.12-1** presents pertinent local plans and policies regarding energy, utilities, public services, and recreation to support County consideration of the Projects' consistency with general policies.<sup>22</sup> In some cases, local policies are used in this EIR as criteria to determine the significance of physical effects on the environment (e.g., Impact NOI-1 in Section 3.8, Noise and Vibration).

**TABLE 3.12-1**  
**SANTA CRUZ COUNTY PLANS AND POLICIES RELEVANT TO THE PROJECT**

<b><i>Santa Cruz County General Plan/Local Coastal Program</i></b>
<b>Objective 7.27: Public Services and Facilities.</b> To promote the improvement of public services and facilities in areas already committed to development, and to spread the costs of needed services and facilities equitably among present and future residents and others who benefit.
<b>Policy 7.25.7: Hazardous Wastes and Environmental Damaging Compounds in Landfills.</b> Prohibit the disposal of radioactive waste, hazardous waste and ozone depleting compounds in County landfills.
SOURCE: Santa Cruz County, 1994 <i>General Plan and Local Coastal Program for the County of Santa Cruz, California</i> , 1994.

### Zero Waste Plan for Santa Cruz County

The County of Santa Cruz has a history of progressive waste management policies, programs and facilities dating back to November 1999. The County of Santa Cruz met a 75 percent diversion rate goal in 2010 and continues to be a leader in the reduction in the amount of waste being disposed as well as spearheading efforts to minimize upstream impacts on materials through sustainable manufacturing and consumerism.

Zero Waste is a systems approach to avoid the creation of waste that follows a hierarchy, focusing first on reducing the volume and toxicity of waste by elimination, then focusing on reusing materials and products for their original intended uses, and then for alternative uses, before recycling. Zero Waste encourages local and regional public-private partnerships to provide the infrastructure and services needed to accomplish all of these functions. In a Zero Waste system, any materials that cannot be easily and conveniently reduced, reused, recycled or composted are either returned to the manufacturer directly or through retail channels, or no longer

<sup>22</sup> Government Code Section 53091 exempts agencies like PV Water from complying with local building and zoning ordinances when locating or constructing facilities for the production, generation, storage, treatment, or transmission of water. California Government Code Section 65402(c) requires that PV Water notify cities and counties of its plans to construct projects or to acquire or dispose of property. The planning agency then has 40 days to determine project consistency with its general plan. If the planning agency disapproves, the disapproval may be overruled by PV Water.



used. The Zero Waste Plan is intended to guide County of Santa Cruz officials in the planning and decision making process to achieve Zero Waste goals.<sup>23</sup>

### 3.12.3 Impacts and Mitigation Measures

#### 3.12.3.1 Significance Criteria

In accordance with the California Environmental Quality Act (CEQA), state CEQA *Guidelines* (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Projects could have a significant impact if they were to:<sup>24</sup>

- Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation;
- Conflict with or obstruct a state or local plan for renewable energy or energy efficiency;
- Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals;
- Fail to comply with federal, state, and local management and reduction statutes and regulations related to solid waste.
- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:
  - Fire protection;
  - Police protection;
  - Schools;
  - Parks; or
  - Other public facilities; and/or
- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

#### 3.12.3.2 Methodology

As described in Section 3.1, this EIR provides an independent analysis of the Projects' potential environmental impacts. **Table 3.12-2** presents mitigation measures from the 2014 BMP Update PEIR adopted by the Board of Directors (Resolution 2014-05) for the purpose of reducing impacts related to energy, utilities, public services, and recreation. These adopted mitigation measures are considered part of the Projects and thus are considered prior to any significance determinations. Potential impacts are evaluated in the following section. If warranted, additional mitigation is included and takes the form of (1) modifications to update the mitigation measures

<sup>23</sup> County of Santa Cruz, Department of Public Works, Zero Waste Plan for Santa Cruz County, 2015.

<sup>24</sup> Refer also to Appendix NOP for additional topics that were addressed in the Notice of Preparation.

presented in Table 3.12-2 to reflect current conditions and site-specific impacts; or (2) new mitigation measures to replace or augment an adopted mitigation measure.

**TABLE 3.12-2**  
**2014 BMP UPDATE PEIR MITIGATION MEASURES – ENERGY, UTILITIES, PUBLIC SERVICES, AND RECREATION**

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**ES-1:** A study to identify utilities along proposed alignments will be conducted by PVWMA during pre- design states of projects. The following mitigation measures are required for segments identified in final design as having potential conflicts with significant utilities:

- a. Utility excavation and encroachment permits would be required from the appropriate agencies, including the Public Works Departments of Santa Cruz County, City of Watsonville, Caltrans, and Union Pacific Railroad. These permits include measures to minimize utility disruption. PVWMA and its contractors shall comply with permit conditions. Permit requirements shall be included in construction contract specifications.
- b. Utility locations would be verified through field survey (potholing) and use of an underground locating service.
- c. A detailed engineering and construction plan shall be prepared as part of the design plans and specifications. This plan shall include procedures for the excavation, support, and fill of areas around utility cables and pipes. All affected utility services would be notified of PVWMA construction plans and schedule. Arrangements would be made with these entities regarding protection, relocation, or temporary disconnection of services.
- d. In areas where the pipeline would parallel wastewater mains, engineering and construction plans shall include trench wall support measures to guard against trench wall failure, and possible resulting loss of structural support for the wastewater main.

Residents and businesses in the project area shall be notified in writing by the contractor of planned utility service disruption two to four days in advance, in conformance with state and County standards.

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**ES-2:** PVWMA shall include in its construction specifications a requirement for the contractor to provide plans for recovering, reusing, and recycling construction, demolition, and excavation wastes and providing for composting of plant material, where feasible.

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SOURCE: Pajaro Valley Water Management Agency, 2014. Resolution No. 2014-05, adopted April 16, 2014.

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### 3.12.3.3 Impacts and Mitigation Measures

**Impact EUP-1: Implementation of the Projects could result in wasteful, inefficient, or unnecessary consumption of energy during Project construction or operation, or conflict with or obstruct a state or local plan for renewable energy or energy efficiency. (*Less than Significant*)**

#### **Construction**

Construction of Project components would result in indirect energy consumption from construction traffic and the use of construction materials. Although the precise amount of construction-related energy demand cannot be predicted at this time, the primary energy demand during construction would occur from use of gasoline and diesel-powered mobile construction equipment and vehicles to transport workers and materials to and from the construction sites. Electricity would also be used for construction lighting, field services, and electrically driven construction devices such as air compressors, pumps and other equipment. Although Project construction would result in increased indirect energy consumption, the amount of transportation fuel and potential electricity use required for Project construction is not considered an inefficient or wasteful use of energy as fuel use would be consistent with current construction and manufacturing practices, energy standards that promote strategic planning, and building standards that reduce consumption of fossil fuels and enhance energy efficiency. During construction, the Project would comply with regulations in Section 3.12.2, and would not obstruct any state or local plans for renewable energy or energy efficiency. Therefore, the impact would be *less than significant*.

## Operation

Implementation of the Project would result in direct energy consumption associated with operations from an incremental increase in the demand for electrical energy. PV Water could continue to divert up to a maximum of 2,000 acre-feet (652 million gallons) of water per year from Harkins Slough, as well as an additional maximum of 4,000 acre-feet (1,120 million gallons) of water per year from Struve Slough. Operation of the Harkins Slough filter plant after proposed improvements are complete would increase energy use from approximately 800,000 kWh per year to approximately 1,800,000 kWh per year.<sup>25</sup> Operation of the proposed intake and pump station at Struve Slough would require approximately 900,000 kWh per year to pump water from Struve Slough to the Harkins Slough filter plant.<sup>26</sup> Refer to **Table 3.12-3** for existing and proposed equipment capacity associated with Project components. Existing PG&E power lines are located near the proposed facilities, and a distribution power line is not anticipated for operation of the Projects.

**TABLE 3.12-3  
EXISTING AND PROPOSED EQUIPMENT CAPACITY**

Project Component		Existing Equipment Capacity	Proposed Equipment Capacity
Harkins Slough Project	Diversion Pump Station	30 hp pump (1) 7.5 hp pump (1)	30 hp pump (2)
	Intermediate Pump Station	200 hp pump (1) 100 hp pump (2)	200 hp pump (3)
	Filter Plant	N/A	50 hp power blowers (2)
Struve Slough Project	Screened Intake/Pump Station	N/A	200 hp (3) <sup>a</sup>

NOTES:

<sup>a</sup> Assumes two duty and one standby pump.

SOURCE: Carollo Engineers, Request for Information, email from R. Gutierrez, February 10, 2019.

As noted in Chapter 2, *Project Description*, while operation of the Projects is not expected to add any new employees, existing employees would conduct routine inspections, deliver water treatment chemicals, and perform scheduled maintenance of the facilities and pipelines, which would generate approximately four new one-way trips (2 round trips) per week (208 annual one-way trips).

While the Projects would increase electricity demands and truck trips, as described above, the amount of transportation fuel and potential electricity use required for operation of the Projects is not considered an inefficient or wasteful use of energy as fuel use would be consistent with current construction and manufacturing practices, energy standards that promote strategic planning, and building standards that reduce consumption of fossil fuels and enhance energy efficiency. Additionally, the Projects would relieve groundwater overdraft in the Pajaro Valley,

<sup>25</sup> E-mail correspondence between A. Maudru (ESA) and P. Friedlander (Carollo Engineers) regarding Project energy demand, January 23, 2020.

<sup>26</sup> E-mail correspondence between A. Maudru (ESA) and P. Friedlander (Carollo Engineers) regarding Project energy demand, January 23, 2020.

so energy use during operation would not be wasteful. During operation, the Projects would comply with regulations in Section 3.12.2, and would not obstruct any state or local plans for renewable energy or energy efficiency. For these reasons, this impact is *less than significant*.

**Mitigation:** None required.

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**Impact EUP-2: Project construction and operation could result in a substantial adverse effect related to generating solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impairing the attainment of solid waste reduction goals. (*Less than Significant*)**

### **Construction**

The Projects would generate solid waste requiring disposal from excavation and other earthwork activities. As noted in Section 2.6, construction activities may also include demolition of an existing storage building in the footprint of the proposed Southeast recharge basin. Material types to be disposed of are expected to include steel, dirt, soil, rock, concrete, and wood.

As described in Table 2-5 in Chapter 2, *Project Description*, after excavated soil has been reused as approximately 172,800 cubic yards for the Harkins Slough Project, and 10,230 cubic yards for the Struve Slough Project, for a total of approximately 183,030 cubic yards. The operating solid waste disposal facility that would receive these materials is the Buena Vista Landfill or an appropriate recycling facility. As explained in Section 3.12.1.2, the remaining capacity of this facility is approximately 2.2 million cubic yards.<sup>27</sup> There is thus adequate permitted capacity at the facility for the volumes and types of solid waste that would be generated. Additionally, in accordance with adopted Mitigation Measure ES-2, PV Water would include in its construction specifications a requirement for the contractor to provide plans for recovering, reusing, and recycling construction, demolition, and excavation waste and providing composting of plant material, where feasible. Construction of the Projects would also comply with regulations in Section 3.12.2, like Section 5.408 of the 2016 California Green Building Code, to ensure that solid waste is not generated in excess of state or local standards. With implementation of adopted Mitigation Measure ES-2 and compliance with regulations in Section 3.12.2, the impact would be *less than significant*.

### **Operation**

The Projects are not expected to generate solid waste during operation. Any waste that is generated as a byproduct of the Projects would be discarded in a manner that complies with regulations in Section 3.12.2 to ensure that solid waste is not generated in excess of state or local standards. The impact would be *less than significant*.

**Mitigation:** None required.

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<sup>27</sup> CalRecycle, SWIS Facility Detail, Buena Vista Drive Sanitary Landfill (44-AA-0004), 2019. Available online at <https://www2.calrecycle.ca.gov/swfacilities/Directory/44-AA-0004/>. Accessed on December 17, 2019.

**Impact EUP-3: The Projects would comply with federal, state, and local management and reduction statutes and regulations related to solid waste. (*Less than Significant*)**

**Construction**

Buena Vista Landfill, where disposal and recycling of construction and demolition debris would occur, is permitted for all types of waste that would be generated by construction of the Projects. As discussed in Section 3.12.2, the California Integrated Waste Management Act of 1989 requires municipalities to divert at least 50 percent of all solid waste generated by the year 2000 and establishes the goal of diverting at least 75 percent of generated waste (based on per capita disposal rates) by 2020. In addition, Section 5.408 of the 2016 California Green Building Standards Code requires all nonresidential construction and demolition projects to reuse or recycle at least 65 percent of materials generated. The Zero Waste Plan for Santa Cruz County ensures Santa Cruz County's compliance with state recycling mandates and provides residents and businesses with information on Zero Waste Policy objectives, local recycling facilities, programs to assist with waste diversion, and green practices in schools and other areas of the county.<sup>28</sup>

Consistent with the 2016 California Green Building Standards Code and adopted Mitigation Measure ES-2, PV Water would require contractors to provide plans for recovering, reusing, and recycling construction, demolition, and excavation wastes and compost plant material, where feasible. Construction of the Projects would be in compliance with state or local statutes related to solid waste by reusing or recycling at least 65 percent of materials generated during construction and demolition, and disposing of additional debris at a landfill that is permitted for the waste and has adequate capacity (i.e., Buena Vista Landfill). With implementation of these practices and adopted Mitigation Measure ES-2, the impact would be *less than significant*.

**Operation**

As indicated under Impact EUP-2, the Projects are not expected to generate solid waste during operation. Any waste that is generated as a byproduct of the Projects would be sent to Buena Vista Landfill for disposal. This disposal would not result in an inconsistency or violation of permit conditions at this facility because the facility is permitted and has adequate capacity to accept non-hazardous wastes. Project operations would also comply with the Zero Waste Plan for Santa Cruz County, which ensures Santa Cruz County's compliance with state recycling mandates. Through compliance with applicable permits and federal, state, and local statutes related to solid waste, this impact would be *less than significant*.

**Mitigation:** None required.

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<sup>28</sup> County of Santa Cruz, Department of Public Work, *Zero Waste Plan for Santa Cruz County*, 2015.

**Impact EUP-4: The Projects could result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or increase the demand for new or increased staff and/or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for public services including, fire protection, police protection, schools, or other public facilities. (*Less than Significant*)**

### **Construction**

The Project sites currently receive services from the providers identified in Section 3.12.1, Setting. As described in Chapter 2, *Project Description*, construction of each of the Projects' components would occur over a period of several months at each site and would employ 6 to 12 construction workers. Construction workers would likely come from within Santa Cruz County or Monterey County. Construction workers who are residents of Santa Cruz County are currently being served by the existing county and individual city/town services, and thus would not represent an increase in demand for these services. While it is possible that some workers might temporarily relocate from other areas, the Projects are not expected to result in a substantial increase in the local population and thus not expected to result in increased response times such that new or physically altered facilities would be required to maintain service. Incidents could occur during construction requiring law enforcement, fire protection, or emergency medical services. However, this analysis presumes that any incremental increase in demand for these services during construction would be temporary, could be accommodated by existing services, and would not require construction of new or physically altered facilities to maintain service. Therefore, the impact of the Projects' construction on public services would be *less than significant*.

### **Operation**

The Projects do not involve the construction of residences or businesses and would not require an increase in maintenance staff; therefore, the Projects would not result in a substantial permanent increase in the local population. The Projects' facilities would be constructed in compliance with all applicable fire codes and public safety standards. Operation of the Projects thus would not result in substantial increases in demand for public services, including law enforcement, fire protection, emergency medical services, schools or libraries. Therefore, operation of the Projects would not require new or physically altered governmental facilities, and the Projects would have no impact on public services.

Because construction and operation of the Projects would not result in a substantial increase in the local population, the impact of construction and operation of the Projects on public services would be *less than significant*.

**Mitigation:** None required.

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**Impact EUP-5: The Projects could increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated. (*Less than Significant*)**

### **Construction**

Temporary, direct impacts on established recreational facilities (parks and trails) and resources could result if construction activities overlapped geographically with existing recreational facilities or trails. Construction activities would have minimal impacts to nearby parks (such as Seaview Ranch Park) and other recreation facilities due to the temporary nature of the activities, and the fact that parks would remain open during construction. Construction activities would not affect nearby trails because the existing trails in the vicinity would remain open and are over half of a mile away from the nearest Project site (the intake and pump station at Struve Slough) on the opposite (eastern) side of State Route 1. As such, construction of the Projects would have *less-than-significant* impacts related to direct or indirect physical deterioration of recreational resources.

### **Operation**

The Projects do not include new recreational facilities and would not permanently affect existing recreational resources. The Projects do not include new residential or other uses that would generate increased demand for parks or other recreational facilities. The Projects would not require an increase in maintenance staff at PV Water, so demand at existing recreational facilities would not substantially increase as a result of Project operations; ongoing demand would continue to be met by existing parks and recreational facilities. As such, operation of the Projects would have *less-than-significant* impacts related to direct or indirect physical deterioration of recreational resources.

**Mitigation:** None required.

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## ***Cumulative Impacts***

**Impact C-EUP-1: The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative energy impacts. (*Less than Significant*)**

The geographic scope for the analysis of potential cumulative impacts related to energy, fuel, and water resources encompasses the Project sites and the broader region, which generally would use the same fuel, water, and energy supply sources. All projects listed in Table 3.1-1 in Section 3.1, Overview, are considered in the cumulative impact analysis for both construction and operation.

### **Construction**

Regarding construction-phase impacts related to energy and water use, all of the projects presented in Table 3.1-1 involve some level of construction. Some of the projects (e.g., Pajaro Valley High School Athletic Field Project, West Struve Slough Habitat Enhancement and Climate Change Adaptation Pilot Project, Middle Watsonville Slough Upland Enhancement

Project) have already begun or completed construction, while the majority of the projects could be under construction during some portion of the construction period of the Projects. Like the Projects, construction of all cumulative projects would require the use of fuel and energy, and could also require the use of water. The amount of fuel, energy and water consumed during construction would vary by project. The projects identified in Table 3.1-1 are within Santa Cruz County or the City of Watsonville, and would be subject to the same regulatory framework as the Projects for the use of fuel, water, and energy during construction, with the addition of *Watsonville 2005 General Plan* policies. These requirements include the California Green Building Standards Code, California Energy Action Plan, and *Watsonville 2005 General Plan* Policy 9.J Energy. Compliance with these existing regulations by the identified cumulative projects would ensure that fuel, water, or energy resources are not used wastefully during construction, and that construction of these projects would not result in a significant adverse, cumulative impact to which the Projects could contribute. Accordingly, the cumulative effect would be *less than significant*.

### Operation

Regarding operations-phase impacts related to energy and water use, many of the projects listed in Table 3.1-1 involve enhancement and/or replacement of existing roadways and related infrastructure, local trails, and habitat (e.g., Lee Road Trail Connector, Bryant Habert Ecological Restoration Project); these projects generally would not increase consumption of energy and water above existing levels. Operation of the other projects listed in Table 3.1-1 (e.g., Pajaro Valley High School Athletic Field Project) would require the use of fuel, energy or water in varying quantities. For example, similar to the Projects, equipment (i.e., pump stations) that could be installed as part of the cumulative projects would use fuel, but these uses are generally required by safety regulations. As indicated above, the projects identified in Table 3.1-1 are within Santa Cruz County or the City of Watsonville and would generally be subject to the same regulatory framework as the Projects for the use of fuel, water, and energy during operations. At a minimum, applicable regulations would include current State standards regarding energy consumption and conservation (e.g., energy efficiency standards and green building standards in Title 24 of the California Code of Regulations). The application of local energy and water efficiency requirements would vary by project type, size, and sponsor. Compliance with applicable energy and water use regulations would ensure that the identified cumulative projects in the region would not result in wasteful use of these resources. As a result, there would not be a significant cumulative impact from the wasteful use of fuel, energy, or water to which the Projects could contribute. Accordingly, the cumulative effect would be *less than significant*.

**Mitigation:** None required.

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### **Impact C-EUP-2: The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative utilities impacts. (*Less than Significant*)**

The geographic scope for the analysis of potential cumulative impacts related to utilities encompasses the Projects' sites in unincorporated Santa Cruz County and the areas served by the



City of Watsonville (water, wastewater, and stormwater), Buena Vista Landfill (solid waste), and other utilities described in Section 3.12.1.2. All projects listed in Table 3.1-1 in Section 3.1, Overview, are considered in the cumulative impact analysis for both construction and operation.

### **Construction and Operation**

As discussed in Impact EUP-3, Section 5.408 of the 2016 California Green Building Standards Code requires all nonresidential construction and demolition projects to reuse or recycle at least 65 percent of materials generated. Additionally, pursuant to adopted Mitigation Measure ES-2, PV Water would require contractors to provide plans for recovering, reusing, and recycling construction, demolition, and excavation wastes and compost plant material, where feasible. During operation, the Projects would also implement measures to achieve zero waste in accordance with the Zero Waste Plan for Santa Cruz County as discussed in Impact EUP-3. All projects within Santa Cruz County would be required to implement these or similar regulatory requirements, and there is sufficient landfill capacity at Buena Vista Landfill as discussed in Impacts EUP-2 and EUP-3. Therefore, cumulative impacts related to generating solid waste in excess of State or local standards, exceeding landfill capacity, impairing the attainment of solid waste reduction goals, and compliance with federal, state, or local management and reduction statutes and regulations related to solid waste would be *less than significant*.

**Mitigation:** None required.

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### **Impact C-EUP-3: The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative public services impacts. (*Less than Significant*)**

The geographic scope for the analysis of potential cumulative impacts related to public services encompasses the Projects' sites and areas served by the public service provider described in Section 3.12.1.3. All projects listed in Table 3.1-1 in Section 3.1, Overview, are considered in the cumulative impact analysis for both construction and operation.

### **Construction and Operation**

Some of these projects identified in Table 3.1-1 would be under construction at the same time as the Projects (e.g., College Lake Integrated Resources Management Project, Pajaro River Flood Risk Management Study). Incidents could occur during construction requiring law enforcement, fire protection, or emergency medical services. However, the Watsonville Fire Department includes two stations and the Pajaro Valley Fire Protection District has one station to serve the area, and the Santa Cruz County Sheriff's Office receives and addressed nearly 95,000 calls for service each year.<sup>29</sup> As described in Impact EUP-4, any incremental increase in demand for these services during construction would be temporary and could be accommodated by existing services. Additionally, the Projects do not involve the construction of residences or businesses and would not require an increase in maintenance staff, and would therefore not result in a substantial permanent

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<sup>29</sup> Santa Cruz County Sheriff's Office, Operations Bureau, 2019. Available online at <http://scsheriff.com/Home/OurAgency/OperationsBureau.aspx>. Accessed on December 27, 2019.

increase in the local population. Project construction and operation would not result in a substantial increased need for law enforcement or fire protection services, and therefore would not considerably contribute to cumulative impacts resulting from the construction of new or physically altered governmental facilities that are not already planned. Therefore, the Projects' contribution to public services impacts would be *less-than-significant*.

**Mitigation:** None required.

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**Impact C-EUP-4: The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative recreational impacts. (*Less than Significant*)**

The geographic scope for the analysis of potential cumulative impacts related to recreation encompasses the Projects' sites and recreational facilities identified in Section 3.12.1.3. All projects listed in Table 3.1-1 in Section 3.1, Overview, are considered in the cumulative impact analysis for both construction and operation.

Watsonville, the closest city to the Projects' sites, has 26 parks, totaling 143 acres of park land.<sup>30</sup> The closest park to the Projects is Seaview Ranch Park, approximately .75 miles east of the proposed intake and pump station at Struve Slough. The City of Watsonville also provides public access to more than 7 miles of trail with 29 entrances.

**Construction**

Because the Projects would not include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment, they would not contribute to any cumulative effects related to this impact.

Some of the projects identified in Table 3.1-1 would be under construction at the same time as the Project (e.g., College Lake Integrated Resources Management Project, Pajaro River Flood Risk Management Study), and could result in short-term disruption of recreational facilities. The Projects may include minimal temporary impacts to Seaview Ranch Park during construction of the Projects, but because the park would remain open during construction, the use of the facility is not expected to shift to other recreational facilities within the City of Watsonville or in neighboring jurisdictions. Construction of Project components would occur during the same time frame and in the same vicinity as some other planned and proposed projects, which could cause temporary park closures or disruptions to bicycle lanes, and shift public access and recreational use to other facilities. This increased use of those facilities could cause congestion or other adverse effects. However, given the distance of the Project components, and the temporary and staggered nature of the construction schedule (refer to Figure 2-10), there is a low probability of other projects listed in Table 3.1-1 that may include park closures or disruptions to bicycle lanes occurring simultaneously with these

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<sup>30</sup> City of Watsonville, Parks & Community Services, City Parks, no date. Available online at <https://www.cityofwatsonville.org/1207/City-Parks>. Accessed on May 16, 2018.

Projects. The Projects in combination with other projects in the cumulative scenario would have a *less-than-significant* impact related to recreation.

### **Operation**

The Projects do not include new residential or other uses that would generate increased demand for parks or other recreational facilities and would not require an increase in maintenance staff. Operation of the Projects would not substantially increase the use of existing neighborhood and regional parks or other recreational facilities, and substantial physical deterioration of those facilities would not occur. Therefore, the Projects' contribution to impacts related to recreational facilities would be *less than significant*.

**Mitigation:** None required.

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## 3.13 Aesthetic Resources

This section presents an analysis of potential impacts related to aesthetic resources that would result from implementation of the proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects). Information from the 2014 Basin Management Plan Update Program Environmental Impact Report (2014 BMP Update PEIR) that remains relevant and accurate for the purposes of describing the physical or regulatory setting of aesthetic resources has been incorporated as appropriate. The Projects include mitigation measures adopted by the Board of Directors to reduce the severity and magnitude of potential environmental effects.

### 3.13.1 Setting

#### 3.13.1.1 Concepts and Terminology

Visual or aesthetic resources are generally defined as both the natural and built features of the landscape that contribute to the public viewer's experience and appreciation of the environment. Depending on the extent to which a project's presence would alter the perceived visual character and quality of the environment, a visual or aesthetic impact may occur. Familiarity with the following terms and concepts will aid the reader in understanding the content of this section.

**Visual Character** is a general description of the visual attributes of a particular land use setting. The purpose of defining the visual character of an area is to provide the context within which the visual quality of a particular site or locale is most likely to be perceived by the viewing public.

**Visual Quality** is defined as the overall visual impression or attractiveness of a site or locale as determined by its particular landscape characteristics and aesthetic qualities (such as color, variety, vividness, coherence, uniqueness, harmony, and pattern). For this analysis, the visual quality of a site or locale is defined according to three levels:

- **Low.** The location is lacking in natural or cultural visual resource amenities typical of the region. A site with low visual quality will have aesthetic elements that are relatively unappealing and perceptibly uncharacteristic of the surrounding area.
- **Moderate.** The location is typical or characteristic of the region's natural or cultural visual amenities. A site with moderate visual quality maintains the visual character of the surrounding area, with aesthetic elements that do not stand out as either contributing to or detracting from the visual character of an area.
- **High.** The location has visual resources that are unique or exemplary of the region's natural or cultural scenic amenities. A site with high visual quality is likely to stand out as particularly appealing and makes a notable positive contribution to the visual character of an area.

**Viewshed.** A viewshed is an area of land, water, or other urban or environmental element that is visible to the human eye from a fixed vantage point.

### **3.13.1.2 Regional Setting**

The Projects would be located in the Pajaro Valley, a region characterized by the peaks and ridges of the Coast Range to the east, and the scenic coastline of Monterey Bay to the west. The floor of the Pajaro Valley features predominantly flat topography typical of inland valley landscapes. The visual character of the Pajaro Valley can be typified as rural agricultural croplands and orchards, interspersed with meandering creeks and sloughs, small lakes, and pockets of residential and institutional development, surrounding the urbanized landscape of the City of Watsonville.

### **3.13.1.3 Harkins and Struve Slough Vicinity**

Agricultural uses, including croplands and low-lying agricultural buildings, visually dominate the area surrounding the Project sites. Rural agricultural vistas of rolling croplands, orchards, unembellished square- and rectangular-shaped agricultural buildings, and occasional silos are interspersed with built features such as residential development. Single family residences are located directly west of the existing Harkins Slough filter plant, and along San Andreas Road. Residences in the area tend to be single-family, ranch-style homes.

#### ***Harkins Slough Filter Plant***

The visual character of the existing Harkins Slough filter plant is described on page 3.1-3 of the 2014 BMP Update PEIR. As stated in the 2014 BMP Update PEIR, the area around the Harkins Slough filter plant consists of rolling terrain and expansive irrigated croplands. Surrounding lands are used for agricultural production. Structures located in the site area include the existing diversion facility and the filtration facility near the confluence of Watsonville and Harkins Sloughs. The pumps and filtration facility are partially visible, but not prominent, from motorists going north on San Andreas Road and west on West Beach Street, as shown on **Figure 3.13-1**.

The Harkins Slough filter plant has a moderate visual quality. The visual attributes of the Harkins Slough filter plant are typical of the region's agricultural visual character. Visually, the filter plant is poorly exposed (i.e., there are few vantage points readily accessible to the public from which it is visible).

#### ***Recharge Basins, Recovery Wells, Monitoring Wells, and Associated Pipelines***

The Southwest, Southeast, and North recharge basins would be located approximately 2,300 feet west of San Andreas Road. As is characteristic of the region, the area is characterized by rolling terrain, expansive agricultural land, and low-lying agricultural buildings. There is one residence adjacent to the northern boundary of the proposed Southeast recharge basin; the rolling terrain in the general area screens public views of the proposed recharge basins, recovery wells, and monitoring wells from San Andreas Road. The land on which the recharge basins and recovery wells would be constructed have a moderate visual quality. The visual attributes of the area are typical of the region's agricultural visual character and visually, the land is poorly exposed.



Photo 1: Public view of the Harkins Slough Filter Plant looking north from San Andreas Road.



Photo 2: Public view of the Harkins Slough Filter Plant looking northwest from West Beach Street.

SOURCE: ESA, photo taken by E.Walther, January 27, 2020;  
Google Maps imagery, May 2011.

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 3.13-1**  
Existing Public Views of the Harkins Slough Filter Plant

### ***Struve Slough Screened Intake and Pump Station***

The proposed intake and pump station would be constructed on the northern shore of Struve Slough. As is characteristic of the region, the area surrounding the proposed Project site is characterized by rolling terrain, expansive agricultural land, low-lying agricultural buildings, and the Struve Slough. The rolling terrain and existing agricultural buildings in the area screen public views of the proposed intake and pump station from State Route (SR) 1, Lee Road, and other surrounding public roadways. The screened intake and pump station sites have a moderate visual quality. The visual attributes of the area are typical of the region's agricultural visual character and visually, the land is poorly exposed.

## **3.13.2 Regulatory Framework**

### **3.13.2.1 Federal and State**

There are no applicable federal regulations related to aesthetics. The State Scenic Highway Program and the Green Building Code are discussed below.

#### ***Scenic Highway Program***

In 1963, the State Legislature established the California Scenic Highway Program through Senate Bill 1467, which added Sections 260 through 263 to the Streets and Highways Code, to preserve and enhance the natural beauty of California. The State Highway System includes highways that either are eligible for designation as Scenic Highways or have been designated as such. There are no officially designated Scenic Highways within the County of Santa Cruz or the City of Watsonville, although SR 1 and SR 152, which extend through the Pajaro Valley, are both eligible for the official State Scenic Highway designation.<sup>1</sup> Santa Cruz County and City of Watsonville scenic road designations are discussed below.

#### ***California Green Building Standards Code***

The California Green Building Standards Code includes mandatory regulations for exterior light sources to reduce the amount of light and glare that extends beyond a property. Non-residential mandatory measures contained in Section 5.106.8, Light Pollution Reduction, require that exterior lights be shielded or meet "cutoff" lighting standards and meet specified backlight, uplight, and glare ratings designed to limit the amount of light that escapes beyond a site's boundary.

### **3.13.2.2 Local**

Table 2-8 in Chapter 2, Project Description, identifies the approvals from Santa Cruz County required for the Project. **Table 3.13-1** presents pertinent local plans and policies regarding the protection of visual resources to support County consideration of Project consistency with general

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<sup>1</sup> California Department of Transportation (Caltrans), *California Scenic Highway Mapping System*, Santa Cruz County. Available online at [http://www.dot.ca.gov/hq/LandArch/16\\_livability/scenic\\_highways/index.htm](http://www.dot.ca.gov/hq/LandArch/16_livability/scenic_highways/index.htm). Accessed on March 26, 2018.



policies.<sup>2</sup> In some cases, local policies are used in this EIR as criteria to determine the significance of physical effects on the environment (e.g., Impact NOI-1 in Section 3.8, Noise and Vibration).

**TABLE 3.13-1**  
**SANTA CRUZ COUNTY PLANS AND POLICIES RELEVANT TO THE PROJECT**

<b><i>Santa Cruz County General Plan/Local Coastal Program</i></b>
<b>Objective 5.10a: Protection of Visual Resources.</b> To identify, protect and restore the aesthetic values of visual resources.
<b>Objective 5.10b: New Development in Visual Resource Areas.</b> To ensure that new development is appropriately designed and constructed to have minimal to no adverse impact upon identified visual resources.
<b>Policy 5.10.2: Development within Visual Resource Areas.</b> Recognize that visual resources of Santa Cruz County possess diverse characteristics and that the resources worthy of protection may include, but are not limited to, ocean views, agricultural fields, wooded forests, open meadows, and mountain hillside views. Require projects to be evaluated against the context of their unique environment and regulate structure height, setbacks and design to protect these resources consistent with the objectives and policies of this [visual resources] section.
<b>Policy 5.10.3: Protection of Public Vistas.</b> Protect significant public vistas as described in policy 5.10.2 from all publicly used roads and vista points by minimizing disruption of landform and aesthetic character caused by grading operations, timber harvests, utility wires and poles, signs, inappropriate landscaping and structure design. Provide necessary landscaping to screen development which is unavoidably sited within these vistas.
<b>Policy 5.10.4: Preserving Natural Buffers.</b> Preserve the vegetation and landform of natural wooded hillsides, which serve as a backdrop for new development.
<b>Policy 5.10.5: Preserving Agricultural Vistas.</b> Continue to preserve the aesthetic value of agricultural vistas. Encourage development to be consistent with the agricultural character of the community. Structures appurtenant to agricultural uses on agriculturally designated parcels shall be considered to be compatible with the agricultural character of surrounding areas.
<b>Policy 5.10.11: Development Visible from Rural Scenic Roads.</b> In the viewsheds of rural scenic roads, require new discretionary development, including development envelopes in proposed land divisions, to be sited out of public view, obscured by natural landforms and/or existing vegetation. Where proposed structures on existing lots are unavoidably visible from scenic roads, identify those visual qualities worthy of protection and require the siting, architectural design and landscaping to mitigate the impacts on those visual qualities.
<b>Policy 5.10.13: Landscaping Requirements.</b> All grading and land disturbance projects visible from scenic roads shall conform to the following visual mitigation conditions:
a) Blended contours of the finished surface with the adjacent natural terrain and landscape to achieve a smooth transition and natural appearance; and
b) Incorporate only characteristic or indigenous plant species appropriate for the area.
<b>Objective 8.5: Commercial and Industrial Design.</b> To achieve a well-defined hierarchy of neighborhood, community and regional commercial and industrial areas which harmonize and complement the unique characteristics of each neighborhood they serve, through coordinated circulation systems and architectural style, and appropriate landscaping and signage.
<b>Policy 8.5.1: Concentrate Commercial Uses.</b> Contain commercial and industrial uses in designated areas, avoiding new strip commercial uses, to minimize impacts on residential areas, adjacent roads, and property, and on the scenic setting of the County.
<b>Policy 8.5.2: Commercial Compatibility with Other Uses.</b> Ensure compatibility of commercial and industrial use with adjacent uses through application of the Site Architectural and Landscape Design Review or similar ordinance. Give careful attention to landscaping, signing, access, site and building design, visual impacts, drainage, parking, on site circulation, traffic patterns, and where applicable, availability of water, sewage system capacity, fencing and mitigation of potential nuisance factors, visual aspects, and traffic problems.
<b>Objective 8.6: Building Design.</b> To encourage building design that addresses the neighborhood and community context; utilizes scale appropriate to adjacent development; and incorporates design elements that are appropriate to surrounding uses and the type of land use planned for the area.

<sup>2</sup> California Government Code Section 53091 exempts agencies like PV Water from complying with local building and zoning ordinances when locating or constructing facilities for the production, generation, storage, treatment, or transmission of water. California Government Code Section 65402(c) requires that PV Water notify cities and counties of its plans to construct projects or to acquire or dispose of property. The planning agency then has 40 days to determine project consistency with its general plan. If the planning agency disapproves, the disapproval may be overruled by PV Water.

**TABLE 3.13-1 (CONTINUED)**  
**SANTA CRUZ COUNTY PLANS AND POLICIES RELEVANT TO THE PROJECT**

<i>Santa Cruz County Code</i>
<b>Section 13.11.072(A): Site Design.</b> It shall be the objective of new development to enhance or preserve the integrity of existing land use patterns or character where those exist and to be consistent with village plans, community plans and coastal special community plans as they become adopted, and to complement the scale of neighboring development where appropriate to the zoning district context. New development, where appropriate, shall be sited, designed and landscaped so as to be visually compatible and integrated with the character of surrounding areas.
<b>Section 13.11.072(B)(2)(a): Views.</b> Development shall protect the public viewshed, where possible.
<b>Section 13.11.072(B)(2)(b): Views.</b> Development should minimize the impact on private views from adjacent parcels, wherever practicable.
<b>Section 13.11.073, Building Design, and Section 13.11.075, Landscaping,</b> provide planning and design objectives for new developments in Santa Cruz County.
NOTES:
<sup>a</sup> Note that the pipelines and recharge basins proposed as part of the Projects would be installed below ground; once constructed, the pipelines would be completely buried.
SOURCE: County of Santa Cruz, <i>1994 General Plan/Local Coastal Program, Chapter 5 – Conservation and Open Space</i> , Effective December 19, 1994.

### **Scenic Road Designations**

SR 1 is eligible for the official State Scenic Highway designation. Santa Cruz County also has scenic road designations, as described in the 2014 BMP Update PEIR Section 3.1.1.2 (p. 3.1-2 *et seq.*). SR 1 (from San Mateo County to Monterey County), West Beach Street (formally Beach Road, from SR 1 to Palm Beach) are designated as Santa Cruz County scenic roads.<sup>3</sup>

## **3.13.3 Impacts and Mitigation Measures**

### **3.13.3.1 Significance Criteria**

In accordance with the California Environmental Quality Act (CEQA), State CEQA *Guidelines* (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Projects could have a significant impact if they were to:<sup>4</sup>

- Have a substantial adverse effect on a scenic vista;
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within view of a state scenic highway;
- In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings<sup>5</sup>, or, if the Project is in an urbanized area, conflict with applicable zoning and other regulations governing scenic quality; and/or
- Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

<sup>3</sup> County of Santa Cruz, General Plan and Local Coastal Program for the County of Santa Cruz, California, Chapter 5, Conservation and Open Space, 1994.

<sup>4</sup> Refer also to Appendix NOP for additional topics that were addressed in the Notice of Preparation.

<sup>5</sup> Public views are those that are experienced from publicly accessible vantage point.

### 3.13.3.2 Methodology

As described in Section 3.1, this EIR provides an independent analysis of the Projects' potential environmental impacts. No mitigation measures were adopted for the purpose of reducing impacts to aesthetics resources in the 2014 BMP Update PEIR. Potential impacts are evaluated in the following section, with mitigation measures if warranted.

The visual quality impact analysis is based on review of Project maps and drawings, field observations conducted by ESA in 2019 and 2020, and review of a variety of data in the record, including the 2014 BMP Program EIR and the local plans and policies described in the preceding section. The analysis describes potential temporary (short-term) and permanent (long-term) impacts on scenic vistas or the visual character or quality of a site. Consistent with CEQA, the evaluation of impacts to visual quality focuses on publicly accessible views. The approach to evaluating the effect of the Projects under each CEQA significance criterion is briefly clarified below:

- ***Have a substantial adverse effect on a scenic vista.*** For purposes of this evaluation, scenic vistas include broad, expansive, publicly-accessible views from roads in the Project area. This criterion applies only to projects that would be located on or disrupt access to a scenic vista, or result in visual changes within its viewshed. Scenic vistas may be officially recognized or designated (e.g., within local planning documents or the California Department of Transportation (Caltrans) scenic highway program), or they may be informal in nature (e.g., mountain peaks or coastal bluffs). The Projects' effect would be considered substantial if they would appreciably damage or remove the visual qualities that make the view unique, unobstructed, and/or exemplary.
- ***Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway.*** Damage to a scenic resource is substantial when it is reasonably perceptible to affected viewers, as seen from a scenic highway, and when it appreciably degrades one or more of the aesthetic qualities that contributes to a scenic setting. The presence of and potential damage to scenic resources in this analysis is considered along with Project-related effects on the existing visual character and quality of a site or surroundings (see next bullet).
- ***In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings, or, if the Project is in an urbanized area, conflict with applicable zoning and other regulations governing scenic quality.*** Because all project components are in non-urbanized areas, this criterion is applicable to all locations where the Projects would result in either temporary or permanent visual change to public views. The Projects are considered to "substantially degrade" the visual character or quality of public views of a site if they would have a strong negative influence on the public's experience and appreciation of the visual environment. As such, visual changes are always considered in the context of a site or locale's visual sensitivity (as described in the setting). Visual changes caused by the Projects are evaluated in terms of their visual contrast with the area's predominant landscape elements and features, their dominance in views relative to other existing features, and the degree to which they could block or obscure public views of aesthetically pleasing landscape elements. Visual changes are also evaluated in terms of potential damage to or removal of features of the natural or built environment that contribute to a scenic public setting. The magnitude of visual change that would result in a significant

impact (i.e., substantial degradation) is influenced by its degree of permanence, and is inversely related to the visual sensitivity of a site.

- ***Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.*** This criterion is applicable to projects that require nighttime lighting (either during construction or operation), or that involve structures or finishes that could create substantial glare.

The Projects include pipelines and recharge basins that (with the exception of chain-link fences surrounding the basins) would be at or below grade. Following construction, these facilities would not be visible to the public. The potential visual effects associated with the construction of proposed below-grade components such as removal of vegetation during construction are discussed below.

### **3.13.3.3 Impact Evaluation**

#### **Impact AES-1: Implementation of the Projects could have a substantial adverse effect on scenic vistas or substantially damage scenic resources. (*Less than Significant*)**

Scenic vistas in the Project area are characterized by expansive agricultural fields in the foreground framed by the Santa Cruz Mountains in the background. As stated above under Section 3.13.3.2, damage to a scenic resource is substantial when it is reasonably perceptible to affected viewers, as seen from a scenic highway; and when it appreciably degrades one or more of the aesthetic qualities that contributes to a scenic setting. Scenic resources visible from segments of SR 1 in the vicinity of the Projects include agricultural fields, trees, the Santa Cruz Mountains, and other natural areas.

#### **Harkins Slough Filter Plant**

Construction of the new filters, replacement pumps, and coagulant addition facilities would occur within the existing approximately 0.4-acre footprint, with 3,000 square feet (0.07 acres) of ground disturbance anticipated for the new filters and coagulant facilities. Construction at the Harkins Slough filter plant is not expected to require the removal of any existing vegetation. As noted in Section 3.13.1.3 and shown on Figure 3.13-1, the existing Harkins Slough filter plant is partially visible to the public from the northbound lane of San Andreas Road and westbound lane of West Beach Street. As shown on Figure 2-10 and Table 2-4A (in Chapter 2), construction at the Harkins Slough filter plant is expected to last approximately one year. Construction would involve a variety of small- and large-scale construction equipment and a crew of up to 12 workers. Construction vehicles, materials, and equipment may be noticeable and visually unappealing; however, the equipment that would be used (listed in Table 2-4) is generally similar to or smaller in scale than equipment used regularly in the Project area, in farm fields (e.g., tractors) and for construction projects on and nearby city streets (e.g., equipment associated with roadwork and utility installation). Construction at the Harkins Slough filter plant may be partially visible by travelers along San Andreas Road, but the construction site is approximately 800 feet from the road, and San Andreas Road is not designated as a scenic roadway by the State of California or Santa Cruz County.

The footprint of the existing Harkins Slough filter plant would not increase in size compared to the existing footprint (refer to Figure 2-2 in Chapter 2 for a site plan of proposed upgrades at the filter plant). Once operational, the new facilities would be similar in appearance to the existing industrial facilities and are not expected to increase visibility of the filter plant compared to existing public views.

Because construction would be temporary in nature, and because the appearance of the upgrades would be similar to the existing facilities and remain only partially visible from San Andreas Road and West Beach Street, impacts to scenic vistas and scenic resources related to construction and operation at the Harkins Slough filter plant would be considered *less than significant*.

### **Recharge Basins, Recovery Wells, Monitoring Wells**

The construction disturbance areas for the recharge basins, recovery wells, and monitoring wells are noted in Table 2-7 in Chapter 2. Construction of the recharge basins, recovery wells, and monitoring wells would require removal of existing vegetation, including crops. Construction of the Southeast recharge basin would also require the removal of several trees adjacent to the existing warehouse structure. As described in Section 3.13.1.3, the land on which the recharge basins, recovery wells, and monitoring wells would be constructed are screened by topography and not visible from public viewpoints. Once operational, with the exception of a chain-link fence the recharge basins themselves would be below grade. Although crops would no longer be able to grow on the land, the basins would still have a natural-looking surface (refer to Figure 2-3 for a photo of the existing recharge basin, and Section 3.2, Land Use and Agricultural Resources, for information regarding the loss of Important Farmland). There would be an estimated 10 recovery wells for each of the three proposed recharge basins, each standing approximately 3 feet tall, and an estimated 10 monitoring wells for each of the proposed recharge basins, each of which would also stand approximately 3 feet tall. The recharge basins, recovery wells, and monitoring wells would remain out of the public viewshed during operation of the Projects. Because the Project sites are not visible to the public, visual impacts to scenic vistas and scenic resources related to construction and operation of the recharge basins, recovery wells, and monitoring wells would be *less than significant*.

### **Struve Slough Screened Intake and Pump Station**

Construction of the screened intake and pump station at Struve Slough would require removal of existing vegetation, although there are no crops grown on this parcel. Once constructed, the pump station wet well structure would extend approximately 2.5 feet above grade at its highest point, and the pump station equipment would extend approximately 10 feet above the wet well structure (refer to Table 2-2 for intake and pump station dimensions). As described in Section 3.13.1.3, the rolling terrain and existing agricultural buildings in the area screen public views of the site, including those from SR 1. Because the Project sites are not visible to the public, and construction would be temporary in nature, visual impacts related to construction and operation of the screened intake and pump station would be *less than significant*.

## Pipelines

Pipelines proposed as part of the Projects would generally be constructed within agricultural land, with the exception of where the filter plant to recharge basins pipeline crosses San Andreas Road and extends down Dairy Road, and where the backwash and raw water pipeline connects to the existing sewer in West Beach Street. Construction activities on paved land (e.g., Dairy Road) would progress at about 100 feet per day, meaning that pipeline construction in these areas would only last approximately 1 to 2 days. Pipeline construction through farm fields (as shown on Figure 2-1) would generally progress at about 250 feet per day. The equipment that would be used is generally similar to or smaller in scale than equipment used regularly in the Project area.

Pipelines proposed as part of the Projects would be completely underground following construction and generally would not affect the visual characteristics of the overlying land uses (e.g., strawberry crops and other crops excluding orchards could be replanted above the pipelines). No tree removal would be required for construction of the pipelines. Given the visibility and scale of construction and operations activities in the context of scenic vistas and scenic resources, degree of contrast with existing activities in the Project area, duration of construction activities, and number of affected viewers, impacts on scenic vistas and scenic resources from construction and operation of pipelines are considered *less than significant*.

**Mitigation:** None required.

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**Impact AES-2: Implementation of the Projects could degrade the existing visual character or quality of public views of the sites in non-urbanized areas. (*Less than Significant*)**

### Construction (Daytime)

For reasons stated under Impact AES-1, daytime construction would not substantially degrade the existing visual character or quality of public views of the Project sites in non-urbanized areas, and impacts would be *less than significant* during Project construction.

### Operation

#### Harkins Slough Filter Plant

The visual character of the Harkins Slough filter plant after upgrades are completed would continue to have moderate visual quality and be poorly exposed to public views. All upgrades would be within the existing footprint and would look similar to existing facilities. Consequently, impacts related to the existing visual character and quality of public views of the Harkins Slough filter plant under future, with-Project conditions are considered *less than significant*.

#### Recharge Basins, Recovery Wells, and Monitoring Wells

The recharge basins would be below-grade once operational, and would therefore not change the existing visual character and quality of views of the land on which they are sited. Each of the proposed recovery wells and monitoring wells would stand approximately 3 feet tall, but are visually consistent with surrounding agricultural equipment and facilities. The visual character of the area encompassing the recharge basins, recovery wells, and monitoring wells would therefore

continue to have moderate visual quality and be poorly exposed to public views. Consequently, impacts related to the existing visual character and quality of public views of the recharge basins, recovery wells, and monitoring wells under future, with-Project conditions are considered ***less than significant***.

#### Struve Slough Screened Intake and Pump Station

As noted under Impact AES-1, once operational, the pump station would be about 12.5 feet above grade at the highest point, appear as a small-scale man-made structure, and be shielded from public view by topography and existing buildings. The Struve Slough intake and pump station would be consistent in appearance with the varied development nearby, which includes a residence and agricultural buildings. Given that the site has moderate visual quality and poor exposure, these Project components would not have a substantial adverse effect on the visual character or quality of the public views of the site and its surroundings. Consequently, the effects of the proposed screened intake and pump station on the visual character and quality of public views of the site are considered ***less than significant***.

#### Pipelines

Pipelines proposed as part of the Projects would be completely underground following construction, and would therefore have ***no impact*** related to the visual character and quality of public views of the sites.

**Mitigation:** None required.

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### **Impact AES-3: Project components could introduce significant new sources of light or glare. (*Less than Significant with Mitigation*)**

#### **Construction**

Generally, construction of the Projects would take place during daytime hours, and would not require construction lighting. However, as described in Section 2.6.1.2, Construction Hours, exceptions to standard construction hours include recovery well construction and trenchless pipeline construction due to the need for continuous drilling and tunneling. Proposed recovery well construction could occur for up to 24 hours per day for several days in a row, and would require early morning and late afternoon/nighttime lighting depending upon ambient light conditions. Similarly, potential trenchless pipeline construction for portions of the Struve Slough to Filter Plant pipeline could require construction for up to 24 hours per day for up to several days in a row. Construction-related lighting would be temporary in duration. Implementation of **Mitigation Measure AES-1** would require PV Water or its contractor to use shielded and hooded outdoor construction lighting directed to the area where the lighting would be required to minimize ambient light during Project construction. With the implementation of Mitigation Measure AES-2, visual impacts related to construction lighting would be ***less than significant with mitigation***.

## Operation

Existing residential and industrial uses in the Project area have existing lighting. Exterior security lighting exists at the Harkins Slough filter plant, and would be upgraded and remain in use after the Harkins Slough filter plant upgrades are complete. Additional exterior lighting would be included with the new filters that are proposed at the Harkins Slough filter plant. Exterior security lighting proposed at the Struve Slough screened intake and pump station would be limited to nighttime security lighting. Permanent exterior security lighting is not proposed at the recharge basins, recovery wells, or monitoring walls. Because lighting for these Project components would be required to comply with the California Green Building Standards Code (including shielded lights or “cutoff” standards), the amount of light that could extend beyond property boundaries would be limited. While the new exterior lighting could be visible from the nearby residences at the Struve Slough pump station and Harkins Slough filter plant, new lighting sources would not substantially increase ambient light in the Project area. This impact relating to the operational phase of the Projects is *less than significant*.

### Mitigation Measure AES-1: Construction Lighting

PV Water shall require contractors to direct nighttime lighting used during construction away from residential areas, use the minimum amount of night lighting necessary for construction and safety, and shield and hood outdoor lighting to prevent light spillover effects during Project construction.

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## Cumulative Impacts

**Impact C-AES-1: The Projects, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative aesthetic impacts. (*Less than Significant*)**

The cumulative analysis of aesthetic impacts uses a list-based approach and identifies probable future projects in the vicinity of the Projects that could contribute to a cumulative impact. The geographic scope for the analysis of cumulative aesthetic impacts includes the viewsheds affected by the Project components (as indicated in the preceding text, once constructed, the recharge basins and pipelines would be entirely below ground). Table 3.1-1 and Figure 3.1-1 in Section 3.1, Overview, provide descriptions and locations of potential cumulative projects in the vicinity of the Projects. The following cumulative projects are located near viewsheds affected by the Projects:

- Lee Road Trail Connector (City of Watsonville)
- Rail Trail – Pedestrian Trail (City of Watsonville)
- Lower Harkins Slough Habitat Restoration Project (Watsonville Wetlands Watch)

These projects are numbered 5, 8, and 12 on Figure 3.1-1. The Lee Road Trail Connector Project would be part of the Watsonville Area Scenic Trails Network, and would connect the southern terminus of the Lee Road Connector Trail to the planned Rail Trail Project via a bridge across Struve Slough. These trails are planned to be built between 2020 and 2022, with construction



completed before construction begins on any of the Struve Slough Project components. Although topography would interrupt views of the Struve Slough Project sites, construction activities and the proposed pump station may be viewable from portions of the proposed pedestrian bridge, but as stated in the impact analyses above, are not currently visible within public viewsheds. Given the characteristics and timing of the two projects, the combination of the projects are not expected to substantially and adversely alter views affected by the Projects.

The Lower Harkins Slough Habitat Restoration Project is a 22-acre wetland habitat restoration project adjacent to Harkins and Watsonville/Struve Slough between Lee Road and San Andreas Road. The project has been under construction since 2016, with completion expected in 2020. Because the project involves restoring habitat and not building any structures, it is not expected to substantially alters views affected by the Projects. Additionally, construction of the Lower Harkins Slough Habitat Restoration Project would not overlap with construction of the Projects. Consequently, cumulative impacts to aesthetic resources would be *less than significant*.

**Mitigation:** None required.

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# CHAPTER 4

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## Other CEQA Issues

### 4.1 Significant Unavoidable Impacts

In accordance with Section 21100(b)(2)(A) of the California Environmental Quality Act (CEQA) and with Sections 15126(b) and 15126.2(c) of the CEQA *Guidelines*, the purpose of this section is to identify Project-related environmental impacts that could not be eliminated or reduced to a less-than-significant level with implementation of mitigation measures identified in Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*, and the reasons why the Projects are being proposed, notwithstanding their effect. With the exception described below, all Project impacts would either be less than significant or reduced to less-than-significant levels with implementation of the identified mitigation measures:

- **Conversion of Important Farmland.** The Projects would result in the conversion of Important Farmland to non-agricultural use. Even with implementation of Mitigation Measures LU-1a (Compensate for Conversion of Important Farmland) and LU-1b (Replacement of Topsoil), these impacts would be significant and unavoidable on a project-specific and cumulative basis. (Impacts LU-1 and C-LU-1)

PV Water proposes to implement the Projects, notwithstanding this significant and unavoidable impact. Absent the Projects, it is anticipated that groundwater overdraft conditions in the area will continue to worsen. This condition is expected to have detrimental impacts on agricultural operations in the Pajaro Valley.

### 4.2 Significant Irreversible Environmental Changes

In accordance with CEQA Section 21100(b) (2) (B) and CEQA *Guidelines* Sections 15126(c) and 15126.2(d), the purpose of this section is to identify significant irreversible environmental changes that would be caused by the Projects Construction and operational impacts associated with implementation of the Projects would result in an irretrievable and irreversible commitment of natural resources through the use of fossil fuels and construction materials. The Projects would require the commitment of energy resources to fuel and maintain construction equipment (such as gasoline, diesel, and oil) during the construction period. Construction of the Projects would commit resources, such as concrete and steel, to be used for the proposed facilities and related improvements. Irreversible changes associated with increased energy demand due to energy usage and greenhouse gas emissions would result from operation of the Project facilities.

## 4.3 Areas of Known Controversy and Issues to be Resolved

Pursuant to CEQA *Guidelines* Section 15123(b)(1), environmental impact reports (EIRs) are required to identify areas of controversy known to the lead agency including issues raised by agencies and the public. Pajaro Valley Water Management Agency distributed a Notice of Preparation (NOP) to agencies and interested parties to begin the formal CEQA scoping process for the Projects on May 31, 2019 and held a public meeting on Wednesday, June 12, 2019, to receive comments on the scope of the EIR. Issues raised in comments on the NOP and in the public meetings included, but were not limited to, the following:

- Estimated success of the proposed recharge basins;
- Water quality (i.e., salinity) in Harkin Slough; and
- Adverse effects on biological resources.

Refer to **Appendix NOP**, which contains all written comments received on the NOP.

Assuming the Board of Directors certifies the EIR as complete and adequate under CEQA, issues to be resolved would include acquisition of properties, easements, and/or rights-of-way. Regarding the acquisition of properties, easements, and/or rights-of-way, these issues are addressed in Section 2.8 in Chapter 2, *Project Description*.

# CHAPTER 5

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## Alternatives

### 5.1 CEQA Requirements

This chapter presents the California Environmental Quality Act (CEQA) alternatives analysis for the proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects). The CEQA *Guidelines*, Section 15126.6(a), state that an environmental impact report (EIR) must describe and evaluate a reasonable range of alternatives to a project that would feasibly attain most of the project's basic objectives but would avoid or substantially lessen any identified significant adverse environmental effects of the project. Specifically, the CEQA *Guidelines* (Section 15126.6) set forth the following criteria for selecting and evaluating alternatives:

- **Identifying Alternatives.** The selection of alternatives is limited to those that would avoid or substantially lessen any of the significant environmental effects of the project, are feasible, and would attain most of the basic objectives of the project. Factors that may be considered when addressing the feasibility of an alternative include site suitability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries, economic viability, and whether the proponent can reasonably acquire, control, or otherwise have access to an alternative site. An EIR need not consider an alternative whose impact cannot be reasonably ascertained and whose implementation is remote and speculative. The specific alternative of “no project” must also be evaluated.
- **Range of Alternatives.** An EIR need not consider every conceivable alternative, but must consider and discuss a reasonable range of feasible alternatives in a manner that will foster informed decision-making and public participation. The “rule of reason” governs the selection and consideration of EIR alternatives, requiring that an EIR set forth only those alternatives necessary to permit a reasoned choice. As the lead agency, Pajaro Valley Water Management Agency (PV Water) is responsible for selecting a range of project alternatives to be examined and for disclosing its reasons for the selection of the alternatives.
- **Evaluation of Alternatives.** EIRs are required to include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the Project. Matrices may be used to display the major characteristics and the potential environmental effects of each alternative. If an alternative would cause one or more significant effects that would not result from the project as proposed, the significant effects of the alternative must be discussed, but in less detail than the significant effects of the project.

## 5.2 Alternatives Screening and Selection

### 5.2.1 Previous Alternatives Screening and Analyses

This EIR incorporates by reference the alternatives analyses conducted for the 2014 Basin Management Plan Update Program EIR (2014 BMP Update PEIR),<sup>1</sup> which in turn incorporates by reference all alternative analyses conducted in EIRs on PV Water's Basin Management Plans (BMPs) and local water supply projects preceding the 2014 BMP Update PEIR, including the 1993 BMP EIR,<sup>2</sup> the 1999 Local Water Supply EIR,<sup>3</sup> and the 2002 Revised BMP EIR,<sup>4</sup> each of which evaluated preliminary versions of the Harkins Slough Facilities Upgrades Project (Harkins Slough Project, previously referred to as the Harkins Slough Recharge Facilities Upgrades) and the Struve Slough Project (previously referred to as the Watsonville Slough with Recharge Basins). **Appendix ALTS** of this EIR includes 2014 BMP Update PEIR Chapter 5, *Alternatives to the BMP Update*. Appendix ALTS summarizes the alternatives analyses of the EIRs listed above and also describes and evaluates the following alternatives:

- **No Project.** This alternative was defined as no implementation of any plans, policies, programs, projects or components by PV Water or others to meet the BMP objectives.
- **Demand Management Only.** This alternative assumed that only mandatory basin-wide pumping controls would be implemented to meet the BMP objectives.
- **Water Supply Facilities Alternatives.** This was a category of alternatives to the individual BMP projects and programs evaluated in the 2014 BMP Update PEIR, including the following: Coastal Distribution System (CDS) Expansion; Winter Recycled Water Deep Aquifer Storage and Recovery (ASR); River Conveyance of Water for Recharge at Murphy Crossing; San Benito County Groundwater Demineralization at Watsonville Wastewater Treatment Plant (WWTP); Expanded College Lake, Pinto Lake, Corralitos Creek, Watsonville Slough, and ASR; Seawater Desalination; and Bolsa De San Cayetano with Pajaro River Diversion.
- **Alternative Locations for BMP Update Components.** This alternative analyzed the potential for each project/program of the BMP Update to be located at a different site while still meeting BMP objectives. The projects/programs considered included alternative locations for recycled water storage and treatment, Harkins Slough Recharge Facilities Upgrades, Watsonville Slough with Recharge Basins, College Lake with Inland Pipeline to CDS, and Murphy Crossing with Recharge Basins.

The 2014 BMP Update PEIR alternative analysis concluded that the proposed BMP Update would best meet the BMP Update objectives and would likely result in fewer and less severe environmental impacts overall.

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<sup>1</sup> PV Water, *Final Environmental Impact Report for the Basin Management Plan Update*, February 2014. This document is available for review at PV Water's offices, 36 Brennan Street, Watsonville, CA 95076.

<sup>2</sup> PV Water, *PVWMA Basin Management Plan*, 1993.

<sup>3</sup> PV Water, *PVWMA Local Water Supply and Distribution Environmental Impact Report*, 1999.

<sup>4</sup> PV Water, *PVWMA 2002 Revised Basin Management Plan*, 2002.

The 2014 BMP Update PEIR addressed two potential alternatives specifically involving the Harkins Slough Facilities Upgrades Project and the Struve Slough Project: Alternative Locations for Harkins Slough Recharge Facilities Upgrades and Alternative Locations for Watsonville Slough with Recharge Basins. With regard to Harkins Slough, the 2014 BMP Update PEIR concluded that “feasible alternative locations [for the recharge basins] that might achieve the basic project objectives may not reduce the number or severity of significant adverse impacts, assuming the same or similar design and operational characteristics.” With regard to Watsonville Slough (now analyzed as Struve Slough), three different locations were analyzed as alternatives to the proposed diversion location. For the Off-Stream near Watsonville Slough Alternative, the 2014 BMP Update PEIR concluded that the alternative “would have increased impacts on agricultural resources” and “also may significantly impact water quality and biological resources during operation.” Construction impacts would be greater and the project was not expected to be “feasibly planned, built and operated in the vicinity of the sloughs within the timeframes required.” The 2014 BMP Update PEIR concluded that the Hanson Slough near Watsonville Slough Alternative “would be prohibitively costly and potentially technically infeasible” and that there would be greater environmental impacts due to increased areas of construction disturbance. The Alternative Sloughs would not be able to use existing and upgraded Harkins Slough facilities.

This EIR is based in part on information on the Projects that was not available when the 2014 BMP Update PEIR was prepared. In some cases, the severity and magnitude of impacts (e.g., conversion of Important Farmland) are greater than those identified in the 2014 BMP Update PEIR. In light of this, some alternatives screened out in the 2014 BMP Update EIR and/or identified in the BMP Update itself were reconsidered during the alternatives screening process.

## 5.2.2 Additional Alternatives Screening Conducted for the Projects

Consistent with CEQA,<sup>5</sup> PV Water has incorporated consideration of environmental impacts as well as environmental benefits into conceptualization, planning and design for the Projects. This effort included evaluation of the projects in the 2014 BMP Update PEIR and subsequent adoption of mitigation measures to avoid or reduce the Projects’ significant impacts, additional consideration of environmental constraints during Project planning and siting, and input from cultural and biological resource experts. Given the sensitivity of the area for archaeological resources, an archaeologist conducted a database search on recorded cultural resources and a geoarchaeological survey, which resulted in the elimination of one recharge basin site identified in the BMP Update and the relocation of the Struve Slough pump station site. As indicated in Appendix HYD, proposed pumping operations are designed to maintain more even water levels (compared to existing operations at Harkins Slough) during the breeding and egg maturation stage for the California red legged frog (*Rana draytonii*, CRF), and gradually draw down the water levels in the sloughs after the CRF season.

<sup>5</sup> CEQA *Guidelines* Section 15004(b)(1).

Additional alternatives screening conducted for this EIR involved reviewing significant impacts attributable to the Projects' implementation; identifying potentially impact-reducing or impact-avoidance concepts or strategies, including consideration of alternatives identified subsequent to the 2014 BMP Update PEIR; and screening out potential alternatives that failed to meet the following criteria:

- *Is the alternative potentially feasible?*
- *Does the alternative reduce the severity of one or more of the projects' significant adverse impacts?*
- *Does the alternative meet most of the basic objectives of the projects?*
- *Does the alternative foster informed decision-making and public participation?*

### 5.2.2.1 Summary of Significant Impacts

The alternatives analysis is intended to focus on eliminating, or reducing in magnitude or severity, impacts identified in this Draft EIR as significant and unavoidable. As described in Chapter 3, the Projects were determined to have significant and unavoidable impacts related to the conversion of Important Farmland, as described below:

- **Conversion of Important Farmland.** The Projects would result in the conversion of Important Farmland to non-agricultural use. Even with implementation of Mitigation Measures LU-1a (Compensate for Conversion of Important Farmland), and LU-1b (Replacement of Topsoil), these impacts would be significant and unavoidable on a project-specific and cumulative basis. (Impacts LU-1 and C-LU-1)

All other significant impacts could be reduced to less-than-significant levels through the incorporation of mitigation measures, including the following impact areas (refer to Chapter 3 for details):

- |                                   |                              |
|-----------------------------------|------------------------------|
| • Hydrology and Water Quality     | • Transportation and Traffic |
| • Biological Resources            | • Cultural Resources         |
| • Geology and Soils               | • Tribal Cultural Resources  |
| • Hazards and Hazardous Materials | • Aesthetics                 |
| • Noise and Vibration             |                              |

In addition, the alternatives analysis considered ways to reduce the magnitude and severity of impacts to archaeological resources that could be considered particularly sensitive.

### 5.2.2.2 Strategies and Concepts to Reduce Significant Impacts

Strategies identified to reduce the magnitude or severity of impacts on Important Farmland, based on an understanding of the scope and nature of the Projects' impacts and the findings of previous alternatives analyses include:



- **Alternative Storage.** Aquifer storage and recovery was identified as an alternative storage method that would require conversion of less Important Farmland.
- **Recharge Basin Locations.** The conversion of Important Farmland is associated with the recharge basins. Alternative locations for the recharge basins that would avoid Important Farmland were considered. However, the currently proposed locations are considered optimal compared to other options due to hydrogeologic and percolation/recharge characteristics, and all of the suitable land in the vicinity of the proposed recharge basins is also designated as Importation Farmland (refer to Figure 3.2-2 in Section 3.2, Land Use and Agricultural Resources).

### 5.2.2.3 Screening Results

After considering the scope and severity of the Project's impacts and screening potential alternatives, including those previously evaluated or suggested, the alternatives described in the following section were selected for analysis.

## 5.3 Selected CEQA Alternatives Evaluated in this Chapter

The alternatives to the Projects selected for analysis in this EIR are:

- No Projects
- Aquifer Storage and Recovery
- Reduced Impacts to Cultural and Biological Resources
- Struve Slough Pump Station on Land Trust Property

### 5.3.1 No Projects Alternative

#### 5.3.1.1 Description

As required by CEQA *Guidelines* Section 15126.6(e), the No Project Alternative is evaluated to allow decision-makers to compare the environmental effects of approving the project with the effects of not approving the project.

The No Project Alternative is defined as no Harkins Slough or Struve Slough Project. None of the actions described in Chapter 2, including construction and operation of the intake and pump station at Struve Slough, recharge basins, pipelines, or upgrades at the Harkins Slough Facility would occur. PV Water would presumably continue to pump water up to a maximum of 2,000 acre-feet per year (AFY) from Harkins Slough as described in Section 2.1.4.2 of Chapter 2, *Project Description*.

Groundwater, recycled water, and Harkins Slough diversions would continue to provide water for agricultural irrigation. Industrial, commercial, and domestic residential use of groundwater and limited surface water within the City of Watsonville and beyond would continue. PV Water would have to pursue other options in order to help balance the groundwater basin, prevent

further seawater intrusion, and meet water supply needs. These actions would be necessary in accordance with PV Water's mission, its commitments to implement the BMP Update, and its obligations as the designated Groundwater Sustainability Agency under the Sustainable Groundwater Management Act, California Water Code Section 10723. Other options could include one or more of the components of the Water Supply Facilities Alternative presented in the 2014 BMP Update PEIR.

### **5.3.1.2 Ability to Meet the Project's Objectives**

**Table 5-1** summarizes the ability of the Projects and the alternatives to meet the Projects objectives. The No Project Alternative would fail to meet any of the Projects' or BMP Update objectives.

### **5.3.1.3 Evaluation**

If the Projects are not implemented, then none of the environmental impacts attributable to the Projects (described in Chapter 3) would occur, including the significant and unavoidable impacts on Important Farmland.

If the Projects are not implemented and supplies not replaced by another project, the Basin's overdraft condition is anticipated to continue. Seawater intrusion would presumably continue to advance into freshwater aquifers underlying coastal lands. On coastal acreage that does not receive delivered water, irrigation with groundwater is anticipated to continue until groundwater salinity becomes unsuitable and/or the salt content in the soils builds up to the point that existing agricultural crops typical of the area could not grow. Production of more salt tolerant crops may occur; however, the agricultural economy of the area could change. Wells would likely become unsuitable over time and lands would be fallowed, resulting in a significant loss of active farmland.

Implementation of any projects to replace the Slough Projects' water supply would result in other, potentially more severe impacts on the environment. Refer to Sections 5.5 and 5.7 in the 2014 BMP Update PEIR (presented in Appendix ALTS of this EIR) for a description of impacts associated with the projects comprising the Water Supply Facilities Alternative.

## **5.3.2 Aquifer Storage and Recovery Alternative**

### **5.3.2.1 Description**

Aquifer storage and recovery (ASR) is the storage of water in an aquifer during times when water is available, and recovery of the stored water from the same aquifer when it is needed. ASR represents a storage alternative; water diverted from the sloughs would be treated and injected into deep aquifers confined by overlying and underlying fine-grained geologic formations, and then recovered using the same wells. This alternative would eliminate the need to develop recharge basins. The purpose of this alternative is to reduce the loss of Important Farmland associated with development of the recharge basins proposed for the Projects.

**TABLE 5-1**  
**SUMMARY OF ABILITY OF PROJECTS AND ALTERNATIVES TO MEET PROJECT OBJECTIVES**

	<b>Harkins Slough and Struve Slough Projects</b>	<b>No Projects</b>	<b>Aquifer Storage and Recovery</b>	<b>Reduced Impacts on Biological &amp; Cultural Resources</b>	<b>Struve Pump Station on Land Trust Property</b>
<b>Objectives from the 2014 BMP Update PEIR</b>	<b>Would the project or alternative meet the objective?</b>				
Prevent seawater intrusion, long-term groundwater overdraft, land subsidence, and water quality degradation.	Yes	No	Yes	Yes	Yes
Manage existing and supplemental water supplies to control overdraft and provide for present and future water needs.	Yes	No	Yes	Yes	Yes
Create a reliable, long-term water supply, which has been identified as an important cornerstone of the long-term economic vitality of the Pajaro Valley.	Yes	No	Yes	Yes	Yes
Develop water conservation programs. <sup>a</sup>	No	No	No	No	No
Recommend a program that is cost effective and environmentally sound.	Yes	No	Partial	Yes	Partial
<b>Project Specific Objectives for the Projects</b>					
Design and implement reliable facilities to help achieve sustainable groundwater management of the Pajaro Valley Groundwater Subbasin by 2040, taking into account potential future hydrologic changes, including those associated with climate change.	Yes	No	Yes	Yes	Yes
Substantially contribute to the Pajaro Valley's water supply needs in a timely manner, consistent with the Basin Management Plan Update implementation goals.	Yes	No	Partial	Yes	Yes
Use locally controlled surface water for agricultural purposes to offset groundwater pumping in an environmentally sound manner and in coordination with resource agencies, the public, and other stakeholders, while preserving existing habitat.	Yes	No	Yes	Yes	Yes
Make efficient use of, and leverage federal, state, and local investments in, existing Agency infrastructure.	Yes	No	Yes	Yes	Yes
In coordination with other agencies, develop surface water supplies in a manner that is compatible with flood risk reduction and habitat restoration planning.	Yes	No	Yes	Yes	Yes

## NOTES:

<sup>a</sup> While the Project and action alternatives would conserve groundwater by creating a reliable source of surface water to offset groundwater pumping, PV Water's water conservation programs are designed to reduce water use in the Pajaro Valley. Information on PV Water's water conservation programs is available at <https://www.pvwater.org/>.

<sup>b</sup> "Partial" indicates that the alternative does not satisfy an objective as well as the proposed Projects (e.g., because it would be costlier or take longer to implement).

This alternative includes the following components, depicted on **Figure 5-1** and summarized in **Table 5-2**:

- **Intakes and Pump stations.** These components would be as described for the proposed Projects.
- **Water Treatment Plant.** Water from the sloughs may require advanced treatment prior to injection; processes could include microfiltration, reverse osmosis<sup>6</sup> to remove salts and other minerals, and ultraviolet disinfection; chemical storage would also be required.<sup>7</sup> The water treatment plant (WTP) is estimated to occupy approximately five acres.
- **ASR Injection/Extraction Wells.** This alternative would require injection/extraction wells. The number of wells and recovery yield would likely vary depending on individual well site conditions. For purposes of analysis it is assumed that 20 ASR wells would be constructed and operated. The ASR wells would be paired in two and spaced approximately one-quarter mile apart from other pairs within the CDS service area. Each well and pump pair would occupy an estimated 1,000 square-foot site surrounded by security fencing. Access would be via farm roads. Each well would have a pump and associated electrical control system, transformer to power the electrical control system; Supervisory Control and Data Acquisition (commonly called SCADA)<sup>8</sup> controls for remote operation; and various pipes and valves. New power would be required for the wells; improvements (e.g., the need for new power poles) would depend on the location of each ASR well.

Each of the ASR wells would periodically be backflushed to clear suspended solids. The reject water from the backflushing operations would be directed to an infiltration basin and passively recharged into the shallow aquifer. Each pair of ASR wells would have an infiltration basin; for purposes of analysis, it is assumed that each infiltration basin would be less than 20 feet deep and approximately 10,000 square feet.

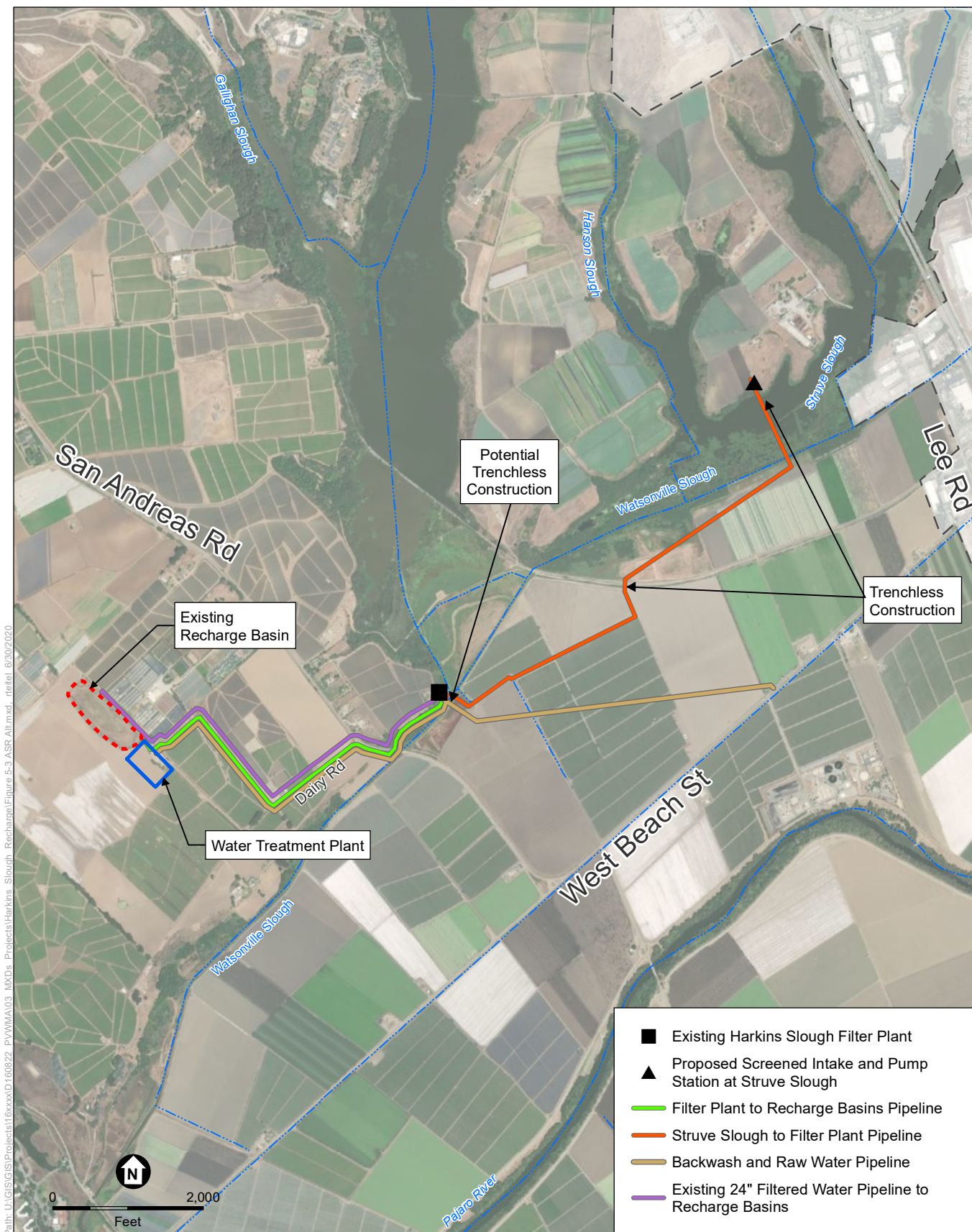
- **Monitoring.** PV Water would install monitoring wells throughout the network of ASR wells to monitor groundwater levels for the purpose of avoiding changes to the hydraulic gradient or creating/exacerbating localized depressions.
- **Pipelines.** This alternative includes the Struve Slough to filter plant pipeline, pipeline from the filter plant to the WTP (in the alignment of the filter plant to recharge basins pipeline), pipelines from the treatment plant to the ASR wells, and a pipeline to the wastewater treatment plant. Given that there would be 20 ASR wells located in pairs one quarter-mile apart, this alternative would require over four miles of new pipeline to connect the WTP to the ASR wells, as well as additional piping to connect the wells to the CDS.

The backwash and raw water pipeline associated with the proposed Projects would be extended to the WTP, paralleling the filter plant to recharge basins pipeline alignment associated with the proposed Projects.

<sup>6</sup> Reverse osmosis is a process in which dissolved inorganic solids (such as salts) are removed from a solution (such as water). This is accomplished by pushing the water through a semi-permeable membrane; pressure is exerted on the side with the concentrated solution to force the water molecules across the membrane. The membrane allows the water to pass through while capturing the impurities or contaminants. The reverse osmosis process produces product water or permeate (purified water) and concentrate (also referred to as brine).

<sup>7</sup> The following treatment chemicals may be required: sodium hypochlorite, sodium hydroxide, sulfuric acid, antiscalant, and polymer. Storage tanks/drums likely would sit on concrete stalls with secondary containment curbs to contain inadvertent spills of hazardous treatment chemicals.

<sup>8</sup> SCADA (Supervisory Control and Data Acquisition) is a system for remote monitoring and operations of water supply facilities.



SOURCE: Carollo Engineers, 2020;  
ESRI World Imagery, 7/23/2016; ESA, 2020

Note: Injection/recovery wells (20), infiltration basins, and associated pipelines not shown.



Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 5-1**  
Aquifer Storage and Recovery Alternative

**TABLE 5-2**  
**KEY FEATURES OF ALTERNATIVES IN COMPARISON TO THE PROJECTS**

Key Feature		Projects	Aquifer Storage and Recovery Alternative	Reduced Impacts to Cultural and Biological Resources Alternative	Struve Slough Pump Station on Land Trust Property Alternative
Annual Diversion	Average	<b>Harkins and Struve Slough Projects:</b> Approximately 2,060 AFY	Assumed to be the same <sup>a</sup>	Same	Same
	Maximum	<b>Harkins Slough Project:</b> 2,000 AFY <b>Struve Slough Project:</b> 4,000 AFY	Assumed to be the same <sup>a</sup>	Same	Same
Components	Facility Construction/Expansion	<b>Harkins Slough Project:</b> Upgrade existing filter plant, replace pumps, add screens to intake. <b>Struve Slough Project:</b> Construct pump station on the north shore of Struve Slough (APN 052-08-138) and screened intake within Struve Slough	Same	<b>Harkins Slough Project:</b> Same <b>Struve Slough Project:</b> Construct pump station south of Struve Slough (APN 052-22-124) and screened intake within Struve Slough	<b>Harkins Slough Project:</b> Same <b>Struve Slough Project:</b> Construct pump station west of the proposed location (APN 052-08-137) and screened intake within Struve Slough
	Recharge Basins and Recovery/Monitoring Wells	<b>Harkins Slough Project:</b> Southwest recharge basin (16.7 acres) and Southeast recharge basin (12.7 acres) <b>Struve Slough Project:</b> North recharge basin (3.9 acres) <b>Recovery/Monitoring Wells:</b> Estimated 10 recovery wells and 10 monitoring wells per recharge basin	20 Aquifer Storage and Recovery (ASR) wells throughout Coastal Distribution System service area in place of recharge basins and recovery wells	Same	Same
	Pipelines	<b>Harkins Slough Project:</b> Pipeline to Southwest recharge basin (1,500 feet), pipeline to Southeast recharge basin (200 feet), backwash and raw water pipeline (4,600 feet) <b>Struve Slough Project:</b> Screened intake to pump station (250 feet), Struve Slough to filter plant (7,150 feet), filter plant to recharge basins (5,500 feet), pipeline to North recharge basin (700 feet)	<b>Harkins Slough Project:</b> backwash and raw water pipeline (4,600 feet), pipelines to ASR wells and backflush infiltration basins <b>Struve Slough Project:</b> essentially the same as Project but no pipeline to North recharge basin. Addition of pipelines to the ASR wells and backflush infiltration basins	<b>Harkins Slough Project:</b> Same <b>Struve Slough Project:</b> Screened intake to pump station (1,200 feet), Struve Slough to filter plant (6,250 feet), filter plant to recharge basins (5,650 feet), pipeline from North recharge basin (700 feet)	<b>Harkins Slough Project:</b> Same <b>Struve Slough Project:</b> Screened intake to pump station (250 feet), Struve Slough to filter plant (7,100 feet), filter plant to recharge basins (5,500 feet), pipeline from North recharge basin (700 feet)
Operations and Maintenance	Water Supply Diversions	<b>Harkins Slough:</b> November 1 through May 31 <b>Struve Slough:</b> October 1 to September 30 subject to constraints	Same	Same	Same
	Maintenance	Periodic inspections and maintenance of Project components	Same	Same	Same

## NOTES:

AFY = acre-feet per year      AF = acre-feet      cfs = cubic feet per second

<sup>a</sup> Detailed hydrogeologic studies to evaluate the yield of an Aquifer Storage and Recovery Alternative have not been conducted.

The following components would be the same as under the proposed Projects: Harkins Slough screened intake, Struve Slough screened intake, Struve Slough pump station, Struve Slough to filter plant pipeline. As indicated above, this alternative includes a pipeline from the Harkins Slough filter plant to the WTP which follow the alignment of the filter plant to recharge basins pipeline associated with the Struve Slough Project. The following components would not be implemented under this alternative: filter plant upgrades to the Harkins Slough filter plant; and the Southwest, Southeast and North recharge basins, associated recovery wells and pipelines, and monitoring wells.

### **Construction**

General construction activities would be similar to those for the proposed Projects, but would involve more pipeline construction. Construction of the WTP likely would take a year or more. Construction activities for the ASR wells would be dispersed throughout the CDS service area. The BMP Update indicated that planning, design, permitting and construction of projects involving ASR could take at least 10 years to implement.

### **Operation**

Diversions from the sloughs would occur as planned for the Projects. It is assumed the ASR wells would have a combined capacity to inject a peak flow of approximately 45 cubic feet per second. Injection and operation of the WTP would occur during the periods of diversions proposed for the Projects (November 1 through May 31 subject to diversion limits for Harkins Slough, and October 1 through September 30 for Struve Slough subject to constraints on minimum water depths and diversion limits). Water from well back-flushing operations would be directed to the infiltration basin adjacent to the wells. Brine from the reverse osmosis process would require special disposal: either the brine would be sent to onsite evaporation ponds (to concentrate the brine) and then trucked offsite for disposal or PV Water would construct a new pipeline to the Watsonville Water Resources Center for disposal via the facility's outfall. PV Water would continue to operate existing Harkins Slough facilities.

Operation of the WTP (particularly the reverse osmosis process) and the ASR wells would require a substantial increase in electricity usage compared to the proposed Projects.

### **5.3.2.2 Ability to Meet the Project's Objectives**

Table 5-1 summarizes the ability of the Aquifer Storage and Recovery Alternative to meet the project objectives. This alternative would meet most of the objectives of the Projects but would only partially meet the following objectives:

- *Recommend a program that is cost effective and environmentally sound.* The BMP Update evaluated four projects involving an ASR component. The cost per acre-foot for any of the projects involving ASR was substantially higher than for the proposed Projects due to the energy costs associated with additional treatment processes and operation of the injection wells.
- *Substantially contribute to the Pajaro Valley's water supply needs in a timely manner, consistent with the Basin Management Plan Update implementation goals.* The projects



evaluated in the BMP Update that included an ASR component would take substantially longer to implement than the proposed Projects.

### 5.3.2.3 Evaluation

**Table 5-3** compares the significant impacts of the Projects with those of the Aquifer Storage and Recovery Alternative. The table also lists impacts that would be less than significant for the Projects but would be worse with this alternative. The primary differences between the environmental impacts of the Projects and the Aquifer Storage and Recovery Alternative are summarized below:

- **Land Use and Agricultural Resources.** While the Aquifer Storage and Recovery Alternative would result in conversion of an estimated 7.5 acres of Important Farmland associated with the WTP, ASR wells, and infiltration basins, the amount of converted land would be less than the 34.2 acres associated with the Projects (largely the recharge basins).
- **Hydrology, Water Quality and Hazardous Materials.** This alternative would involve injecting treated surface water into the deep aquifer for subsequent recovery. Water would be treated to meet requirements of the Surface Water Treatment Rule and other applicable regulations prior to injection, protecting groundwater quality. The injection and extraction of surface water into the deep aquifer could create localized changes in groundwater, potentially causing mounding and changes in groundwater flow directions, and affecting localized depressions. PV Water currently monitors groundwater levels throughout the basin, and would use new and existing monitoring wells to monitor groundwater in the vicinity of the injection/extraction well sites and adjust ASR recovery operations as needed to avoid creating/exacerbating localized depressions.
- **Biological Resources.** Construction of several miles and pipeline between the ASR wells and WTP, and the need to extend the backwash water and raw water pipeline to the WTP may cross potentially jurisdictional wetland features that could provide suitable habitat for California red legged frogs (CRF). Depending on where the pipeline alignments are located, there could be additional temporary impacts to this feature.
- **Noise and Vibration.** Construction-phase noise impacts could be greater than with the Projects because the 20 injection/extraction wells would require nighttime construction. The severity of the impacts would depend on proximity to sensitive receptors (no specific ASR well sites have been identified).
- **Cultural and Tribal Cultural Resources.** The magnitude of impacts to cultural resources and tribal cultural resources as well as the potential to disturb human remains would be greater than the Projects because, although recharge basins would not be included, the increased length in pipelines associated with this alternative would require more excavation near sensitive recorded resources.
- **Aesthetics.** All of the components of the Projects that are visible from publicly accessible areas are part of this alternative, as is the WTP, 20 ASR wells, and attendant improvements to supply these facilities with electrical power. Overall, the potential to degrade existing visual quality and adversely affect scenic vistas and scenic resources is greater than with the Projects.



TABLE 5-3  
COMPARISON OF ENVIRONMENTAL IMPACTS OF PROJECTS AND ACTION ALTERNATIVES

Environmental Resource	Watsonville Slough System Managed Aquifer Recharge and Recovery Projects	Aquifer Storage and Recovery Alternative	Reduced Impacts to Cultural and Biological Resources Alternative	Struve Slough Pump Station on Land Trust Property Alternative
Land Use and Agricultural Resources	<b>Impact LU-1:</b> The Projects would convert Important Farmland to non-agricultural use and could involve changes in the existing environment which, due to their location or nature, could result in conversion of Important Farmland to non-agricultural use. (Significant and Unavoidable with Mitigation)	<b>Less than the Projects.</b>  Implementation of the recharge basins and wells associated with the Projects would result in the permanent conversion of an estimated 34.2 acres of Important Farmland (see Table 3.2.2 in Section 3.2, Land Use and Agricultural Resources). The ASR Alternative would result in conversion of an estimated 7.5 acres of Important Farmland associated with the WTP, ASR wells, and infiltration basins, and this impact would therefore be less than with the Projects.	<b>Greater than the Projects.</b>  While the acreage of Important Farmland converted to non-agricultural use related to the recharge basins would not change, this alternative would move the Struve Slough pump station onto land that is designated as Important Farmland and would require an elevated access road and a fill pad with sloped sides to raise the pump station above the 100-year flood elevation, incrementally increasing the magnitude of this impact by approximately 1.5 acre. Like the Projects, implementation of applicable mitigation measures could reduce this impact, but it would still be considered unavoidable.	<b>Greater than the Projects.</b>  While the acreage of Important Farmland converted to non-agricultural use related to the recharge basins would not change, this alternative would move the Struve Slough pump station onto land that is designated as Important Farmland, incrementally increasing the impact by approximately 0.05 acre. Like the Projects, implementation of applicable mitigation measures could reduce this impact, but it would still be considered unavoidable.
	<b>Impact HYD-1:</b> Project construction could violate water quality standards and/or waste discharge requirements, or otherwise substantially degrade surface or groundwater quality. (Less than Significant with Mitigation)	<b>Similar to or greater than the Projects.</b>  The sources of potential contamination from construction activities (earthwork within and near surface waters, discharges from dewatering and pipeline cleaning, frac-outs) would be the same as with the Projects. There would be incrementally more earthwork associated with this alternative with the potential to result in discharges of sediment and contaminants from construction to surface waters (i.e., construction of the WTP and the estimated 20 ASR wells). Like the Projects, implementation of applicable mitigation measures would reduce impacts to water quality associated with construction of the Projects to less than significant.  In addition, during operation, the WTP would generate brine, which would require disposal via the Watsonville Water Resources Center's outfall. It is unknown whether such a discharge would be compatible with limits in the facility's National Pollutant Discharge Elimination System permit.	<b>Similar to the Projects.</b>  The sources of potential contamination from construction activities would be the same as with the Projects. There would be incrementally more earthwork associated with this alternative with the potential to result in discharges of sediment and contaminants from construction (i.e., due to more pipeline construction). Like the Projects, implementation of applicable mitigation measures would reduce impacts to water quality associated with construction of the Projects to less than significant.	<b>Same as the Project.</b>  Construction-phase water quality impacts would essentially be the same as with implementation of the Projects.
Hydrology and Water Quality	<b>Impact HYD-2:</b> Project operations could adversely affect surface water quality. (Less than Significant)	<b>Similar to the Projects.</b>  The sources of potential contamination from operations (storage and use of water treatment chemicals) would be similar to the Projects, but the expanded water treatment processes associated with this alternative would require the use and storage of additional water treatment chemicals. Like the Projects, compliance with regulatory standards for the storage and handling of hazardous materials and implementation of adopted mitigation measures would reduce impacts to water quality associated with operations to less than significant.	<b>Similar to the Projects.</b>  The sources of potential contamination from operations (storage and use of water treatment chemicals) would be the same as the Projects. The location of the Struve Slough pump station within the 100-year flood hazard zone would incrementally increase the risk of pollutant release during operations. Like the Projects, compliance with regulatory standards for the storage and handling of hazardous materials and implementation of adopted mitigation measures would reduce impacts to water quality associated with operations to less than significant.	<b>Same as the Projects.</b>  Operations-phase water quality impacts would essentially be the same as with implementation of the Projects.
	<b>Impact HYD-3:</b> The Projects could cause localized temporary or seasonal changes in shallow groundwater levels, but would not degrade groundwater quality or decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin. (Less than Significant)	<b>Similar to the Projects.</b>  This alternative would involve injecting treated surface water into the deep aquifer for subsequent recovery. Water would be treated to meet requirements of the Surface Water Treatment Rule and other applicable regulations prior to injection, protecting groundwater quality. PV Water would monitor groundwater levels to ensure that pumping did not create or exacerbate groundwater depressions or seawater intrusion, and the impact would remain less than significant.	<b>Same as the Projects.</b>  Construction- and operations-phase effects on groundwater would essentially be the same as with implementation of the Projects.	<b>Same as the Projects.</b>  Construction- and operations-phase effects on groundwater would essentially be the same as with implementation of the Projects.
	<b>Impact HYD-5:</b> The Projects would not impede or redirect flood flows such that new flooding would result. (Less than Significant)	<b>Similar to the Projects.</b>  Like the Projects, some components of this alternative could incrementally impede flood flows, but the removal of water from the sloughs system would counteract any displacement of slough capacity and limit the potential for flood flows to be impeded or redirected. Implementation of applicable adopted mitigation measures would further reduce impacts by requiring facilities to be designed to avoid exacerbating upstream and downstream flood hazards on other properties.	<b>Similar to the Projects.</b>  Like the Projects, some components of this alternative could incrementally impede flood flows, but the removal of water from the sloughs system would counteract any displacement of slough capacity and limit the potential for flood flows to be impeded or redirected. Implementation of applicable adopted mitigation measures would further reduce impacts by requiring facilities to be designed to avoid exacerbating upstream and downstream flood hazards on other properties.	<b>Same as the Projects.</b>  The potential for flood flows to be redirected such that new flooding would result would be the same as with the Projects.
	<b>Impact HYD-6:</b> The Projects could conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. (Less than Significant with Mitigation)	<b>Similar to the Project.</b>  This alternative would implement the same construction water quality controls and more stringent operations water quality controls, and, like the Projects, would support sustainable groundwater management of the Pajaro Valley Groundwater Basin. Like the Projects, implementation of applicable mitigation measures would reduce this alternative's effects on water quality so that the project would not conflict with a water quality control plan.	<b>Same as the Projects.</b>  This alternative would implement the same construction and operations water quality controls, and, like the Projects, would support sustainable groundwater management of the Pajaro Valley Groundwater Basin.	<b>Same as the Projects.</b>  This alternative would implement the same construction and operations water quality controls, and, like the Projects, would support sustainable groundwater management of the Pajaro Valley Groundwater Basin.

TABLE 5-3 (CONTINUED)  
COMPARISON OF ENVIRONMENTAL IMPACTS OF PROJECTS AND ACTION ALTERNATIVES

Environmental Resource	Watsonville Slough System Managed Aquifer Recharge and Recovery Projects	Aquifer Storage and Recovery Alternative	Reduced Impacts to Cultural and Biological Resources Alternative	Struve Slough Pump Station on Land Trust Property Alternative
Biological Resources	<b>Impact BR-1:</b> Construction of Project components could result in a substantial adverse effect on special-status species. (Less than Significant with Mitigation)	<b>Similar to or Greater than the Projects.</b>  The Projects' impacts to special-status species generally are not associated with the recharge basins. The primary differences between the Projects and this alternative is the construction of a WTP within a portion of the southeast recharge basin, the use of injection/extraction wells for ASR in place of recharge basins, and construction of several miles of pipelines between the WTP and ASR wells. The wells would be sited in upland areas. The operation of diversions from the sloughs is assumed to be the same as with the Projects. Consequently, construction- and operations-phase impacts to special status species would largely be the same under this alternative in comparison to the Projects. One exception is the need to extend the backwash water and raw water pipeline to the WTP. A segment of that pipeline crosses a ditch that is potentially a jurisdictional wetland and could provide suitable habitat for California red legged frogs (CRF). Depending on where the pipeline alignment is located, there could be additional temporary impacts to this feature. Like the Projects, implementation of applicable mitigation measures would reduce this impact to less than significant.	<b>Less than the Projects.</b>  The primary differences between the Projects and this alternative are the location of the Struve Slough pump station and the alignments of the Struve Slough to filter plant and filter plant to recharge basins pipelines. Under this alternative, there would be less construction activity within critical habitat for the CRF because the Struve Slough pump station would be located south of the slough. As described below under Impact BR-2, there would be less pipeline construction within sensitive habitat compared to the Projects. Construction-phase impacts to special-status species would otherwise be similar to those of the Projects.	<b>Less than the Projects.</b>  This alternative involves locating the Struve Slough pump station, intake pipeline and screened intake about 80 feet to the west of the proposed sites. The Land Trust of Santa Cruz County (Land Trust or Santa Cruz Land Trust) Property is regularly cultivated; the proposed site for the Struve Slough pump station is not. Cropland generally supports few wildlife species. Consequently, constructing the pump station on the Land Trust Property would be less likely to adversely affect special-status species such as CRF. The habitat within which the alternative intake and intake pipeline would be located is essentially the same as that of the Project (see Figure BIO-1h in Appendix BIO). Construction-phase impacts to special-status species would otherwise be similar to those of the Projects.
	<b>Impact BR-2:</b> Construction of Project components would result in a substantial adverse effect on riparian habitat or other sensitive natural community or on state or federally protected wetlands or waters through direct removal, filling, hydrological interruption, or other means. (Less than Significant with Mitigation)	<b>Similar to or Greater than the Projects.</b>  For reasons stated under Impact BR-1, construction impacts to riparian habitat or other sensitive natural community or on state or federally protected wetlands would be similar to or incrementally greater than with the Projects.	<b>Less than the Project.</b>  Implementation of this alternative would include an alternative alignment for the Struve Slough to filter plant pipeline that would avoid crossing through a Central Coast Arroyo willow riparian forest. The alternative alignment would also require less pipeline to be installed within cropland/agricultural wetland immediately south of Struve Slough and riparian forest north of Struve Slough. Overall, the amount of sensitive habitat affected by the alternative alignment for the Struve Slough to filter plant pipeline would be about 400 linear feet less than with the Projects.	<b>Similar to the Projects.</b>  For reasons stated under Impact BR-1, construction impacts to riparian habitat or other sensitive natural community or on state or federally protected wetlands would be similar to the Projects.
	<b>Impact BR-4:</b> Project operations could result in a substantial adverse effect on riparian habitat or other sensitive natural community or on state or federally protected wetlands or waters through direct removal, filling, hydrological interruption, or other means. (Less than Significant with Mitigation)	<b>Same as the Projects.</b>  Operational effects on riparian habitats, other sensitive natural communities, and state or federally protected wetlands or waters is primarily associated with changes in water surface elevations and resulting habitat changes from proposed diversions. Proposed diversions are assumed to be the same under this alternative; consequently, this impact would be the same as with the Projects.	<b>Same as the Projects.</b>  Operational effects on riparian habitats, other sensitive natural communities, and state or federally protected wetlands or waters is primarily associated with changes in water surface elevations and resulting habitat changes from proposed diversions. Proposed diversions are assumed to be the same under this alternative; consequently, this impact would be the same as with the Projects.	<b>Same as the Projects.</b>  Operational effects on riparian habitats, other sensitive natural communities, and state or federally protected wetlands or waters is primarily associated with changes in water surface elevations and resulting habitat changes from proposed diversions. Proposed diversions are assumed to be the same under this alternative; consequently, this impact would be the same as with the Projects.
	<b>Impact BR-5:</b> Project operations could result in a substantial adverse effect on terrestrial special-status species. (Less than Significant with Mitigation)	<b>Same as the Projects.</b>  Operational effects on terrestrial special-status species associated with the Projects include effects on CRF from proposed diversions. Proposed diversions are assumed to be the same under this alternative; consequently, this impact would be the same as with the Projects.	<b>Same as the Projects.</b>  Operational effects on terrestrial special-status species associated with the Projects include effects on CRF from proposed diversions. Proposed diversions are assumed to be the same under this alternative; consequently, this impact would be the same as with the Projects.	<b>Same as the Project.</b>  Operational effects on terrestrial special-status species associated with the Projects include effects on CRF from proposed diversions. Proposed diversions are assumed to be the same under this alternative; consequently, this impact would be the same as with the Projects.
	<b>Impact AIR-4:</b> The Projects could lead to an increase of GHG emissions that are associated with global climate change; however, not at a cumulatively considerable level. (Less than Significant)	<b>Greater than the Projects.</b>  Operation of the WTP and ASR wells would require substantially more electricity than the Projects, which would generate greenhouse gas emissions. It is unknown whether emissions levels would exceed thresholds.	<b>Same as the Projects.</b>  Energy use and thus greenhouse gas emission associated with energy use would essentially be the same as under the Projects.	<b>Same as the Projects.</b>  Energy use and thus greenhouse gas emission associated with energy use would essentially be the same as under the Projects.
	<b>Impact GEO-3:</b> The Projects could be located on a geologic unit or soil that becomes unstable as a result of the Projects or that could potentially result in landslide, lateral spreading, subsidence, liquefaction, or collapse for reasons caused or exacerbated by the Projects. (Less than Significant)	<b>Greater than the Projects.</b>  Basin deposits that are present in the area are potentially susceptible to liquefaction-induced settlement and lateral spreading, with expansive soils subject to shrink-swell (refer to Figure 3.6-2 in Section 3.6, Geology and Soils). Like the Projects, some components of this alternative would be located in areas with soils subject to liquefaction-induced settlement and lateral spreading. The potential for subsidence from groundwater extraction to occur would be greater with this alternative. However, PV Water would monitor groundwater levels to ensure that pumping did not create or exacerbate groundwater depressions. Compliance with applicable adopted mitigation measures would reduce impacts associated with unstable soils to less than significant.	<b>Greater than the Projects.</b>  The alternative location of the Struve Slough pump station would be within basin deposits instead of terrace deposits (refer to Figure 3.6-2). Because basin deposits may be susceptible to liquefaction-induced settlement and lateral spreading, applicable adopted mitigation measures would be implemented to reduce impacts to less than significant.	<b>Similar to the Projects.</b>  Like the Projects, some components would be located in areas with soils subject to liquefaction-induced settlement and lateral spreading. This impact would be similar to the Projects.
Geology and Soils	<b>Impact GEO-5:</b> The Projects could directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. (Less than Significant with Mitigation)	<b>Less than the Projects.</b>  With the Projects, most excavation in Pleistocene-age deposits, which have a high paleontological sensitivity at all depths, is associated with the recharge basins. None of the recharge basins would be constructed under this alternative. This alternative would involve less excavation in Pleistocene-age deposits, thus the likelihood that paleontological resources would be encountered is less under this alternative.	<b>Less than the Projects.</b>  While the pump station under the Struve Slough Project would be constructed on Pleistocene-age deposits, which have a high paleontological sensitivity at all depths, under this alternative, the Struve Slough pump station would be on Holocene-age deposits, which have low to high paleontological sensitivity, with the sensitivity increasing with depth. Therefore, the likelihood that paleontological resources would be encountered is less under this alternative.	<b>Same as the Projects.</b>  Excavation in soils with the potential to contain paleontological resources is the same under this alternative as under the Projects.

TABLE 5-3 (CONTINUED)  
COMPARISON OF ENVIRONMENTAL IMPACTS OF PROJECTS AND ACTION ALTERNATIVES

Environmental Resource	Watsonville Slough System Managed Aquifer Recharge and Recovery Projects	Aquifer Storage and Recovery Alternative	Reduced Impacts to Cultural and Biological Resources Alternative	Struve Slough Pump Station on Land Trust Property Alternative
Hazards and Hazardous Materials	<b>Impact HAZ-1:</b> Project construction and operation could result in a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials. (Less than Significant)	<b>Similar to the Projects.</b>  The expanded water treatment processes associated with this alternative would require the use and storage of additional water treatment chemicals. Like the Projects, compliance with regulatory standards for the storage and handling of hazardous materials and implementation of applicable adopted mitigation measures would reduce impacts to water quality associated with operations to less than significant.	<b>Similar to the Projects.</b>  The potential for exposure of the public or the environment to hazardous materials used during construction and operations of this alternative would be similar to the Projects.	<b>Similar to the Projects.</b>  The potential for exposure of the public or the environment to hazardous materials used during construction and operations of this alternative would be similar to the Projects.
	<b>Impact HAZ-2:</b> Project construction and operation could result in reasonably foreseeable conditions involving the release of hazardous materials to the environment (Less than Significant with Mitigation).	<b>Similar to or greater than the Projects.</b>  Like construction of the Southeast recharge basin under the Projects, development of the WTP may require the demolition of an existing storage building. Because the specific locations of the estimated 20 ASR wells have not been identified, it is not known whether contamination could be present at the well sites. With compliance of state regulations and implementation of applicable mitigation measures, potentially significant impacts related to the release of hazardous materials into the environmental during construction would be reduced to less than significant.	<b>Similar to the Projects.</b>  The potential for release of hazardous materials into the environment during construction or operation of this alternative would be similar to the Projects.	<b>Similar to the Projects.</b>  The potential for release of hazardous materials into the environment during construction or operation of this alternative would be similar to the Projects.
	<b>Impact HAZ-3:</b> Project construction and operation could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. (Less than Significant with Mitigation)	<b>Similar to the Projects.</b>  Due to the location of the alternative components and nature of construction activities, the potential for emergency access to be disrupted by construction in public streets or by the presence of construction-related truck trips under this alternative would be similar to the Projects.	<b>Greater than the Projects.</b>  The potential for emergency access to be disrupted by construction in public streets or by the presence of construction-related truck trips would be incrementally greater than the Projects because this alternative would involve installing pipeline within approximately 550 feet of San Andreas Road. The impact could be mitigated to less than significant through implementation of applicable mitigation measures.	<b>Same as the Projects.</b>  Due to the location of the alternative components and nature of construction activities, the potential for emergency access to be disrupted by construction in public streets or by the presence of construction-related truck trips would be the same as the Projects.
Noise and Vibration	<b>Impact NOI-1:</b> Construction of the Projects would result in a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plans or noise ordinances. (Less than Significant with Mitigation)	<b>Greater than the Projects.</b>  This impact is associated with construction activities at the southeast recharge basin, wells near that recharge basin, and segments of the Struve Slough to filter plant pipeline and filter plant to recharge basins pipeline near the receptors shown on Figure 3.8-2. Construction-phase noise impacts would be greater than those attributable to the Projects. The WTP associated with this alternative is essentially at the site of the southeast recharge basin and the above-referenced pipelines would essentially be the same (with respect to the potential to generate noise above County standards). There would be more pipeline construction near Receptors 1 and 2 (shown on Figure 3.8-2). Like the Projects, this alternative would involve construction during sensitive nighttime hours for trenchless pipeline construction and for well installation. Implementation of applicable mitigation measures likely could reduce these impacts to less than significant levels.	<b>Less than the Projects.</b>  Under this alternative there would be no trenchless construction (i.e., nighttime construction) beneath Struve Slough, and the northern terminus of the Struve Slough to filter plant pipeline would be approximately 420 feet farther from Receptor 4 (shown on Figure 3.8-2). Construction would not otherwise materially affect the significance of noise impacts on sensitive receptors, and impacts would therefore be less than with the Projects.	<b>Less than the Projects.</b>  Moving the Struve Slough pump station farther west onto the Land Trust property would move construction activities associated with the pump station and northern terminus of the Struve Slough to filter plant pipeline incrementally farther away from Receptor 4 (shown on Figure 3.8-2). Construction would not otherwise affect the significance of noise impacts on sensitive receptors, and impacts would therefore be less than with the Projects.
	<b>Impact NOI-2:</b> Operation of the Projects could result in a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance. (Less than Significant with Mitigation)	<b>Similar to the Projects.</b>  This impact is associated with operation of the upgrades proposed for the Harkins Slough filter plant, which would be the same under this alternative, and the monitoring and recovery wells which would not be included in this alternative. Although the location of the ASR wells is not known, compliance with applicable mitigation measures would ensure that noise impacts would be less than significant.	<b>Same as the Projects.</b>  This impact is associated with operation of the upgrades proposed for the Harkins Slough filter plant and monitoring and recovery wells, which would be the same under this alternative. Construction at alternative locations for the Struve Slough pump station and pipeline segments would not be near sensitive receptors.	<b>Same as the Projects.</b>  This impact is associated with operation of the upgrades proposed for the Harkins Slough filter plant and monitoring and recovery wells, which would be the same under this alternative. The alternative location for the Struve Slough pump station would be located farther from sensitive receptors than under the Struve Slough Project.
	<b>Impact NOI-3:</b> Project construction would generate excessive groundborne vibration. (Less than Significant)	<b>Similar to or greater than the Projects.</b>  This impact is associated with construction of monitoring and recovery wells, which would not be included in this alternative. However, construction of the ASR wells could have similar or greater vibration effects that could be reduced to less than significant with implementation of applicable mitigation measures.	<b>Same as the Projects.</b>  This impact is associated with construction of monitoring and recovery wells, which would remain the same under this alternative.	<b>Same as the Projects.</b>  This impact is associated with construction of monitoring and recovery wells, which would remain the same under this alternative.
Transportation and Traffic	<b>Impact TRA-1:</b> Construction of the Projects would have temporary and intermittent effects on traffic and transportation conditions in the Project area. (Less than Significant with Mitigation)	<b>Less than the Projects.</b>  Like the Projects, this alternative would involve limited construction within public road rights-of-way. Because there would be substantially less earthwork under this alternative, the magnitude of temporary effects on traffic and transportation conditions would be less than with the Projects.	<b>Greater than the Project.</b>  While overall, the magnitude of earthwork and construction activities associated with this alternative is similar to the Projects, this alternative would involve installing pipeline within approximately 550 feet of San Andreas Road, which would remove one travel lane from service for about one week. Implementation of applicable mitigation measures would reduce impacts to less than significant.	<b>Same as the Projects.</b>  Temporary and intermittent effects on traffic and transportation conditions would be the same under this alternative as under the Projects because the amount of earthwork and travel lane closures in public rights-of-way would be the same.
	<b>Impact TRA-2:</b> Construction of the Projects would temporarily disrupt circulation patterns near sensitive land uses (schools, hospitals, fire stations, police stations, and other emergency providers). (Less than Significant with Mitigation)	<b>Less than the Projects.</b>  For reasons stated under Impact TRA-1, the magnitude of this impact would be incrementally less than the Projects.	<b>Greater than the Project.</b>  For reasons stated under Impact TRA-1, this impact would be incrementally greater than the Projects and could be mitigated through implementation of applicable mitigation measures.	<b>Same as the Projects.</b>  For reasons stated under Impact TRA-1, the magnitude of this impact would be the same as the Projects.

TABLE 5-3 (CONTINUED) COMPARISON OF ENVIRONMENTAL IMPACTS OF PROJECTS AND ACTION ALTERNATIVES				
Environmental Resource	Watsonville Slough System Managed Aquifer Recharge and Recovery Projects	Aquifer Storage and Recovery Alternative	Reduced Impacts to Cultural and Biological Resources Alternative	Struve Slough Pump Station on Land Trust Property Alternative
Transportation and Traffic (cont.)	Impact TRA-3: Construction of the Projects would have temporary effects on alternative transportation or alternative transportation facilities in the Project area. (Less than Significant with Mitigation)	Greater than the Project.  Because this impact is primarily associated with construction in San Andreas Road, which would be increased due to the realigned backwash and raw water pipeline under this alternative, this impact would be incrementally greater than the Projects and could be mitigated through implemented of applicable mitigation measures.	Greater than the Project.  Because this impact is primarily associated with construction in San Andreas Road, and for reasons stated under Impact TRA-1, this impact would be incrementally greater than the Projects and could be mitigated through implementation of applicable mitigation measures.	Same as the Projects.  Because this impact is primarily associated with construction in San Andreas Road, which would not change under this alternative, impacts would be the same as the Projects.
	Impact TRA-4: Construction of the Projects could temporarily increase the potential for accidents on Project area roadways. (Less than Significant with Mitigation)	Less than the Project.  For reasons stated under Impact TRA-1, the magnitude of this impact would be incrementally less that the Projects.	Greater than the Project.  For reasons stated under Impact TRA-1, this impact would be incrementally greater than the Projects and could be mitigated through implementation of applicable mitigation measures.	Same as the Projects.  For reasons stated under Impact TRA-1, this impact would be the same as the Projects.
Cultural Resources	Impact CUL-2: The Projects could cause a substantial adverse change in the significance of an archaeological resource, including those determined to be a historical resource defined in Section 15064.5 or a unique archaeological resource defined in Public Resources Code 21083.2. (Less than Significant with Mitigation)	Greater than the Projects.  Although this alternative would require less excavation than the Projects (because no recharge basins would be developed), it would require more excavation adjacent to sensitive recorded sites; therefore, the magnitude of impacts to archaeological resources is considered worse with this alternative compared to the Projects. Like the Projects, this impact could be mitigated through implementation of applicable mitigation measures.	Less than the Projects.  Because three recorded sites would be wholly or partially avoided under this alternative, the magnitude of impacts to cultural resources would be less than with the Projects.	Similar to the Projects.  Two recorded sites are located in the vicinity of both the proposed location for the Struve Slough pump station and this alternative site. Subsequent investigations could indicate that the two sites are in fact part of one large site. The potential exists for disturbance of a recorded site to occur at either the proposed or alternative site.
	Impact CUL-3: The Projects could disturb human remains, including those interred outside of formal cemeteries. (Less than Significant with Mitigation)	Greater than the Project.  For reasons described under Impact CUL-2, the potential to disturb human remains would be greater under this alternative compared to the Projects.	Less than the Projects.  For reasons described under Impact CUL-2, the potential to disturb human remains would be less under this alternative compared to the Projects.	Similar to the Projects.  For reasons described under Impact CUL-2, the potential to disturb human remains is considered similar under this alternative compared to the Projects.
Tribal Cultural Resources	Impact TCR-2: The Projects could result in a substantial adverse change in the significance of a tribal cultural resource. (Less than Significant with Mitigation)	Greater than the Projects.  For reasons stated under Impacts CUL-2 and CUL-3, the potential to result in a substantial adverse change in the significance of a tribal cultural resources would be greater under this alternative compared to the Projects.	Less than the Projects.  For reasons stated under Impacts CUL-2 and CUL-3, the potential to result in a substantial adverse change in the significance of a tribal cultural resources would be less under this alternative compared to the Projects.	Similar to the Projects.  For reasons stated under Impacts CUL-2 and CUL-3, the potential to result in a substantial adverse change in the significance of a tribal cultural resources would be similar under this alternative compared to the Projects.
Energy, Utilities, Public Services, and Recreation	Impact EUP-1: Implementation of the Projects could result in wasteful, inefficient, or unnecessary consumption of energy during Project construction or operation, or conflict with or obstruct a state or local plan for renewable energy or energy efficiency. (Less than Significant)	Greater than the Projects.  Operation of the WTP and ASR wells would require substantially more electricity than the Projects, although this would not constitute a wasteful use of energy.	Same as the Projects.  Energy use would essentially be the same as under the Projects.	Same as the Projects.  Energy use would essentially be the same as under the Projects.
Aesthetics	Impact AES-1: Implementation of the Projects could have a substantial adverse effect on scenic vistas or substantially damage scenic resources. (Less than Significant)	Greater than the Projects.  With regard to aesthetics, all of the visible elements of the Projects (upgrades to the Harkins Slough filter plant, Struve Slough pump station) are included in this alternative. This alternative also includes a WTP that is estimated to occupy approximately 5 acres, an estimated 20 ASR wells, with each pair occupying an estimated 1,000 square foot site surrounded by security fencing, and 10 infiltration basins, each approximately 10,000 square feet and included within the security fencing. The additional facilities would be equipped with nighttime lighting. The WTP likely would not be visible from nearby publicly accessible viewpoints due to distance, height, and intervening topography and structures. Although individual ASR well sites would not be visually prominent due to size, some could be visible from publicly accessible viewpoints, as would new power poles and lines needed to provide electricity to the ASR wells. Overall, while the effect on scenic vistas and scenic resources would be greater than with the Projects, the impact would remain less than significant.	Greater than the Project.  Although the Struve Slough pump station would be too distant and small to be noticeable from scenic vistas, and intervening structures would generally block views, the alternative location would be more visible than the location proposed under the Struve Slough Project. Impacts would remain less than significant.	Similar to the Projects.  Views of the alternative site for the Struve Slough pump station from publicly accessible roadways are screened by the rolling terrain, as is the proposed site. The pump station would be consistent in appearance with varied small-scale man-made structures nearby. Effects on scenic vistas and scenic resources would be similar to those of the Projects.
	Impact AES-2: Implementation of the Projects could degrade the existing visual character or quality of public views of the sites in non-urbanized areas. (Less than Significant)	Greater than the Projects.  For reasons stated under Impact AES-1, potential degradation of the existing visual character or quality of sites in non-urbanized areas are considered worse under this alternative, but the impact would remain less than significant.	Greater than the Project.  The upper portion of the Struve Slough pump station would be more visible in dynamic views from West Beach Street than under the Struve Slough Project, but would constitute a very small portion of the view shed, and would be consistent with surrounding agricultural structures. The impact would remain less than significant.	Similar to the Projects.  For reasons stated above under Impact AES-1, potential degradation of the existing visual character or quality of the sites is considered similar under this alternative.
	Impact AES-3: Project components could introduce significant new sources of light or glare. (Less than Significant with Mitigation)	Greater than the Projects.  As indicated under Impact AES-1, this alternative would introduce additional sources of construction and security lighting compared to the Projects. The magnitude of light and glare impacts would be greater under this alternative and could be mitigated with implementation of applicable mitigation measures.	Less than the Projects.  Due to alternative pipeline alignments that would not require trenchless construction, there would be incrementally less nighttime pipeline construction with this alternative, and the impact would be less than the Projects.	Same as the Project.  Sources of nighttime construction lighting would be the same under this alternative as the Projects.

### 5.3.3 Reduced Impacts to Cultural and Biological Resources Alternative

#### 5.3.3.1 Description

This alternative would reduce potential impacts to cultural and biological resources by implementing the following:

- Relocating the Struve Slough pump station to the south of Struve Slough;
- Rerouting the Struve Slough to filter plant pipeline; and
- Rerouting the filter plant to recharge basins pipeline.

As shown on **Figure 5-2**, under this alternative, the Struve Slough pump station would be constructed south of Struve Slough, on the eastern side of Assessor Parcel Number (APN) 052-221-24, instead of north of the Slough. Moving the pump station to this location would put it within the 100-year flood hazard zone mapped by the Federal Emergency Management Agency (FEMA), as shown on Figure 3.3-4. The screened intake would also be moved approximately 200 feet south of the location proposed under the Struve Slough Project.

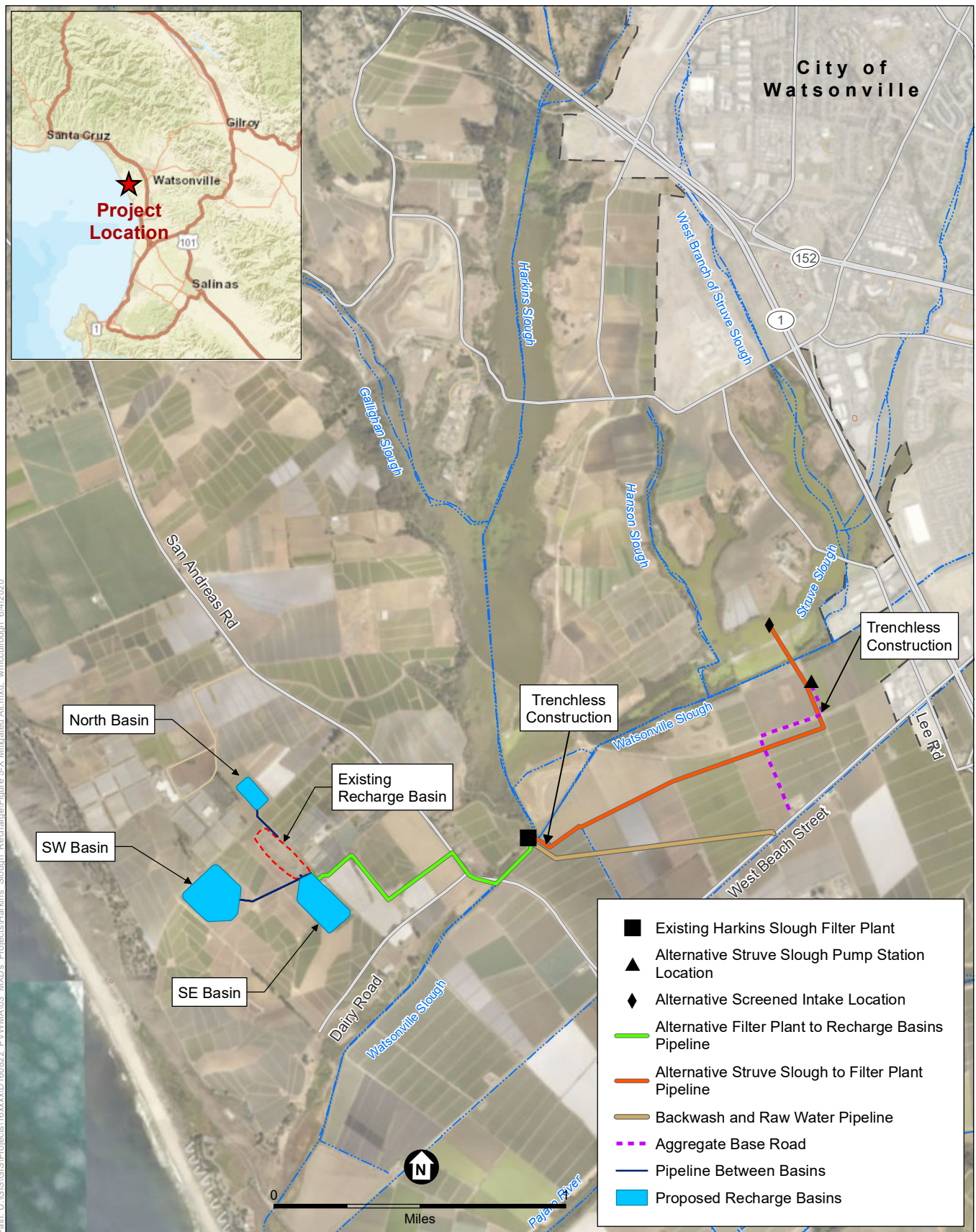
To accommodate the change in location of the pump station and screened intake, the pipeline connecting the intake pipeline between the screened intake and the pump station would be approximately 1,200 feet long. Under this alternative, the Struve Slough to filter plant pipeline would be rerouted to accommodate the pump station location and to avoid impacts to riparian forest within APN 052-22-125. This alternative Struve Slough to filter plant pipeline would be approximately 6,250 feet long. The filter plant to recharge basins pipeline would be rerouted as shown on Figure 5-2 and would be approximately 5,650 feet long under this alternative. The pump station would need to incorporate flood proofing features into its design (e.g., the pump station fill pad would be elevated and/or bermed; electrical equipment would be elevated). Consequently, the footprint of the facility would be significantly larger and the pump station structure would extend to a greater height above ground than with the proposed Project. PV Water would install an elevated all-weather aggregate base road to facilitate access to the pump station during the wet season.

Construction, operations and maintenance activities under the Reduced Impacts to Cultural and Biological Resources Alternative would be generally the same as under the Projects. Access to the pump station during major wet weather events could be limited. Project yield would remain the same as proposed Projects.

#### 5.3.3.2 Ability to Meet the Project's Objectives

Table 5-1 summarizes the ability of the Reduced Impacts to Cultural and Biological Resources Alternative to meet the Projects' objectives. As shown, this alternative would meet most of the Projects' objectives. The longer length of intake pipeline and the filter plant to recharge basins pipeline would increase capital costs in comparison to the proposed Struve Slough Project. There would also be additional costs associated with constructing the Struve Slough pump station and





SOURCE: Carollo Engineers, 2019;  
ESRI World Imagery, 7/23/2016; ESA

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 5-2**  
Reduced Impacts to Cultural and Biological Resources Alternative

access road due to its location in the 100-year flood hazard zone. Those factors, coupled with a greater loss of Important Farmland, would diminish this alternative's ability to meet the following objective compared to the Projects: *Recommend a program that is cost effective and environmentally sound.*

### 5.3.3.3 Evaluation

Table 5-3 compares the significant impacts of the Project with those of the Reduced Impacts to Cultural and Biological Resources Alternative. The table also lists impacts that would be less than significant for the Projects but would be worse with this alternative. The primary differences between the environmental impacts of the Project and the Reduced Impacts to Cultural and Biological Resources Alternative are addressed below.

- **Important Farmland.** The location of the Struve Slough pump station under this alternative would be on land that is designated as Important Farmland. Implementation of this alternative would result in the conversion of about 1.5 acres more Important Farmland to non-agricultural use compared to the Projects.
- **Hydrology and Water Quality, Hazardous Materials.** While this alternative locates the Struve Slough pump station within the 100-year flood hazard zone, the incremental increase in the risk of pollutant release during construction or operations would be addressed through compliance with regulatory standards and implementation of adopted mitigation measures. (The pump station would not substantially impede or redirect flood flows.)
- **Geology and Soils.** The alternative location of the Struve Slough pump station would be in basin deposits rather than terrace deposits, meaning that soils at the site would be more susceptible to liquefaction-induced settlement or lateral spreading but less likely to contain paleontological resources.
- **Biological Resources.** Under this alternative, the Struve Slough pump station would be located outside critical habitat for the CRF. The Struve Slough to filter plant pipeline alignment under this alternative would avoid areas of riparian forest and cropland/agricultural wetland. Overall, temporary impacts to state and federally protect wetlands would be less than with the proposed Projects.
- **Transportation and Traffic.** While the number truck trips associated with this alternative would be similar to the Projects, this alternative would involve installing pipeline within approximately 550 feet of San Andreas Road, which would remove one travel lane from service for about one week.
- **Cultural and Tribal Cultural Resources.** Compared to the Projects, relocating the Struve Slough pump station and a portion of the filter plant to recharge basins pipeline alignment would wholly or partially avoid impacts to three recorded archaeological sites that may also be tribal cultural resources.

### 5.3.4 Struve Slough Pump Station on Land Trust Property Alternative

#### 5.3.4.1 Description

This alternative location for the Struve Slough Pump Station, shown in **Figure 5-3**, is included in this EIR in response to public comments. This alternative involves moving the proposed Struve Slough pump station, intake, and associated pipelines (intake pipeline and Struve Slough to filter plant pipeline) from APN 052-081-38 to APN 052-081-37, which is owned by the Land Trust of Santa Cruz County (Land Trust or Santa Cruz Land Trust). All other components of the Struve Slough Project (including yield) would remain the same under this alternative. Additionally, operations and maintenance activities for the Struve Slough Pump Station on Land Trust Property Alternative would be the same as the Struve Slough Project.

#### 5.3.4.2 Ability to Meet the Project's Objectives

The Struve Slough Pump Station on Land Trust Property Alternative would meet most of the basic objectives of the Projects. This alternative's potential to worsen effects on Important Farmland (described below), would diminish this alternative's ability to meet the following objective compared to the Struve Slough Project: *Recommend a program that is cost effective and environmentally sound.*

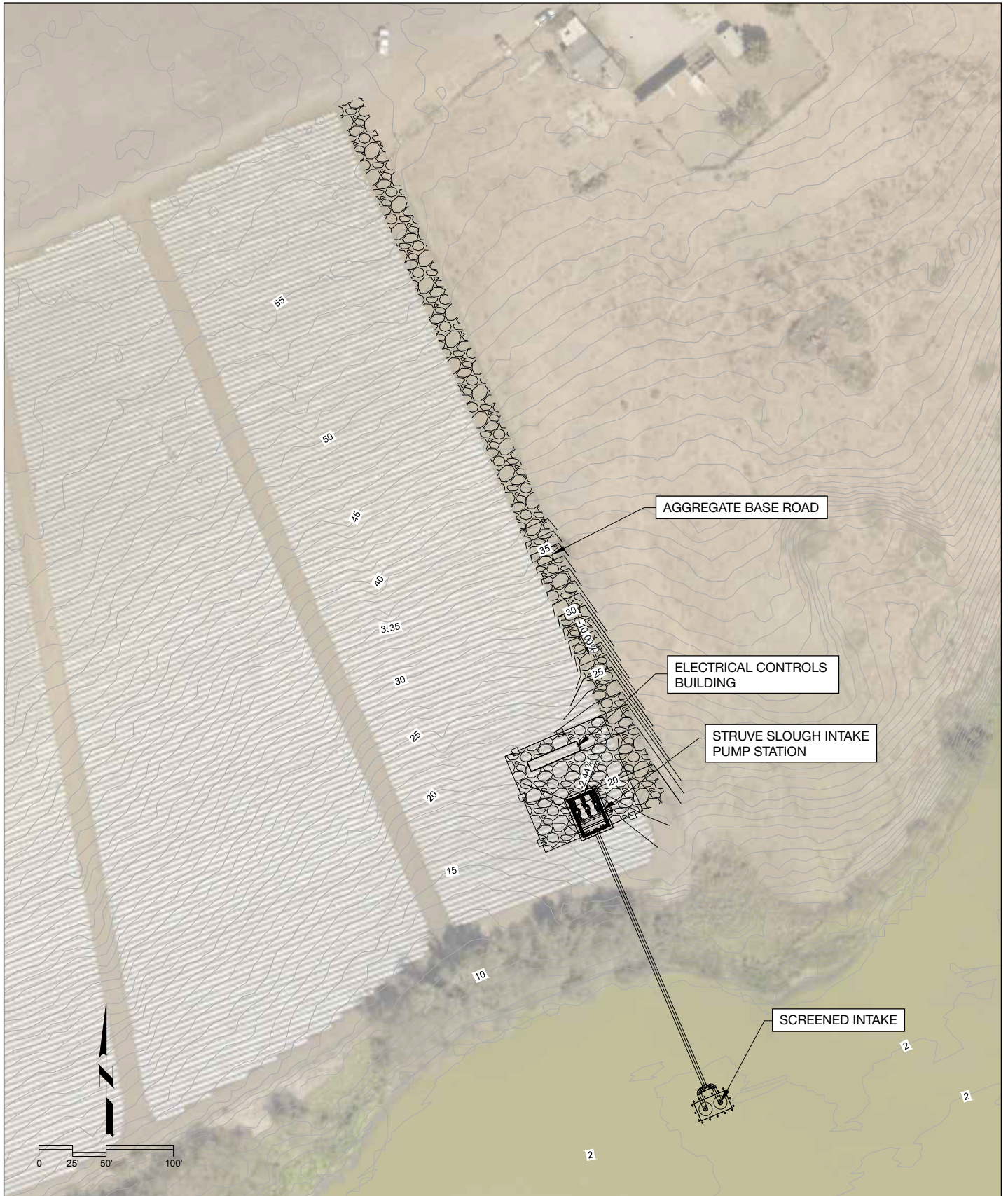
#### 5.3.4.3 Evaluation

Table 5-3 compares the significant impacts of the Struve Slough Project with those of the Struve Slough Pump Station on Land Trust Property Alternative. As shown on Figure 3.2-2 in Section 3.2, Land Use and Agriculture, while APN 052-08-138 is not designated as Important Farmland, APN 052-08-137, the Land Trust property, is. Constructing the Struve Slough pump station would result in the conversion of approximately 0.05 acre of Important Farmland to non-agricultural use that would not occur under the proposed Struve Slough Project. The Land Trust Property is regularly cultivated; the proposed site for the Struve Slough pump station is not. Cropland generally supports few wildlife species. Consequently, constructing the pump station on the Land Trust Property would be less likely to adversely affect special-status species such as CRF. All other impacts would be similar to or incrementally less than those of the proposed Projects.

## 5.4 Comparison of Project Alternatives and Environmentally Superior Alternative

The CEQA *Guidelines* require the identification of an environmentally superior alternative to the Project (Section 15126.6[e]). If it is determined that the “no project” alternative would be the environmentally superior alternative, then the EIR shall also identify an environmentally superior alternative among the other project alternatives (Section 15126.6[3]).





SOURCE: PV Water, Struve Slough with Recharge Basins Preliminary Design Drawings, prepared by Carollo Engineers, February 2019.

College Lake Integrated Resources Management Project

**Figure 5-3**  
Struve Slough Pump Station on  
Land Trust Property Alternative

Under the No Project Alternative, overdraft and seawater intrusion conditions would continue within the Pajaro Valley Groundwater Basin, potentially resulting in land fallowing and significant loss of farmland. Implementation of projects to replace the Sloughs Projects would result in other, potentially more severe environmental impacts than those associated with the Projects as proposed. For these reasons, the No Project Alternative is not considered the environmentally superior alternative.

There are trade-offs, in terms of environmental impacts, between the proposed Projects and the other alternatives. The Aquifer Storage and Recovery Alternative would reduce the loss of Important Farmland from 34.2 acres to 7.5 acres, but could worsen impacts related to cultural resources and tribal cultural resources, noise, aesthetics, energy, and greenhouse gas emissions. The Reduced Impacts to Cultural and Biological Resources Alternative would wholly or partially avoid three recorded archaeological sites that could also be considered tribal cultural resources and could reduce construction-phase impacts on sensitive habitat, while the relocated Struve Slough pump station would incrementally increase the loss of Important Farmland. Disruption of transportation facilities would also be incrementally greater with this alternative because of the additional construction in San Andreas Road. There is little overall difference between the impacts of the Projects and the Struve Slough Pump Station on Land Trust Property Alternative: the latter would incrementally reduce the potential for adverse effects on special status species during construction while increasing the loss of Important Farmland by 0.05 acre.

The purpose of considering alternatives in an EIR is to identify feasible ways to avoid or substantially lessen the significant adverse environmental effects of a project while meeting most of its basic objectives. Implementation of the Projects would result in significant and unavoidable impacts from the loss of Important Farmland. The Aquifer Storage and Recovery Alternative is the only alternative that substantially reduces, while not entirely eliminating, this impact. Overall, this EIR concludes that a modified version of the Aquifer Storage and Recovery Alternative that incorporates the pipeline alignment in the vicinity of San Andreas and Dairy Roads associated with the Reduced Impacts to Cultural and Biological Resources Alternative is considered the environmentally superior alternative. While the Aquifer Storage and Recovery Alternative could feasibly meet most of the basic objectives of the Projects, the reasons that aquifer storage and recovery was considered and rejected in the BMP Update and in prior basin management plans – cost and length of time to implement – remain valid concerns to PV Water. In addition, as discussed in Section 3.2, Land Use and Agriculture, while implementation of the Projects would result in the permanent conversion of Important Farmland, these impacts would should be considered in the context of the Projects’ contribution to the long-term preservation of such farmland within the Pajaro Valley by substituting surface water for groundwater resources in Coastal areas of the Pajaro Valley.

## 5.5 Alternatives Considered but Eliminated from Further Analysis

### 5.5.1 Reduced Diversion Alternative

#### 5.5.1.1 Description

The hydraulic and hydrologic modeling conducted for the Projects included a Reduced Diversion Alternative that reduced water surface elevation (WSE) volatility during CRF breeding season but also reduced overall diversion volume. This alternative set the diversion threshold during CRF breeding season to be the observed WSE in each slough on the first day of the season that is not salinity-limited (i.e., the first day after January 1st in which electrical specific conductivity is less than 1,000 microsiemens per centimeter). This threshold depends on each year's unique hydrologic and water quality circumstances, and in most years, on the first day that water was not salinity-restricted, the WSE in both sloughs was higher than the 5 feet (Harkins) or 6 feet (Struve) prescribed under the operations proposed for the Projects that are described and evaluated in this EIR. These higher WSE thresholds, particularly in wetter years with more flow, reduce WSE volatility in CRF breeding season.

While there were modeled years when the threshold was slightly lower than the Projects as proposed, any gains in diverted volume due to a lower threshold were marginal compared to the decreases in diverted volume from the remaining years where the CRF season threshold was as much as 2.9 feet higher (Struve Slough, modeled years 2011 and 2017) than the threshold set for the Projects as proposed.

#### 5.5.1.2 Reasons for Rejection

This alternative would reduce average diversions by about 24 percent for Struve Slough and about 11 percent for Harkins Slough compared to the Projects as proposed. Consequently, this alternative was rejected because it would not meet most of the basic objectives of the Projects, nor would it substantially advance the objectives of the BMP Update based on the reduction in yield associated with operations under this alternative.

### 5.5.2 Alternative Recharge Basins

#### 5.5.2.1 Description

PV Water considered and rejected multiple alternative recharge basin locations north and south of the recharge basins proposed as part of the Projects (Southeast, Southwest, and North) during development of both the 2014 BMP Update EIR and this EIR.

Other suitable sites may be presented that reduce impacts due to farmland conversion; however, currently there are no known feasible sites (e.g., sites that would not cause additional loss of Important Farmland, not adversely affect recorded cultural resources, and have the correct soil and hydrologic conditions) available.

### **5.5.2.2 Reasons for Rejection**

Potential alternative recharge basin sites were ultimately rejected due to impacts to known cultural resources, unsuitable topography, unsuitable hydrogeologic characteristics, and/or failure to reduce loss of Important Farmland.

## **5.5.3 Watsonville Slough Diversion**

### **5.5.3.1 Description**

As discussed in Section 5.2, the Struve Slough Project was referred to in the BMP Update and 2014 BMP Update PEIR as the Watsonville Slough with Recharge Basins Project because, at the time, the proposed diversion point was located in Watsonville Slough between the railroad tracks and the confluence with Harkins Slough.

### **5.5.3.2 Reasons for Rejection**

On the basis of water quality investigations and information regarding habitat for special status species developed during conceptual design, PV Water rejected a diversion point in Watsonville Slough in favor of the proposed diversion in Struve Slough. Slough water southwest of the railroad tracks generally has a higher salinity than water further upstream where the diversion is currently proposed.

## **5.5.4 Off-Stream Diversion from Watsonville Slough**

### **5.5.4.1 Description**

In the BMP Update and 2014 BMP Update PEIR, PV Water explored implementation of an “off stream” diversion for Watsonville Slough at the location described in Section 5.5.2. The off-stream diversion would be located in an isolated “stent” or “pond” area; the off-stream area could be a pond next to Watsonville Slough, or an existing open-water area isolated from immediate connection with Watsonville Slough. This alternative pond would have a volume of between 50 and 150-acre-feet (for example, 10 acres at 10-feet deep) and would require screening for threatened and endangered aquatic species, and turbidity/floatables management. Ponds would receive diversions at high water, or (much more slowly) at lower water. Water from the pond would be sent through the treatment plant and to the recharge basins as proposed by the Struve Slough Project. Refer to Appendix ALTS for the full description of this alternative from the 2014 BMP Update PEIR.

### **5.5.4.2 Reasons for Rejection**

This alternative was rejected because it would have increased the loss of Important Farmland compared to the Struve Slough Project as proposed (i.e., due to conversion of agricultural land to a pond/stent system) and because slough water west of the railroad tracks generally has a higher salinity than water further upstream where the diversion is currently proposed. The ability of the pond or stent to receive adequate flows also was questionable. No suitable sites (e.g., sites that

would not cause additional loss of Important Farmland, not adversely affect special status species habitat, and not adversely affect recorded cultural resources) for an off-stream pond were identified near the existing filtration facilities or recharge basin sites.

## 5.5.5 Basin Management Plan Update Alternatives

### 5.5.5.1 Description

As part of the BMP Update, PV Water considered several alternatives related to surface water that either involved Harkins, Struve, or Watsonville Slough or represented a potential alternative water supply and storage project.<sup>9</sup> Appendix B of the BMP Update lists 44 projects that were identified by the Ad Hoc BMP Committee. Of these, the following three were revisited as part of the alternatives screening for this EIR. These alternatives include the following:

- **R-1: Recycled Water to Harkins Slough Recharge Basin.** This alternative would use the existing Harkins Slough facilities for surface spreading of recycled water for groundwater recharge. The existing recycled water treatment facility at the Watsonville Water Resources Center produces recycled water meeting Title 22 disinfected tertiary recycled water standards. The surface spreading of recycled water treated to the disinfected tertiary standard is limited to an initial blend of 80 percent diluent water and 20 percent recycled water. 2,000 AF of diluent water would be provided from the existing Harkins Slough diversion and 500 AF of recycled water would be provided during the winter from the WWTP. Existing infrastructure would bring the diluent water and recycled water to the existing recharge basin site. The use of recycled water would require the construction of monitoring wells between the basin and potable wells. This project's yield would be 500 AFY.
- **R-2: Recycled Water to Harkins Slough and North Dunes Recharge Basins.** This alternative would use the existing Harkins Slough Facilities for surface spreading of recycled water for groundwater recharge. A new 25-acre North Dunes recharge basin would be constructed 0.6 miles northwest of the existing Harkins Slough recharge basin. The existing recycled water treatment facility at the WWTP produces recycled water meeting Title 22 disinfected tertiary recycled water standards. The surface spreading of recycled water treated to the disinfected tertiary standard is limited to an initial blend of 80% diluent water and 20% recycled water. 2,000 AF of diluent water would be provided from the existing Harkins Slough and 1,200 AF from Watsonville Slough. 800 AF of recycled water would be provided during the winter from the WWTP, 500 AF to the Harkins Slough recharge basin and 300 AF to the North Dunes recharge basin. Existing infrastructure would bring the diluent water and recycled water to the Harkins Slough recharge basin. Approximately 1.3 miles of new conveyance pipeline would be required to bring water to the new North Dunes recharge basin. The use of recycled water would require the construction of monitoring wells between the basins and potable wells. Potable wells located down gradient of the recharge area which would not allow for at least a six-month recycled water travel time to a well would need to be abandoned. Expansion of the filtration system would also be required to treat water from Watsonville Slough. This project's yield would be 800 AFY.
- **SEA-1: Saltwater Desalination.** This project includes construction and operation of a seawater desalination facility north of the State Route 1 and Elkhorn Slough crossing in

<sup>9</sup> PV Water, *Basin Management Plan Update*, Final, February 2014.

unincorporated Monterey County that would produce potable water from seawater. This project consists of a seawater intake and pipeline, desalination plant, brine discharge and outfall facilities, product water conveyance pipelines to the recycled WWTP clearwell and three City of Watsonville potable wells (8-miles of 24-inch pipe), and storage facilities. The treated water would be used for agricultural irrigation during the irrigation season via an expanded CDS, and as potable water for the City of Watsonville during the winter months. This project's yield would be 7,500 AFY (6,500 AFY for coastal agriculture and 1,000 AFY for potable water for the City of Watsonville).

#### **5.5.5.2 Reasons for Rejection**

While the Recycled Water to Harkins Slough Recharge Basin (R-1) and Recycled Water to Harkins Slough and North Dunes Recharge Basins (R-2) projects would reduce the acreage of converted Important Farmland compared to the Projects, both would still result in significant and unavoidable impacts related to the conversion of Important Farmland. Additionally, all three alternatives were rejected from further consideration due to one or more of the following reasons: low yield, potentially having the same or greater environmental effects, regulatory uncertainty/greater difficulty to achieve regulatory compliance, high capital costs, and/or implementation timeline (i.e., 10 or more years to implement).

# CHAPTER 6

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## Report Preparers

### 6.1 Lead Agency – Pajaro Valley Water Management Agency

Brian Lockwood – *General Manager*

Casey Meusel – *Associate Hydrologist*

Jesus “Chuy” Martinez – *Water System Operations Supervisor*

Shinehah Bigham – *Water System Operator*

Marcus Mendiola – *Water Conservation and Outreach Specialist*

Marino Hernandez – *Water Resources Technician*

### 6.2 Program Management and Project Design

Lou Carella – *Program Manager*

Paul Friedlander – *Lead Engineer*

Richard Gutierrez – *Design Engineer*

Jamie Pigott – *Design Engineer*

### 6.3 CEQA Consultants

#### 6.3.1 Environmental Science Associates

Jim O’Toole – *Project Director*

Jill Hamilton – *Project Manager*

Alena Maudru – *Deputy Project Manager; Land Use and Agricultural Resources; Hazards and Hazardous Materials; Energy, Utilities, Public Services, and Recreation; Aesthetics*

Rachel Brownsey – *Biological Resources*

Brandon Carroll – *Geology and Soils; Surface Water, Groundwater, and Water Quality*

Candace Ehringer – *Cultural Resources; Tribal Cultural Resources*

Jyothi Iyer – *Air Quality and Greenhouse Gases; Noise*

Karen Lancelle – *Surface Water, Groundwater, and Water Quality*

Wes McCullough – *Graphics*

Shadde Rosenblum – *Transportation and Traffic*

Jill Sunahara – *Permitting Lead; Biological Resources*

Ron Teitel – *Graphics*

Erika Walther – *Biological Resources*

### **6.3.1.2 Kittleson Environmental Consulting**

Gary Kittleson – *Principal*

### **6.3.1.3 Mike Podlech**

Mike Podlech – *Fisheries Biologist*



## **APPENDIX AIR**

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### Air Quality Supporting Information

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

### Santa Cruz County, Annual

## 1.0 Project Characteristics

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### 1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	1.00	1,000.00	0

### 1.2 Other Project Characteristics

<b>Urbanization</b>	Urban	<b>Wind Speed (m/s)</b>	1.8	<b>Precipitation Freq (Days)</b>	61
<b>Climate Zone</b>	5			<b>Operational Year</b>	2029
<b>Utility Company</b>	Pacific Gas & Electric Company				
<b>CO2 Intensity (lb/MWhr)</b>	210	<b>CH4 Intensity (lb/MWhr)</b>	0.029	<b>N2O Intensity (lb/MWhr)</b>	0.006

### 1.3 User Entered Comments & Non-Default Data

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

Project Characteristics - [http://www.pgecorp.com/corp\\_responsibility/reports/2019/assets/PGE\\_CRSR\\_2019.pdf](http://www.pgecorp.com/corp_responsibility/reports/2019/assets/PGE_CRSR_2019.pdf)

Land Use - Unit values assumed

Construction Phase - Project data

Off-road Equipment - Project data

Off-road Equipment - Based on equipment refinements provided in email from Paul F dated July 7, 2020 for screening HRA for this project component

Off-road Equipment - Project data

Off-road Equipment - Project data

Off-road Equipment - Project data

Off-road Equipment - Revised equipment list based on email from Paul F dated 7/28/2020

Off-road Equipment - Project data

Off-road Equipment - Project data

Off-road Equipment - Project data

Off-road Equipment - Project data

Off-road Equipment - Based on revised equipment list provided by Paul F dated 7/28/2020

Off-road Equipment - Project data

Off-road Equipment - Phase not used

Off-road Equipment - Phase not used

Off-road Equipment - Project data

Off-road Equipment - Phase not used

Trips and VMT - Project data

Grading - Project data

Architectural Coating - No architectural coatings

Vehicle Trips - Operational emissions not estimated

Energy Use - x

Construction Off-road Equipment Mitigation - Tier 4 F equipment used as Best Available Control Technology

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

[illegible]

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

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## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

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## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

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## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

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tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00



## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.50
tblOffRoadEquipment	UsageHours	8.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	210
tblTripsAndVMT	HaulingTripNumber	0.00	53.00
tblTripsAndVMT	HaulingTripNumber	0.00	70.00
tblTripsAndVMT	HaulingTripNumber	0.00	3,136.00
tblTripsAndVMT	HaulingTripNumber	0.00	86.00
tblTripsAndVMT	HaulingTripNumber	0.00	468.00
tblTripsAndVMT	HaulingTripNumber	0.00	668.00
tblTripsAndVMT	HaulingTripNumber	0.00	1,210.00
tblTripsAndVMT	HaulingTripNumber	0.00	13,781.00
tblTripsAndVMT	HaulingTripNumber	0.00	1,100.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	1.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	WorkerTripNumber	0.00	10.00

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

tblTripsAndVMT	WorkerTripNumber	0.00	24.00
tblTripsAndVMT	WorkerTripNumber	0.00	22.00
tblTripsAndVMT	WorkerTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripNumber	15.00	22.00
tblTripsAndVMT	WorkerTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripNumber	0.00	12.00
tblTripsAndVMT	WorkerTripNumber	0.00	20.00
tblTripsAndVMT	WorkerTripNumber	30.00	18.00
tblTripsAndVMT	WorkerTripNumber	33.00	22.00
tblTripsAndVMT	WorkerTripNumber	50.00	22.00
tblTripsAndVMT	WorkerTripNumber	33.00	22.00

## 2.0 Emissions Summary

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## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**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					
2021	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
2022	0.2029	2.1339	1.9932	5.3400e-003	0.1357	0.0763	0.2120	0.0544	0.0731	0.1275	0.0000	479.9943	479.9943	0.0711	0.0000	481.7713
2023	0.0704	0.7581	0.6845	2.3200e-003	0.0752	0.0218	0.0970	0.0266	0.0208	0.0474	0.0000	211.2037	211.2037	0.0294	0.0000	211.9381
2024	0.2949	3.3367	3.5366	0.0110	0.1558	0.0921	0.2479	0.0418	0.0877	0.1295	0.0000	1,004.701 2	1,004.701 2	0.1442	0.0000	1,008.306 5
2025	0.0659	0.8097	0.8771	2.9100e-003	0.1056	0.0185	0.1241	0.0270	0.0175	0.0445	0.0000	268.7936	268.7936	0.0352	0.0000	269.6725
2026	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
2027	0.1871	1.4797	2.4652	5.0900e-003	0.0179	0.0593	0.0772	4.8200e-003	0.0564	0.0613	0.0000	445.2441	445.2441	0.0999	0.0000	447.7420
Maximum	0.2949	3.3367	3.5366	0.0110	0.1558	0.0921	0.2479	0.0544	0.0877	0.1295	0.0000	1,004.701 2	1,004.701 2	0.1442	0.0000	1,008.306 5

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**2.1 Overall Construction****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					
2021	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
2022	0.0725	0.8281	2.3426	5.3400e-003	0.1357	7.6400e-003	0.1434	0.0544	7.5300e-003	0.0620	0.0000	479.9939	479.9939	0.0711	0.0000	481.7709
2023	0.0285	0.3708	0.8313	2.3200e-003	0.0752	2.8400e-003	0.0780	0.0266	2.8000e-003	0.0294	0.0000	211.2036	211.2036	0.0294	0.0000	211.9379
2024	0.1211	1.7656	4.2615	0.0110	0.1558	0.0134	0.1692	0.0418	0.0132	0.0550	0.0000	1,004.7006	1,004.7006	0.1442	0.0000	1,008.3058
2025	0.0305	0.5003	1.0358	2.9100e-003	0.1056	3.3000e-003	0.1089	0.0270	3.2400e-003	0.0302	0.0000	268.7934	268.7934	0.0352	0.0000	269.6724
2026	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
2027	0.0649	0.4027	3.0436	5.0900e-003	0.0179	7.6200e-003	0.0255	4.8200e-003	7.6100e-003	0.0124	0.0000	445.2436	445.2436	0.0999	0.0000	447.7415
Maximum	0.1211	1.7656	4.2615	0.0110	0.1558	0.0134	0.1692	0.0544	0.0132	0.0620	0.0000	1,004.7006	1,004.7006	0.1442	0.0000	1,008.3058

	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
Percent Reduction	61.32	54.60	-20.49	0.00	0.00	87.02	30.75	0.00	86.53	53.91	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)
5	7-1-2022	9-30-2022	1.4199	0.5100
6	10-1-2022	12-31-2022	0.9009	0.3835
7	1-1-2023	3-31-2023	0.8170	0.3943
8	4-1-2023	6-30-2023	0.0029	0.0016

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

13	7-1-2024	9-30-2024	2.1338	1.0608
14	10-1-2024	12-31-2024	1.4675	0.8057
15	1-1-2025	3-31-2025	0.8604	0.5217
25	7-1-2027	9-30-2027	0.9653	0.2714
		Highest	2.1338	1.0608

## 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	4.6000e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	4.6000e-003	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005

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**2.2 Overall Operational****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	4.6000e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Energy	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
Mobile	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
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
<b>Total</b>	<b>4.6000e-003</b>	<b>0.0000</b>	<b>1.0000e-005</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>2.0000e-005</b>	<b>2.0000e-005</b>	<b>0.0000</b>	<b>0.0000</b>	<b>3.0000e-005</b>

	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
<b>Percent Reduction</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

**3.0 Construction Detail****Construction Phase**

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	7/1/2021	6/30/2021	5	0	
2	1.2a HS - Southeast Recharge Basin	Site Preparation	7/1/2022	3/9/2023	5	180	
3	1.2b HS - Recovery Wells for SE Recharge Basin	Building Construction	7/1/2022	11/17/2022	5	100	
4	2.3 SS - Intake Cone Screen	Building Construction	7/1/2022	8/25/2022	5	40	
5	2.4 SS - Intake Pump Station	Building Construction	7/1/2022	4/6/2023	5	200	
6	2.5 SS - Intake and Pipeline to Filter Plant	Trenching	8/1/2022	11/18/2022	5	80	
7	2.1 SS - Filter Plant to Recharge Basins Pipeline	Trenching	1/1/2023	3/17/2023	5	55	
8	1.3a HS - Southwest Recharge Basin	Grading	7/1/2024	3/7/2025	5	180	
9	1.1 HS - Filter Plant to Sewer Pipeline	Trenching	7/1/2024	9/8/2024	5	50	
10	1.3b HS - Recovery Wells for SW Recharge Basin	Building Construction	7/1/2024	11/15/2024	5	100	
11	1.4 HS - Filter Plant Upgrades	Building Construction	7/1/2024	3/7/2025	5	180	
12	Paving	Paving	10/22/2026	10/21/2026	5	0	
13	Architectural Coating	Architectural Coating	10/22/2026	10/21/2026	5	0	
14	2.2a SS - MW7 Recharge Basin	Building Construction	7/1/2027	12/15/2027	5	120	
15	2.2b SS - Recovery Wells for MW7 Recharge Basin	Building Construction	7/1/2027	11/17/2027	5	100	

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 (Architectural Coating – sqft)

OffRoad Equipment

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
1.1 HS - Filter Plant to Sewer Pipeline	Air Compressors	1	1.00	78	0.48
1.1 HS - Filter Plant to Sewer Pipeline	Excavators	1	6.00	158	0.38
1.1 HS - Filter Plant to Sewer Pipeline	Forklifts	1	2.00	89	0.20
1.1 HS - Filter Plant to Sewer Pipeline	Generator Sets	1	6.00	84	0.74
1.1 HS - Filter Plant to Sewer Pipeline	Off-Highway Trucks	1	2.00	402	0.38
1.1 HS - Filter Plant to Sewer Pipeline	Off-Highway Trucks	1	8.00	402	0.38
1.1 HS - Filter Plant to Sewer Pipeline	Plate Compactors	2	4.00	8	0.43
1.1 HS - Filter Plant to Sewer Pipeline	Pumps	2	6.00	84	0.74
1.1 HS - Filter Plant to Sewer Pipeline	Skid Steer Loaders	1	6.00	65	0.37
1.1 HS - Filter Plant to Sewer Pipeline	Sweepers/Scrubbers	1	1.00	64	0.46
1.1 HS - Filter Plant to Sewer Pipeline	Tractors/Loaders/Backhoes	1	4.00	97	0.37
1.2a HS - Southeast Recharge Basin	Excavators	1	0.40	158	0.38
1.2a HS - Southeast Recharge Basin	Graders	0	0.00	187	0.41
1.2a HS - Southeast Recharge Basin	Off-Highway Trucks	1	0.70	402	0.38
1.2a HS - Southeast Recharge Basin	Rubber Tired Dozers	1	0.20	247	0.40
1.2a HS - Southeast Recharge Basin	Rubber Tired Dozers	1	1.10	247	0.40
1.2a HS - Southeast Recharge Basin	Rubber Tired Loaders	1	0.70	203	0.36
1.2a HS - Southeast Recharge Basin	Scrapers	1	0.90	367	0.48
1.2a HS - Southeast Recharge Basin	Tractors/Loaders/Backhoes	0	0.00	97	0.37
1.2b HS - Recovery Wells for SE Recharge Basin	Air Compressors	1	1.00	78	0.48
1.2b HS - Recovery Wells for SE Recharge Basin	Bore/Drill Rigs	1	4.00	221	0.50
1.2b HS - Recovery Wells for SE Recharge Basin	Cranes	0	0.00	231	0.29
1.2b HS - Recovery Wells for SE Recharge Basin	Forklifts	1	4.00	89	0.20
1.2b HS - Recovery Wells for SE Recharge Basin	Generator Sets	1	6.00	84	0.74
1.2b HS - Recovery Wells for SE Recharge Basin	Off-Highway Trucks	1	1.20	402	0.38



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1.2b HS - Recovery Wells for SE Recharge Basin	Off-Highway Trucks	1	4.00	402	0.38
1.2b HS - Recovery Wells for SE Recharge Basin	Pumps	1	6.00	84	0.74
1.2b HS - Recovery Wells for SE Recharge Basin	Skid Steer Loaders	1	6.00	65	0.37
1.2b HS - Recovery Wells for SE Recharge Basin	Tractors/Loaders/Backhoes	1	4.00	97	0.37
1.2b HS - Recovery Wells for SE Recharge Basin	Welders	0	0.00	46	0.45
1.3a HS - Southwest Recharge Basin	Aerial Lifts	1	4.00	63	0.31
1.3a HS - Southwest Recharge Basin	Air Compressors	4	1.00	78	0.48
1.3a HS - Southwest Recharge Basin	Excavators	4	6.00	158	0.38
1.3a HS - Southwest Recharge Basin	Forklifts	1	4.00	89	0.20
1.3a HS - Southwest Recharge Basin	Generator Sets	2	6.00	84	0.74
1.3a HS - Southwest Recharge Basin	Graders	0	0.00	187	0.41
1.3a HS - Southwest Recharge Basin	Off-Highway Trucks	2	4.00	402	0.38
1.3a HS - Southwest Recharge Basin	Other Material Handling Equipment	2	4.00	168	0.40
1.3a HS - Southwest Recharge Basin	Pumps	1	6.00	84	0.74
1.3a HS - Southwest Recharge Basin	Rubber Tired Dozers	0	0.00	247	0.40
1.3a HS - Southwest Recharge Basin	Skid Steer Loaders	1	6.00	65	0.37
1.3a HS - Southwest Recharge Basin	Tractors/Loaders/Backhoes	2	4.00	97	0.37
1.3b HS - Recovery Wells for SW Recharge Basin	Air Compressors	1	1.00	78	0.48
1.3b HS - Recovery Wells for SW Recharge Basin	Bore/Drill Rigs	1	4.00	221	0.50
1.3b HS - Recovery Wells for SW Recharge Basin	Cranes	0	0.00	231	0.29
1.3b HS - Recovery Wells for SW Recharge Basin	Forklifts	1	4.00	89	0.20
1.3b HS - Recovery Wells for SW Recharge Basin	Generator Sets	1	6.00	84	0.74
1.3b HS - Recovery Wells for SW Recharge Basin	Off-Highway Trucks	1	1.20	402	0.38
1.3b HS - Recovery Wells for SW Recharge Basin	Off-Highway Trucks	1	4.00	402	0.38

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1.3b HS - Recovery Wells for SW Recharge Basin	Pumps	1	6.00	84	0.74
1.3b HS - Recovery Wells for SW Recharge Basin	Skid Steer Loaders	1	6.00	65	0.37
1.3b HS - Recovery Wells for SW Recharge Basin	Tractors/Loaders/Backhoes	1	4.00	97	0.37
1.3b HS - Recovery Wells for SW Recharge Basin	Welders	0	0.00	46	0.45
1.4 HS - Filter Plant Upgrades	Air Compressors	0	0.00	78	0.48
1.4 HS - Filter Plant Upgrades	Cranes	0	0.00	231	0.29
1.4 HS - Filter Plant Upgrades	Excavators	0	0.00	158	0.38
1.4 HS - Filter Plant Upgrades	Forklifts	0	0.00	89	0.20
1.4 HS - Filter Plant Upgrades	Generator Sets	0	0.00	84	0.74
1.4 HS - Filter Plant Upgrades	Off-Highway Trucks	1	0.10	402	0.38
1.4 HS - Filter Plant Upgrades	Other Material Handling Equipment	0	0.00	168	0.40
1.4 HS - Filter Plant Upgrades	Pumps	0	0.00	84	0.74
1.4 HS - Filter Plant Upgrades	Tractors/Loaders/Backhoes	1	0.10	97	0.37
1.4 HS - Filter Plant Upgrades	Welders	0	0.00	46	0.45
2.1 SS - Filter Plant to Recharge Basins Pipeline	Air Compressors	1	1.00	78	0.48
2.1 SS - Filter Plant to Recharge Basins Pipeline	Excavators	1	6.00	158	0.38
2.1 SS - Filter Plant to Recharge Basins Pipeline	Forklifts	1	2.00	89	0.20
2.1 SS - Filter Plant to Recharge Basins Pipeline	Generator Sets	1	6.00	84	0.74
2.1 SS - Filter Plant to Recharge Basins Pipeline	Off-Highway Trucks	1	2.00	402	0.38
2.1 SS - Filter Plant to Recharge Basins Pipeline	Off-Highway Trucks	1	8.00	402	0.38
2.1 SS - Filter Plant to Recharge Basins Pipeline	Plate Compactors	2	4.00	8	0.43
2.1 SS - Filter Plant to Recharge Basins Pipeline	Pumps	2	6.00	84	0.74
2.1 SS - Filter Plant to Recharge Basins Pipeline	Skid Steer Loaders	1	6.00	65	0.37
2.1 SS - Filter Plant to Recharge Basins Pipeline	Sweepers/Scrubbers	1	1.00	64	0.46

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2.1 SS - Filter Plant to Recharge Basins Pipeline	Tractors/Loaders/Backhoes	1	4.00	97	0.37
2.2a SS - MW7 Recharge Basin	Aerial Lifts	1	4.00	63	0.31
2.2a SS - MW7 Recharge Basin	Air Compressors	4	1.00	78	0.48
2.2a SS - MW7 Recharge Basin	Cranes	0	0.00	231	0.29
2.2a SS - MW7 Recharge Basin	Excavators	4	6.00	158	0.38
2.2a SS - MW7 Recharge Basin	Forklifts	1	4.00	89	0.20
2.2a SS - MW7 Recharge Basin	Generator Sets	2	6.00	84	0.74
2.2a SS - MW7 Recharge Basin	Off-Highway Trucks	2	4.00	402	0.38
2.2a SS - MW7 Recharge Basin	Other Material Handling Equipment	2	4.00	168	0.40
2.2a SS - MW7 Recharge Basin	Pumps	1	6.00	84	0.74
2.2a SS - MW7 Recharge Basin	Skid Steer Loaders	1	6.00	65	0.37
2.2a SS - MW7 Recharge Basin	Tractors/Loaders/Backhoes	2	4.00	97	0.37
2.2a SS - MW7 Recharge Basin	Welders	0	0.00	46	0.45
2.2b SS - Recovery Wells for MW7Recharge Basin	Air Compressors	1	1.00	78	0.48
2.2b SS - Recovery Wells for MW7Recharge Basin	Bore/Drill Rigs	1	4.00	221	0.50
2.2b SS - Recovery Wells for MW7Recharge Basin	Cranes	0	0.00	231	0.29
2.2b SS - Recovery Wells for MW7Recharge Basin	Forklifts	1	4.00	89	0.20
2.2b SS - Recovery Wells for MW7Recharge Basin	Generator Sets	1	6.00	84	0.74
2.2b SS - Recovery Wells for MW7Recharge Basin	Off-Highway Trucks	1	1.20	402	0.38
2.2b SS - Recovery Wells for MW7Recharge Basin	Off-Highway Trucks	1	4.00	402	0.38
2.2b SS - Recovery Wells for MW7Recharge Basin	Pumps	1	6.00	84	0.74
2.2b SS - Recovery Wells for MW7Recharge Basin	Skid Steer Loaders	1	6.00	65	0.37
2.2b SS - Recovery Wells for MW7Recharge Basin	Tractors/Loaders/Backhoes	1	4.00	97	0.37
2.2b SS - Recovery Wells for MW7Recharge Basin	Welders	0	0.00	46	0.45

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2.3 SS - Intake Cone Screen	Air Compressors	1	1.00	78	0.48
2.3 SS - Intake Cone Screen	Cranes	1	3.00	231	0.29
2.3 SS - Intake Cone Screen	Excavators	1	6.00	158	0.38
2.3 SS - Intake Cone Screen	Forklifts	0	0.00	89	0.20
2.3 SS - Intake Cone Screen	Generator Sets	1	6.00	84	0.74
2.3 SS - Intake Cone Screen	Pumps	2	6.00	84	0.74
2.3 SS - Intake Cone Screen	Skid Steer Loaders	1	6.00	65	0.37
2.3 SS - Intake Cone Screen	Tractors/Loaders/Backhoes	0	0.00	97	0.37
2.3 SS - Intake Cone Screen	Welders	1	0.50	46	0.45
2.4 SS - Intake Pump Station	Cranes	0	0.00	231	0.29
2.4 SS - Intake Pump Station	Excavators	1	0.40	158	0.38
2.4 SS - Intake Pump Station	Forklifts	0	0.00	89	0.20
2.4 SS - Intake Pump Station	Generator Sets	0	0.00	84	0.74
2.4 SS - Intake Pump Station	Off-Highway Trucks	1	0.40	402	0.38
2.4 SS - Intake Pump Station	Rubber Tired Dozers	1	0.40	247	0.40
2.4 SS - Intake Pump Station	Tractors/Loaders/Backhoes	0	0.00	97	0.37
2.4 SS - Intake Pump Station	Welders	0	0.00	46	0.45
2.5 SS - Intake and Pipeline to Filter Plant	Cranes	1	1.50	231	0.29
2.5 SS - Intake and Pipeline to Filter Plant	Excavators	1	6.00	158	0.38
2.5 SS - Intake and Pipeline to Filter Plant	Forklifts	1	3.00	89	0.20
2.5 SS - Intake and Pipeline to Filter Plant	Generator Sets	1	6.00	84	0.74
2.5 SS - Intake and Pipeline to Filter Plant	Off-Highway Trucks	1	2.00	402	0.38
2.5 SS - Intake and Pipeline to Filter Plant	Pumps	2	6.00	84	0.74
2.5 SS - Intake and Pipeline to Filter Plant	Pumps	2	1.50	84	0.74
2.5 SS - Intake and Pipeline to Filter Plant	Skid Steer Loaders	1	6.00	65	0.37

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

2.5 SS - Intake and Pipeline to Filter Plant	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Architectural Coating	Air Compressors	0	0.00	78	0.48
Demolition	Concrete/Industrial Saws	0	0.00	81	0.73
Demolition	Rubber Tired Dozers	0	0.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Paving	Cement and Mortar Mixers	0	0.00	9	0.56
Paving	Pavers	0	0.00	130	0.42
Paving	Paving Equipment	0	0.00	132	0.36
Paving	Rollers	0	0.00	80	0.38
Paving	Tractors/Loaders/Backhoes	0	0.00	97	0.37

**Trips and VMT**

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

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
1.1 HS - Filter Plant to Sewer Pipeline	13	22.00	4.00	1,100.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
1.2a HS - Southeast Recharge Basin	6	22.00	4.00	3,136.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
1.2b HS - Recovery Wells for SE Recharge	9	10.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
1.3a HS - Southwest Recharge Basin	20	22.00	4.00	13,781.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
1.3b HS - Recovery Wells for SW Recharge	9	10.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
1.4 HS - Filter Plant Upgrades	2	24.00	4.00	53.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
2.1 SS - Filter Plant to Recharge Basins Pipeline	13	22.00	4.00	1,210.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
2.2a SS - MW7 Recharge Basin	20	22.00	4.00	70.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
2.2b SS - Recovery Wells for MW7 Recharge	9	10.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
2.3 SS - Intake Cone Screen	8	12.00	2.00	86.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
2.4 SS - Intake Pump Station	3	20.00	0.00	468.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
2.5 SS - Intake and Pipeline to Filter Plant	12	18.00	1.00	668.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	0	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	0	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	0	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

**3.1 Mitigation Measures Construction**

Use Cleaner Engines for Construction Equipment

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

### 3.2 Demolition - 2021

### Unmitigated Construction On-Site

[illegible]

### Unmitigated Construction Off-Site

[illegible]

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### 3.2 Demolition - 2021

### Mitigated Construction On-Site

[illegible]

### Mitigated Construction Off-Site

[illegible]



## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.3 1.2a HS - Southeast Recharge Basin - 2022****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					
Fugitive Dust					0.0644	0.0000	0.0644	0.0353	0.0000	0.0353	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0203	0.2057	0.1238	3.3000e-004		8.7100e-003	8.7100e-003		8.0200e-003	8.0200e-003	0.0000	29.0988	29.0988	9.4100e-003	0.0000	29.3341
<b>Total</b>	<b>0.0203</b>	<b>0.2057</b>	<b>0.1238</b>	<b>3.3000e-004</b>	<b>0.0644</b>	<b>8.7100e-003</b>	<b>0.0731</b>	<b>0.0353</b>	<b>8.0200e-003</b>	<b>0.0433</b>	<b>0.0000</b>	<b>29.0988</b>	<b>29.0988</b>	<b>9.4100e-003</b>	<b>0.0000</b>	<b>29.3341</b>

**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	8.1800e-003	0.3343	0.0771	9.0000e-004	0.0245	1.2500e-003	0.0258	6.5700e-003	1.2000e-003	7.7700e-003	0.0000	87.6260	87.6260	3.5600e-003	0.0000	87.7149
Vendor	8.5000e-004	0.0304	7.8300e-003	7.0000e-005	1.7100e-003	9.0000e-005	1.8000e-003	4.9000e-004	9.0000e-005	5.8000e-004	0.0000	6.7257	6.7257	2.6000e-004	0.0000	6.7322
Worker	5.6500e-003	4.8000e-003	0.0441	1.1000e-004	0.0114	9.0000e-005	0.0115	3.0300e-003	9.0000e-005	3.1200e-003	0.0000	9.8772	9.8772	3.6000e-004	0.0000	9.8862
<b>Total</b>	<b>0.0147</b>	<b>0.3694</b>	<b>0.1291</b>	<b>1.0800e-003</b>	<b>0.0377</b>	<b>1.4300e-003</b>	<b>0.0391</b>	<b>0.0101</b>	<b>1.3800e-003</b>	<b>0.0115</b>	<b>0.0000</b>	<b>104.2289</b>	<b>104.2289</b>	<b>4.1800e-003</b>	<b>0.0000</b>	<b>104.3334</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.3 1.2a HS - Southeast Recharge Basin - 2022****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					
Fugitive Dust					0.0644	0.0000	0.0644	0.0353	0.0000	0.0353	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.0600e-003	0.0176	0.1542	3.3000e-004		5.4000e-004	5.4000e-004		5.4000e-004	5.4000e-004	0.0000	29.0988	29.0988	9.4100e-003	0.0000	29.3340
<b>Total</b>	<b>4.0600e-003</b>	<b>0.0176</b>	<b>0.1542</b>	<b>3.3000e-004</b>	<b>0.0644</b>	<b>5.4000e-004</b>	<b>0.0649</b>	<b>0.0353</b>	<b>5.4000e-004</b>	<b>0.0358</b>	<b>0.0000</b>	<b>29.0988</b>	<b>29.0988</b>	<b>9.4100e-003</b>	<b>0.0000</b>	<b>29.3340</b>

**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	8.1800e-003	0.3343	0.0771	9.0000e-004	0.0245	1.2500e-003	0.0258	6.5700e-003	1.2000e-003	7.7700e-003	0.0000	87.6260	87.6260	3.5600e-003	0.0000	87.7149
Vendor	8.5000e-004	0.0304	7.8300e-003	7.0000e-005	1.7100e-003	9.0000e-005	1.8000e-003	4.9000e-004	9.0000e-005	5.8000e-004	0.0000	6.7257	6.7257	2.6000e-004	0.0000	6.7322
Worker	5.6500e-003	4.8000e-003	0.0441	1.1000e-004	0.0114	9.0000e-005	0.0115	3.0300e-003	9.0000e-005	3.1200e-003	0.0000	9.8772	9.8772	3.6000e-004	0.0000	9.8862
<b>Total</b>	<b>0.0147</b>	<b>0.3694</b>	<b>0.1291</b>	<b>1.0800e-003</b>	<b>0.0377</b>	<b>1.4300e-003</b>	<b>0.0391</b>	<b>0.0101</b>	<b>1.3800e-003</b>	<b>0.0115</b>	<b>0.0000</b>	<b>104.2289</b>	<b>104.2289</b>	<b>4.1800e-003</b>	<b>0.0000</b>	<b>104.3334</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.3 1.2a HS - Southeast Recharge Basin - 2023****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					
Fugitive Dust					0.0242	0.0000	0.0242	0.0132	0.0000	0.0132	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.7900e-003	0.0664	0.0436	1.2000e-004		2.7300e-003	2.7300e-003		2.5100e-003	2.5100e-003	0.0000	10.8854	10.8854	3.5200e-003	0.0000	10.9734
<b>Total</b>	<b>6.7900e-003</b>	<b>0.0664</b>	<b>0.0436</b>	<b>1.2000e-004</b>	<b>0.0242</b>	<b>2.7300e-003</b>	<b>0.0270</b>	<b>0.0132</b>	<b>2.5100e-003</b>	<b>0.0157</b>	<b>0.0000</b>	<b>10.8854</b>	<b>10.8854</b>	<b>3.5200e-003</b>	<b>0.0000</b>	<b>10.9734</b>

**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	2.3800e-003	0.0983	0.0268	3.3000e-004	0.0216	2.9000e-004	0.0219	5.5100e-003	2.8000e-004	5.7900e-003	0.0000	31.9979	31.9979	1.2600e-003	0.0000	32.0294
Vendor	2.5000e-004	9.5600e-003	2.6300e-003	3.0000e-005	6.4000e-004	2.0000e-005	6.6000e-004	1.9000e-004	2.0000e-005	2.0000e-004	0.0000	2.4725	2.4725	9.0000e-005	0.0000	2.4747
Worker	1.9700e-003	1.6100e-003	0.0151	4.0000e-005	4.2700e-003	3.0000e-005	4.3000e-003	1.1300e-003	3.0000e-005	1.1700e-003	0.0000	3.5595	3.5595	1.2000e-004	0.0000	3.5625
<b>Total</b>	<b>4.6000e-003</b>	<b>0.1095</b>	<b>0.0446</b>	<b>4.0000e-004</b>	<b>0.0265</b>	<b>3.4000e-004</b>	<b>0.0269</b>	<b>6.8300e-003</b>	<b>3.3000e-004</b>	<b>7.1600e-003</b>	<b>0.0000</b>	<b>38.0299</b>	<b>38.0299</b>	<b>1.4700e-003</b>	<b>0.0000</b>	<b>38.0666</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.3 1.2a HS - Southeast Recharge Basin - 2023****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					
Fugitive Dust					0.0242	0.0000	0.0242	0.0132	0.0000	0.0132	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.5200e-003	6.5900e-003	0.0577	1.2000e-004		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	10.8854	10.8854	3.5200e-003	0.0000	10.9734
<b>Total</b>	<b>1.5200e-003</b>	<b>6.5900e-003</b>	<b>0.0577</b>	<b>1.2000e-004</b>	<b>0.0242</b>	<b>2.0000e-004</b>	<b>0.0244</b>	<b>0.0132</b>	<b>2.0000e-004</b>	<b>0.0134</b>	<b>0.0000</b>	<b>10.8854</b>	<b>10.8854</b>	<b>3.5200e-003</b>	<b>0.0000</b>	<b>10.9734</b>

**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	2.3800e-003	0.0983	0.0268	3.3000e-004	0.0216	2.9000e-004	0.0219	5.5100e-003	2.8000e-004	5.7900e-003	0.0000	31.9979	31.9979	1.2600e-003	0.0000	32.0294
Vendor	2.5000e-004	9.5600e-003	2.6300e-003	3.0000e-005	6.4000e-004	2.0000e-005	6.6000e-004	1.9000e-004	2.0000e-005	2.0000e-004	0.0000	2.4725	2.4725	9.0000e-005	0.0000	2.4747
Worker	1.9700e-003	1.6100e-003	0.0151	4.0000e-005	4.2700e-003	3.0000e-005	4.3000e-003	1.1300e-003	3.0000e-005	1.1700e-003	0.0000	3.5595	3.5595	1.2000e-004	0.0000	3.5625
<b>Total</b>	<b>4.6000e-003</b>	<b>0.1095</b>	<b>0.0446</b>	<b>4.0000e-004</b>	<b>0.0265</b>	<b>3.4000e-004</b>	<b>0.0269</b>	<b>6.8300e-003</b>	<b>3.3000e-004</b>	<b>7.1600e-003</b>	<b>0.0000</b>	<b>38.0299</b>	<b>38.0299</b>	<b>1.4700e-003</b>	<b>0.0000</b>	<b>38.0666</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.4 1.2b HS - Recovery Wells for SE Recharge Basin - 2022****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	0.0596	0.5231	0.5899	1.3800e-003		0.0239	0.0239		0.0229	0.0229	0.0000	119.9529	119.9529	0.0266	0.0000	120.6185
<b>Total</b>	<b>0.0596</b>	<b>0.5231</b>	<b>0.5899</b>	<b>1.3800e-003</b>		<b>0.0239</b>	<b>0.0239</b>		<b>0.0229</b>	<b>0.0229</b>	<b>0.0000</b>	<b>119.9529</b>	<b>119.9529</b>	<b>0.0266</b>	<b>0.0000</b>	<b>120.6185</b>

**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	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
Vendor	6.5000e-004	0.0232	5.9800e-003	5.0000e-005	1.3100e-003	7.0000e-005	1.3800e-003	3.8000e-004	7.0000e-005	4.4000e-004	0.0000	5.1341	5.1341	2.0000e-004	0.0000	5.1391
Worker	1.9600e-003	1.6600e-003	0.0153	4.0000e-005	3.9600e-003	3.0000e-005	3.9900e-003	1.0500e-003	3.0000e-005	1.0800e-003	0.0000	3.4272	3.4272	1.3000e-004	0.0000	3.4303
<b>Total</b>	<b>2.6100e-003</b>	<b>0.0248</b>	<b>0.0213</b>	<b>9.0000e-005</b>	<b>5.2700e-003</b>	<b>1.0000e-004</b>	<b>5.3700e-003</b>	<b>1.4300e-003</b>	<b>1.0000e-004</b>	<b>1.5200e-003</b>	<b>0.0000</b>	<b>8.5613</b>	<b>8.5613</b>	<b>3.3000e-004</b>	<b>0.0000</b>	<b>8.5695</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.4 1.2b HS - Recovery Wells for SE Recharge Basin - 2022****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	0.0167	0.1076	0.7658	1.3800e-003		2.1000e-003	2.1000e-003		2.1000e-003	2.1000e-003	0.0000	119.9528	119.9528	0.0266	0.0000	120.6184
<b>Total</b>	<b>0.0167</b>	<b>0.1076</b>	<b>0.7658</b>	<b>1.3800e-003</b>		<b>2.1000e-003</b>	<b>2.1000e-003</b>		<b>2.1000e-003</b>	<b>2.1000e-003</b>	<b>0.0000</b>	<b>119.9528</b>	<b>119.9528</b>	<b>0.0266</b>	<b>0.0000</b>	<b>120.6184</b>

**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	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
Vendor	6.5000e-004	0.0232	5.9800e-003	5.0000e-005	1.3100e-003	7.0000e-005	1.3800e-003	3.8000e-004	7.0000e-005	4.4000e-004	0.0000	5.1341	5.1341	2.0000e-004	0.0000	5.1391
Worker	1.9600e-003	1.6600e-003	0.0153	4.0000e-005	3.9600e-003	3.0000e-005	3.9900e-003	1.0500e-003	3.0000e-005	1.0800e-003	0.0000	3.4272	3.4272	1.3000e-004	0.0000	3.4303
<b>Total</b>	<b>2.6100e-003</b>	<b>0.0248</b>	<b>0.0213</b>	<b>9.0000e-005</b>	<b>5.2700e-003</b>	<b>1.0000e-004</b>	<b>5.3700e-003</b>	<b>1.4300e-003</b>	<b>1.0000e-004</b>	<b>1.5200e-003</b>	<b>0.0000</b>	<b>8.5613</b>	<b>8.5613</b>	<b>3.3000e-004</b>	<b>0.0000</b>	<b>8.5695</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.5 2.3 SS - Intake Cone Screen - 2022****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	0.0234	0.2115	0.2591	4.6000e-004		0.0103	0.0103		0.0101	0.0101	0.0000	39.8539	39.8539	5.6600e-003	0.0000	39.9955
<b>Total</b>	<b>0.0234</b>	<b>0.2115</b>	<b>0.2591</b>	<b>4.6000e-004</b>		<b>0.0103</b>	<b>0.0103</b>		<b>0.0101</b>	<b>0.0101</b>	<b>0.0000</b>	<b>39.8539</b>	<b>39.8539</b>	<b>5.6600e-003</b>	<b>0.0000</b>	<b>39.9955</b>

**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	3.1000e-004	0.0126	2.9100e-003	3.0000e-005	7.2000e-004	5.0000e-005	7.7000e-004	2.0000e-004	5.0000e-005	2.4000e-004	0.0000	3.3018	3.3018	1.3000e-004	0.0000	3.3052
Vendor	1.3000e-004	4.6300e-003	1.2000e-003	1.0000e-005	2.6000e-004	1.0000e-005	2.8000e-004	8.0000e-005	1.0000e-005	9.0000e-005	0.0000	1.0268	1.0268	4.0000e-005	0.0000	1.0278
Worker	9.4000e-004	8.0000e-004	7.3500e-003	2.0000e-005	1.9000e-003	2.0000e-005	1.9200e-003	5.1000e-004	1.0000e-005	5.2000e-004	0.0000	1.6451	1.6451	6.0000e-005	0.0000	1.6466
<b>Total</b>	<b>1.3800e-003</b>	<b>0.0180</b>	<b>0.0115</b>	<b>6.0000e-005</b>	<b>2.8800e-003</b>	<b>8.0000e-005</b>	<b>2.9700e-003</b>	<b>7.9000e-004</b>	<b>7.0000e-005</b>	<b>8.5000e-004</b>	<b>0.0000</b>	<b>5.9737</b>	<b>5.9737</b>	<b>2.3000e-004</b>	<b>0.0000</b>	<b>5.9796</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.5 2.3 SS - Intake Cone Screen - 2022****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	5.3600e-003	0.0384	0.2923	4.6000e-004		6.6000e-004	6.6000e-004		6.6000e-004	6.6000e-004	0.0000	39.8538	39.8538	5.6600e-003	0.0000	39.9954
<b>Total</b>	<b>5.3600e-003</b>	<b>0.0384</b>	<b>0.2923</b>	<b>4.6000e-004</b>		<b>6.6000e-004</b>	<b>6.6000e-004</b>		<b>6.6000e-004</b>	<b>6.6000e-004</b>	<b>0.0000</b>	<b>39.8538</b>	<b>39.8538</b>	<b>5.6600e-003</b>	<b>0.0000</b>	<b>39.9954</b>

**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	3.1000e-004	0.0126	2.9100e-003	3.0000e-005	7.2000e-004	5.0000e-005	7.7000e-004	2.0000e-004	5.0000e-005	2.4000e-004	0.0000	3.3018	3.3018	1.3000e-004	0.0000	3.3052
Vendor	1.3000e-004	4.6300e-003	1.2000e-003	1.0000e-005	2.6000e-004	1.0000e-005	2.8000e-004	8.0000e-005	1.0000e-005	9.0000e-005	0.0000	1.0268	1.0268	4.0000e-005	0.0000	1.0278
Worker	9.4000e-004	8.0000e-004	7.3500e-003	2.0000e-005	1.9000e-003	2.0000e-005	1.9200e-003	5.1000e-004	1.0000e-005	5.2000e-004	0.0000	1.6451	1.6451	6.0000e-005	0.0000	1.6466
<b>Total</b>	<b>1.3800e-003</b>	<b>0.0180</b>	<b>0.0115</b>	<b>6.0000e-005</b>	<b>2.8800e-003</b>	<b>8.0000e-005</b>	<b>2.9700e-003</b>	<b>7.9000e-004</b>	<b>7.0000e-005</b>	<b>8.5000e-004</b>	<b>0.0000</b>	<b>5.9737</b>	<b>5.9737</b>	<b>2.3000e-004</b>	<b>0.0000</b>	<b>5.9796</b>



## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.6 2.4 SS - Intake Pump Station - 2022****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	5.1300e-003	0.0478	0.0334	9.0000e-005		2.1300e-003	2.1300e-003		1.9600e-003	1.9600e-003	0.0000	7.7426	7.7426	2.5000e-003	0.0000	7.8052
<b>Total</b>	<b>5.1300e-003</b>	<b>0.0478</b>	<b>0.0334</b>	<b>9.0000e-005</b>		<b>2.1300e-003</b>	<b>2.1300e-003</b>		<b>1.9600e-003</b>	<b>1.9600e-003</b>	<b>0.0000</b>	<b>7.7426</b>	<b>7.7426</b>	<b>2.5000e-003</b>	<b>0.0000</b>	<b>7.8052</b>

**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	1.1000e-003	0.0449	0.0104	1.2000e-004	3.5900e-003	1.7000e-004	3.7600e-003	9.6000e-004	1.6000e-004	1.1200e-003	0.0000	11.7692	11.7692	4.8000e-004	0.0000	11.7811
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	5.1300e-003	4.3600e-003	0.0401	1.0000e-004	0.0104	8.0000e-005	0.0105	2.7600e-003	8.0000e-005	2.8400e-003	0.0000	8.9793	8.9793	3.3000e-004	0.0000	8.9875
<b>Total</b>	<b>6.2300e-003</b>	<b>0.0493</b>	<b>0.0505</b>	<b>2.2000e-004</b>	<b>0.0140</b>	<b>2.5000e-004</b>	<b>0.0142</b>	<b>3.7200e-003</b>	<b>2.4000e-004</b>	<b>3.9600e-003</b>	<b>0.0000</b>	<b>20.7484</b>	<b>20.7484</b>	<b>8.1000e-004</b>	<b>0.0000</b>	<b>20.7686</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.6 2.4 SS - Intake Pump Station - 2022****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	1.0800e-003	4.6800e-003	0.0448	9.0000e-005		1.4000e-004	1.4000e-004		1.4000e-004	1.4000e-004	0.0000	7.7426	7.7426	2.5000e-003	0.0000	7.8052
<b>Total</b>	<b>1.0800e-003</b>	<b>4.6800e-003</b>	<b>0.0448</b>	<b>9.0000e-005</b>		<b>1.4000e-004</b>	<b>1.4000e-004</b>		<b>1.4000e-004</b>	<b>1.4000e-004</b>	<b>0.0000</b>	<b>7.7426</b>	<b>7.7426</b>	<b>2.5000e-003</b>	<b>0.0000</b>	<b>7.8052</b>

**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	1.1000e-003	0.0449	0.0104	1.2000e-004	3.5900e-003	1.7000e-004	3.7600e-003	9.6000e-004	1.6000e-004	1.1200e-003	0.0000	11.7692	11.7692	4.8000e-004	0.0000	11.7811
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	5.1300e-003	4.3600e-003	0.0401	1.0000e-004	0.0104	8.0000e-005	0.0105	2.7600e-003	8.0000e-005	2.8400e-003	0.0000	8.9793	8.9793	3.3000e-004	0.0000	8.9875
<b>Total</b>	<b>6.2300e-003</b>	<b>0.0493</b>	<b>0.0505</b>	<b>2.2000e-004</b>	<b>0.0140</b>	<b>2.5000e-004</b>	<b>0.0142</b>	<b>3.7200e-003</b>	<b>2.4000e-004</b>	<b>3.9600e-003</b>	<b>0.0000</b>	<b>20.7484</b>	<b>20.7484</b>	<b>8.1000e-004</b>	<b>0.0000</b>	<b>20.7686</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.6 2.4 SS - Intake Pump Station - 2023****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	2.3800e-003	0.0211	0.0167	5.0000e-005		9.1000e-004	9.1000e-004		8.3000e-004	8.3000e-004	0.0000	4.0797	4.0797	1.3200e-003	0.0000	4.1127
<b>Total</b>	<b>2.3800e-003</b>	<b>0.0211</b>	<b>0.0167</b>	<b>5.0000e-005</b>		<b>9.1000e-004</b>	<b>9.1000e-004</b>		<b>8.3000e-004</b>	<b>8.3000e-004</b>	<b>0.0000</b>	<b>4.0797</b>	<b>4.0797</b>	<b>1.3200e-003</b>	<b>0.0000</b>	<b>4.1127</b>

**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	4.5000e-004	0.0186	5.0800e-003	6.0000e-005	3.3000e-003	6.0000e-005	3.3500e-003	8.5000e-004	5.0000e-005	9.0000e-004	0.0000	6.0518	6.0518	2.4000e-004	0.0000	6.0578
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	2.5300e-003	2.0600e-003	0.0193	5.0000e-005	5.4600e-003	4.0000e-005	5.5100e-003	1.4500e-003	4.0000e-005	1.4900e-003	0.0000	4.5566	4.5566	1.5000e-004	0.0000	4.5605
<b>Total</b>	<b>2.9800e-003</b>	<b>0.0207</b>	<b>0.0244</b>	<b>1.1000e-004</b>	<b>8.7600e-003</b>	<b>1.0000e-004</b>	<b>8.8600e-003</b>	<b>2.3000e-003</b>	<b>9.0000e-005</b>	<b>2.3900e-003</b>	<b>0.0000</b>	<b>10.6085</b>	<b>10.6085</b>	<b>3.9000e-004</b>	<b>0.0000</b>	<b>10.6183</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.6 2.4 SS - Intake Pump Station - 2023****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	5.7000e-004	2.4600e-003	0.0236	5.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005	0.0000	4.0797	4.0797	1.3200e-003	0.0000	4.1127
<b>Total</b>	<b>5.7000e-004</b>	<b>2.4600e-003</b>	<b>0.0236</b>	<b>5.0000e-005</b>		<b>8.0000e-005</b>	<b>8.0000e-005</b>		<b>8.0000e-005</b>	<b>8.0000e-005</b>	<b>0.0000</b>	<b>4.0797</b>	<b>4.0797</b>	<b>1.3200e-003</b>	<b>0.0000</b>	<b>4.1127</b>

**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	4.5000e-004	0.0186	5.0800e-003	6.0000e-005	3.3000e-003	6.0000e-005	3.3500e-003	8.5000e-004	5.0000e-005	9.0000e-004	0.0000	6.0518	6.0518	2.4000e-004	0.0000	6.0578
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	2.5300e-003	2.0600e-003	0.0193	5.0000e-005	5.4600e-003	4.0000e-005	5.5100e-003	1.4500e-003	4.0000e-005	1.4900e-003	0.0000	4.5566	4.5566	1.5000e-004	0.0000	4.5605
<b>Total</b>	<b>2.9800e-003</b>	<b>0.0207</b>	<b>0.0244</b>	<b>1.1000e-004</b>	<b>8.7600e-003</b>	<b>1.0000e-004</b>	<b>8.8600e-003</b>	<b>2.3000e-003</b>	<b>9.0000e-005</b>	<b>2.3900e-003</b>	<b>0.0000</b>	<b>10.6085</b>	<b>10.6085</b>	<b>3.9000e-004</b>	<b>0.0000</b>	<b>10.6183</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.7 2.5 SS - Intake and Pipeline to Filter Plant - 2022****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	0.0641	0.5796	0.7288	1.2900e-003		0.0289	0.0289		0.0279	0.0279	0.0000	112.2248	112.2248	0.0201	0.0000	112.7266
<b>Total</b>	<b>0.0641</b>	<b>0.5796</b>	<b>0.7288</b>	<b>1.2900e-003</b>		<b>0.0289</b>	<b>0.0289</b>		<b>0.0279</b>	<b>0.0279</b>	<b>0.0000</b>	<b>112.2248</b>	<b>112.2248</b>	<b>0.0201</b>	<b>0.0000</b>	<b>112.7266</b>

**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	2.4000e-003	0.0978	0.0226	2.6000e-004	5.6000e-003	3.7000e-004	5.9700e-003	1.5400e-003	3.5000e-004	1.8900e-003	0.0000	25.6469	25.6469	1.0400e-003	0.0000	25.6729
Vendor	1.3000e-004	4.6300e-003	1.2000e-003	1.0000e-005	2.6000e-004	1.0000e-005	2.8000e-004	8.0000e-005	1.0000e-005	9.0000e-005	0.0000	1.0268	1.0268	4.0000e-005	0.0000	1.0278
Worker	2.8200e-003	2.4000e-003	0.0221	5.0000e-005	5.7000e-003	5.0000e-005	5.7500e-003	1.5200e-003	4.0000e-005	1.5600e-003	0.0000	4.9352	4.9352	1.8000e-004	0.0000	4.9397
<b>Total</b>	<b>5.3500e-003</b>	<b>0.1049</b>	<b>0.0458</b>	<b>3.2000e-004</b>	<b>0.0116</b>	<b>4.3000e-004</b>	<b>0.0120</b>	<b>3.1400e-003</b>	<b>4.0000e-004</b>	<b>3.5400e-003</b>	<b>0.0000</b>	<b>31.6089</b>	<b>31.6089</b>	<b>1.2600e-003</b>	<b>0.0000</b>	<b>31.6404</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.7 2.5 SS - Intake and Pipeline to Filter Plant - 2022****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	0.0151	0.0935	0.8273	1.2900e-003		1.9000e-003	1.9000e-003		1.9000e-003	1.9000e-003	0.0000	112.2247	112.2247	0.0201	0.0000	112.7265
<b>Total</b>	<b>0.0151</b>	<b>0.0935</b>	<b>0.8273</b>	<b>1.2900e-003</b>		<b>1.9000e-003</b>	<b>1.9000e-003</b>		<b>1.9000e-003</b>	<b>1.9000e-003</b>	<b>0.0000</b>	<b>112.2247</b>	<b>112.2247</b>	<b>0.0201</b>	<b>0.0000</b>	<b>112.7265</b>

**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	2.4000e-003	0.0978	0.0226	2.6000e-004	5.6000e-003	3.7000e-004	5.9700e-003	1.5400e-003	3.5000e-004	1.8900e-003	0.0000	25.6469	25.6469	1.0400e-003	0.0000	25.6729
Vendor	1.3000e-004	4.6300e-003	1.2000e-003	1.0000e-005	2.6000e-004	1.0000e-005	2.8000e-004	8.0000e-005	1.0000e-005	9.0000e-005	0.0000	1.0268	1.0268	4.0000e-005	0.0000	1.0278
Worker	2.8200e-003	2.4000e-003	0.0221	5.0000e-005	5.7000e-003	5.0000e-005	5.7500e-003	1.5200e-003	4.0000e-005	1.5600e-003	0.0000	4.9352	4.9352	1.8000e-004	0.0000	4.9397
<b>Total</b>	<b>5.3500e-003</b>	<b>0.1049</b>	<b>0.0458</b>	<b>3.2000e-004</b>	<b>0.0116</b>	<b>4.3000e-004</b>	<b>0.0120</b>	<b>3.1400e-003</b>	<b>4.0000e-004</b>	<b>3.5400e-003</b>	<b>0.0000</b>	<b>31.6089</b>	<b>31.6089</b>	<b>1.2600e-003</b>	<b>0.0000</b>	<b>31.6404</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.8 2.1 SS - Filter Plant to Recharge Basins Pipeline - 2023****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	0.0478	0.3884	0.4974	1.1000e-003		0.0172	0.0172		0.0166	0.0166	0.0000	95.4766	95.4766	0.0207	0.0000	95.9928
<b>Total</b>	<b>0.0478</b>	<b>0.3884</b>	<b>0.4974</b>	<b>1.1000e-003</b>		<b>0.0172</b>	<b>0.0172</b>		<b>0.0166</b>	<b>0.0166</b>	<b>0.0000</b>	<b>95.4766</b>	<b>95.4766</b>	<b>0.0207</b>	<b>0.0000</b>	<b>95.9928</b>

**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	3.3700e-003	0.1394	0.0380	4.7000e-004	0.0102	4.1000e-004	0.0106	2.7800e-003	4.0000e-004	3.1800e-003	0.0000	45.3531	45.3531	1.7900e-003	0.0000	45.3978
Vendor	2.8000e-004	0.0107	2.9600e-003	3.0000e-005	7.2000e-004	2.0000e-005	7.4000e-004	2.1000e-004	2.0000e-005	2.3000e-004	0.0000	2.7753	2.7753	1.0000e-004	0.0000	2.7778
Worker	2.2200e-003	1.8100e-003	0.0169	4.0000e-005	4.7900e-003	4.0000e-005	4.8300e-003	1.2700e-003	3.0000e-005	1.3100e-003	0.0000	3.9953	3.9953	1.4000e-004	0.0000	3.9987
<b>Total</b>	<b>5.8700e-003</b>	<b>0.1519</b>	<b>0.0579</b>	<b>5.4000e-004</b>	<b>0.0157</b>	<b>4.7000e-004</b>	<b>0.0161</b>	<b>4.2600e-003</b>	<b>4.5000e-004</b>	<b>4.7200e-003</b>	<b>0.0000</b>	<b>52.1237</b>	<b>52.1237</b>	<b>2.0300e-003</b>	<b>0.0000</b>	<b>52.1743</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.8 2.1 SS - Filter Plant to Recharge Basins Pipeline - 2023****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	0.0130	0.0797	0.6231	1.1000e-003		1.6500e-003	1.6500e-003		1.6500e-003	1.6500e-003	0.0000	95.4765	95.4765	0.0207	0.0000	95.9927
<b>Total</b>	<b>0.0130</b>	<b>0.0797</b>	<b>0.6231</b>	<b>1.1000e-003</b>		<b>1.6500e-003</b>	<b>1.6500e-003</b>		<b>1.6500e-003</b>	<b>1.6500e-003</b>	<b>0.0000</b>	<b>95.4765</b>	<b>95.4765</b>	<b>0.0207</b>	<b>0.0000</b>	<b>95.9927</b>

**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	3.3700e-003	0.1394	0.0380	4.7000e-004	0.0102	4.1000e-004	0.0106	2.7800e-003	4.0000e-004	3.1800e-003	0.0000	45.3531	45.3531	1.7900e-003	0.0000	45.3978
Vendor	2.8000e-004	0.0107	2.9600e-003	3.0000e-005	7.2000e-004	2.0000e-005	7.4000e-004	2.1000e-004	2.0000e-005	2.3000e-004	0.0000	2.7753	2.7753	1.0000e-004	0.0000	2.7778
Worker	2.2200e-003	1.8100e-003	0.0169	4.0000e-005	4.7900e-003	4.0000e-005	4.8300e-003	1.2700e-003	3.0000e-005	1.3100e-003	0.0000	3.9953	3.9953	1.4000e-004	0.0000	3.9987
<b>Total</b>	<b>5.8700e-003</b>	<b>0.1519</b>	<b>0.0579</b>	<b>5.4000e-004</b>	<b>0.0157</b>	<b>4.7000e-004</b>	<b>0.0161</b>	<b>4.2600e-003</b>	<b>4.5000e-004</b>	<b>4.7200e-003</b>	<b>0.0000</b>	<b>52.1237</b>	<b>52.1237</b>	<b>2.0300e-003</b>	<b>0.0000</b>	<b>52.1743</b>



## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.9 1.3a HS - Southwest Recharge Basin - 2024****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					
Fugitive Dust					4.0000e-004	0.0000	4.0000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1529	1.2418	2.0261	3.8000e-003		0.0556	0.0556		0.0527	0.0527	0.0000	331.5713	331.5713	0.0806	0.0000	333.5860
<b>Total</b>	<b>0.1529</b>	<b>1.2418</b>	<b>2.0261</b>	<b>3.8000e-003</b>	<b>4.0000e-004</b>	<b>0.0556</b>	<b>0.0560</b>	<b>4.0000e-005</b>	<b>0.0527</b>	<b>0.0528</b>	<b>0.0000</b>	<b>331.5713</b>	<b>331.5713</b>	<b>0.0806</b>	<b>0.0000</b>	<b>333.5860</b>

**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	0.0273	1.1004	0.3095	3.8700e-003	0.1080	3.1400e-003	0.1112	0.0290	3.0100e-003	0.0320	0.0000	375.9412	375.9412	0.0149	0.0000	376.3148
Vendor	6.5000e-004	0.0249	6.6500e-003	7.0000e-005	1.7300e-003	5.0000e-005	1.7700e-003	5.0000e-004	5.0000e-005	5.4000e-004	0.0000	6.6226	6.6226	2.4000e-004	0.0000	6.6285
Worker	4.9900e-003	3.9000e-003	0.0374	1.0000e-004	0.0115	9.0000e-005	0.0116	3.0600e-003	8.0000e-005	3.1400e-003	0.0000	9.2233	9.2233	2.9000e-004	0.0000	9.2306
<b>Total</b>	<b>0.0329</b>	<b>1.1292</b>	<b>0.3535</b>	<b>4.0400e-003</b>	<b>0.1213</b>	<b>3.2800e-003</b>	<b>0.1245</b>	<b>0.0325</b>	<b>3.1400e-003</b>	<b>0.0357</b>	<b>0.0000</b>	<b>391.7871</b>	<b>391.7871</b>	<b>0.0155</b>	<b>0.0000</b>	<b>392.1738</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.9 1.3a HS - Southwest Recharge Basin - 2024****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					
Fugitive Dust					4.0000e-004	0.0000	4.0000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0460	0.2713	2.4520	3.8000e-003		5.8800e-003	5.8800e-003		5.8800e-003	5.8800e-003	0.0000	331.5710	331.5710	0.0806	0.0000	333.5856
<b>Total</b>	<b>0.0460</b>	<b>0.2713</b>	<b>2.4520</b>	<b>3.8000e-003</b>	<b>4.0000e-004</b>	<b>5.8800e-003</b>	<b>6.2800e-003</b>	<b>4.0000e-005</b>	<b>5.8800e-003</b>	<b>5.9200e-003</b>	<b>0.0000</b>	<b>331.5710</b>	<b>331.5710</b>	<b>0.0806</b>	<b>0.0000</b>	<b>333.5856</b>

**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	0.0273	1.1004	0.3095	3.8700e-003	0.1080	3.1400e-003	0.1112	0.0290	3.0100e-003	0.0320	0.0000	375.9412	375.9412	0.0149	0.0000	376.3148
Vendor	6.5000e-004	0.0249	6.6500e-003	7.0000e-005	1.7300e-003	5.0000e-005	1.7700e-003	5.0000e-004	5.0000e-005	5.4000e-004	0.0000	6.6226	6.6226	2.4000e-004	0.0000	6.6285
Worker	4.9900e-003	3.9000e-003	0.0374	1.0000e-004	0.0115	9.0000e-005	0.0116	3.0600e-003	8.0000e-005	3.1400e-003	0.0000	9.2233	9.2233	2.9000e-004	0.0000	9.2306
<b>Total</b>	<b>0.0329</b>	<b>1.1292</b>	<b>0.3535</b>	<b>4.0400e-003</b>	<b>0.1213</b>	<b>3.2800e-003</b>	<b>0.1245</b>	<b>0.0325</b>	<b>3.1400e-003</b>	<b>0.0357</b>	<b>0.0000</b>	<b>391.7871</b>	<b>391.7871</b>	<b>0.0155</b>	<b>0.0000</b>	<b>392.1738</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.9 1.3a HS - Southwest Recharge Basin - 2025****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					
Fugitive Dust					4.0000e-004	0.0000	4.0000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0520	0.4071	0.7338	1.3800e-003		0.0173	0.0173		0.0164	0.0164	0.0000	120.5662	120.5662	0.0292	0.0000	121.2959
<b>Total</b>	<b>0.0520</b>	<b>0.4071</b>	<b>0.7338</b>	<b>1.3800e-003</b>	<b>4.0000e-004</b>	<b>0.0173</b>	<b>0.0177</b>	<b>4.0000e-005</b>	<b>0.0164</b>	<b>0.0164</b>	<b>0.0000</b>	<b>120.5662</b>	<b>120.5662</b>	<b>0.0292</b>	<b>0.0000</b>	<b>121.2959</b>

**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	9.6600e-003	0.3797	0.1105	1.4000e-003	0.0948	1.0500e-003	0.0959	0.0242	1.0000e-003	0.0252	0.0000	135.7486	135.7486	5.4400e-003	0.0000	135.8846
Vendor	2.2000e-004	8.7900e-003	2.2900e-003	2.0000e-005	6.3000e-004	2.0000e-005	6.4000e-004	1.8000e-004	2.0000e-005	2.0000e-004	0.0000	2.3948	2.3948	8.0000e-005	0.0000	2.3969
Worker	1.7100e-003	1.2800e-003	0.0125	4.0000e-005	4.1800e-003	3.0000e-005	4.2100e-003	1.1100e-003	3.0000e-005	1.1400e-003	0.0000	3.2219	3.2219	1.0000e-004	0.0000	3.2243
<b>Total</b>	<b>0.0116</b>	<b>0.3897</b>	<b>0.1253</b>	<b>1.4600e-003</b>	<b>0.0997</b>	<b>1.1000e-003</b>	<b>0.1007</b>	<b>0.0255</b>	<b>1.0500e-003</b>	<b>0.0265</b>	<b>0.0000</b>	<b>141.3653</b>	<b>141.3653</b>	<b>5.6200e-003</b>	<b>0.0000</b>	<b>141.5058</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.9 1.3a HS - Southwest Recharge Basin - 2025****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					
Fugitive Dust					4.0000e-004	0.0000	4.0000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0167	0.0987	0.8917	1.3800e-003		2.1400e-003	2.1400e-003		2.1400e-003	2.1400e-003	0.0000	120.5661	120.5661	0.0292	0.0000	121.2958
<b>Total</b>	<b>0.0167</b>	<b>0.0987</b>	<b>0.8917</b>	<b>1.3800e-003</b>	<b>4.0000e-004</b>	<b>2.1400e-003</b>	<b>2.5400e-003</b>	<b>4.0000e-005</b>	<b>2.1400e-003</b>	<b>2.1800e-003</b>	<b>0.0000</b>	<b>120.5661</b>	<b>120.5661</b>	<b>0.0292</b>	<b>0.0000</b>	<b>121.2958</b>

**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	9.6600e-003	0.3797	0.1105	1.4000e-003	0.0948	1.0500e-003	0.0959	0.0242	1.0000e-003	0.0252	0.0000	135.7486	135.7486	5.4400e-003	0.0000	135.8846
Vendor	2.2000e-004	8.7900e-003	2.2900e-003	2.0000e-005	6.3000e-004	2.0000e-005	6.4000e-004	1.8000e-004	2.0000e-005	2.0000e-004	0.0000	2.3948	2.3948	8.0000e-005	0.0000	2.3969
Worker	1.7100e-003	1.2800e-003	0.0125	4.0000e-005	4.1800e-003	3.0000e-005	4.2100e-003	1.1100e-003	3.0000e-005	1.1400e-003	0.0000	3.2219	3.2219	1.0000e-004	0.0000	3.2243
<b>Total</b>	<b>0.0116</b>	<b>0.3897</b>	<b>0.1253</b>	<b>1.4600e-003</b>	<b>0.0997</b>	<b>1.1000e-003</b>	<b>0.1007</b>	<b>0.0255</b>	<b>1.0500e-003</b>	<b>0.0265</b>	<b>0.0000</b>	<b>141.3653</b>	<b>141.3653</b>	<b>5.6200e-003</b>	<b>0.0000</b>	<b>141.5058</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.10 1.1 HS - Filter Plant to Sewer Pipeline - 2024****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	0.0416	0.3302	0.4508	1.0000e-003		0.0140	0.0140		0.0134	0.0134	0.0000	86.8162	86.8162	0.0187	0.0000	87.2838
<b>Total</b>	<b>0.0416</b>	<b>0.3302</b>	<b>0.4508</b>	<b>1.0000e-003</b>		<b>0.0140</b>	<b>0.0140</b>		<b>0.0134</b>	<b>0.0134</b>	<b>0.0000</b>	<b>86.8162</b>	<b>86.8162</b>	<b>0.0187</b>	<b>0.0000</b>	<b>87.2838</b>

**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	2.9700e-003	0.1198	0.0337	4.2000e-004	9.2300e-003	3.4000e-004	9.5700e-003	2.5300e-003	3.3000e-004	2.8600e-003	0.0000	40.9195	40.9195	1.6300e-003	0.0000	40.9602
Vendor	2.4000e-004	9.4400e-003	2.5200e-003	3.0000e-005	6.5000e-004	2.0000e-005	6.7000e-004	1.9000e-004	2.0000e-005	2.1000e-004	0.0000	2.5086	2.5086	9.0000e-005	0.0000	2.5108
Worker	1.8900e-003	1.4800e-003	0.0142	4.0000e-005	4.3500e-003	3.0000e-005	4.3900e-003	1.1600e-003	3.0000e-005	1.1900e-003	0.0000	3.4937	3.4937	1.1000e-004	0.0000	3.4964
<b>Total</b>	<b>5.1000e-003</b>	<b>0.1307</b>	<b>0.0504</b>	<b>4.9000e-004</b>	<b>0.0142</b>	<b>3.9000e-004</b>	<b>0.0146</b>	<b>3.8800e-003</b>	<b>3.8000e-004</b>	<b>4.2600e-003</b>	<b>0.0000</b>	<b>46.9217</b>	<b>46.9217</b>	<b>1.8300e-003</b>	<b>0.0000</b>	<b>46.9674</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.10 1.1 HS - Filter Plant to Sewer Pipeline - 2024****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	0.0118	0.0724	0.5665	1.0000e-003		1.5000e-003	1.5000e-003		1.5000e-003	1.5000e-003	0.0000	86.8161	86.8161	0.0187	0.0000	87.2837
<b>Total</b>	<b>0.0118</b>	<b>0.0724</b>	<b>0.5665</b>	<b>1.0000e-003</b>		<b>1.5000e-003</b>	<b>1.5000e-003</b>		<b>1.5000e-003</b>	<b>1.5000e-003</b>	<b>0.0000</b>	<b>86.8161</b>	<b>86.8161</b>	<b>0.0187</b>	<b>0.0000</b>	<b>87.2837</b>

**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	2.9700e-003	0.1198	0.0337	4.2000e-004	9.2300e-003	3.4000e-004	9.5700e-003	2.5300e-003	3.3000e-004	2.8600e-003	0.0000	40.9195	40.9195	1.6300e-003	0.0000	40.9602
Vendor	2.4000e-004	9.4400e-003	2.5200e-003	3.0000e-005	6.5000e-004	2.0000e-005	6.7000e-004	1.9000e-004	2.0000e-005	2.1000e-004	0.0000	2.5086	2.5086	9.0000e-005	0.0000	2.5108
Worker	1.8900e-003	1.4800e-003	0.0142	4.0000e-005	4.3500e-003	3.0000e-005	4.3900e-003	1.1600e-003	3.0000e-005	1.1900e-003	0.0000	3.4937	3.4937	1.1000e-004	0.0000	3.4964
<b>Total</b>	<b>5.1000e-003</b>	<b>0.1307</b>	<b>0.0504</b>	<b>4.9000e-004</b>	<b>0.0142</b>	<b>3.9000e-004</b>	<b>0.0146</b>	<b>3.8800e-003</b>	<b>3.8000e-004</b>	<b>4.2600e-003</b>	<b>0.0000</b>	<b>46.9217</b>	<b>46.9217</b>	<b>1.8300e-003</b>	<b>0.0000</b>	<b>46.9674</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.11 1.3b HS - Recovery Wells for SW Recharge Basin - 2024****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	0.0534	0.4472	0.5849	1.3800e-003		0.0185	0.0185		0.0177	0.0177	0.0000	120.0974	120.0974	0.0264	0.0000	120.7562
<b>Total</b>	<b>0.0534</b>	<b>0.4472</b>	<b>0.5849</b>	<b>1.3800e-003</b>		<b>0.0185</b>	<b>0.0185</b>		<b>0.0177</b>	<b>0.0177</b>	<b>0.0000</b>	<b>120.0974</b>	<b>120.0974</b>	<b>0.0264</b>	<b>0.0000</b>	<b>120.7562</b>

**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	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
Vendor	4.9000e-004	0.0189	5.0300e-003	5.0000e-005	1.3100e-003	4.0000e-005	1.3400e-003	3.8000e-004	3.0000e-005	4.1000e-004	0.0000	5.0171	5.0171	1.8000e-004	0.0000	5.0216
Worker	1.7200e-003	1.3400e-003	0.0129	4.0000e-005	3.9600e-003	3.0000e-005	3.9900e-003	1.0500e-003	3.0000e-005	1.0800e-003	0.0000	3.1761	3.1761	1.0000e-004	0.0000	3.1786
<b>Total</b>	<b>2.2100e-003</b>	<b>0.0202</b>	<b>0.0179</b>	<b>9.0000e-005</b>	<b>5.2700e-003</b>	<b>7.0000e-005</b>	<b>5.3300e-003</b>	<b>1.4300e-003</b>	<b>6.0000e-005</b>	<b>1.4900e-003</b>	<b>0.0000</b>	<b>8.1932</b>	<b>8.1932</b>	<b>2.8000e-004</b>	<b>0.0000</b>	<b>8.2002</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.11 1.3b HS - Recovery Wells for SW Recharge Basin - 2024****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	0.0167	0.1076	0.7658	1.3800e-003		2.1000e-003	2.1000e-003		2.1000e-003	2.1000e-003	0.0000	120.0972	120.0972	0.0264	0.0000	120.7561
<b>Total</b>	<b>0.0167</b>	<b>0.1076</b>	<b>0.7658</b>	<b>1.3800e-003</b>		<b>2.1000e-003</b>	<b>2.1000e-003</b>		<b>2.1000e-003</b>	<b>2.1000e-003</b>	<b>0.0000</b>	<b>120.0972</b>	<b>120.0972</b>	<b>0.0264</b>	<b>0.0000</b>	<b>120.7561</b>

**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	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
Vendor	4.9000e-004	0.0189	5.0300e-003	5.0000e-005	1.3100e-003	4.0000e-005	1.3400e-003	3.8000e-004	3.0000e-005	4.1000e-004	0.0000	5.0171	5.0171	1.8000e-004	0.0000	5.0216
Worker	1.7200e-003	1.3400e-003	0.0129	4.0000e-005	3.9600e-003	3.0000e-005	3.9900e-003	1.0500e-003	3.0000e-005	1.0800e-003	0.0000	3.1761	3.1761	1.0000e-004	0.0000	3.1786
<b>Total</b>	<b>2.2100e-003</b>	<b>0.0202</b>	<b>0.0179</b>	<b>9.0000e-005</b>	<b>5.2700e-003</b>	<b>7.0000e-005</b>	<b>5.3300e-003</b>	<b>1.4300e-003</b>	<b>6.0000e-005</b>	<b>1.4900e-003</b>	<b>0.0000</b>	<b>8.1932</b>	<b>8.1932</b>	<b>2.8000e-004</b>	<b>0.0000</b>	<b>8.2002</b>



## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.12 1.4 HS - Filter Plant Upgrades - 2024****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	5.3000e-004	3.9400e-003	4.5300e-003	1.0000e-005		1.5000e-004	1.5000e-004		1.4000e-004	1.4000e-004	0.0000	1.1841	1.1841	3.8000e-004	0.0000	1.1937
<b>Total</b>	<b>5.3000e-004</b>	<b>3.9400e-003</b>	<b>4.5300e-003</b>	<b>1.0000e-005</b>		<b>1.5000e-004</b>	<b>1.5000e-004</b>		<b>1.4000e-004</b>	<b>1.4000e-004</b>	<b>0.0000</b>	<b>1.1841</b>	<b>1.1841</b>	<b>3.8000e-004</b>	<b>0.0000</b>	<b>1.1937</b>

**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	1.1000e-004	4.2300e-003	1.1900e-003	1.0000e-005	4.2000e-004	1.0000e-005	4.3000e-004	1.1000e-004	1.0000e-005	1.2000e-004	0.0000	1.4458	1.4458	6.0000e-005	0.0000	1.4473
Vendor	6.5000e-004	0.0249	6.6500e-003	7.0000e-005	1.7300e-003	5.0000e-005	1.7700e-003	5.0000e-004	5.0000e-005	5.4000e-004	0.0000	6.6226	6.6226	2.4000e-004	0.0000	6.6285
Worker	5.4400e-003	4.2600e-003	0.0407	1.1000e-004	0.0125	1.0000e-004	0.0126	3.3400e-003	9.0000e-005	3.4200e-003	0.0000	10.0618	10.0618	3.2000e-004	0.0000	10.0697
<b>Total</b>	<b>6.2000e-003</b>	<b>0.0334</b>	<b>0.0486</b>	<b>1.9000e-004</b>	<b>0.0147</b>	<b>1.6000e-004</b>	<b>0.0148</b>	<b>3.9500e-003</b>	<b>1.5000e-004</b>	<b>4.0800e-003</b>	<b>0.0000</b>	<b>18.1302</b>	<b>18.1302</b>	<b>6.2000e-004</b>	<b>0.0000</b>	<b>18.1455</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.12 1.4 HS - Filter Plant Upgrades - 2024****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	1.6000e-004	7.1000e-004	6.8200e-003	1.0000e-005		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	1.1841	1.1841	3.8000e-004	0.0000	1.1937
<b>Total</b>	<b>1.6000e-004</b>	<b>7.1000e-004</b>	<b>6.8200e-003</b>	<b>1.0000e-005</b>		<b>2.0000e-005</b>	<b>2.0000e-005</b>		<b>2.0000e-005</b>	<b>2.0000e-005</b>	<b>0.0000</b>	<b>1.1841</b>	<b>1.1841</b>	<b>3.8000e-004</b>	<b>0.0000</b>	<b>1.1937</b>

**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	1.1000e-004	4.2300e-003	1.1900e-003	1.0000e-005	4.2000e-004	1.0000e-005	4.3000e-004	1.1000e-004	1.0000e-005	1.2000e-004	0.0000	1.4458	1.4458	6.0000e-005	0.0000	1.4473
Vendor	6.5000e-004	0.0249	6.6500e-003	7.0000e-005	1.7300e-003	5.0000e-005	1.7700e-003	5.0000e-004	5.0000e-005	5.4000e-004	0.0000	6.6226	6.6226	2.4000e-004	0.0000	6.6285
Worker	5.4400e-003	4.2600e-003	0.0407	1.1000e-004	0.0125	1.0000e-004	0.0126	3.3400e-003	9.0000e-005	3.4200e-003	0.0000	10.0618	10.0618	3.2000e-004	0.0000	10.0697
<b>Total</b>	<b>6.2000e-003</b>	<b>0.0334</b>	<b>0.0486</b>	<b>1.9000e-004</b>	<b>0.0147</b>	<b>1.6000e-004</b>	<b>0.0148</b>	<b>3.9500e-003</b>	<b>1.5000e-004</b>	<b>4.0800e-003</b>	<b>0.0000</b>	<b>18.1302</b>	<b>18.1302</b>	<b>6.2000e-004</b>	<b>0.0000</b>	<b>18.1455</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.12 1.4 HS - Filter Plant Upgrades - 2025****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	1.8000e-004	1.2600e-003	1.6200e-003	0.0000		5.0000e-005	5.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.4305	0.4305	1.4000e-004	0.0000	0.4340
<b>Total</b>	<b>1.8000e-004</b>	<b>1.2600e-003</b>	<b>1.6200e-003</b>	<b>0.0000</b>		<b>5.0000e-005</b>	<b>5.0000e-005</b>		<b>4.0000e-005</b>	<b>4.0000e-005</b>	<b>0.0000</b>	<b>0.4305</b>	<b>0.4305</b>	<b>1.4000e-004</b>	<b>0.0000</b>	<b>0.4340</b>

**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	1.4600e-003	4.3000e-004	1.0000e-005	3.6000e-004	0.0000	3.7000e-004	9.0000e-005	0.0000	1.0000e-004	0.0000	0.5221	0.5221	2.0000e-005	0.0000	0.5226
Vendor	2.2000e-004	8.7900e-003	2.2900e-003	2.0000e-005	6.3000e-004	2.0000e-005	6.4000e-004	1.8000e-004	2.0000e-005	2.0000e-004	0.0000	2.3948	2.3948	8.0000e-005	0.0000	2.3969
Worker	1.8600e-003	1.4000e-003	0.0136	4.0000e-005	4.5600e-003	3.0000e-005	4.5900e-003	1.2100e-003	3.0000e-005	1.2400e-003	0.0000	3.5148	3.5148	1.0000e-004	0.0000	3.5174
<b>Total</b>	<b>2.1200e-003</b>	<b>0.0117</b>	<b>0.0164</b>	<b>7.0000e-005</b>	<b>5.5500e-003</b>	<b>5.0000e-005</b>	<b>5.6000e-003</b>	<b>1.4800e-003</b>	<b>5.0000e-005</b>	<b>1.5400e-003</b>	<b>0.0000</b>	<b>6.4316</b>	<b>6.4316</b>	<b>2.0000e-004</b>	<b>0.0000</b>	<b>6.4369</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.12 1.4 HS - Filter Plant Upgrades - 2025****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	6.0000e-005	2.6000e-004	2.4800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	0.4305	0.4305	1.4000e-004	0.0000	0.4340
<b>Total</b>	<b>6.0000e-005</b>	<b>2.6000e-004</b>	<b>2.4800e-003</b>	<b>0.0000</b>		<b>1.0000e-005</b>	<b>1.0000e-005</b>		<b>1.0000e-005</b>	<b>1.0000e-005</b>	<b>0.0000</b>	<b>0.4305</b>	<b>0.4305</b>	<b>1.4000e-004</b>	<b>0.0000</b>	<b>0.4340</b>

**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	1.4600e-003	4.3000e-004	1.0000e-005	3.6000e-004	0.0000	3.7000e-004	9.0000e-005	0.0000	1.0000e-004	0.0000	0.5221	0.5221	2.0000e-005	0.0000	0.5226
Vendor	2.2000e-004	8.7900e-003	2.2900e-003	2.0000e-005	6.3000e-004	2.0000e-005	6.4000e-004	1.8000e-004	2.0000e-005	2.0000e-004	0.0000	2.3948	2.3948	8.0000e-005	0.0000	2.3969
Worker	1.8600e-003	1.4000e-003	0.0136	4.0000e-005	4.5600e-003	3.0000e-005	4.5900e-003	1.2100e-003	3.0000e-005	1.2400e-003	0.0000	3.5148	3.5148	1.0000e-004	0.0000	3.5174
<b>Total</b>	<b>2.1200e-003</b>	<b>0.0117</b>	<b>0.0164</b>	<b>7.0000e-005</b>	<b>5.5500e-003</b>	<b>5.0000e-005</b>	<b>5.6000e-003</b>	<b>1.4800e-003</b>	<b>5.0000e-005</b>	<b>1.5400e-003</b>	<b>0.0000</b>	<b>6.4316</b>	<b>6.4316</b>	<b>2.0000e-004</b>	<b>0.0000</b>	<b>6.4369</b>

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### 3.13 Paving - 2026

### Unmitigated Construction On-Site

[illegible]

### Unmitigated Construction Off-Site

[illegible]

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### 3.13 Paving - 2026

### Mitigated Construction On-Site

[illegible]

### Mitigated Construction Off-Site

[illegible]

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### 3.14 Architectural Coating - 2026

### Unmitigated Construction On-Site

[illegible]

### Unmitigated Construction Off-Site

[illegible]

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

### 3.14 Architectural Coating - 2026

### Mitigated Construction On-Site

[illegible]

### Mitigated Construction Off-Site

[illegible]



## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.15 2.2a SS - MW7 Recharge Basin - 2027****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	0.1301	1.0176	1.8346	3.4500e-003		0.0432	0.0432		0.0409	0.0409	0.0000	301.4156	301.4156	0.0730	0.0000	303.2398
<b>Total</b>	<b>0.1301</b>	<b>1.0176</b>	<b>1.8346</b>	<b>3.4500e-003</b>		<b>0.0432</b>	<b>0.0432</b>		<b>0.0409</b>	<b>0.0409</b>	<b>0.0000</b>	<b>301.4156</b>	<b>301.4156</b>	<b>0.0730</b>	<b>0.0000</b>	<b>303.2398</b>

**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	1.8000e-004	6.6000e-003	2.0700e-003	3.0000e-005	5.9000e-004	2.0000e-005	6.0000e-004	1.6000e-004	2.0000e-005	1.8000e-004	0.0000	2.5556	2.5556	1.0000e-004	0.0000	2.5582
Vendor	5.2000e-004	0.0208	5.3200e-003	6.0000e-005	1.5700e-003	3.0000e-005	1.6000e-003	4.5000e-004	3.0000e-005	4.9000e-004	0.0000	5.9295	5.9295	2.1000e-004	0.0000	5.9347
Worker	3.8200e-003	2.6400e-003	0.0267	8.0000e-005	0.0105	7.0000e-005	0.0105	2.7800e-003	7.0000e-005	2.8400e-003	0.0000	7.4876	7.4876	2.0000e-004	0.0000	7.4924
<b>Total</b>	<b>4.5200e-003</b>	<b>0.0301</b>	<b>0.0341</b>	<b>1.7000e-004</b>	<b>0.0126</b>	<b>1.2000e-004</b>	<b>0.0127</b>	<b>3.3900e-003</b>	<b>1.2000e-004</b>	<b>3.5100e-003</b>	<b>0.0000</b>	<b>15.9727</b>	<b>15.9727</b>	<b>5.1000e-004</b>	<b>0.0000</b>	<b>15.9854</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.15 2.2a SS - MW7 Recharge Basin - 2027****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	0.0419	0.2466	2.2291	3.4500e-003		5.3400e-003	5.3400e-003		5.3400e-003	5.3400e-003	0.0000	301.4152	301.4152	0.0730	0.0000	303.2394
<b>Total</b>	<b>0.0419</b>	<b>0.2466</b>	<b>2.2291</b>	<b>3.4500e-003</b>		<b>5.3400e-003</b>	<b>5.3400e-003</b>		<b>5.3400e-003</b>	<b>5.3400e-003</b>	<b>0.0000</b>	<b>301.4152</b>	<b>301.4152</b>	<b>0.0730</b>	<b>0.0000</b>	<b>303.2394</b>

**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	1.8000e-004	6.6000e-003	2.0700e-003	3.0000e-005	5.9000e-004	2.0000e-005	6.0000e-004	1.6000e-004	2.0000e-005	1.8000e-004	0.0000	2.5556	2.5556	1.0000e-004	0.0000	2.5582
Vendor	5.2000e-004	0.0208	5.3200e-003	6.0000e-005	1.5700e-003	3.0000e-005	1.6000e-003	4.5000e-004	3.0000e-005	4.9000e-004	0.0000	5.9295	5.9295	2.1000e-004	0.0000	5.9347
Worker	3.8200e-003	2.6400e-003	0.0267	8.0000e-005	0.0105	7.0000e-005	0.0105	2.7800e-003	7.0000e-005	2.8400e-003	0.0000	7.4876	7.4876	2.0000e-004	0.0000	7.4924
<b>Total</b>	<b>4.5200e-003</b>	<b>0.0301</b>	<b>0.0341</b>	<b>1.7000e-004</b>	<b>0.0126</b>	<b>1.2000e-004</b>	<b>0.0127</b>	<b>3.3900e-003</b>	<b>1.2000e-004</b>	<b>3.5100e-003</b>	<b>0.0000</b>	<b>15.9727</b>	<b>15.9727</b>	<b>5.1000e-004</b>	<b>0.0000</b>	<b>15.9854</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.16 2.2b SS - Recovery Wells for MW7Recharge Basin - 2027****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	0.0506	0.4137	0.5819	1.3800e-003		0.0160	0.0160		0.0153	0.0153	0.0000	120.0783	120.0783	0.0262	0.0000	120.7332
<b>Total</b>	<b>0.0506</b>	<b>0.4137</b>	<b>0.5819</b>	<b>1.3800e-003</b>		<b>0.0160</b>	<b>0.0160</b>		<b>0.0153</b>	<b>0.0153</b>	<b>0.0000</b>	<b>120.0783</b>	<b>120.0783</b>	<b>0.0262</b>	<b>0.0000</b>	<b>120.7332</b>

**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	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
Vendor	4.3000e-004	0.0174	4.4400e-003	5.0000e-005	1.3100e-003	3.0000e-005	1.3400e-003	3.8000e-004	3.0000e-005	4.1000e-004	0.0000	4.9413	4.9413	1.7000e-004	0.0000	4.9456
Worker	1.4500e-003	1.0000e-003	0.0101	3.0000e-005	3.9600e-003	3.0000e-005	3.9900e-003	1.0500e-003	2.0000e-005	1.0800e-003	0.0000	2.8362	2.8362	7.0000e-005	0.0000	2.8380
<b>Total</b>	<b>1.8800e-003</b>	<b>0.0184</b>	<b>0.0146</b>	<b>8.0000e-005</b>	<b>5.2700e-003</b>	<b>6.0000e-005</b>	<b>5.3300e-003</b>	<b>1.4300e-003</b>	<b>5.0000e-005</b>	<b>1.4900e-003</b>	<b>0.0000</b>	<b>7.7775</b>	<b>7.7775</b>	<b>2.4000e-004</b>	<b>0.0000</b>	<b>7.7836</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**3.16 2.2b SS - Recovery Wells for MW7Recharge Basin - 2027****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	0.0167	0.1076	0.7658	1.3800e-003		2.1000e-003	2.1000e-003		2.1000e-003	2.1000e-003	0.0000	120.0782	120.0782	0.0262	0.0000	120.7330
<b>Total</b>	<b>0.0167</b>	<b>0.1076</b>	<b>0.7658</b>	<b>1.3800e-003</b>		<b>2.1000e-003</b>	<b>2.1000e-003</b>		<b>2.1000e-003</b>	<b>2.1000e-003</b>	<b>0.0000</b>	<b>120.0782</b>	<b>120.0782</b>	<b>0.0262</b>	<b>0.0000</b>	<b>120.7330</b>

**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	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
Vendor	4.3000e-004	0.0174	4.4400e-003	5.0000e-005	1.3100e-003	3.0000e-005	1.3400e-003	3.8000e-004	3.0000e-005	4.1000e-004	0.0000	4.9413	4.9413	1.7000e-004	0.0000	4.9456
Worker	1.4500e-003	1.0000e-003	0.0101	3.0000e-005	3.9600e-003	3.0000e-005	3.9900e-003	1.0500e-003	2.0000e-005	1.0800e-003	0.0000	2.8362	2.8362	7.0000e-005	0.0000	2.8380
<b>Total</b>	<b>1.8800e-003</b>	<b>0.0184</b>	<b>0.0146</b>	<b>8.0000e-005</b>	<b>5.2700e-003</b>	<b>6.0000e-005</b>	<b>5.3300e-003</b>	<b>1.4300e-003</b>	<b>5.0000e-005</b>	<b>1.4900e-003</b>	<b>0.0000</b>	<b>7.7775</b>	<b>7.7775</b>	<b>2.4000e-004</b>	<b>0.0000</b>	<b>7.7836</b>

**4.0 Operational Detail - Mobile**

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**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	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
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	0.0000	0.0000

**4.2 Trip Summary Information**

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

**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
User Defined Industrial	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

**4.4 Fleet Mix**

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.599608	0.024515	0.205520	0.108091	0.013987	0.004134	0.021227	0.013186	0.001229	0.001862	0.004978	0.000953	0.000710

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

## 5.0 Energy Detail

Historical Energy Use: N

## 5.1 Mitigation Measures Energy

[illegible]

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

## 5.2 Energy by Land Use - NaturalGas

**Unmitigated**

[illegible]

**Mitigated**

[illegible]

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**5.3 Energy by Land Use - Electricity****Unmitigated**

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
<b>Total</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

**Mitigated**

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
<b>Total</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

**6.0 Area Detail****6.1 Mitigation Measures Area**



## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

	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	4.6000e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Unmitigated	4.6000e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005

## 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	7.0000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	3.9100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
<b>Total</b>	<b>4.6100e-003</b>	<b>0.0000</b>	<b>1.0000e-005</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>2.0000e-005</b>	<b>2.0000e-005</b>	<b>0.0000</b>	<b>0.0000</b>	<b>3.0000e-005</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**6.2 Area by SubCategory****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	7.0000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	3.9100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
<b>Total</b>	<b>4.6100e-003</b>	<b>0.0000</b>	<b>1.0000e-005</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>2.0000e-005</b>	<b>2.0000e-005</b>	<b>0.0000</b>	<b>0.0000</b>	<b>3.0000e-005</b>

**7.0 Water Detail****7.1 Mitigation Measures Water**

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

**7.2 Water by Land Use****Unmitigated**

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
<b>Total</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**7.2 Water by Land Use****Mitigated**

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
<b>Total</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

**8.0 Waste Detail**

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**8.1 Mitigation Measures Waste****Category/Year**

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

**8.2 Waste by Land Use****Unmitigated**

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
<b>Total</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

**Mitigated**

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
<b>Total</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

**9.0 Operational Offroad**

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type
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## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Annual

## 10.0 Stationary Equipment

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### Fire Pumps and Emergency Generators

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

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type
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### User Defined Equipment

Equipment Type	Number
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## 11.0 Vegetation

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## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**Watsonville Slough System Managed Aquifer Recharge and Recovery Projects**  
**Santa Cruz County, Summer****1.0 Project Characteristics**

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**1.1 Land Usage**

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	1.00	1,000.00	0

**1.2 Other Project Characteristics**

Urbanization	Urban	Wind Speed (m/s)	1.8	Precipitation Freq (Days)	61
Climate Zone	5			Operational Year	2029
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	210	CH4 Intensity (lb/MWhr)	0.029	N2O Intensity (lb/MWhr)	0.006

**1.3 User Entered Comments & Non-Default Data**

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

Project Characteristics - [http://www.pgecorp.com/corp\\_responsibility/reports/2019/assets/PGE\\_CRSR\\_2019.pdf](http://www.pgecorp.com/corp_responsibility/reports/2019/assets/PGE_CRSR_2019.pdf)

Land Use - Unit values assumed

Construction Phase - Project data

Off-road Equipment - Project data

Off-road Equipment - Based on equipment refinements provided in email from Paul F dated July 7, 2020 for screening HRA for this project component

Off-road Equipment - Project data

Off-road Equipment - Project data

Off-road Equipment - Project data

Off-road Equipment - Revised equipment list based on email from Paul F dated 7/28/2020

Off-road Equipment - Project data

Off-road Equipment - Project data

Off-road Equipment - Project data

Off-road Equipment - Project data

Off-road Equipment - Based on revised equipment list provided by Paul F dated 7/28/2020

Off-road Equipment - Project data

Off-road Equipment - Phase not used

Off-road Equipment - Phase not used

Off-road Equipment - Project data

Off-road Equipment - Phase not used

Trips and VMT - Project data

Grading - Project data

Architectural Coating - No architectural coatings

Vehicle Trips - Operational emissions not estimated

Energy Use - x

Construction Off-road Equipment Mitigation - Tier 4 F equipment used as Best Available Control Technology



Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

[illegible]

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

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
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tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstructionPhase	NumDays	5.00	0.00
tblConstructionPhase	NumDays	100.00	180.00
tblConstructionPhase	NumDays	100.00	120.00
tblConstructionPhase	NumDays	100.00	40.00
tblConstructionPhase	NumDays	100.00	200.00
tblConstructionPhase	NumDays	10.00	0.00
tblConstructionPhase	NumDays	2.00	180.00
tblConstructionPhase	NumDays	5.00	0.00
tblConstructionPhase	NumDays	1.00	180.00
tblGrading	AcresOfGrading	0.00	0.75
tblGrading	AcresOfGrading	20.25	0.50
tblLandUse	LandUseSquareFeet	0.00	1,000.00
tblLandUse	LotAcreage	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
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tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	6.00	3.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	8.00	0.00

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
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tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.20
tblOffRoadEquipment	UsageHours	7.00	1.10
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	0.10
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
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tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.50
tblOffRoadEquipment	UsageHours	8.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	210
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tblTripsAndVMT	HaulingTripNumber	0.00	70.00
tblTripsAndVMT	HaulingTripNumber	0.00	3,136.00
tblTripsAndVMT	HaulingTripNumber	0.00	86.00
tblTripsAndVMT	HaulingTripNumber	0.00	468.00
tblTripsAndVMT	HaulingTripNumber	0.00	668.00
tblTripsAndVMT	HaulingTripNumber	0.00	1,210.00
tblTripsAndVMT	HaulingTripNumber	0.00	13,781.00
tblTripsAndVMT	HaulingTripNumber	0.00	1,100.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
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tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	1.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	WorkerTripNumber	0.00	10.00

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

tblTripsAndVMT	WorkerTripNumber	0.00	24.00
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tblTripsAndVMT	WorkerTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripNumber	0.00	12.00
tblTripsAndVMT	WorkerTripNumber	0.00	20.00
tblTripsAndVMT	WorkerTripNumber	30.00	18.00
tblTripsAndVMT	WorkerTripNumber	33.00	22.00
tblTripsAndVMT	WorkerTripNumber	50.00	22.00
tblTripsAndVMT	WorkerTripNumber	33.00	22.00

## 2.0 Emissions Summary

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## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**2.1 Overall Construction (Maximum Daily Emission)****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	lb/day										lb/day					
2021	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
2022	4.9214	49.5933	50.2797	0.1229	2.3560	1.9247	4.2806	0.9067	1.8524	2.7590	0.0000	12,093.83 69	12,093.83 69	1.7904	0.0000	12,138.59 78
2023	2.5647	27.8507	24.9825	0.0859	2.9592	0.7979	3.7572	1.0565	0.7608	1.8173	0.0000	8,631.476 6	8,631.476 6	1.1866	0.0000	8,661.140 5
2024	5.8858	63.8899	68.9009	0.2114	2.8353	1.8408	4.6761	0.7603	1.7563	2.5165	0.0000	21,207.40 53	21,207.40 53	3.1090	0.0000	21,285.13 03
2025	2.7401	33.4686	36.4950	0.1219	4.5623	0.7687	5.3310	1.1661	0.7291	1.8952	0.0000	12,399.57 66	12,399.57 66	1.6116	0.0000	12,439.86 68
2026	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
2027	3.2909	26.0880	43.0906	0.0898	0.3269	1.0425	1.3694	0.0880	0.9919	1.0799	0.0000	8,661.769 4	8,661.769 4	1.9328	0.0000	8,710.089 5
<b>Maximum</b>	<b>5.8858</b>	<b>63.8899</b>	<b>68.9009</b>	<b>0.2114</b>	<b>4.5623</b>	<b>1.9247</b>	<b>5.3310</b>	<b>1.1661</b>	<b>1.8524</b>	<b>2.7590</b>	<b>0.0000</b>	<b>21,207.40 53</b>	<b>21,207.40 53</b>	<b>3.1090</b>	<b>0.0000</b>	<b>21,285.13 03</b>



## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**2.1 Overall Construction (Maximum Daily Emission)****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	lb/day										lb/day					
2021	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
2022	1.6234	16.9483	58.5589	0.1229	2.3560	0.1749	2.5308	0.9067	0.1729	1.0796	0.0000	12,093.83 69	12,093.83 69	1.7904	0.0000	12,138.59 78
2023	1.0324	13.6387	30.3320	0.0859	2.9592	0.1041	3.0633	1.0565	0.1025	1.1589	0.0000	8,631.476 6	8,631.476 6	1.1866	0.0000	8,661.140 5
2024	2.3361	32.0333	83.6345	0.2114	2.8353	0.2595	3.0948	0.7603	0.2564	1.0167	0.0000	21,207.40 53	21,207.40 53	3.1090	0.0000	21,285.13 03
2025	1.2641	20.5772	43.1063	0.1219	4.5623	0.1367	4.6990	1.1661	0.1346	1.3007	0.0000	12,399.57 66	12,399.57 66	1.6116	0.0000	12,439.86 68
2026	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
2027	1.1419	7.1171	53.3441	0.0898	0.3269	0.1342	0.4611	0.0880	0.1340	0.2220	0.0000	8,661.769 3	8,661.769 3	1.9328	0.0000	8,710.089 5
Maximum	2.3361	32.0333	83.6345	0.2114	4.5623	0.2595	4.6990	1.1661	0.2564	1.3007	0.0000	21,207.40 53	21,207.40 53	3.1090	0.0000	21,285.13 03

	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
Percent Reduction	61.87	55.04	-20.21	0.00	0.00	87.30	28.67	0.00	86.86	52.54	0.00	0.00	0.00	0.00	0.00	0.00

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**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	lb/day										lb/day					
Area	0.0252	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	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
Mobile	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
<b>Total</b>	<b>0.0252</b>	<b>0.0000</b>	<b>1.0000e-004</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>2.2000e-004</b>	<b>2.2000e-004</b>	<b>0.0000</b>	<b>0.0000</b>	<b>2.3000e-004</b>

**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	lb/day										lb/day					
Area	0.0252	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	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
Mobile	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
<b>Total</b>	<b>0.0252</b>	<b>0.0000</b>	<b>1.0000e-004</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>2.2000e-004</b>	<b>2.2000e-004</b>	<b>0.0000</b>	<b>0.0000</b>	<b>2.3000e-004</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

	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
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	Demolition	Demolition	7/1/2021	6/30/2021	5	0	
2	1.2a HS - Southeast Recharge Basin	Site Preparation	7/1/2022	3/9/2023	5	180	
3	1.2b HS - Recovery Wells for SE Recharge Basin	Building Construction	7/1/2022	11/17/2022	5	100	
4	2.3 SS - Intake Cone Screen	Building Construction	7/1/2022	8/25/2022	5	40	
5	2.4 SS - Intake Pump Station	Building Construction	7/1/2022	4/6/2023	5	200	
6	2.5 SS - Intake and Pipeline to Filter Plant	Trenching	8/1/2022	11/18/2022	5	80	
7	2.1 SS - Filter Plant to Recharge Basins Pipeline	Trenching	1/1/2023	3/17/2023	5	55	
8	1.3a HS - Southwest Recharge Basin	Grading	7/1/2024	3/7/2025	5	180	
9	1.1 HS - Filter Plant to Sewer Pipeline	Trenching	7/1/2024	9/8/2024	5	50	
10	1.3b HS - Recovery Wells for SW Recharge Basin	Building Construction	7/1/2024	11/15/2024	5	100	
11	1.4 HS - Filter Plant Upgrades	Building Construction	7/1/2024	3/7/2025	5	180	
12	Paving	Paving	10/22/2026	10/21/2026	5	0	
13	Architectural Coating	Architectural Coating	10/22/2026	10/21/2026	5	0	
14	2.2a SS - MW7 Recharge Basin	Building Construction	7/1/2027	12/15/2027	5	120	
15	2.2b SS - Recovery Wells for MW7 Recharge Basin	Building Construction	7/1/2027	11/17/2027	5	100	

Acres of Grading (Site Preparation Phase): 0

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**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 (Architectural Coating – sqft)****OffRoad Equipment**

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
1.1 HS - Filter Plant to Sewer Pipeline	Air Compressors	1	1.00	78	0.48
1.1 HS - Filter Plant to Sewer Pipeline	Excavators	1	6.00	158	0.38
1.1 HS - Filter Plant to Sewer Pipeline	Forklifts	1	2.00	89	0.20
1.1 HS - Filter Plant to Sewer Pipeline	Generator Sets	1	6.00	84	0.74
1.1 HS - Filter Plant to Sewer Pipeline	Off-Highway Trucks	1	2.00	402	0.38
1.1 HS - Filter Plant to Sewer Pipeline	Off-Highway Trucks	1	8.00	402	0.38
1.1 HS - Filter Plant to Sewer Pipeline	Plate Compactors	2	4.00	8	0.43
1.1 HS - Filter Plant to Sewer Pipeline	Pumps	2	6.00	84	0.74
1.1 HS - Filter Plant to Sewer Pipeline	Skid Steer Loaders	1	6.00	65	0.37
1.1 HS - Filter Plant to Sewer Pipeline	Sweepers/Scrubbers	1	1.00	64	0.46
1.1 HS - Filter Plant to Sewer Pipeline	Tractors/Loaders/Backhoes	1	4.00	97	0.37
1.2a HS - Southeast Recharge Basin	Excavators	1	0.40	158	0.38
1.2a HS - Southeast Recharge Basin	Graders	0	0.00	187	0.41
1.2a HS - Southeast Recharge Basin	Off-Highway Trucks	1	0.70	402	0.38
1.2a HS - Southeast Recharge Basin	Rubber Tired Dozers	1	0.20	247	0.40
1.2a HS - Southeast Recharge Basin	Rubber Tired Dozers	1	1.10	247	0.40
1.2a HS - Southeast Recharge Basin	Rubber Tired Loaders	1	0.70	203	0.36
1.2a HS - Southeast Recharge Basin	Scrapers	1	0.90	367	0.48
1.2a HS - Southeast Recharge Basin	Tractors/Loaders/Backhoes	0	0.00	97	0.37
1.2b HS - Recovery Wells for SE Recharge Basin	Air Compressors	1	1.00	78	0.48

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

1.2b HS - Recovery Wells for SE Recharge Basin	Bore/Drill Rigs	1	4.00	221	0.50
1.2b HS - Recovery Wells for SE Recharge Basin	Cranes	0	0.00	231	0.29
1.2b HS - Recovery Wells for SE Recharge Basin	Forklifts	1	4.00	89	0.20
1.2b HS - Recovery Wells for SE Recharge Basin	Generator Sets	1	6.00	84	0.74
1.2b HS - Recovery Wells for SE Recharge Basin	Off-Highway Trucks	1	1.20	402	0.38
1.2b HS - Recovery Wells for SE Recharge Basin	Off-Highway Trucks	1	4.00	402	0.38
1.2b HS - Recovery Wells for SE Recharge Basin	Pumps	1	6.00	84	0.74
1.2b HS - Recovery Wells for SE Recharge Basin	Skid Steer Loaders	1	6.00	65	0.37
1.2b HS - Recovery Wells for SE Recharge Basin	Tractors/Loaders/Backhoes	1	4.00	97	0.37
1.2b HS - Recovery Wells for SE Recharge Basin	Welders	0	0.00	46	0.45
1.3a HS - Southwest Recharge Basin	Aerial Lifts	1	4.00	63	0.31
1.3a HS - Southwest Recharge Basin	Air Compressors	4	1.00	78	0.48
1.3a HS - Southwest Recharge Basin	Excavators	4	6.00	158	0.38
1.3a HS - Southwest Recharge Basin	Forklifts	1	4.00	89	0.20
1.3a HS - Southwest Recharge Basin	Generator Sets	2	6.00	84	0.74
1.3a HS - Southwest Recharge Basin	Graders	0	0.00	187	0.41
1.3a HS - Southwest Recharge Basin	Off-Highway Trucks	2	4.00	402	0.38
1.3a HS - Southwest Recharge Basin	Other Material Handling Equipment	2	4.00	168	0.40
1.3a HS - Southwest Recharge Basin	Pumps	1	6.00	84	0.74
1.3a HS - Southwest Recharge Basin	Rubber Tired Dozers	0	0.00	247	0.40
1.3a HS - Southwest Recharge Basin	Skid Steer Loaders	1	6.00	65	0.37
1.3a HS - Southwest Recharge Basin	Tractors/Loaders/Backhoes	2	4.00	97	0.37
1.3b HS - Recovery Wells for SW Recharge Basin	Air Compressors	1	1.00	78	0.48
1.3b HS - Recovery Wells for SW Recharge Basin	Bore/Drill Rigs	1	4.00	221	0.50

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

1.3b HS - Recovery Wells for SW Recharge Basin	Cranes	0	0.00	231	0.29
1.3b HS - Recovery Wells for SW Recharge Basin	Forklifts	1	4.00	89	0.20
1.3b HS - Recovery Wells for SW Recharge Basin	Generator Sets	1	6.00	84	0.74
1.3b HS - Recovery Wells for SW Recharge Basin	Off-Highway Trucks	1	1.20	402	0.38
1.3b HS - Recovery Wells for SW Recharge Basin	Off-Highway Trucks	1	4.00	402	0.38
1.3b HS - Recovery Wells for SW Recharge Basin	Pumps	1	6.00	84	0.74
1.3b HS - Recovery Wells for SW Recharge Basin	Skid Steer Loaders	1	6.00	65	0.37
1.3b HS - Recovery Wells for SW Recharge Basin	Tractors/Loaders/Backhoes	1	4.00	97	0.37
1.3b HS - Recovery Wells for SW Recharge Basin	Welders	0	0.00	46	0.45
1.4 HS - Filter Plant Upgrades	Air Compressors	0	0.00	78	0.48
1.4 HS - Filter Plant Upgrades	Cranes	0	0.00	231	0.29
1.4 HS - Filter Plant Upgrades	Excavators	0	0.00	158	0.38
1.4 HS - Filter Plant Upgrades	Forklifts	0	0.00	89	0.20
1.4 HS - Filter Plant Upgrades	Generator Sets	0	0.00	84	0.74
1.4 HS - Filter Plant Upgrades	Off-Highway Trucks	1	0.10	402	0.38
1.4 HS - Filter Plant Upgrades	Other Material Handling Equipment	0	0.00	168	0.40
1.4 HS - Filter Plant Upgrades	Pumps	0	0.00	84	0.74
1.4 HS - Filter Plant Upgrades	Tractors/Loaders/Backhoes	1	0.10	97	0.37
1.4 HS - Filter Plant Upgrades	Welders	0	0.00	46	0.45
2.1 SS - Filter Plant to Recharge Basins Pipeline	Air Compressors	1	1.00	78	0.48
2.1 SS - Filter Plant to Recharge Basins Pipeline	Excavators	1	6.00	158	0.38
2.1 SS - Filter Plant to Recharge Basins Pipeline	Forklifts	1	2.00	89	0.20
2.1 SS - Filter Plant to Recharge Basins Pipeline	Generator Sets	1	6.00	84	0.74
2.1 SS - Filter Plant to Recharge Basins Pipeline	Off-Highway Trucks	1	2.00	402	0.38

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

2.1 SS - Filter Plant to Recharge Basins Pipeline	Off-Highway Trucks	1	8.00	402	0.38
2.1 SS - Filter Plant to Recharge Basins Pipeline	Plate Compactors	2	4.00	8	0.43
2.1 SS - Filter Plant to Recharge Basins Pipeline	Pumps	2	6.00	84	0.74
2.1 SS - Filter Plant to Recharge Basins Pipeline	Skid Steer Loaders	1	6.00	65	0.37
2.1 SS - Filter Plant to Recharge Basins Pipeline	Sweepers/Scrubbers	1	1.00	64	0.46
2.1 SS - Filter Plant to Recharge Basins Pipeline	Tractors/Loaders/Backhoes	1	4.00	97	0.37
2.2a SS - MW7 Recharge Basin	Aerial Lifts	1	4.00	63	0.31
2.2a SS - MW7 Recharge Basin	Air Compressors	4	1.00	78	0.48
2.2a SS - MW7 Recharge Basin	Cranes	0	0.00	231	0.29
2.2a SS - MW7 Recharge Basin	Excavators	4	6.00	158	0.38
2.2a SS - MW7 Recharge Basin	Forklifts	1	4.00	89	0.20
2.2a SS - MW7 Recharge Basin	Generator Sets	2	6.00	84	0.74
2.2a SS - MW7 Recharge Basin	Off-Highway Trucks	2	4.00	402	0.38
2.2a SS - MW7 Recharge Basin	Other Material Handling Equipment	2	4.00	168	0.40
2.2a SS - MW7 Recharge Basin	Pumps	1	6.00	84	0.74
2.2a SS - MW7 Recharge Basin	Skid Steer Loaders	1	6.00	65	0.37
2.2a SS - MW7 Recharge Basin	Tractors/Loaders/Backhoes	2	4.00	97	0.37
2.2a SS - MW7 Recharge Basin	Welders	0	0.00	46	0.45
2.2b SS - Recovery Wells for MW7Recharge Basin	Air Compressors	1	1.00	78	0.48
2.2b SS - Recovery Wells for MW7Recharge Basin	Bore/Drill Rigs	1	4.00	221	0.50
2.2b SS - Recovery Wells for MW7Recharge Basin	Cranes	0	0.00	231	0.29
2.2b SS - Recovery Wells for MW7Recharge Basin	Forklifts	1	4.00	89	0.20
2.2b SS - Recovery Wells for MW7Recharge Basin	Generator Sets	1	6.00	84	0.74
2.2b SS - Recovery Wells for MW7Recharge Basin	Off-Highway Trucks	1	1.20	402	0.38

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

2.2b SS - Recovery Wells for MW7Recharge Basin	Off-Highway Trucks	1	4.00	402	0.38
2.2b SS - Recovery Wells for MW7Recharge Basin	Pumps	1	6.00	84	0.74
2.2b SS - Recovery Wells for MW7Recharge Basin	Skid Steer Loaders	1	6.00	65	0.37
2.2b SS - Recovery Wells for MW7Recharge Basin	Tractors/Loaders/Backhoes	1	4.00	97	0.37
2.2b SS - Recovery Wells for MW7Recharge Basin	Welders	0	0.00	46	0.45
2.3 SS - Intake Cone Screen	Air Compressors	1	1.00	78	0.48
2.3 SS - Intake Cone Screen	Cranes	1	3.00	231	0.29
2.3 SS - Intake Cone Screen	Excavators	1	6.00	158	0.38
2.3 SS - Intake Cone Screen	Forklifts	0	0.00	89	0.20
2.3 SS - Intake Cone Screen	Generator Sets	1	6.00	84	0.74
2.3 SS - Intake Cone Screen	Pumps	2	6.00	84	0.74
2.3 SS - Intake Cone Screen	Skid Steer Loaders	1	6.00	65	0.37
2.3 SS - Intake Cone Screen	Tractors/Loaders/Backhoes	0	0.00	97	0.37
2.3 SS - Intake Cone Screen	Welders	1	0.50	46	0.45
2.4 SS - Intake Pump Station	Cranes	0	0.00	231	0.29
2.4 SS - Intake Pump Station	Excavators	1	0.40	158	0.38
2.4 SS - Intake Pump Station	Forklifts	0	0.00	89	0.20
2.4 SS - Intake Pump Station	Generator Sets	0	0.00	84	0.74
2.4 SS - Intake Pump Station	Off-Highway Trucks	1	0.40	402	0.38
2.4 SS - Intake Pump Station	Rubber Tired Dozers	1	0.40	247	0.40
2.4 SS - Intake Pump Station	Tractors/Loaders/Backhoes	0	0.00	97	0.37
2.4 SS - Intake Pump Station	Welders	0	0.00	46	0.45
2.5 SS - Intake and Pipeline to Filter Plant	Cranes	1	1.50	231	0.29
2.5 SS - Intake and Pipeline to Filter Plant	Excavators	1	6.00	158	0.38
2.5 SS - Intake and Pipeline to Filter Plant	Forklifts	1	3.00	89	0.20



## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

2.5 SS - Intake and Pipeline to Filter Plant	Generator Sets	1	6.00	84	0.74
2.5 SS - Intake and Pipeline to Filter Plant	Off-Highway Trucks	1	2.00	402	0.38
2.5 SS - Intake and Pipeline to Filter Plant	Pumps	2	6.00	84	0.74
2.5 SS - Intake and Pipeline to Filter Plant	Pumps	2	1.50	84	0.74
2.5 SS - Intake and Pipeline to Filter Plant	Skid Steer Loaders	1	6.00	65	0.37
2.5 SS - Intake and Pipeline to Filter Plant	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Architectural Coating	Air Compressors	0	0.00	78	0.48
Demolition	Concrete/Industrial Saws	0	0.00	81	0.73
Demolition	Rubber Tired Dozers	0	0.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Paving	Cement and Mortar Mixers	0	0.00	9	0.56
Paving	Pavers	0	0.00	130	0.42
Paving	Paving Equipment	0	0.00	132	0.36
Paving	Rollers	0	0.00	80	0.38
Paving	Tractors/Loaders/Backhoes	0	0.00	97	0.37

**Trips and VMT**

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

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
1.1 HS - Filter Plant to Sewer Pipeline	13	22.00	4.00	1,100.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
1.2a HS - Southeast Recharge Basin	6	22.00	4.00	3,136.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
1.2b HS - Recovery Wells for SE Recharge	9	10.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
1.3a HS - Southwest Recharge Basin	20	22.00	4.00	13,781.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
1.3b HS - Recovery Wells for SW Recharge	9	10.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
1.4 HS - Filter Plant Upgrades	2	24.00	4.00	53.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
2.1 SS - Filter Plant to Recharge Basins Pipeline	13	22.00	4.00	1,210.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
2.2a SS - MW7 Recharge Basin	20	22.00	4.00	70.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
2.2b SS - Recovery Wells for MW7 Recharge	9	10.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
2.3 SS - Intake Cone Screen	8	12.00	2.00	86.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
2.4 SS - Intake Pump Station	3	20.00	0.00	468.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
2.5 SS - Intake and Pipeline to Filter Plant	12	18.00	1.00	668.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	0	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	0	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	0	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

**3.1 Mitigation Measures Construction**

Use Cleaner Engines for Construction Equipment

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

### 3.2 Demolition - 2021

### Unmitigated Construction On-Site

[illegible]

### Unmitigated Construction Off-Site

[illegible]

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

### 3.2 Demolition - 2021

### Mitigated Construction On-Site

[illegible]

### Mitigated Construction Off-Site

[illegible]

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.3 1.2a HS - Southeast Recharge Basin - 2022****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	lb/day										lb/day					
Fugitive Dust					0.9815	0.0000	0.9815	0.5382	0.0000	0.5382			0.0000			0.0000
Off-Road	0.3101	3.1399	1.8900	5.0600e-003		0.1330	0.1330		0.1224	0.1224		489.7089	489.7089	0.1584		493.6685
<b>Total</b>	<b>0.3101</b>	<b>3.1399</b>	<b>1.8900</b>	<b>5.0600e-003</b>	<b>0.9815</b>	<b>0.1330</b>	<b>1.1146</b>	<b>0.5382</b>	<b>0.1224</b>	<b>0.6606</b>		<b>489.7089</b>	<b>489.7089</b>	<b>0.1584</b>		<b>493.6685</b>

**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	lb/day										lb/day					
Hauling	0.1235	5.0086	1.1527	0.0139	0.3879	0.0189	0.4068	0.1036	0.0181	0.1217		1,483.1897	1,483.1897	0.0589		1,484.6631
Vendor	0.0127	0.4585	0.1125	1.0800e-003	0.0270	1.3700e-003	0.0283	7.7500e-003	1.3100e-003	9.0600e-003		114.2117	114.2117	4.2600e-003		114.3183
Worker	0.0851	0.0642	0.6965	1.7500e-003	0.1807	1.4200e-003	0.1822	0.0479	1.3100e-003	0.0493		174.3132	174.3132	6.3300e-003		174.4713
<b>Total</b>	<b>0.2213</b>	<b>5.5313</b>	<b>1.9617</b>	<b>0.0167</b>	<b>0.5956</b>	<b>0.0217</b>	<b>0.6173</b>	<b>0.1593</b>	<b>0.0207</b>	<b>0.1800</b>		<b>1,771.7145</b>	<b>1,771.7145</b>	<b>0.0695</b>		<b>1,773.4527</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.3 1.2a HS - Southeast Recharge Basin - 2022****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	lb/day										lb/day					
Fugitive Dust					0.9815	0.0000	0.9815	0.5382	0.0000	0.5382			0.0000			0.0000
Off-Road	0.0621	0.2689	2.3546	5.0600e-003		8.2700e-003	8.2700e-003		8.2700e-003	8.2700e-003	0.0000	489.7089	489.7089	0.1584		493.6685
<b>Total</b>	<b>0.0621</b>	<b>0.2689</b>	<b>2.3546</b>	<b>5.0600e-003</b>	<b>0.9815</b>	<b>8.2700e-003</b>	<b>0.9898</b>	<b>0.5382</b>	<b>8.2700e-003</b>	<b>0.5465</b>	<b>0.0000</b>	<b>489.7089</b>	<b>489.7089</b>	<b>0.1584</b>		<b>493.6685</b>

**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	lb/day										lb/day					
Hauling	0.1235	5.0086	1.1527	0.0139	0.3879	0.0189	0.4068	0.1036	0.0181	0.1217		1,483.1897	1,483.1897	0.0589		1,484.6631
Vendor	0.0127	0.4585	0.1125	1.0800e-003	0.0270	1.3700e-003	0.0283	7.7500e-003	1.3100e-003	9.0600e-003		114.2117	114.2117	4.2600e-003		114.3183
Worker	0.0851	0.0642	0.6965	1.7500e-003	0.1807	1.4200e-003	0.1822	0.0479	1.3100e-003	0.0493		174.3132	174.3132	6.3300e-003		174.4713
<b>Total</b>	<b>0.2213</b>	<b>5.5313</b>	<b>1.9617</b>	<b>0.0167</b>	<b>0.5956</b>	<b>0.0217</b>	<b>0.6173</b>	<b>0.1593</b>	<b>0.0207</b>	<b>0.1800</b>		<b>1,771.7145</b>	<b>1,771.7145</b>	<b>0.0695</b>		<b>1,773.4527</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.3 1.2a HS - Southeast Recharge Basin - 2023****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	lb/day										lb/day					
Fugitive Dust					0.9815	0.0000	0.9815	0.5382	0.0000	0.5382			0.0000			0.0000
Off-Road	0.2770	2.7120	1.7779	5.0600e-003		0.1116	0.1116		0.1026	0.1026		489.7592	489.7592	0.1584		493.7192
<b>Total</b>	<b>0.2770</b>	<b>2.7120</b>	<b>1.7779</b>	<b>5.0600e-003</b>	<b>0.9815</b>	<b>0.1116</b>	<b>1.0931</b>	<b>0.5382</b>	<b>0.1026</b>	<b>0.6409</b>		<b>489.7592</b>	<b>489.7592</b>	<b>0.1584</b>		<b>493.7192</b>

**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	lb/day										lb/day					
Hauling	0.0960	3.9467	1.0750	0.0135	0.9176	0.0117	0.9294	0.2337	0.0112	0.2449		1,448.1069	1,448.1069	0.0559		1,449.5045
Vendor	0.0101	0.3866	0.1013	1.0600e-003	0.0270	7.7000e-004	0.0277	7.7600e-003	7.4000e-004	8.4900e-003		112.2598	112.2598	3.8800e-003		112.3567
Worker	0.0795	0.0577	0.6379	1.6900e-003	0.1807	1.3800e-003	0.1821	0.0479	1.2700e-003	0.0492		167.9398	167.9398	5.6700e-003		168.0815
<b>Total</b>	<b>0.1856</b>	<b>4.3909</b>	<b>1.8142</b>	<b>0.0163</b>	<b>1.1253</b>	<b>0.0139</b>	<b>1.1392</b>	<b>0.2894</b>	<b>0.0132</b>	<b>0.3026</b>		<b>1,728.3065</b>	<b>1,728.3065</b>	<b>0.0655</b>		<b>1,729.9427</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.3 1.2a HS - Southeast Recharge Basin - 2023****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	lb/day										lb/day					
Fugitive Dust					0.9815	0.0000	0.9815	0.5382	0.0000	0.5382			0.0000			0.0000
Off-Road	0.0621	0.2689	2.3546	5.0600e-003		8.2700e-003	8.2700e-003		8.2700e-003	8.2700e-003	0.0000	489.7592	489.7592	0.1584		493.7192
<b>Total</b>	<b>0.0621</b>	<b>0.2689</b>	<b>2.3546</b>	<b>5.0600e-003</b>	<b>0.9815</b>	<b>8.2700e-003</b>	<b>0.9898</b>	<b>0.5382</b>	<b>8.2700e-003</b>	<b>0.5465</b>	<b>0.0000</b>	<b>489.7592</b>	<b>489.7592</b>	<b>0.1584</b>		<b>493.7192</b>

**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	lb/day										lb/day					
Hauling	0.0960	3.9467	1.0750	0.0135	0.9176	0.0117	0.9294	0.2337	0.0112	0.2449		1,448.1069	1,448.1069	0.0559		1,449.5045
Vendor	0.0101	0.3866	0.1013	1.0600e-003	0.0270	7.7000e-004	0.0277	7.7600e-003	7.4000e-004	8.4900e-003		112.2598	112.2598	3.8800e-003		112.3567
Worker	0.0795	0.0577	0.6379	1.6900e-003	0.1807	1.3800e-003	0.1821	0.0479	1.2700e-003	0.0492		167.9398	167.9398	5.6700e-003		168.0815
<b>Total</b>	<b>0.1856</b>	<b>4.3909</b>	<b>1.8142</b>	<b>0.0163</b>	<b>1.1253</b>	<b>0.0139</b>	<b>1.1392</b>	<b>0.2894</b>	<b>0.0132</b>	<b>0.3026</b>		<b>1,728.3065</b>	<b>1,728.3065</b>	<b>0.0655</b>		<b>1,729.9427</b>



## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.4 1.2b HS - Recovery Wells for SE Recharge Basin - 2022****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	lb/day										lb/day					
Off-Road	1.1924	10.4614	11.7981	0.0275		0.4777	0.4777		0.4587	0.4587		2,644.5090	2,644.5090	0.5870		2,659.1831
<b>Total</b>	<b>1.1924</b>	<b>10.4614</b>	<b>11.7981</b>	<b>0.0275</b>		<b>0.4777</b>	<b>0.4777</b>		<b>0.4587</b>	<b>0.4587</b>		<b>2,644.5090</b>	<b>2,644.5090</b>	<b>0.5870</b>		<b>2,659.1831</b>

**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	lb/day										lb/day					
Hauling	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
Vendor	0.0127	0.4585	0.1125	1.0800e-003	0.0270	1.3700e-003	0.0283	7.7500e-003	1.3100e-003	9.0600e-003		114.2117	114.2117	4.2600e-003		114.3183
Worker	0.0387	0.0292	0.3166	8.0000e-004	0.0822	6.5000e-004	0.0828	0.0218	6.0000e-004	0.0224		79.2333	79.2333	2.8800e-003		79.3052
<b>Total</b>	<b>0.0514</b>	<b>0.4877</b>	<b>0.4291</b>	<b>1.8800e-003</b>	<b>0.1091</b>	<b>2.0200e-003</b>	<b>0.1111</b>	<b>0.0295</b>	<b>1.9100e-003</b>	<b>0.0315</b>		<b>193.4449</b>	<b>193.4449</b>	<b>7.1400e-003</b>		<b>193.6234</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.4 1.2b HS - Recovery Wells for SE Recharge Basin - 2022****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	lb/day										lb/day					
Off-Road	0.3338	2.1525	15.3154	0.0275		0.0420	0.0420		0.0420	0.0420	0.0000	2,644.5090	2,644.5090	0.5870		2,659.1831
<b>Total</b>	<b>0.3338</b>	<b>2.1525</b>	<b>15.3154</b>	<b>0.0275</b>		<b>0.0420</b>	<b>0.0420</b>		<b>0.0420</b>	<b>0.0420</b>	<b>0.0000</b>	<b>2,644.5090</b>	<b>2,644.5090</b>	<b>0.5870</b>		<b>2,659.1831</b>

**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	lb/day										lb/day					
Hauling	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
Vendor	0.0127	0.4585	0.1125	1.0800e-003	0.0270	1.3700e-003	0.0283	7.7500e-003	1.3100e-003	9.0600e-003		114.2117	114.2117	4.2600e-003		114.3183
Worker	0.0387	0.0292	0.3166	8.0000e-004	0.0822	6.5000e-004	0.0828	0.0218	6.0000e-004	0.0224		79.2333	79.2333	2.8800e-003		79.3052
<b>Total</b>	<b>0.0514</b>	<b>0.4877</b>	<b>0.4291</b>	<b>1.8800e-003</b>	<b>0.1091</b>	<b>2.0200e-003</b>	<b>0.1111</b>	<b>0.0295</b>	<b>1.9100e-003</b>	<b>0.0315</b>		<b>193.4449</b>	<b>193.4449</b>	<b>7.1400e-003</b>		<b>193.6234</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.5 2.3 SS - Intake Cone Screen - 2022****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	lb/day										lb/day					
Off-Road	1.1707	10.5739	12.9544	0.0231		0.5168	0.5168		0.5043	0.5043		2,196.569 4	2,196.569 4	0.3122		2,204.373 6
<b>Total</b>	<b>1.1707</b>	<b>10.5739</b>	<b>12.9544</b>	<b>0.0231</b>		<b>0.5168</b>	<b>0.5168</b>		<b>0.5043</b>	<b>0.5043</b>		<b>2,196.569 4</b>	<b>2,196.569 4</b>	<b>0.3122</b>		<b>2,204.373 6</b>

**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	lb/day										lb/day					
Hauling	0.0152	0.6181	0.1423	1.7100e-003	0.0372	2.3300e-003	0.0396	0.0102	2.2300e-003	0.0124		183.0339	183.0339	7.2700e-003		183.2158
Vendor	6.3500e-003	0.2293	0.0562	5.4000e-004	0.0135	6.8000e-004	0.0142	3.8800e-003	6.5000e-004	4.5300e-003		57.1058	57.1058	2.1300e-003		57.1591
Worker	0.0464	0.0350	0.3799	9.6000e-004	0.0986	7.8000e-004	0.0994	0.0262	7.2000e-004	0.0269		95.0799	95.0799	3.4500e-003		95.1662
<b>Total</b>	<b>0.0680</b>	<b>0.8824</b>	<b>0.5784</b>	<b>3.2100e-003</b>	<b>0.1493</b>	<b>3.7900e-003</b>	<b>0.1531</b>	<b>0.0402</b>	<b>3.6000e-003</b>	<b>0.0438</b>		<b>335.2197</b>	<b>335.2197</b>	<b>0.0129</b>		<b>335.5411</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.5 2.3 SS - Intake Cone Screen - 2022****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	lb/day										lb/day					
Off-Road	0.2681	1.9189	14.6161	0.0231		0.0330	0.0330		0.0330	0.0330	0.0000	2,196.569 4	2,196.569 4	0.3122		2,204.373 6
<b>Total</b>	<b>0.2681</b>	<b>1.9189</b>	<b>14.6161</b>	<b>0.0231</b>		<b>0.0330</b>	<b>0.0330</b>		<b>0.0330</b>	<b>0.0330</b>	<b>0.0000</b>	<b>2,196.569 4</b>	<b>2,196.569 4</b>	<b>0.3122</b>		<b>2,204.373 6</b>

**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	lb/day										lb/day					
Hauling	0.0152	0.6181	0.1423	1.7100e-003	0.0372	2.3300e-003	0.0396	0.0102	2.2300e-003	0.0124		183.0339	183.0339	7.2700e-003		183.2158
Vendor	6.3500e-003	0.2293	0.0562	5.4000e-004	0.0135	6.8000e-004	0.0142	3.8800e-003	6.5000e-004	4.5300e-003		57.1058	57.1058	2.1300e-003		57.1591
Worker	0.0464	0.0350	0.3799	9.6000e-004	0.0986	7.8000e-004	0.0994	0.0262	7.2000e-004	0.0269		95.0799	95.0799	3.4500e-003		95.1662
<b>Total</b>	<b>0.0680</b>	<b>0.8824</b>	<b>0.5784</b>	<b>3.2100e-003</b>	<b>0.1493</b>	<b>3.7900e-003</b>	<b>0.1531</b>	<b>0.0402</b>	<b>3.6000e-003</b>	<b>0.0438</b>		<b>335.2197</b>	<b>335.2197</b>	<b>0.0129</b>		<b>335.5411</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.6 2.4 SS - Intake Pump Station - 2022****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	lb/day										lb/day					
Off-Road	0.0784	0.7292	0.5098	1.3500e-003		0.0325	0.0325		0.0299	0.0299		130.3018	130.3018	0.0421		131.3554
<b>Total</b>	<b>0.0784</b>	<b>0.7292</b>	<b>0.5098</b>	<b>1.3500e-003</b>		<b>0.0325</b>	<b>0.0325</b>		<b>0.0299</b>	<b>0.0299</b>		<b>130.3018</b>	<b>130.3018</b>	<b>0.0421</b>		<b>131.3554</b>

**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	lb/day										lb/day					
Hauling	0.0166	0.6727	0.1548	1.8600e-003	0.0568	2.5400e-003	0.0594	0.0151	2.4300e-003	0.0175		199.2090	199.2090	7.9200e-003		199.4069
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
Worker	0.0774	0.0584	0.6332	1.5900e-003	0.1643	1.2900e-003	0.1656	0.0436	1.1900e-003	0.0448		158.4665	158.4665	5.7500e-003		158.6103
<b>Total</b>	<b>0.0940</b>	<b>0.7311</b>	<b>0.7880</b>	<b>3.4500e-003</b>	<b>0.2211</b>	<b>3.8300e-003</b>	<b>0.2250</b>	<b>0.0587</b>	<b>3.6200e-003</b>	<b>0.0623</b>		<b>357.6755</b>	<b>357.6755</b>	<b>0.0137</b>		<b>358.0172</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.6 2.4 SS - Intake Pump Station - 2022****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	lb/day										lb/day					
Off-Road	0.0165	0.0714	0.6839	1.3500e-003		2.2000e-003	2.2000e-003		2.2000e-003	2.2000e-003	0.0000	130.3018	130.3018	0.0421		131.3554
<b>Total</b>	<b>0.0165</b>	<b>0.0714</b>	<b>0.6839</b>	<b>1.3500e-003</b>		<b>2.2000e-003</b>	<b>2.2000e-003</b>		<b>2.2000e-003</b>	<b>2.2000e-003</b>	<b>0.0000</b>	<b>130.3018</b>	<b>130.3018</b>	<b>0.0421</b>		<b>131.3554</b>

**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	lb/day										lb/day					
Hauling	0.0166	0.6727	0.1548	1.8600e-003	0.0568	2.5400e-003	0.0594	0.0151	2.4300e-003	0.0175		199.2090	199.2090	7.9200e-003		199.4069
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
Worker	0.0774	0.0584	0.6332	1.5900e-003	0.1643	1.2900e-003	0.1656	0.0436	1.1900e-003	0.0448		158.4665	158.4665	5.7500e-003		158.6103
<b>Total</b>	<b>0.0940</b>	<b>0.7311</b>	<b>0.7880</b>	<b>3.4500e-003</b>	<b>0.2211</b>	<b>3.8300e-003</b>	<b>0.2250</b>	<b>0.0587</b>	<b>3.6200e-003</b>	<b>0.0623</b>		<b>357.6755</b>	<b>357.6755</b>	<b>0.0137</b>		<b>358.0172</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.6 2.4 SS - Intake Pump Station - 2023****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	lb/day										lb/day					
Off-Road	0.0689	0.6122	0.4826	1.3500e-003		0.0263	0.0263		0.0242	0.0242		130.3497	130.3497	0.0422		131.4037
<b>Total</b>	<b>0.0689</b>	<b>0.6122</b>	<b>0.4826</b>	<b>1.3500e-003</b>		<b>0.0263</b>	<b>0.0263</b>		<b>0.0242</b>	<b>0.0242</b>		<b>130.3497</b>	<b>130.3497</b>	<b>0.0422</b>		<b>131.4037</b>

**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	lb/day										lb/day					
Hauling	0.0129	0.5301	0.1444	1.8200e-003	0.0993	1.5700e-003	0.1009	0.0255	1.5100e-003	0.0270		194.4970	194.4970	7.5100e-003		194.6847
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
Worker	0.0723	0.0524	0.5799	1.5300e-003	0.1643	1.2500e-003	0.1656	0.0436	1.1600e-003	0.0447		152.6725	152.6725	5.1500e-003		152.8013
<b>Total</b>	<b>0.0852</b>	<b>0.5825</b>	<b>0.7242</b>	<b>3.3500e-003</b>	<b>0.2636</b>	<b>2.8200e-003</b>	<b>0.2664</b>	<b>0.0691</b>	<b>2.6700e-003</b>	<b>0.0717</b>		<b>347.1695</b>	<b>347.1695</b>	<b>0.0127</b>		<b>347.4861</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.6 2.4 SS - Intake Pump Station - 2023****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	lb/day										lb/day					
Off-Road	0.0165	0.0714	0.6839	1.3500e-003		2.2000e-003	2.2000e-003		2.2000e-003	2.2000e-003	0.0000	130.3497	130.3497	0.0422		131.4037
<b>Total</b>	<b>0.0165</b>	<b>0.0714</b>	<b>0.6839</b>	<b>1.3500e-003</b>		<b>2.2000e-003</b>	<b>2.2000e-003</b>		<b>2.2000e-003</b>	<b>2.2000e-003</b>	<b>0.0000</b>	<b>130.3497</b>	<b>130.3497</b>	<b>0.0422</b>		<b>131.4037</b>

**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	lb/day										lb/day					
Hauling	0.0129	0.5301	0.1444	1.8200e-003	0.0993	1.5700e-003	0.1009	0.0255	1.5100e-003	0.0270		194.4970	194.4970	7.5100e-003		194.6847
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
Worker	0.0723	0.0524	0.5799	1.5300e-003	0.1643	1.2500e-003	0.1656	0.0436	1.1600e-003	0.0447		152.6725	152.6725	5.1500e-003		152.8013
<b>Total</b>	<b>0.0852</b>	<b>0.5825</b>	<b>0.7242</b>	<b>3.3500e-003</b>	<b>0.2636</b>	<b>2.8200e-003</b>	<b>0.2664</b>	<b>0.0691</b>	<b>2.6700e-003</b>	<b>0.0717</b>		<b>347.1695</b>	<b>347.1695</b>	<b>0.0127</b>		<b>347.4861</b>



## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.7 2.5 SS - Intake and Pipeline to Filter Plant - 2022****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	lb/day										lb/day					
Off-Road	1.6031	14.4889	18.2200	0.0323		0.7228	0.7228		0.6972	0.6972		3,092.6676	3,092.6676	0.5531		3,106.4952
<b>Total</b>	<b>1.6031</b>	<b>14.4889</b>	<b>18.2200</b>	<b>0.0323</b>		<b>0.7228</b>	<b>0.7228</b>		<b>0.6972</b>	<b>0.6972</b>		<b>3,092.6676</b>	<b>3,092.6676</b>	<b>0.5531</b>		<b>3,106.4952</b>

**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	lb/day										lb/day					
Hauling	0.0592	2.4005	0.5525	6.6400e-003	0.1446	9.0500e-003	0.1537	0.0395	8.6600e-003	0.0482		710.8527	710.8527	0.0283		711.5589
Vendor	3.1800e-003	0.1146	0.0281	2.7000e-004	6.7400e-003	3.4000e-004	7.0800e-003	1.9400e-003	3.3000e-004	2.2700e-003		28.5529	28.5529	1.0700e-003		28.5796
Worker	0.0697	0.0525	0.5698	1.4300e-003	0.1479	1.1600e-003	0.1490	0.0392	1.0700e-003	0.0403		142.6199	142.6199	5.1800e-003		142.7493
<b>Total</b>	<b>0.1320</b>	<b>2.5676</b>	<b>1.1504</b>	<b>8.3400e-003</b>	<b>0.2992</b>	<b>0.0106</b>	<b>0.3098</b>	<b>0.0807</b>	<b>0.0101</b>	<b>0.0908</b>		<b>882.0255</b>	<b>882.0255</b>	<b>0.0345</b>		<b>882.8877</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.7 2.5 SS - Intake and Pipeline to Filter Plant - 2022****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	lb/day										lb/day					
Off-Road	0.3762	2.3366	20.6814	0.0323		0.0476	0.0476		0.0476	0.0476	0.0000	3,092.6676	3,092.6676	0.5531		3,106.4952
<b>Total</b>	<b>0.3762</b>	<b>2.3366</b>	<b>20.6814</b>	<b>0.0323</b>		<b>0.0476</b>	<b>0.0476</b>		<b>0.0476</b>	<b>0.0476</b>	<b>0.0000</b>	<b>3,092.6676</b>	<b>3,092.6676</b>	<b>0.5531</b>		<b>3,106.4952</b>

**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	lb/day										lb/day					
Hauling	0.0592	2.4005	0.5525	6.6400e-003	0.1446	9.0500e-003	0.1537	0.0395	8.6600e-003	0.0482		710.8527	710.8527	0.0283		711.5589
Vendor	3.1800e-003	0.1146	0.0281	2.7000e-004	6.7400e-003	3.4000e-004	7.0800e-003	1.9400e-003	3.3000e-004	2.2700e-003		28.5529	28.5529	1.0700e-003		28.5796
Worker	0.0697	0.0525	0.5698	1.4300e-003	0.1479	1.1600e-003	0.1490	0.0392	1.0700e-003	0.0403		142.6199	142.6199	5.1800e-003		142.7493
<b>Total</b>	<b>0.1320</b>	<b>2.5676</b>	<b>1.1504</b>	<b>8.3400e-003</b>	<b>0.2992</b>	<b>0.0106</b>	<b>0.3098</b>	<b>0.0807</b>	<b>0.0101</b>	<b>0.0908</b>		<b>882.0255</b>	<b>882.0255</b>	<b>0.0345</b>		<b>882.8877</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.8 2.1 SS - Filter Plant to Recharge Basins Pipeline - 2023****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	lb/day										lb/day					
Off-Road	1.7374	14.1253	18.0869	0.0400		0.6264	0.6264		0.6019	0.6019		3,827.0877	3,827.0877	0.8278		3,847.7816
<b>Total</b>	<b>1.7374</b>	<b>14.1253</b>	<b>18.0869</b>	<b>0.0400</b>		<b>0.6264</b>	<b>0.6264</b>		<b>0.6019</b>	<b>0.6019</b>		<b>3,827.0877</b>	<b>3,827.0877</b>	<b>0.8278</b>		<b>3,847.7816</b>

**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	lb/day										lb/day					
Hauling	0.1212	4.9837	1.3575	0.0171	0.3811	0.0148	0.3959	0.1042	0.0142	0.1183		1,828.6044	1,828.6044	0.0706		1,830.3692
Vendor	0.0101	0.3866	0.1013	1.0600e-003	0.0270	7.7000e-004	0.0277	7.7600e-003	7.4000e-004	8.4900e-003		112.2598	112.2598	3.8800e-003		112.3567
Worker	0.0795	0.0577	0.6379	1.6900e-003	0.1807	1.3800e-003	0.1821	0.0479	1.2700e-003	0.0492		167.9398	167.9398	5.6700e-003		168.0815
<b>Total</b>	<b>0.2108</b>	<b>5.4279</b>	<b>2.0966</b>	<b>0.0198</b>	<b>0.5888</b>	<b>0.0170</b>	<b>0.6058</b>	<b>0.1599</b>	<b>0.0162</b>	<b>0.1760</b>		<b>2,108.8039</b>	<b>2,108.8039</b>	<b>0.0801</b>		<b>2,110.8074</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.8 2.1 SS - Filter Plant to Recharge Basins Pipeline - 2023****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	lb/day										lb/day					
Off-Road	0.4723	2.8971	22.6585	0.0400		0.0599	0.0599		0.0599	0.0599	0.0000	3,827.0877	3,827.0877	0.8278		3,847.7816
<b>Total</b>	<b>0.4723</b>	<b>2.8971</b>	<b>22.6585</b>	<b>0.0400</b>		<b>0.0599</b>	<b>0.0599</b>		<b>0.0599</b>	<b>0.0599</b>	<b>0.0000</b>	<b>3,827.0877</b>	<b>3,827.0877</b>	<b>0.8278</b>		<b>3,847.7816</b>

**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	lb/day										lb/day					
Hauling	0.1212	4.9837	1.3575	0.0171	0.3811	0.0148	0.3959	0.1042	0.0142	0.1183		1,828.6044	1,828.6044	0.0706		1,830.3692
Vendor	0.0101	0.3866	0.1013	1.0600e-003	0.0270	7.7000e-004	0.0277	7.7600e-003	7.4000e-004	8.4900e-003		112.2598	112.2598	3.8800e-003		112.3567
Worker	0.0795	0.0577	0.6379	1.6900e-003	0.1807	1.3800e-003	0.1821	0.0479	1.2700e-003	0.0492		167.9398	167.9398	5.6700e-003		168.0815
<b>Total</b>	<b>0.2108</b>	<b>5.4279</b>	<b>2.0966</b>	<b>0.0198</b>	<b>0.5888</b>	<b>0.0170</b>	<b>0.6058</b>	<b>0.1599</b>	<b>0.0162</b>	<b>0.1760</b>		<b>2,108.8039</b>	<b>2,108.8039</b>	<b>0.0801</b>		<b>2,110.8074</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.9 1.3a HS - Southwest Recharge Basin - 2024****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	lb/day										lb/day					
Fugitive Dust					4.4200e-003	0.0000	4.4200e-003	4.8000e-004	0.0000	4.8000e-004			0.0000			0.0000
Off-Road	2.3172	18.8148	30.6981	0.0576		0.8425	0.8425		0.7987	0.7987		5,537.8006	5,537.8006	1.3459		5,571.4485
<b>Total</b>	<b>2.3172</b>	<b>18.8148</b>	<b>30.6981</b>	<b>0.0576</b>	<b>4.4200e-003</b>	<b>0.8425</b>	<b>0.8469</b>	<b>4.8000e-004</b>	<b>0.7987</b>	<b>0.7992</b>		<b>5,537.8006</b>	<b>5,537.8006</b>	<b>1.3459</b>		<b>5,571.4485</b>

**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	lb/day										lb/day					
Hauling	0.4087	16.4037	4.6039	0.0589	1.6946	0.0470	1.7416	0.4529	0.0450	0.4979		6,315.8274	6,315.8274	0.2461		6,321.9806
Vendor	9.5200e-003	0.3744	0.0949	1.0500e-003	0.0270	7.1000e-004	0.0277	7.7600e-003	6.8000e-004	8.4300e-003		111.6211	111.6211	3.8200e-003		111.7166
Worker	0.0745	0.0519	0.5869	1.6200e-003	0.1807	1.3400e-003	0.1821	0.0479	1.2300e-003	0.0492		161.5380	161.5380	5.0900e-003		161.6651
<b>Total</b>	<b>0.4928</b>	<b>16.8300</b>	<b>5.2857</b>	<b>0.0616</b>	<b>1.9023</b>	<b>0.0490</b>	<b>1.9513</b>	<b>0.5086</b>	<b>0.0469</b>	<b>0.5555</b>		<b>6,588.9865</b>	<b>6,588.9865</b>	<b>0.2550</b>		<b>6,595.3623</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.9 1.3a HS - Southwest Recharge Basin - 2024****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	lb/day										lb/day					
Fugitive Dust					4.4200e-003	0.0000	4.4200e-003	4.8000e-004	0.0000	4.8000e-004			0.0000			0.0000
Off-Road	0.6974	4.1108	37.1522	0.0576		0.0891	0.0891		0.0891	0.0891	0.0000	5,537.8006	5,537.8006	1.3459		5,571.4485
<b>Total</b>	<b>0.6974</b>	<b>4.1108</b>	<b>37.1522</b>	<b>0.0576</b>	<b>4.4200e-003</b>	<b>0.0891</b>	<b>0.0935</b>	<b>4.8000e-004</b>	<b>0.0891</b>	<b>0.0896</b>	<b>0.0000</b>	<b>5,537.8006</b>	<b>5,537.8006</b>	<b>1.3459</b>		<b>5,571.4485</b>

**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	lb/day										lb/day					
Hauling	0.4087	16.4037	4.6039	0.0589	1.6946	0.0470	1.7416	0.4529	0.0450	0.4979		6,315.8274	6,315.8274	0.2461		6,321.9806
Vendor	9.5200e-003	0.3744	0.0949	1.0500e-003	0.0270	7.1000e-004	0.0277	7.7600e-003	6.8000e-004	8.4300e-003		111.6211	111.6211	3.8200e-003		111.7166
Worker	0.0745	0.0519	0.5869	1.6200e-003	0.1807	1.3400e-003	0.1821	0.0479	1.2300e-003	0.0492		161.5380	161.5380	5.0900e-003		161.6651
<b>Total</b>	<b>0.4928</b>	<b>16.8300</b>	<b>5.2857</b>	<b>0.0616</b>	<b>1.9023</b>	<b>0.0490</b>	<b>1.9513</b>	<b>0.5086</b>	<b>0.0469</b>	<b>0.5555</b>		<b>6,588.9865</b>	<b>6,588.9865</b>	<b>0.2550</b>		<b>6,595.3623</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.9 1.3a HS - Southwest Recharge Basin - 2025****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	lb/day										lb/day					
Fugitive Dust					4.4200e-003	0.0000	4.4200e-003	4.8000e-004	0.0000	4.8000e-004			0.0000			0.0000
Off-Road	2.1683	16.9604	30.5766	0.0576		0.7194	0.7194		0.6821	0.6821		5,537.5631	5,537.5631	1.3406		5,571.0775
<b>Total</b>	<b>2.1683</b>	<b>16.9604</b>	<b>30.5766</b>	<b>0.0576</b>	<b>4.4200e-003</b>	<b>0.7194</b>	<b>0.7238</b>	<b>4.8000e-004</b>	<b>0.6821</b>	<b>0.6826</b>		<b>5,537.5631</b>	<b>5,537.5631</b>	<b>1.3406</b>		<b>5,571.0775</b>

**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	lb/day										lb/day					
Hauling	0.3977	15.5709	4.5218	0.0585	4.1102	0.0431	4.1534	1.0459	0.0413	1.0871		6,271.6629	6,271.6629	0.2466		6,277.8267
Vendor	9.0800e-003	0.3634	0.0902	1.0500e-003	0.0270	6.5000e-004	0.0276	7.7600e-003	6.2000e-004	8.3800e-003		110.9994	110.9994	3.7700e-003		111.0937
Worker	0.0702	0.0469	0.5410	1.5600e-003	0.1807	1.3100e-003	0.1820	0.0479	1.2100e-003	0.0491		155.1766	155.1766	4.5900e-003		155.2913
<b>Total</b>	<b>0.4770</b>	<b>15.9812</b>	<b>5.1530</b>	<b>0.0611</b>	<b>4.3179</b>	<b>0.0451</b>	<b>4.3630</b>	<b>1.1016</b>	<b>0.0431</b>	<b>1.1446</b>		<b>6,537.8389</b>	<b>6,537.8389</b>	<b>0.2549</b>		<b>6,544.2117</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.9 1.3a HS - Southwest Recharge Basin - 2025****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	lb/day										lb/day					
Fugitive Dust					4.4200e-003	0.0000	4.4200e-003	4.8000e-004	0.0000	4.8000e-004			0.0000			0.0000
Off-Road	0.6974	4.1108	37.1522	0.0576		0.0891	0.0891		0.0891	0.0891	0.0000	5,537.5630	5,537.5630	1.3406		5,571.0775
<b>Total</b>	<b>0.6974</b>	<b>4.1108</b>	<b>37.1522</b>	<b>0.0576</b>	<b>4.4200e-003</b>	<b>0.0891</b>	<b>0.0935</b>	<b>4.8000e-004</b>	<b>0.0891</b>	<b>0.0896</b>	<b>0.0000</b>	<b>5,537.5630</b>	<b>5,537.5630</b>	<b>1.3406</b>		<b>5,571.0775</b>

**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	lb/day										lb/day					
Hauling	0.3977	15.5709	4.5218	0.0585	4.1102	0.0431	4.1534	1.0459	0.0413	1.0871		6,271.6629	6,271.6629	0.2466		6,277.8267
Vendor	9.0800e-003	0.3634	0.0902	1.0500e-003	0.0270	6.5000e-004	0.0276	7.7600e-003	6.2000e-004	8.3800e-003		110.9994	110.9994	3.7700e-003		111.0937
Worker	0.0702	0.0469	0.5410	1.5600e-003	0.1807	1.3100e-003	0.1820	0.0479	1.2100e-003	0.0491		155.1766	155.1766	4.5900e-003		155.2913
<b>Total</b>	<b>0.4770</b>	<b>15.9812</b>	<b>5.1530</b>	<b>0.0611</b>	<b>4.3179</b>	<b>0.0451</b>	<b>4.3630</b>	<b>1.1016</b>	<b>0.0431</b>	<b>1.1446</b>		<b>6,537.8389</b>	<b>6,537.8389</b>	<b>0.2549</b>		<b>6,544.2117</b>



## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.10 1.1 HS - Filter Plant to Sewer Pipeline - 2024****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	lb/day										lb/day					
Off-Road	1.6631	13.2086	18.0320	0.0400		0.5587	0.5587		0.5363	0.5363		3,827.9408	3,827.9408	0.8246		3,848.5552
<b>Total</b>	<b>1.6631</b>	<b>13.2086</b>	<b>18.0320</b>	<b>0.0400</b>		<b>0.5587</b>	<b>0.5587</b>		<b>0.5363</b>	<b>0.5363</b>		<b>3,827.9408</b>	<b>3,827.9408</b>	<b>0.8246</b>		<b>3,848.5552</b>

**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	lb/day										lb/day					
Hauling	0.1175	4.7137	1.3229	0.0169	0.3812	0.0135	0.3947	0.1042	0.0129	0.1171		1,814.8666	1,814.8666	0.0707		1,816.6347
Vendor	9.5200e-003	0.3744	0.0949	1.0500e-003	0.0270	7.1000e-004	0.0277	7.7600e-003	6.8000e-004	8.4300e-003		111.6211	111.6211	3.8200e-003		111.7166
Worker	0.0745	0.0519	0.5869	1.6200e-003	0.1807	1.3400e-003	0.1821	0.0479	1.2300e-003	0.0492		161.5380	161.5380	5.0900e-003		161.6651
<b>Total</b>	<b>0.2015</b>	<b>5.1400</b>	<b>2.0048</b>	<b>0.0196</b>	<b>0.5889</b>	<b>0.0156</b>	<b>0.6044</b>	<b>0.1599</b>	<b>0.0148</b>	<b>0.1747</b>		<b>2,088.0257</b>	<b>2,088.0257</b>	<b>0.0796</b>		<b>2,090.0164</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.10 1.1 HS - Filter Plant to Sewer Pipeline - 2024****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	lb/day										lb/day					
Off-Road	0.4723	2.8971	22.6585	0.0400		0.0599	0.0599		0.0599	0.0599	0.0000	3,827.9408	3,827.9408	0.8246		3,848.5552
<b>Total</b>	<b>0.4723</b>	<b>2.8971</b>	<b>22.6585</b>	<b>0.0400</b>		<b>0.0599</b>	<b>0.0599</b>		<b>0.0599</b>	<b>0.0599</b>	<b>0.0000</b>	<b>3,827.9408</b>	<b>3,827.9408</b>	<b>0.8246</b>		<b>3,848.5552</b>

**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	lb/day										lb/day					
Hauling	0.1175	4.7137	1.3229	0.0169	0.3812	0.0135	0.3947	0.1042	0.0129	0.1171		1,814.8666	1,814.8666	0.0707		1,816.6347
Vendor	9.5200e-003	0.3744	0.0949	1.0500e-003	0.0270	7.1000e-004	0.0277	7.7600e-003	6.8000e-004	8.4300e-003		111.6211	111.6211	3.8200e-003		111.7166
Worker	0.0745	0.0519	0.5869	1.6200e-003	0.1807	1.3400e-003	0.1821	0.0479	1.2300e-003	0.0492		161.5380	161.5380	5.0900e-003		161.6651
<b>Total</b>	<b>0.2015</b>	<b>5.1400</b>	<b>2.0048</b>	<b>0.0196</b>	<b>0.5889</b>	<b>0.0156</b>	<b>0.6044</b>	<b>0.1599</b>	<b>0.0148</b>	<b>0.1747</b>		<b>2,088.0257</b>	<b>2,088.0257</b>	<b>0.0796</b>		<b>2,090.0164</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.11 1.3b HS - Recovery Wells for SW Recharge Basin - 2024****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	lb/day										lb/day					
Off-Road	1.0674	8.9448	11.6971	0.0276		0.3691	0.3691		0.3540	0.3540		2,647.6935	2,647.6935	0.5810		2,662.2186
<b>Total</b>	<b>1.0674</b>	<b>8.9448</b>	<b>11.6971</b>	<b>0.0276</b>		<b>0.3691</b>	<b>0.3691</b>		<b>0.3540</b>	<b>0.3540</b>		<b>2,647.6935</b>	<b>2,647.6935</b>	<b>0.5810</b>		<b>2,662.2186</b>

**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	lb/day										lb/day					
Hauling	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
Vendor	9.5200e-003	0.3744	0.0949	1.0500e-003	0.0270	7.1000e-004	0.0277	7.7600e-003	6.8000e-004	8.4300e-003		111.6211	111.6211	3.8200e-003		111.7166
Worker	0.0339	0.0236	0.2668	7.4000e-004	0.0822	6.1000e-004	0.0828	0.0218	5.6000e-004	0.0224		73.4264	73.4264	2.3100e-003		73.4842
<b>Total</b>	<b>0.0434</b>	<b>0.3980</b>	<b>0.3617</b>	<b>1.7900e-003</b>	<b>0.1091</b>	<b>1.3200e-003</b>	<b>0.1104</b>	<b>0.0296</b>	<b>1.2400e-003</b>	<b>0.0308</b>		<b>185.0475</b>	<b>185.0475</b>	<b>6.1300e-003</b>		<b>185.2007</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.11 1.3b HS - Recovery Wells for SW Recharge Basin - 2024****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	lb/day										lb/day					
Off-Road	0.3338	2.1525	15.3154	0.0276		0.0420	0.0420		0.0420	0.0420	0.0000	2,647.6935	2,647.6935	0.5810		2,662.2186
<b>Total</b>	<b>0.3338</b>	<b>2.1525</b>	<b>15.3154</b>	<b>0.0276</b>		<b>0.0420</b>	<b>0.0420</b>		<b>0.0420</b>	<b>0.0420</b>	<b>0.0000</b>	<b>2,647.6935</b>	<b>2,647.6935</b>	<b>0.5810</b>		<b>2,662.2186</b>

**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	lb/day										lb/day					
Hauling	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
Vendor	9.5200e-003	0.3744	0.0949	1.0500e-003	0.0270	7.1000e-004	0.0277	7.7600e-003	6.8000e-004	8.4300e-003		111.6211	111.6211	3.8200e-003		111.7166
Worker	0.0339	0.0236	0.2668	7.4000e-004	0.0822	6.1000e-004	0.0828	0.0218	5.6000e-004	0.0224		73.4264	73.4264	2.3100e-003		73.4842
<b>Total</b>	<b>0.0434</b>	<b>0.3980</b>	<b>0.3617</b>	<b>1.7900e-003</b>	<b>0.1091</b>	<b>1.3200e-003</b>	<b>0.1104</b>	<b>0.0296</b>	<b>1.2400e-003</b>	<b>0.0308</b>		<b>185.0475</b>	<b>185.0475</b>	<b>6.1300e-003</b>		<b>185.2007</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.12 1.4 HS - Filter Plant Upgrades - 2024****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	lb/day										lb/day					
Off-Road	8.0100e-003	0.0597	0.0686	2.0000e-004		2.3300e-003	2.3300e-003		2.1400e-003	2.1400e-003		19.7765	19.7765	6.4000e-003		19.9364
<b>Total</b>	<b>8.0100e-003</b>	<b>0.0597</b>	<b>0.0686</b>	<b>2.0000e-004</b>		<b>2.3300e-003</b>	<b>2.3300e-003</b>		<b>2.1400e-003</b>	<b>2.1400e-003</b>		<b>19.7765</b>	<b>19.7765</b>	<b>6.4000e-003</b>		<b>19.9364</b>

**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	lb/day										lb/day					
Hauling	1.5700e-003	0.0631	0.0177	2.3000e-004	6.5200e-003	1.8000e-004	6.7000e-003	1.7400e-003	1.7000e-004	1.9100e-003		24.2899	24.2899	9.5000e-004		24.3136
Vendor	9.5200e-003	0.3744	0.0949	1.0500e-003	0.0270	7.1000e-004	0.0277	7.7600e-003	6.8000e-004	8.4300e-003		111.6211	111.6211	3.8200e-003		111.7166
Worker	0.0813	0.0566	0.6403	1.7700e-003	0.1972	1.4600e-003	0.1986	0.0523	1.3500e-003	0.0536		176.2232	176.2232	5.5500e-003		176.3620
<b>Total</b>	<b>0.0924</b>	<b>0.4941</b>	<b>0.7529</b>	<b>3.0500e-003</b>	<b>0.2306</b>	<b>2.3500e-003</b>	<b>0.2330</b>	<b>0.0618</b>	<b>2.2000e-003</b>	<b>0.0640</b>		<b>312.1343</b>	<b>312.1343</b>	<b>0.0103</b>		<b>312.3921</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.12 1.4 HS - Filter Plant Upgrades - 2024****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	lb/day										lb/day					
Off-Road	2.5000e-003	0.0108	0.1034	2.0000e-004		3.3000e-004	3.3000e-004		3.3000e-004	3.3000e-004	0.0000	19.7765	19.7765	6.4000e-003		19.9364
<b>Total</b>	<b>2.5000e-003</b>	<b>0.0108</b>	<b>0.1034</b>	<b>2.0000e-004</b>		<b>3.3000e-004</b>	<b>3.3000e-004</b>		<b>3.3000e-004</b>	<b>3.3000e-004</b>	<b>0.0000</b>	<b>19.7765</b>	<b>19.7765</b>	<b>6.4000e-003</b>		<b>19.9364</b>

**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	lb/day										lb/day					
Hauling	1.5700e-003	0.0631	0.0177	2.3000e-004	6.5200e-003	1.8000e-004	6.7000e-003	1.7400e-003	1.7000e-004	1.9100e-003		24.2899	24.2899	9.5000e-004		24.3136
Vendor	9.5200e-003	0.3744	0.0949	1.0500e-003	0.0270	7.1000e-004	0.0277	7.7600e-003	6.8000e-004	8.4300e-003		111.6211	111.6211	3.8200e-003		111.7166
Worker	0.0813	0.0566	0.6403	1.7700e-003	0.1972	1.4600e-003	0.1986	0.0523	1.3500e-003	0.0536		176.2232	176.2232	5.5500e-003		176.3620
<b>Total</b>	<b>0.0924</b>	<b>0.4941</b>	<b>0.7529</b>	<b>3.0500e-003</b>	<b>0.2306</b>	<b>2.3500e-003</b>	<b>0.2330</b>	<b>0.0618</b>	<b>2.2000e-003</b>	<b>0.0640</b>		<b>312.1343</b>	<b>312.1343</b>	<b>0.0103</b>		<b>312.3921</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.12 1.4 HS - Filter Plant Upgrades - 2025****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	lb/day										lb/day					
Off-Road	7.6200e-003	0.0525	0.0677	2.0000e-004		1.9600e-003	1.9600e-003		1.8000e-003	1.8000e-003		19.7716	19.7716	6.3900e-003		19.9315
<b>Total</b>	<b>7.6200e-003</b>	<b>0.0525</b>	<b>0.0677</b>	<b>2.0000e-004</b>		<b>1.9600e-003</b>	<b>1.9600e-003</b>		<b>1.8000e-003</b>	<b>1.8000e-003</b>		<b>19.7716</b>	<b>19.7716</b>	<b>6.3900e-003</b>		<b>19.9315</b>

**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	lb/day										lb/day					
Hauling	1.5300e-003	0.0599	0.0174	2.2000e-004	0.0158	1.7000e-004	0.0160	4.0200e-003	1.6000e-004	4.1800e-003		24.1200	24.1200	9.5000e-004		24.1437
Vendor	9.0800e-003	0.3634	0.0902	1.0500e-003	0.0270	6.5000e-004	0.0276	7.7600e-003	6.2000e-004	8.3800e-003		110.9994	110.9994	3.7700e-003		111.0937
Worker	0.0766	0.0512	0.5902	1.7000e-003	0.1972	1.4300e-003	0.1986	0.0523	1.3100e-003	0.0536		169.2835	169.2835	5.0100e-003		169.4087
<b>Total</b>	<b>0.0872</b>	<b>0.4745</b>	<b>0.6977</b>	<b>2.9700e-003</b>	<b>0.2399</b>	<b>2.2500e-003</b>	<b>0.2422</b>	<b>0.0641</b>	<b>2.0900e-003</b>	<b>0.0662</b>		<b>304.4030</b>	<b>304.4030</b>	<b>9.7300e-003</b>		<b>304.6461</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.12 1.4 HS - Filter Plant Upgrades - 2025****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	lb/day										lb/day					
Off-Road	2.5000e-003	0.0108	0.1034	2.0000e-004		3.3000e-004	3.3000e-004		3.3000e-004	3.3000e-004	0.0000	19.7716	19.7716	6.3900e-003		19.9315
<b>Total</b>	<b>2.5000e-003</b>	<b>0.0108</b>	<b>0.1034</b>	<b>2.0000e-004</b>		<b>3.3000e-004</b>	<b>3.3000e-004</b>		<b>3.3000e-004</b>	<b>3.3000e-004</b>	<b>0.0000</b>	<b>19.7716</b>	<b>19.7716</b>	<b>6.3900e-003</b>		<b>19.9315</b>

**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	lb/day										lb/day					
Hauling	1.5300e-003	0.0599	0.0174	2.2000e-004	0.0158	1.7000e-004	0.0160	4.0200e-003	1.6000e-004	4.1800e-003		24.1200	24.1200	9.5000e-004		24.1437
Vendor	9.0800e-003	0.3634	0.0902	1.0500e-003	0.0270	6.5000e-004	0.0276	7.7600e-003	6.2000e-004	8.3800e-003		110.9994	110.9994	3.7700e-003		111.0937
Worker	0.0766	0.0512	0.5902	1.7000e-003	0.1972	1.4300e-003	0.1986	0.0523	1.3100e-003	0.0536		169.2835	169.2835	5.0100e-003		169.4087
<b>Total</b>	<b>0.0872</b>	<b>0.4745</b>	<b>0.6977</b>	<b>2.9700e-003</b>	<b>0.2399</b>	<b>2.2500e-003</b>	<b>0.2422</b>	<b>0.0641</b>	<b>2.0900e-003</b>	<b>0.0662</b>		<b>304.4030</b>	<b>304.4030</b>	<b>9.7300e-003</b>		<b>304.6461</b>



Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

### 3.13 Paving - 2026

### Unmitigated Construction On-Site

[illegible]

### Unmitigated Construction Off-Site

[illegible]

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

### 3.13 Paving - 2026

### Mitigated Construction On-Site

[illegible]

### Mitigated Construction Off-Site

[illegible]

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

### 3.14 Architectural Coating - 2026

### Unmitigated Construction On-Site

[illegible]

### Unmitigated Construction Off-Site

[illegible]

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

### 3.14 Architectural Coating - 2026

### Mitigated Construction On-Site

[illegible]

### Mitigated Construction Off-Site

[illegible]

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.15 2.2a SS - MW7 Recharge Basin - 2027****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	lb/day										lb/day					
Off-Road	2.1683	16.9604	30.5766	0.0576		0.7194	0.7194		0.6821	0.6821		5,537.563 1	5,537.563 1	1.3406		5,571.077 5
<b>Total</b>	<b>2.1683</b>	<b>16.9604</b>	<b>30.5766</b>	<b>0.0576</b>		<b>0.7194</b>	<b>0.7194</b>		<b>0.6821</b>	<b>0.6821</b>		<b>5,537.563 1</b>	<b>5,537.563 1</b>	<b>1.3406</b>		<b>5,571.077 5</b>

**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	lb/day										lb/day					
Hauling	2.9000e-003	0.1083	0.0339	4.4000e-004	0.0101	2.8000e-004	0.0104	2.7600e-003	2.7000e-004	3.0300e-003		47.2296	47.2296	1.8900e-003		47.2768
Vendor	8.3900e-003	0.3447	0.0838	1.0400e-003	0.0270	5.6000e-004	0.0275	7.7600e-003	5.4000e-004	8.3000e-003		109.9372	109.9372	3.6900e-003		110.0294
Worker	0.0626	0.0386	0.4642	1.4500e-003	0.1807	1.1800e-003	0.1819	0.0479	1.0900e-003	0.0490		144.2573	144.2573	3.7600e-003		144.3513
<b>Total</b>	<b>0.0739</b>	<b>0.4916</b>	<b>0.5818</b>	<b>2.9300e-003</b>	<b>0.2178</b>	<b>2.0200e-003</b>	<b>0.2198</b>	<b>0.0585</b>	<b>1.9000e-003</b>	<b>0.0604</b>		<b>301.4241</b>	<b>301.4241</b>	<b>9.3400e-003</b>		<b>301.6575</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.15 2.2a SS - MW7 Recharge Basin - 2027****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	lb/day										lb/day					
Off-Road	0.6974	4.1108	37.1522	0.0576		0.0891	0.0891		0.0891	0.0891	0.0000	5,537.5630	5,537.5630	1.3406		5,571.0775
<b>Total</b>	<b>0.6974</b>	<b>4.1108</b>	<b>37.1522</b>	<b>0.0576</b>		<b>0.0891</b>	<b>0.0891</b>		<b>0.0891</b>	<b>0.0891</b>	<b>0.0000</b>	<b>5,537.5630</b>	<b>5,537.5630</b>	<b>1.3406</b>		<b>5,571.0775</b>

**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	lb/day										lb/day					
Hauling	2.9000e-003	0.1083	0.0339	4.4000e-004	0.0101	2.8000e-004	0.0104	2.7600e-003	2.7000e-004	3.0300e-003		47.2296	47.2296	1.8900e-003		47.2768
Vendor	8.3900e-003	0.3447	0.0838	1.0400e-003	0.0270	5.6000e-004	0.0275	7.7600e-003	5.4000e-004	8.3000e-003		109.9372	109.9372	3.6900e-003		110.0294
Worker	0.0626	0.0386	0.4642	1.4500e-003	0.1807	1.1800e-003	0.1819	0.0479	1.0900e-003	0.0490		144.2573	144.2573	3.7600e-003		144.3513
<b>Total</b>	<b>0.0739</b>	<b>0.4916</b>	<b>0.5818</b>	<b>2.9300e-003</b>	<b>0.2178</b>	<b>2.0200e-003</b>	<b>0.2198</b>	<b>0.0585</b>	<b>1.9000e-003</b>	<b>0.0604</b>		<b>301.4241</b>	<b>301.4241</b>	<b>9.3400e-003</b>		<b>301.6575</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.16 2.2b SS - Recovery Wells for MW7Recharge Basin - 2027****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	lb/day										lb/day					
Off-Road	1.0119	8.2736	11.6375	0.0276		0.3200	0.3200		0.3068	0.3068		2,647.2735	2,647.2735	0.5775		2,661.7109
<b>Total</b>	<b>1.0119</b>	<b>8.2736</b>	<b>11.6375</b>	<b>0.0276</b>		<b>0.3200</b>	<b>0.3200</b>		<b>0.3068</b>	<b>0.3068</b>		<b>2,647.2735</b>	<b>2,647.2735</b>	<b>0.5775</b>		<b>2,661.7109</b>

**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	lb/day										lb/day					
Hauling	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
Vendor	8.3900e-003	0.3447	0.0838	1.0400e-003	0.0270	5.6000e-004	0.0275	7.7600e-003	5.4000e-004	8.3000e-003		109.9372	109.9372	3.6900e-003		110.0294
Worker	0.0284	0.0176	0.2110	6.6000e-004	0.0822	5.4000e-004	0.0827	0.0218	4.9000e-004	0.0223		65.5715	65.5715	1.7100e-003		65.6142
<b>Total</b>	<b>0.0368</b>	<b>0.3623</b>	<b>0.2948</b>	<b>1.7000e-003</b>	<b>0.1091</b>	<b>1.1000e-003</b>	<b>0.1102</b>	<b>0.0296</b>	<b>1.0300e-003</b>	<b>0.0306</b>		<b>175.5087</b>	<b>175.5087</b>	<b>5.4000e-003</b>		<b>175.6436</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**3.16 2.2b SS - Recovery Wells for MW7Recharge Basin - 2027****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	lb/day										lb/day					
Off-Road	0.3338	2.1525	15.3154	0.0276		0.0420	0.0420		0.0420	0.0420	0.0000	2,647.2735	2,647.2735	0.5775		2,661.7109
<b>Total</b>	<b>0.3338</b>	<b>2.1525</b>	<b>15.3154</b>	<b>0.0276</b>		<b>0.0420</b>	<b>0.0420</b>		<b>0.0420</b>	<b>0.0420</b>	<b>0.0000</b>	<b>2,647.2735</b>	<b>2,647.2735</b>	<b>0.5775</b>		<b>2,661.7109</b>

**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	lb/day										lb/day					
Hauling	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
Vendor	8.3900e-003	0.3447	0.0838	1.0400e-003	0.0270	5.6000e-004	0.0275	7.7600e-003	5.4000e-004	8.3000e-003		109.9372	109.9372	3.6900e-003		110.0294
Worker	0.0284	0.0176	0.2110	6.6000e-004	0.0822	5.4000e-004	0.0827	0.0218	4.9000e-004	0.0223		65.5715	65.5715	1.7100e-003		65.6142
<b>Total</b>	<b>0.0368</b>	<b>0.3623</b>	<b>0.2948</b>	<b>1.7000e-003</b>	<b>0.1091</b>	<b>1.1000e-003</b>	<b>0.1102</b>	<b>0.0296</b>	<b>1.0300e-003</b>	<b>0.0306</b>		<b>175.5087</b>	<b>175.5087</b>	<b>5.4000e-003</b>		<b>175.6436</b>

**4.0 Operational Detail - Mobile**



## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**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	lb/day										lb/day					
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
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

**4.2 Trip Summary Information**

Land Use	Average Daily Trip Rate			Unmitigated	Mitigated
	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

**4.3 Trip Type Information**

Land Use	Miles			Trip %			Trip Purpose %		
	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
User Defined Industrial	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

**4.4 Fleet Mix**

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.599608	0.024515	0.205520	0.108091	0.013987	0.004134	0.021227	0.013186	0.001229	0.001862	0.004978	0.000953	0.000710

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**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	lb/day										lb/day					
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
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

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**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	lb/day										lb/day					
User Defined Industrial	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
<b>Total</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

**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	lb/day										lb/day					
User Defined Industrial	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
<b>Total</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

**6.0 Area Detail****6.1 Mitigation Measures Area**

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

	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	lb/day										lb/day					
Mitigated	0.0252	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	0.0252	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-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	lb/day										lb/day					
Architectural Coating	3.8100e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0214					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
<b>Total</b>	<b>0.0252</b>	<b>0.0000</b>	<b>1.0000e-004</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>		<b>2.2000e-004</b>	<b>2.2000e-004</b>	<b>0.0000</b>		<b>2.3000e-004</b>

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

**6.2 Area by SubCategory****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	lb/day										lb/day					
Architectural Coating	3.8100e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0214					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
<b>Total</b>	<b>0.0252</b>	<b>0.0000</b>	<b>1.0000e-004</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>		<b>0.0000</b>	<b>0.0000</b>		<b>2.2000e-004</b>	<b>2.2000e-004</b>	<b>0.0000</b>		<b>2.3000e-004</b>

**7.0 Water Detail****7.1 Mitigation Measures Water****8.0 Waste Detail****8.1 Mitigation Measures Waste****9.0 Operational Offroad**

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type
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**10.0 Stationary Equipment****Fire Pumps and Emergency Generators**

## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects - Santa Cruz County, Summer

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

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type
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**User Defined Equipment**

Equipment Type	Number
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**11.0 Vegetation**

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**WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS**  
**Construction Emissions Summary**  
**Criteria Air Pollutants (based on CalEEMod output)**

Scenario	Maximum Pounds per day			
	ROG	NOx	PM-10	PM-2.5
<b>Uncontrolled Scenario</b>				
2022*	6.2	60.5	4.9	3.2
2023	2.6	27.9	3.8	1.8
2024*	7.0	73.2	5.2	2.9
2025	2.7	33.5	5.3	1.9
2027*	4.3	34.7	1.8	1.4
MBARD Significance Thresholds	137	137	82	55
Significant?	No	No	No	No
<b>Mitigated Scenario - All Tier 4 Final equipment</b>				
2022*	2.0	19.6	2.7	1.1
2023	1.0	13.6	3.1	1.2
2024*	2.4	32.5	3.2	1.0
2025	1.3	20.6	4.7	1.3
2027*	1.5	9.6	0.6	0.3
MBARD Significance Thresholds	137	137	82	55
Significant?	No	No	No	No

\* Construction emissions for the 10 recovery wells as estimated in the CalEEMod summer output were multiplied by 2 to account for emissions from construction of the 10 monitoring wells.

**Construction GHG Emissions (from CalEEMod output)**

Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e <sup>1</sup>
2022*	609	0.0980	0	611.0
2023	211	0.0294	0	211.9
2024*	1133	0.1709	0	1137.3
2025	269	0.0352	0	269.7
2027*	573	0.1263	0	576.3
TOTAL	2795	0.45985	0	2806.1
Project life				25
Amortized annual emissions				112.2

NOTES:

1. CO<sub>2</sub>e equivalents calculated using GWP of 25 and 298 for CH<sub>4</sub> and N<sub>2</sub>O, respectively based on AR4 GWPs used for the 2000-2017 emission inventory

\* Construction emissions for the 10 recovery wells as estimated in the CalEEMod annual output were multiplied by 2 to account for emissions from construction of the 10 monitoring wells.

## WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS

### Construction Emissions Summary

#### Emissions by Project Component

	Project Component	Unmitigated Emissions (Tons/phase)		workdays/phase	Unmitigated Emissions (lbs/workday)		
		Onsite Exhaust PM <sub>10</sub>	Onroad Exhaust PM <sub>10</sub>		Onsite Exhaust PM <sub>10</sub>	Onroad Exhaust PM <sub>10</sub>	Total PM <sub>10</sub>
	<b>Harkins Slough</b>						
1.1	Filter Plant to Sewer Pipeline	1.40E-02	3.60E-04	50	0.56	0.01	0.57
1.2a	Southeast Recharge Basin	1.14E-02	1.65E-03	180	0.13	0.02	0.15
1.2b	Recovery Wells (10) & Monitoring wells (10) - SE Recharge Basin	4.78E-02	1.40E-04	100	0.96	0.00	0.96
1.3a	Southwest Recharge Basin	7.29E-02	4.26E-03	180	0.81	0.05	0.86
1.3b	Recovery wells (10) & Monitoring wells (10) - SW Recharge Basin	3.70E-02	8.00E-05	100	0.74	0.00	0.74
1.4	Filter Plant Upgrades	2.00E-04	8.00E-05	180	0.002	0.001	0.003
	<b>Struve Slough</b>						0.00
2.1	Filter Plant to Recharge Basins Pipeline	1.72E-02	4.30E-04	55	0.63	0.02	0.64
2.2a	MW7 Recharge Basin	4.32E-02	5.00E-05	120	0.72	0.00	0.72
2.2b	Recovery wells (10) & Monitoring wells (10) - MW7 Recharge Basin	3.20E-02	6.00E-05	100	0.64	0.00	0.64
2.3	Intake Cone Screen	1.03E-02	6.00E-05	40	0.52	0.00	0.52
2.4	Intake Pump Station	3.04E-03	2.30E-04	200	0.03	0.00	0.03
2.5	Intake and Pipeline to Filter Plant	2.89E-02	3.80E-04	80	0.72	0.01	0.73



# HRA Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

For Nearby Resident

## MEISR

	Distance to Resident		AERSCREEN OUT [ug/m <sup>3</sup> ]/[g/s]	
	(ft)	(m)	max	annual
Area Source 1	286.4	87.3	2309.06	230.91
Area Source 2	619.1	188.7	2085.40	208.54

	Construction Year	PM <sub>10</sub> Exhaust (tons/yr)		Start Date	End Date	Duration Days	DPM
		Unmitigated	Mitigated				
Construction	2022	0.0116	0.0020	7/1/2022	6/30/2023	365	

REL (ug/m <sup>3</sup> )
5

		DPM Exhaust (g/s)	Exposure Duration			C <sub>AIR</sub> (µg/m <sup>3</sup> )
		Unmitigated	3rd Trimester	Age 0<2	Age 2<9	Unmitigated
Area Source 1	2022	0.0002	90.0	275.0	0.0	0.039
Area Source 2		0.0002	90.0	275.0	0.0	0.035
Total						0.073

$$\text{Cancer Risk} = \text{Dose inhalation} \times \text{Inhalation CPF} \times \text{ASF} \times \text{ED/AT} \times \text{FAH} \quad (\text{Equation 8.2.4 A})$$

Where:

Cancer Risk = residential inhalation cancer risk

$$\text{Dose inhalation (mg/kg-day)} = C_{\text{AIR}} \times \text{DBR} \times A \times \text{EF} \times 10^{-6} \quad (\text{Equation 5.4.1.1})$$

Inhalation CPF = inhalation cancer potency factor ([mg/kg/day]<sup>-1</sup>)

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<sub>AIR</sub> = concentration of compound in air in micrograms per cubic meter (ug/m<sup>3</sup>)

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<sup>-6</sup> = micrograms to milligrams conversion, liters to cubic meters conversion

$$\text{Hazard Quotient} = C_{\text{air}} / \text{REL} \quad (\text{Section 8.3.1})$$

Where:

Hazard Quotient = chronic non-cancer hazard

C<sub>AIR</sub> = concentration of compound in air in micrograms per cubic meter (ug/m<sup>3</sup>)

REL = Chronic non-cancer Reference Exposure Level for substance (ug/m<sup>3</sup>)

Dose Inhalation Inputs				$C_{AIR}$ ( $\mu\text{g}/\text{m}^3$ )			
Receptor Type	Exposure Scenario	Receptor Group Age	Project Year	Unmitigated	DBR (L/kg-day)	A (unitless)	EF (days/year)
Off-Site Child Resident	Construction	3rd Trimester	2022	7.33E-02	361	1	0.96
		Age 0<2	2022	7.33E-02	1090	1	0.96

Dose Inhalation Outputs				Unmitigated
Receptor Type	Exposure Scenario	Receptor Group Age	Project Year	Dose inhalation (mg/kg-day)
Off-Site Child Resident	Construction	3rd Trimester	2022	2.54E-05
		Age 0<2	2022	7.66E-05

Risk Inputs								
Receptor Type	Exposure Scenario	Receptor Group Age	Project Year	CPF ( $\text{mg}/\text{kg}\cdot\text{day}^{-1}$ )	ASF (unitless)	ED (years)	AT (years)	FAH (unitless)
Off-Site Child Resident	Construction	3rd Trimester	2022	1.1	10	0.25	70.00	0.85
		Age 0<2	2022	1.1	10	0.75	70.00	0.85

Risk Outputs				Unmitigated	
Receptor Type	Exposure Scenario	Receptor Group Age	Project Year	Cancer Risk	Hazard Risk
Off-Site Child Resident	Construction	3rd Trimester	2022	8.36E-07	
		Age 0<2	2022	7.71E-06	
Total Cancer Risk (per million)				8.55	0.015

SOURCE: Office of Environmental Health Hazard Assessment, 2015. *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments*. February. Daily breathing rate for school receptor is based on the OEHHA 95th percentile 8-hour moderate intensity breathing rates (Table 5.8). Fraction of time at home is set to 1 for residential since the nearest school unmitigated cancer risk is >1 per million, per OEHHA Table 8.4. Inhalation cancer potency factor from Table 7.1

# **APPENDIX ALTS**

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## Alternatives to the BMP Update

This appendix includes Section 5, Alternatives to the BMP Update, from PV Water's 2014 *Environmental Impact Report for the Basin Management Plan Update*.

## 5 ALTERNATIVES TO THE BMP UPDATE

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### 5.1 INTRODUCTION

CEQA Guidelines §15126.6 requires the consideration of a range of reasonable alternatives to the Proposed Project (in this case, the BMP Update) that could feasibly attain most of the basic objectives of the project. The CEQA Guidelines further require that the discussion focus on alternatives capable of eliminating significant adverse impacts of the project or reducing them to a less-than-significant level, even if the alternative would not fully attain the project objectives or would be more costly. The range of alternatives required in an EIR is governed by the “rule of reason,” which requires an EIR to evaluate only those alternatives necessary to permit a reasoned choice. An EIR need not consider alternatives that have effects that cannot be reasonably ascertained and/or are remote and speculative.

In compliance with CEQA, this section discusses the "No Project Alternative" as well as other alternatives and compares them to the Proposed BMP Update. Through a comparative analysis of the environmental impacts and merits of the alternatives, this section is focused on those alternatives capable of eliminating significant adverse environmental impacts of the project, or reducing them to a less-than-significant level.

This chapter describes and evaluates alternatives that were presented in some detail in the BMP Update. This EIR incorporates by reference all previous alternative analyses that have been conducted in previous EIRs on the PVWMA's BMPs and Local Water Supply Projects, including those evaluated in the following PVWMA EIRs:

- 1993 BMP EIR (PVWMA, 1993 at pages 11-1 through 11-36),
- 1999 Local Water Supply EIR (PVWMA/ESA, 1999 at pages 10-1 through 10-7), and
- 2002 Revised BMP EIR (PVWMA/ESA, Draft, 2001 and Final, 2002 at pages 6-1 through 6-30).

These alternatives are summarized in Section 5.2, below, and maps showing the key project locations and summaries of the environmental analyses of these alternatives from the EIRs are provided in Appendix D.

This EIR analyzes a "No Project" alternative, a demand management only alternative, Water Supply Facilities Alternatives (or structural alternatives), and an alternative considering other locations for BMP Update components. Alternatives that were not recommended in the BMP Update have been eliminated from discussion in this EIR for the reasons identified in Section 5.5. One of the reasons that alternatives may be eliminated from further consideration is if the alternative is not able to attain most of the basic objectives of the BMP Update, which are as follows:

- To prevent seawater intrusion, long-term groundwater overdraft, land subsidence, and water quality degradation;
- To manage existing and supplemental water supplies to control overdraft and to provide for present and future water needs;
- To create a reliable, long-term water supply, which has been identified as an important cornerstone of the long-term economic vitality of the Pajaro Valley;
- To develop water conservation programs; and

- To recommend a program that is cost effective and environmentally sound.

The alternatives analysis is intended to focus on eliminating, or reducing in significance, those project impacts identified in the DEIR as significant and unavoidable. The Draft EIR identified that the BMP Update would result in significant and unavoidable impacts to agricultural resources (specifically, conversion of agricultural land to non-agricultural uses). The Draft EIR determined that all other significant impacts could be reduced to a less-than-significant level through the incorporation of mitigation or project design features, including the following impact areas: aesthetics, air quality / greenhouse gas, biological resources, cultural resources, energy utilities & services, geology / soils, hazards and hazardous materials, surface water, groundwater, and water quality, and transportation / traffic.

## 5.2 ALTERNATIVES FROM PREVIOUS BMP AND LOCAL WATER SUPPLY EIRS

### 5.2.1 Basin Management Plan Environmental Impact Report (1993)

#### **Proposed Project in the 1993 BMP EIR**

PVWMA's first BMP EIR (hereafter, the "1993 BMP EIR") evaluated the environmental impacts of six distinct alternative plans presented in the 1993 BMP, each of which was capable of achieving the BMP 1993 objectives. The BMP Alternative 8A – College Lake, Feeder Canal, San Felipe was the preferred alternative and the proposed action analyzed in the 1993 BMP EIR. Its key feature was to develop a substitute coastal-zone water supply to groundwater pumping. Initially, water would be supplied from a 10,000 acre-feet (AF) College Lake Reservoir supplemented by water from Corralitos Creek and the Pajaro River via feeder canal. A review of likely yields from Kelly and Tynan Lakes indicated that these lakes offer minimal additional water. Further, because of the potential impacts on existing uses of the lakes that would result from water level fluctuations caused by operations, it was concluded that the Feeder Canal should be connected only to College Lake. Later, water from the San Felipe Division of the Central Valley Project (hereafter, the "San Felipe Division") would be imported in to the Basin to further augment supplies. See Appendix D-1 for a map of the facilities and additional information.

#### **Alternatives to the 1993 BMP Proposed Project**

The following summarizes other alternatives considered in the 1993 BMP EIR:

*BMP Alternative 2* - This alternative included water conservation, a seawater intrusion barrier, wastewater reclamation, and the Corncob Canyon reservoir. The intrusion barrier, comprised of injection wells along the coast, using reclaimed wastewater from Watsonville, would reduce the area requiring a substitute water supply. The barrier was assumed to require a substitute supply of 2,000 AFY to serve existing pumpers in the area along the coast where the seawater intrusion barrier would create a mound for maintaining a land-to-sea hydraulic gradient.

*BMP Alternative 5* - This alternative would import wastewater from Santa Cruz to Watsonville for treatment at, and distribution from, a new wastewater reclamation plant. Coastal pumping would be eliminated and substitute supplies would be made available to the coastal area.

*BMP Alternative 8* - This alternative included use of College Lake, Kelly, Tynan Lakes, the Feeder Canal, and the San Felipe Division water. Coastal pumping would be eliminated and substitute supplies would be delivered to the coastal area in the Feeder Canal from College Lake and the San Felipe Division pipeline with storage in these lakes.

*BMP Alternative 10* - This alternative included importation of San Felipe Division water into the Basin, which in combination with reclaimed water injected to form a seawater intrusion barrier, could enhance long-term sustainable pumping.

*BMP Alternative 11* - This alternative included conservation, wastewater reclamation and reuse, and dams at Bolsa de San Cayetano and on Pescadero Creek. Coastal pumping would be eliminated and substitute supplies would be made available from wastewater reclamation and new reservoirs.

As with this EIR, the 1993 BMP included a No Project Alternative that assumed no remedial action, including no plans, policies, programs, or projects that would be undertaken by the PVWMA or others in the Basin to reduce groundwater pumping and seawater intrusion problems. In addition, the 1993 BMP EIR considered a Demand Management alternative that would use only mandatory basin-wide pumping controls for residential, agricultural, and industrial users.

A map of the key facilities and summary of conclusions of the environmental analyses of the proposed project and alternatives in the 1993 BMP EIR are included in Appendix D-1.

## 5.2.2 Local Water Supply and Distribution Environmental Impact Report (1999)

### **Proposed Project in the 1999 Local Water Supply and Distribution EIR**

In March 1994, PVWMA initiated investigation to identify and define potential local water supply projects. An evaluation of 16 water sources and 47 potential sites resulted in a recommendation of further investigation of the following concepts and facilities, all of which were evaluated in the 1999 Local Water Supply and Distribution EIR (see map of key proposed project facilities and more information in Appendix D-2):

- *College Lake* – This proposed project element in the 1999 Local Water Supply and Distribution EIR was generally the same as the currently proposed College Lake with Inland Pipeline to the CDS, except for the pipeline alignments and distribution system connection points.
- *Harkins Slough* – This proposed project element is essentially the same as the existing operational Harkins Slough Managed Aquifer Recharge and Recovery project that began operations in 2002.
- *Murphy Crossing* – This 1999 proposed project element was similar to the currently proposed Murphy Crossing with Recharge Basins component except, in addition to diversion of Pajaro River water for recharge only, the water was proposed to be stored and extracted for conveyance to the coastal service area.
- *Watsonville Wastewater Reclamation Option* – This 1999 proposed project element was originally considered in future phases of the water supply project implementation because it was thought that imported water would be required to provide 5:1 dilution of recycled water. As described previously in this Draft EIR, the City of Watsonville and PVWMA completed construction and began operating the Recycled Water Project and Coastal Distribution System that is consistent with this alternative in 2009.

- *Distribution Systems/Service Areas* – The following three irrigation distribution system/service areas were considered in the 1999 Local Water Supply and Distribution EIR: (1) Coastal Service Area: adjacent to and between Highway 1 and the Pacific Ocean, approximately 8,200 acres, (2) Murphy Crossing Service Area: around Murphy Crossing, approximately 2,100 acres and, (3) Inland Service Areas: along the proposed import pipeline from Highway 1 east to Murphy Crossing and north of the Pajaro River, approximately 5,800 acres.

### **Alternatives to the 1999 Local Water Supply EIR Proposed Project**

In the 1999 Local Water Supply and Distribution EIR, other alternatives were considered including the No Project Alternative and the Demand Management Only Alternative, both of which were described in detail in the 1993 BMP, referenced in the above section. In addition, the EIR described and evaluated the following Structural Alternatives (see map of key alternatives and more information in Appendix D-2):

- *Pajaro Recharge Canal to College Lake* – This alternative would include diversion from the Pajaro River into a 20-foot-bottom-width recharging canal that would discharge residual flows into College Lake for storage and reuse. The facility was eliminated primarily due to cost and lack of land with suitable recharge capacity in the appropriate area. In addition, the canal would cause potentially significant unavoidable impacts to migrant birds and wetlands.
- *College Lake Reservoir* - This alternative would include a 27- foot high dam be constructed at the location of the existing College Lake drainage pumphouse to create a 10,000 AF storage facility. The reservoir would be supplied with a supplemental 25 cubic feet per second (cfs) diversion from Corralitos Creek in the winter months, yielding 3,400 AFY, as well as water diverted from the Pajaro River, as described in the element above. The reservoir would also be supplied with natural runoff. The coastal distribution system would receive water through a 5-mile, 30-inch diameter pipeline along Lake Avenue and Beach Road. This element could be phased into use by initially using the existing storage capacity of College Lake (approximately 1,400 AF) and supplementing it with nearby groundwater pumping. For the proposed 1999 project and the currently proposed College Lake with Inland Pipeline to CDS, the structure of the facility was altered due to adverse impacts of raising College Lake levels that were not expected to be offset by sufficient beneficial storage capacity. In addition, this larger alternative would result in the loss of 400 acres of prime farmland.
- *College Lake Injection/Extraction Wells* – This element proposed seven wells that would inject diverted surface runoff that is currently captured in College Lake into the Aromas aquifer. The injection wells would have been south of the proposed College Lake Dam. The wells would have a conjunctive use function with the San Felipe Division project during dry years when the San Felipe Division water is reduced, the wells could be used for extraction of groundwater. In the future, the injection wells could be converted to extraction wells to supplement flows captured in College Lake for delivery in the coastal area for crop irrigation. This option was eliminated primarily because the relationship of cost and impacts to potential yield was not as efficient as with other alternative structural facilities.
- *Bolsa De San Cayetano Reservoir* – This alternative would include a 4,000 AF reservoir at Bolsa De San Cayetano. A 90- foot high dam would be constructed across the mouth of a topographic depression, south of Trafton Road. The reservoir would store tertiary-treated water produced at the Watsonville Wastewater Treatment Plant during the winter months. The reservoir would have

been supplied via a pipeline from the Plant, and stored reclaimed water would be released into the coastal distribution system. Storage would allow seasonal distribution of reclaimed water as required for direct crop irrigation reuse. At the time, this project would have required treatment upgrades at the Wastewater Treatment Plant to produce tertiary or reclaimed water.

- *Corncob Canyon Reservoir* – This element requires construction of a 21,000 AF reservoir at Corncob Canyon. A 160- foot high dam would be constructed at the intersection of Vega and Lewis Roads. In addition to the main dam, five saddle dams would also be constructed. An intake canal, pumping plant, pipeline, and associated spill outlet would be located at the main dam, and a delivery pipeline would also have been components of this element. The reservoir would be supplied with a 200 cfs surplus winter diversion off the Pajaro River, downstream of Murphy Crossing. This element would deliver 10,000 AFY to the coastal distribution system via pipeline along Garin, Elkhorn, and Trafton Roads. This option was eliminated due to impacts on existing homes and resources in the Corncob area.
- *Pescadero Reservoir* – This element requires the construction of a 20,000 AF reservoir at Pescadero Creek. A 190- foot high dam would be constructed approximately 1,500 feet upstream from the Pescadero Creek and Pajaro River confluence. Natural watershed runoff and a 75 cfs surplus winter diversion from the Pajaro River would supply the reservoir. The riverflow diversion would require a static pumping lift of approximately 200 feet. Water would be delivered through at 13- mile, 42inch diameter coastal distribution system. This element would yield 7,600 AFY, but was eliminated due to infeasibility and environmental impacts.

A map of the key facilities in the proposed project and alternatives and summary of conclusions of the environmental analyses of the proposed project and alternatives in the 1999 Local Water Supply and Distribution EIR are included in Appendix D-2.

### 5.2.3 Revised Basin Management Plan Environmental Impact Report (2002)

#### **Proposed Project in the 2002 Revised BMP EIR**

The 2002 Revised BMP EIR described and evaluated the following two potential projects in detail, the BMP 2000 Alternative and the Local-Only Alternative. A map of the key facilities in these proposed alternatives in Appendix D-3.

*BMP 2000 Alternative* – This alternative included the following components:

- *Water Conservation* – This component, based on the Water Conservation report (PVWMA, 2000), included water metering program, agricultural and urban water conservation.
- *Water Recycling* – The recycling component of the BMP 2000 Alternative included construction of tertiary treatment facilities at the Watsonville Wastewater Treatment Facility and pumping, blending, storage, and distribution facilities to offset a portion of the irrigation demands in the coastal area during the irrigation season. This facility was completed in 2009.
- *Groundwater Banking* – This alternative involves importing surface water and using it in lieu of groundwater whenever it is available, allowing for natural recharge of the groundwater basin. During droughts and dry periods when little or no surface water may be available, PVWMA would then pump the groundwater that was “saved” or “banked” during wet periods. The Groundwater Banking component of the BMP 2000 Alternative includes construction of an



inland distribution system and a pipeline to link the Pajaro Valley with the Santa Clara Conduit of the San Felipe Division facilities. The design capacity available to PVWMA in the Santa Clara Conduit is 75 cfs. The facilities associated with the Groundwater Banking component include the Import Pipeline, supplemental wells, and Inland Distribution System.

- *Harkins Slough and Murphy Crossings Projects* – as described in the 1999 EIR.
- *Coastal and Inland Distribution Systems*. A significant portion of the proposed Coastal Distribution System was built between 2006 and 2009 and is shown in **Figure 2-3** of Section 2 of this Draft EIR. The Inland Distribution System was originally proposed in the 1999 Local Water Supply and Distribution Project to include irrigation pipelines to deliver non-potable water to areas along the Central Valley Project import pipeline from Highway 1 east to Murphy Crossing and north of the Pajaro River.

*Local-Only Alternative* – This alternative aimed to eliminate seawater intrusion through the implementation of local water supply projects and demand management measures, without importing water from outside the basin. This alternative would implement some of the projects that are proposed under the BMP 2000 Alternative, including recycled water and water conservation, in addition to other local water supply projects, which include the following:

- *Intensified Water Conservation* – The conservation component was proposed to be similar to the BMP 2000 Alternative with expanded programs.
- *Water Recycling and Storage* – This element of the Local-Only Alternative includes many of the same aspects of the Water Recycling element of the BMP 2000 Alternative; however, it also includes year-round treatment and storage during low-demand periods.
- *Expanded College Lake with Corralitos Creek, Pinto Lake, Watsonville Slough, and Harkins Slough Diversion with Aquifer Storage and Recovery Program* – The Expanded College Lake project proposes an increase in the total storage capacity of College Lake to 4,600 AF. Water diverted from Harkins and Watsonville sloughs, Corralitos Creek, and Pinto Lake would be stored at College Lake and subsequently conveyed to the Coastal Distribution System or injected into the groundwater basin for temporary storage and subsequent recovery.
- *Coastal Distribution System* – This component was proposed to be similar to the BMP 2000.

### **Alternatives to the 2002 BMP EIR Proposed Project**

In the 2002 Revised BMP EIR, other alternatives were considered including the following:

*No Project Alternative* – The 2002 EIR incorporates by reference the No Project Alternative used in the 1993 BMP, which is detailed in section 5.2.1.

*Modified BMP 2000 Alternative* – This alternative was developed based on input from local stakeholders. The Modified BMP 2000 Alternative involves the injection of Central Valley Project water into the groundwater basin for storage. This alternative includes the following components:

- An Import Pipeline
- Injection/Extraction Wells for Central Valley Project water
- Modified local water supply projects including: Coastal Distribution System, Conservation (Seven-Year Plan), Harkins Slough project with recharge basin and supplemental wells and

connection, Recycled Water Facility, and 54-inch Import Pipeline with injection/extraction wells for Central Valley Project water

*Modified Local-Only Alternative* – This alternative addresses the fundamental shortcoming of the Local-Only Alternative, that it requires a significant amount of agricultural land. This alternative adds another new recharge basin for recycled water, referred to as the Southeast Dunes recharge basin. The specific water supply, transmission, and storage projects comprising the alternative include:

- Harkins Slough Facilities
- Pinto Lake Diversion
- Watsonville Slough Diversion
- Import Central Valley Project Water
- Recycled Water Facility
- College Lake
- North Dunes recharge basin
- Southeast recharge basin

*Regional Serving Alternative* – At the time that this EIR was written, this alternative had not yet been developed. It was included upon request of the Soquel Creek Water District (SCWD). This alternative considers a joint water supply project between SCWD and PVWMA. PVWMA and SCWD entered into a Memorandum of Agreement (MOA) to set forth the parties' intent to work together toward development a potential project in which PVWMA would acquire and distribute a water supply of approximately 2,000 AFY to SCWD in order to meet its long-term water supply needs, and provide a new amount of water to the Pajaro Valley. If the agencies determined that a viable project could be developed between them, the agencies could enter into a binding agreement at that time.

*Alternative Alignments to the Import Pipeline* – PVWMA considered several pipeline route variations for the Import Pipeline. The alternative routes were proposed because of engineering design considerations and flexibility in final site selection, and are not complete alternatives to the project as their implementation would involve only construction of the Import Pipeline to bring water into the PVWMA service area.

A summary of conclusions of the environmental analyses of the proposed project and alternatives in the 2002 BMP EIR is included in Appendix D-3.

## 5.3 NO PROJECT ALTERNATIVE

The No Project alternative is defined as no remedial action. By definition it includes no plans, policies, programs, projects, or components that would be undertaken by the PVWMA or any other body or individual in the Basin relative to development of BMP components considered by this EIR. Groundwater, recycled water, and Harkins Slough diversions (up to 2,000 AFY) would continue to be the source of water for agricultural irrigation as described in Chapter 2. Industrial, commercial, and domestic residential use of water within the City of Watsonville would continue as in the current condition (see Chapter 2). Groundwater extraction by the City of Watsonville may increase to meet any potential higher future water demand; however, the City is implementing aggressive water conservation programs and is also planning for expansion of alternative water supplies, including surface water diversions. The City of Watsonville's stated goal regarding water demand is to have no net increase in groundwater use (Steve

Palmisano, Board of Directors/Ad Hoc BMP Committee Joint Meeting, August 2012). The Basin's overdraft condition is anticipated to continue without implementation of the BMP Update. Seawater intrusion would continue to advance beneath the coastal lands at the current rate of 1,900 AFY or higher. On coastal acreage that do not receive delivered water, irrigation with groundwater would continue until the salt content in the soils builds up to the point where existing agricultural crops typical of the area could not grow. Production of more salt tolerant crops may occur; however, the economy of the area would change. This alternative assumes with continued overdraft and encroaching seawater, wells would eventually become unusable and lands would be fallowed. . This would represent a significant impact due to loss of agricultural lands that may be affected by seawater intrusion and that are not served by the coastal distribution system.

## 5.4 DEMAND MANAGEMENT ONLY ALTERNATIVE

This alternative would use only demand management measures to achieve the PVWMA's water management objectives, which are to balance water use and supply in the Basin and progressively decrease seawater intrusion. The Basin would be brought into balance through mandatory basin-wide pumping controls only, for residential, agricultural, and industrial users. Groundwater modeling has indicated that it would be necessary to reduce groundwater pumping by 12,000 AFY. This 12,000 AFY represents the difference in the water budget (Inflows less Outflows = -12,000 AFY) based on the 33 Basecase simulation developed between the Agency and the USGS. The Basecase assumed 7,150 AFY of delivered water, among other things. The analysis was based on a basin-wide evaluation. Hydrometrics then tested the BMP scenarios and found that the proposed projects and programs would balance the basin and eliminate the majority of SWI. Since municipal and industrial water uses comprise approximately 18 percent of current water use, the major reduction would fall on agricultural users (PVWMA, 2013). The City of Watsonville's stated goal regarding water demand is to have no net increase in groundwater use (Steve Palmisano, Board of Directors/Ad Hoc BMP Committee Joint Meeting, August 2012). This alternative would be most likely to occur if PVWMA fails to implement the BMP Update or any of its components. Without any additional BMP Update, the State Water Resources Control Board or a private entity may intervene. In this case, the State, by statutory adjudication, or the courts by judicial order, would designate an authority, possibly PVWMA, to regulate and oversee the management of water in the Basin, and may impose stringent pumping controls.

However, the Demand Management alternative would conflict with one of the primary BMP Update alternative formulation criteria and thus would not meet a key project objective: provide for needs of all Basin water users. In addition, this alternative would have significant and far worse impacts on agricultural land resources and would adversely affect the economy of the region. For this reason, a Demand Management Only alternative was not pursued in the BMP Update and is not considered further herein.

## 5.5 WATER SUPPLY FACILITIES ALTERNATIVES

A wide variety of structural facilities (i.e., projects or BMP components) were considered as potential projects in the BMP Update during the early phases of BMP Update development. In fact, a primary task of the BMP Update was project alternative development and screening. The project development and screening was a two-stage project review process, consisting of a fatal flaw screening, followed by a more

detailed development of feasible projects. The process began with an extensive list of supplemental water supply projects that could help replenish the basin and bring it back into balance, including projects from the 2002 BMP, committee-developed projects, community group-developed projects, IRWM regional projects, and consultant-developed projects. Project summary sheets and cost estimates for 44 projects considered during the BMP Update effort are included as Appendix B of the BMP Update. Most of these projects were eliminated from consideration due to feasibility (technical and cost) considerations; however, environmental issues and regulatory constraints were also considered.

From the entire list of projects and programs, the BMP Update process narrowed this list to a ranking of fourteen programs/projects, as displayed in **Table 5-1** below. As displayed, the first seven programs/projects contain the primary components ultimately selected for evaluation as the "proposed project" within this EIR for the BMP Update. **Table 5-1** shows that with the exception of the Murphy Crossing with Recharge Basins component, the remaining programs/projects can potentially be implemented within the first 10 years of the implementation of the BMP Update (i.e., by the year 2025). The remaining selected programs/projects in the BMP Update, including the Murphy Crossing with Recharge Basins component, may be implemented after 2025 depending on the success of the primary components/projects in halting seawater intrusion. The potential environmental impacts of the seven proposed components included in the BMP Update portfolio are analyzed within this EIR at a programmatic level.

Table 5-1 BMP Update Summary of Projects and Programs

Project or Program		Estimated Yield AFY
<b>D-6</b>	<b>Increased Recycled Water Deliveries</b>	<b>1,250</b>
<b>D-7</b>	<b>Conservation</b>	<b>5,000</b>
<b>S-22</b>	<b>Harkins Slough Recharge Facilities Upgrades</b>	<b>1,000</b>
<b>R-6</b>	<b>Increased Recycled Water Storage at Treatment Plant</b>	<b>750</b>
<b>S-2</b>	<b>Watsonville Slough with Recharge Basins</b>	<b>1,200</b>
<b>S-3</b>	<b>College Lake with Inland Pipeline To CDS (See Note 2)</b>	<b>2,400<sup>1</sup></b>
<i>S-1</i>	<i>Murphy Crossing with Recharge Basins</i>	<i>500</i>
<i>I-1</i>	<i>CDS Expansion</i>	<i>Footnote<sup>2</sup></i>
<i>R-11</i>	<i>Winter Recycled Water Deep Aquifer ASR</i>	<i>3,200</i>
<i>S-11</i>	<i>River Conveyance of Water for Recharge At Murphy Crossing</i>	<i>2,000</i>
<i>G-3</i>	<i>San Benito County Groundwater Demineralization at WWTP</i>	<i>3,000</i>
<i>S-4</i>	<i>Expanded College Lake, Pinto Lake, Corralitos Creek, Watsonville Slough, and Aquifer Storage and Recovery</i>	<i>2,000</i>
<i>SEA-1</i>	<i>Seawater Desalination</i>	<i>7,500</i>
<i>S-5</i>	<i>Bolsa De San Cayetano with Pajaro River Diversion</i>	<i>3,500</i>
<p><b>Key:</b>  <b>Bold = Could be implemented within the first 10 years of the BMP (by 2025)</b>  <i>Italic = Could be implemented after 2025, based on ongoing adaptive management assessment.</i>  <b>Dark Outline = Seven projects included in proposed BMP Update (called “primary” in this section)</b>  not outlined in bold = seven projects that potentially be added in the future if needed (called “secondary” in this section)</p> <p><b>Notes:</b>  1. College Lake with Inland Pipeline to CDS yield changed to a range of 2,100 to 2,400 AFY based on RCD College Lake Study (2013).  2. Since the project conveys water from other projects, it does not have a yield.</p>		

This alternative description considers implementation of one or more of the “secondary” programs/projects (i.e., those that could potentially be added in the future, if needed) for implementation

instead of one or more of the five (5) components with potentially significant impacts.<sup>1</sup> These secondary components were not included in the primary suite of BMP Update components for various reasons during the BMP 2012 Ad Hoc Committee Alternatives Review process; therefore, they may require additional environmental review prior to implementation. However, they will be considered in this section as replacements for certain BMP Update primary components in this Alternatives Analysis to the extent that they may reduce one or more significant impacts identified in this EIR. These alternative projects/programs include:

- I-1 CDS Expansion
- R-11 Winter Recycled Water Deep Aquifer ASR
- S-11 River Conveyance of Water for Recharge At Murphy Crossing
- G-3 San Benito County Groundwater Demineralization at Watsonville WWTP
- S-4 Expanded College Lake, Pinto Lake, Corralitos Creek, Watsonville Slough, and Aquifer Storage and Recovery
- SEA-1 Seawater Desalination
- S-5 Bolsa De San Cayetano with Pajaro River Diversion

A brief summary of these alternatives is provided below and more detail is included in Appendix E, including conceptual project plan and schematics. A qualitative summary of potential environmental impacts of these programs/projects is presented in the descriptions below and a comparative analysis to the proposed BMP Update components is provided in Section 5.7.

### 5.5.1 CDS Expansion

The existing Coastal Distribution System (CDS) was installed to deliver water to coastal growers. Depending on the success of conservation, expansion of the CDS may be needed to expand the delivered water area and stop seawater intrusion and balance the basin. This alternative does not create additional water; therefore, it has no project yield, but rather contains the infrastructure required to deliver the water from other (existing and proposed) projects to coastal growers outside of the existing delivered water zone. The proposed alignment would extend north from the existing CDS to serve agricultural land south of Zils Road. The expanded area has an average water demand of approximately 2,000 AFY. The pipeline routing could be modified if the North Dunes recharge basin (part of the Watsonville Slough with Recharge Basin component) is built.

Potential environmental effects associated with this project would primarily be related to construction-related impacts, as the pipeline expansion would most likely be located nearly entirely within existing roadways (or unpaved agricultural roads). Potential construction-related impacts would include impacts to Air Quality, Greenhouse Gas Emissions, Noise, Erosion, and Traffic, all of which would be less than significant or could be mitigated to a less than significant level with standard mitigation. This alternative BMP Update component would be the most useful with successful implementation of one or more of the following: Conservation (thus freeing up CDS water for more agricultural land), College Lake and Inland

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<sup>1</sup> Specifically, the Conservation and Increased Recycled Water Deliveries involve no direct physical changes to the environment and require no new physical facilities, thus no significant adverse impacts were identified for these components and alternatives to reduce impacts are not warranted.

Pipeline to CDS, Harkins Slough Recharge Facility Upgrades, or Watsonville Slough with Recharge Basins, all of which provide additional water for the use in the CDS. Without successful implementation of one of those, it would not be technically effective. This alternative component would also be more useful if the Increased Recycled Water Deliveries or the Conservation Programs do not result in their expected benefits.

### 5.5.2 Winter Recycled Water Deep Aquifer ASR

The Watsonville Recycled Water Treatment facilities have the capacity to produce approximately 3,200 AF of recycled water during the winter months when there is little or no irrigation demand. During the winter, this tertiary treated water would be injected into deep aquifers confined by overlying and underlying geologic formations that do not produce water. The water would then be recovered from the same wells later during times of peak demand. This alternative involves the construction of approximately eight 2,000 to 2,500-foot deep injection wells located on the western side of the CDS. The number of wells and recovery yield may vary depending on individual well site conditions.

Potential environmental impacts associated with this project would include construction-related impacts (air quality, greenhouse gas emissions, geology and soils, hydrology and water quality, noise, traffic, and utilities) due to construction of injection wells and associated pipelines and backflush facilities. The project may also potentially result in significant impacts in the following resources/issue areas:

- biological resources due to permanent or construction-related disturbance to habitat areas or direct impacts to plants or wildlife species,
- water quality and hydrology impacts due to changes in groundwater flows and quality and temporary disturbances to soils resulting in changes to water quality in surface water bodies during construction,
- geology & soils impacts due to incompatible or unstable soil properties, seismicity/faulting, and erosion,
- cultural resources due to disturbance to known or unknown resources that may be discovered during ground-disturbing activities, and
- air quality and increased GHG emissions due to higher energy demands (i.e., electricity for pumping).

This alternative may be feasible from a technical perspective, but may be more difficult to achieve regulatory and permitting requirements due to recycled water groundwater injection regulations of the RWQCB and the California Department of Public Health and would be more expensive to implement.

### 5.5.3 River Conveyance of Water for Recharge at Murphy Crossing

The project would convey water from an unidentified source via the Pajaro River for groundwater recharge from the eastern edge of the groundwater basin to Murphy Crossing. Unidentified water from out of the basin would be released to the Pajaro River during months of relatively low flow, commonly June through December.

The project would convey water from an unidentified source via the Pajaro River for groundwater recharge from the eastern edge of the groundwater basin to Murphy Crossing. Unidentified water from

out of the basin would be released to the Pajaro River during months of relatively low flow, commonly June through December.

This alternative would potentially result in construction-related impacts (air quality, greenhouse gas emissions, geology and soils, hydrology and water quality, noise, traffic, and utilities) due to construction of Central Valley Project pipelines and backflush facilities. The alternative may also result in significant impacts in the following resources/issue areas:

- biological resources due to permanent or construction-related disturbance to habitat areas or direct impacts to plants or wildlife species,
- water quality and hydrology impacts due to changes in groundwater flows and quality, and temporary disturbances to soils resulting in changes to water quality in surface water bodies during construction,
- geology & soils impacts due to incompatible or unstable soil properties, seismicity, faulting, and erosion,
- cultural resources due to disturbance to known or unknown resources that may be discovered during ground-disturbing activities, and
- air quality and increased GHG emissions due to higher energy demands (i.e., electricity for pumping).

Although this alternative component could assist in meeting most of the basic project objectives, it would require complex permitting efforts and agreements amongst numerous stakeholders, thus was not considered to be implementable in the near term (i.e., through 2025). It was also considered to be slightly more expensive than other alternative components.

#### 5.5.4 San Benito County Groundwater Demineralization at Watsonville Wastewater Treatment Plant

The Santa Clara Valley Water District (SCVWD) and the San Benito County Water District (SBCWD) performed a feasibility study of desalinating groundwater within the San Juan Valley. The groundwater contains high levels of total dissolved solids (TDS) and would require treatment to reduce these levels. This alternative differs from that outlined in the feasibility study in that the desalination would occur at the Watsonville Wastewater Treatment Plant to facilitate brine management and disposal. Approximately 3,000 AFY of groundwater would be pumped from the San Juan groundwater sub-basin to the Watsonville Wastewater Treatment Plant for treatment. The project includes building seven new groundwater wells, a pump station, approximately 19-miles of conveyance pipeline, and a reverse osmosis treatment and disinfection system at the Wastewater Treatment Plant. Treated water would be discharged directly to the City of Watsonville through an existing water line running to the plant, to agricultural users through the CDS, and potentially inland agricultural users if the College Lake pipeline is constructed. The waste brine would be discharged through the Wastewater Treatment Plant's existing outfall.

Potential environmental impacts associated with this project would include construction-related impacts (air quality, greenhouse gas emissions, noise, and traffic) due to construction of injection wells, pump station, treatments systems, and associated pipelines and backflush facilities. The project potential may also result in significant impacts in the following resources/issue areas:



- biological resources due to permanent or construction-related disturbance to habitat areas or direct impacts to plants or wildlife species and to marine resources due to disposal of brine,
- water quality and hydrology impacts due to changes in groundwater flows and quality from extraction of groundwater and creation of brine evaporation ponds, and temporary disturbances to soils resulting in changes to water quality in surface water bodies during construction,
- geology & soils impacts due to incompatible or unstable soil properties, seismicity, faulting, and erosion.
- cultural resources due to disturbance to known or unknown resources that may be discovered during ground-disturbing activities, and
- air quality and increased GHG emissions due to higher energy demands (i.e., electricity for pumping).

This alternative was considered to be feasible from a technical perspective and could assist in meeting most of the basic project objectives, but may not be financially feasible and had institutional constraints due to agreements needed with SBCWD.

#### 5.5.5 Expanded College Lake, Pinto Lake, Corralitos Creek, Watsonville Slough, and Aquifer Storage and Recovery (ASR)

College Lake is a seasonal water body in a fault-controlled depression located to the north of Holohan Road west of Highway 152, near St. Francis Cemetery. The lake captures runoff from an 11,000 acre watershed during the winter. The Expanded College Lake Project would increase the total storage capacity of College Lake to 4,600 AF, increase the water supplies to College Lake, and add a seasonal storage component. This project would divert water from Corralitos Creek, Pinto Lake, and Watsonville Slough and provide ASR injection during the winter and recovery during the summer. During the late spring, summer and fall months, Pinto Lake experiences heavy blooms of blue green algae (also known as cyanobacteria). Blue green algae blooms are an emerging health threat in the United States and many other countries. These blooms often produce toxins, which can be harmful to humans and animals. A filtration and disinfection system would treat water from College Lake prior to entering the distribution pipeline. Two pipelines would be required; one to convey filtered water to the injection system wells, and a second to convey water from the slough to College Lake in the winter and also to convey College Lake and well water to the CDS during the irrigation season. This project would include the construction of College Lake main dam and saddle dam, filtration and disinfection facilities, pump stations, ASR wells, and approximately 15 miles of new conveyance pipeline. Note: The Harkins Slough yield (1,100 AF) was included in the 2002 BMP; however, it is no longer considered as part of the suite of BMP Update components because it has already been built, and is in operation, and therefore, is considered an existing condition.

Potential environmental effects associated with this project would include construction-related impacts (air quality, greenhouse gas emissions, hydrology/water quality, noise, traffic, utilities) that would occur in a large geographic area due to the amount/extent of construction activities (including dam, wells, pipelines, pump stations, filtration facilities, and appurtenant facilities). This alternative would have the same and greater impacts than the College Lake project including impacts to biological resources (habitat, special-status plants, steelhead, and birds), hydrology, water quality, flooding, cultural resources, and geology & soils (due to incompatible or unstable soil properties, seismicity, faulting, and erosion),

and potential blue green algae toxin issues at Pinto Lake that could have an unacceptable and significant human health impact. Operational emissions of air pollutants and greenhouse gas emissions would be greater than with the proposed BMP components due to the amount of pumping necessary for the various conveyance facilities.

This alternative may be feasible from a technical perspective and could assist in meeting most of the basic project objectives, but may not be financially feasible.

#### 5.5.6 Seawater Desalination

This project includes construction and operation of a seawater desalination facility that would produce potable water from seawater. The project consists of a seawater intake structure(s) and pipeline, desalination plant, brine discharge and outfall facilities, product water conveyance pipelines to the recycled water treatment plant clearwell and three City of Watsonville potable wells (8 miles of 24-inch pipe), and storage facilities. The treated water would be used for agricultural irrigation during the irrigation season via an expanded CDS, and as potable water for the City of Watsonville during winter months.

Potential environmental effects associated with this project would include construction-related impacts (air quality, greenhouse gas emissions, noise, hydrology/water quality, traffic, and utilities) due to construction or upgrades to intake facilities, treatment plant, brine disposal facilities and product water conveyance facilities. Potentially significant and more severe operational impacts would be expected in most resource issues/topics, including aesthetic resources, air quality, biological (including marine) resources, climate change, coastal resources, cultural resources, geology & soils, greenhouse gas, utilities/services, growth inducement, and water supply/quality. This project component has numerous and more severe potentially significant environmental impacts, including due to brine disposal impacts on water quality and marine biological resources, potential marine life impingement/entrainment, and use of energy resulting in higher greenhouse gas emissions than any other alternative. If included as a BMP Update component, it could reduce the significant and unavoidable impact of the BMP Update due to conversion of agricultural land to non-agricultural uses.

This project would be more costly, more difficult to achieve regulatory compliance and permits, and result in increased impacts on the environment in the issue areas identified above.

#### 5.5.7 Bolsa de San Cayetano with Pajaro River Diversion

This project consists of two options, one involving surface water only and one involving both surface and recycled water. Option 1 involves the construction of the Bolsa De San Cayetano Dam and Reservoir for seasonal surface water storage to allow up to 5,000 AF in peak storm flow years of Pajaro River water to be diverted and pumped to the reservoir in the winter and used to meet irrigation demand in the summer. The dam and reservoir would be located in Monterey County on the south side of the Pajaro River and adjacent to Trafton Road. The reservoir site is surrounded by 100- to 150-foot high terrace upland that has been eroded to form a canyon. The earth fill dam would be located across the mouth of the canyon to form the reservoir. A small saddle dam would also be constructed on the north ridge. The Pajaro River diversion would consist of an infiltration gallery, filtration system, and pump station facilities. The diversion would be located approximately 0.5 miles upstream of the confluence of Salsipuedes Creek and the Pajaro River. It is assumed the water would need to be filtered and disinfected after storage to meet

user requirements. Option 2 involves using the reservoir for both surface water and recycled water storage. Option 2 uses the same infrastructure as Option 1 and also includes lining the reservoir as may be required by the Regional Water Quality Control Board for surface storage of recycled water. Having the availability to store recycled water increases the average project yield since some years sufficient surface water is not available for diversion.

Potential environmental effects associated with this project would include construction-related impacts (air quality, greenhouse gas emissions, hydrology/water quality, noise, traffic, and utilities) due to construction of the dam, pump station, diversion facilities, and conveyance pipelines. The construction impacts would be greater than many of the other alternative components. The project would be expected to have significant impacts to biological resources (including potential impacts to birds due to tree removal, sensitive plant species and habitat), coastal resources, hydrology, water quality, cultural resources, and geology & soils. Operational impacts due to air quality and greenhouse gas emissions would also be anticipated; however to a lesser extent than most of the other alternative components because most of the storage would be downgradient from the diversion point.

Of the fourteen alternatives carried into the last alternatives screening process, this alternative is the most expensive and thus, may not be considered feasible.

## 5.6 ALTERNATIVE LOCATIONS FOR BMP UPDATE COMPONENTS

This section describes the potential for each component to be located at a different location, in terms of feasibility and the ability to reduce significant impacts of the BMP Update. A brief summary of these alternatives is provided below. A qualitative analysis of potential environmental impacts of these programs/projects is presented in the descriptions below and a more detailed comparative analysis to the proposed BMP Update components is also provided.

### 5.6.1 Alternative Locations for Conservation

No alternative locations are needed to reduce impacts of this component as it would not result in any significant impacts.

### 5.6.2 Alternative Locations for Increased Recycled Water Storage at Treatment Plant

Alternative sites of adequate size are not feasibly available at or near the Recycled Water Facility site without significant and more severe impacts on agricultural land or biological resources, and/or or such sites would require cost-prohibitive property acquisition.

### 5.6.3 Alternative Locations for Harkins Slough Recharge Facilities Upgrades

Because this BMP Update component requires only upgrades to the existing pump station and treatment facilities, those components do not warrant relocation to reduce significant impacts. The proposed filter backwash to waste pipeline is proposed within existing roadways with very little traffic and no significant impacts that cannot be mitigated with standard construction practices; therefore, an alternative alignment is unnecessary to reduce significant impacts. Construction of a new recharge basin for the Harkins Slough Recharge Facilities Upgrades component has been identified as resulting in significant and unavoidable impacts to agricultural resources. There have been several potentially feasible recharge basin

sites identified in the vicinity of the existing Harkins Slough Recharge Basin; however, the recharge basins that may be considered most feasible and least costly to construct are the Southeast Recharge Basin and the Monitoring Well #7 site due to their proximity to existing facilities. The proposed new recharge basin for this component (either the Monitoring Well #7 or the "Southeast" recharge basin), would have a significant impact on agricultural land; however, the alternative sites would also affect agricultural land (and would be similar on an acre-by-acre basis), the impacts of those basins have been evaluated in the Watsonville Slough with Recharge Basins component in Chapter 3. Other suitable sites may be presented that reduce impacts due to farmland conversion; however, currently there are no known feasible sites available. The proposed locations are currently considered the optimal locations due to soil types, hydrology, and percolation/recharge characteristics. In addition, the sites are relatively disturbed and lack quality habitat. Furthermore, feasible alternative locations that might achieve the basic project objectives may not reduce the number or severity of significant adverse impacts, assuming the same or similar design and operational characteristics. Specifically, pursuant to investigations to date, there is no environmentally superior location that could feasibly meet the BMP objectives. The conceptual design of this component minimizes the construction and operational environmental impacts of the proposed component through inclusion of the least environmentally damaging methods and facilities while still meeting the basic objectives of increasing the yield of the component up to the existing water right to maximize its benefit to the water supply portfolio and groundwater basin.

#### 5.6.4 Alternative Locations for Watsonville Slough with Recharge Basins

The Watsonville Slough with Recharge Basins project has significant impacts in the following resource areas: agricultural resources, biological resources, geology and soils, operational and construction water quality, and traffic, all of which except agricultural resources impacts can be reduced to a less-than-significant level with mitigation. To better reduce these significant impacts beyond the mitigation measures already proposed in this EIR and/or to provide better operational characteristics / flexibility and success toward achieving groundwater basin benefits, several alternative locations for the diversion of slough water were analyzed during preparation of the Draft EIR. These include the following:

- an "off-stream" or "isolated stent" or "pond" in the general vicinity and/or associated with potential future wetland construction projects,
- a location north of the railroad tracks owned by Santa Cruz County Transportation in the vicinity of the confluence of Watsonville Slough and Hanson Slough, and
- other sloughs in the vicinity.

#### **Off-Stream near Watsonville Slough Alternative**

The physical location of the diversion point would be similar to the proposed Watsonville Slough component (i.e., within the general vicinity of the existing Harkins Slough diversion point or the area of the slough between that point and the railroad tracks to the north), but the diversion would be located "off- stream" in an isolated "stent" or "pond" area; the off-stream area may be a pond next to Watsonville Slough, or it may be an existing open-water area isolated from immediate connection with Watsonville Slough. This alternative "pond" would have a volume of between 50 and 150-acre feet (for example, 10-acres at 10-feet deep) and would require proper fish screening, CRLF screening (if possible), and turbidity/ floatables management. A similar volume in one of the other sloughs or drainage ways might

also be used. Water flow would be managed into the pond through the use of self-adjustable valves. Ponds would receive diversions at high water, or (much more slowly) at lower water. Water from the pond would be sent through the treatment plant and to the recharge basins as proposed by the Watsonville Slough with Recharge Basins component. This alternative could be integrated with the NRCS-proposed wetland area at the confluence of the two sloughs. Prefiltration or treatment of water may be feasible in an isolated pond or slough. A pond on the east side of Watsonville Slough may draw in some of the moderately salty water within the ‘perched aquifer’ (as defined by California Department of Water Resources Bulletin 5, 1953); ponds on the west side of the slough are not as susceptible to this risk.

This alternative would have increased impacts on agricultural resources (i.e., due to conversion of agricultural land to a pond/stent system. The project also may significantly impact water quality and biological resources during operation. Construction impacts would be greater, but those are anticipated to be able to be mitigated to a less-than-significant level and operational air quality, aesthetics, noise, and traffic impacts would be similar to the Watsonville Slough with Recharge Basins component.

Based on current data and experience, PVWMA staff believes this type of project could not be feasibly planned, built and operated in the vicinity of the sloughs within the timeframes required. The ability of the pond or stent to receive adequate flows of water to feed into the filtration plant and ultimately to the recharge basins is questionable. No suitable sites have been identified within the vicinity of the existing filtration facilities and existing and proposed recharge basins.

### **Hanson Slough near Watsonville Slough Alternative**

As part of preparation of this Draft EIR, the PVWMA BMP and EIR Team investigated in a change the point of diversion to a point in the lower reach of the Hanson Slough (i.e., within approximately ¼ mile of the Hanson Slough/Watsonville Slough junction). This alternative would require new pipelines to connect the diversion point to the Harkins Slough treatment plant site. Although it was thought to be preferable due to better water quality at this site and greater amounts of water year round, the PVWMA staff and its consultants determined that a new diversion in this location of Hanson Slough, and the connecting pipeline to the filtration plant (i.e., the pipeline would have to pass under the railroad tracks and under Watsonville Slough and/or Harkins Slough) would be prohibitively costly and potentially technically infeasible. In addition, there would be greater environmental impacts due to increased areas of construction disturbance.

This alternative would have increased impacts on agricultural resources, but could have fewer and less severe significant impacts during operation on water quality (lower salts and potentially, turbidity/sedimentation, including due to bank erosion). Biological resources impacts would be greater, including due to more temporary and permanent impacts to habitat. The same or similar impacts to red-legged frogs from construction in the sloughs and diversion impingement/entrainment of fish and other wildlife would be expected to occur with implementation of this alternative. Construction impacts would be greater, but those could all be mitigated to a less-than-significant level.

### **Alternative Sloughs**

An alternative slough, or stormwater drainage facility, could be used as a source of diversion water for recharge. These other diversion sites would have similar facilities including pipelines to the filtration plant and recharge basins. However, this type of alternative project would not be able to use existing and

upgraded Harkins Slough facilities, including recharge basin sites; therefore, this alternative does not meet the criteria for inclusion as a potential alternative. Under this alternative, significant impacts may still occur due to temporary changes to the environment: construction impacts on habitat and species; water quality and hydrology; geology and soils; utilities; noise and traffic. In addition, air quality and due operational, long-term impacts due to conversion of agricultural land to non-agricultural use, increased air quality and greenhouse gas emissions, and of entraining fish and other aquatic wildlife. Site-specific information, including project design details, would be needed to assess impact and to conclude whether impacts would be greater or less severe with implementation of this type of alternative. Construction of a similar facility on another slough, channel, or storm drain outfall would likely have greater impacts overall related to construction of new pipelines, and potentially new filtration facilities and recharge basins, depending upon the location of diversion and whether there would need to be new filtration facilities rather than use of the existing.

### 5.6.5 Alternative Locations for College Lake with Inland Pipeline to CDS

This project cannot be replicated in another location due to uniqueness of the College Lake hydrologic conditions. Specifically, the lake is already seasonally drained by the Reclamation District creating the potential for diversion of that water for another beneficial use with appropriate flow maintenance in downstream creeks and the Pajaro River. As evidenced by the previous alternatives analyses, these conditions cannot be replicated at another location, making an alternative location infeasible.

### 5.6.6 Alternative Locations for Murphy Crossing with Recharge Basins

This component of the BMP was developed as part of the 1999 Local Water Supply Project EIR (CH2M Hill, 1997, 1999a, and 1999b) and was further evaluated during development of the currently proposed BMP Update (Carollo and PVWMA, 2012) and EIR (B. Hecht and M. Woyshner, Balance Hydrologics and G. Kittleson, Kittleson Environmental Consulting, personal communication, 2013). The proposed location is the optimal location due to soil types, hydrology, and percolation/recharge characteristics of the Pajaro River at this location. In addition, the site is relatively disturbed and lacks quality habitat. Furthermore, feasible alternative locations that might achieve the basic project objectives would not reduce the number or severity of significant adverse impacts, assuming the same or similar design and operational characteristics. Specifically, pursuant to investigations to date, there is no environmentally superior location that could feasibly meet the BMP objectives.

## 5.7 ALTERNATIVES IMPACTS COMPARISON

The purpose of this section is to present a comparison of the alternatives and to identify the environmentally superior alternative. Consistent with the CEQA Guidelines (Section 15126.6[a]), the comparison of alternatives and determination of the environmentally superior alternative is based on the ability of the alternative to meet the basic objectives of the project while avoiding or substantially lessening any significant impacts. Consequently, this section presumes implementation of mitigation measures identified in the EIR.

### 5.7.1 No Project Alternative

The No Project Alternative would not have the significant environmental impacts associated with the BMP Update. However, this alternative would have significant, and in some cases, unavoidable impacts on potentially thousands of acres of agricultural lands. Furthermore, this is the only alternative that would result in a continuance of groundwater overdraft, which would become more severe, and therefore, would not meet the most basic objectives of the BMP Update. Therefore the No Project alternative would not be the environmentally superior alternative.

### 5.7.2 BMP Update Alternative Secondary Components

The BMP Update alternative secondary components would not directly replace the primary components (i.e., the BMP Update components described in Section 2, Project Description and evaluated in Section 3) on a one-for-one basis. An alternative for the proposed project could include any number of primary and alternative component combinations that meet the objectives of the proposed project (see Section 2) including water supply yield (see **Table 5-1**). The development of alternative components can potentially be restricted by the development of another component because of project size (including cost), geographic constraints with other projects, or timeframe for implementation.

The tables below (**5-2** through **5-5**) compare the BMP Update Alternative (Secondary) Components to the Proposed BMP Update primary components for the following impact areas:

- Agriculture and Land Use;
- Biological Resources;
- Surface Water, Groundwater & Water Quality; and,
- Construction-Related Impacts (air quality, cultural resources, geology and soils, noise, transportation / traffic, and utilities conflicts).

#### **Agriculture and Land Use**

**Table 5-2** compares the agriculture impacts of the BMP Update alternative or “secondary” components to those found to occur with implementation of the primary BMP Update components described in Section 2, Project Description. The proposed BMP Update had significant unavoidable impacts to agricultural resources due to conversion of prime farmland for Harkins Slough Recharge Facility Upgrades, Watsonville Slough with Recharge Basins, College Lake with Inland Pipeline to CDS, and Murphy Crossing with Recharge Basins components of the BMP Update. Many of the secondary components would also have the potential to convert agricultural land to public infrastructure use, resulting in impacts that would be the same (on an acre-by-acre basis) or more severe than the proposed BMP Update. Those secondary alternatives that would result in more severe or a greater number of significant impacts are shown with “+”, respectively, in **Table 5-2**. Those resulting in the same or similar impacts are shown with a “=” and those with fewer or less impacts or that would have no impact on agriculture resources are shown in with a “—”. Replacing the primary components that convert agricultural land with alternative (secondary) components that do not convert agricultural land would potentially avoid or lessen significant impacts, perhaps to a less-than-significant level. Taking into account feasibility, cost, and timeframe which are critical to the BMP Update, other combinations or suites of project components may not be

environmentally superior to the proposed project due to the inability to meet the BMP Update objectives or reduce agricultural impacts.



**Table 5-2 Agriculture Impacts of Alternative Components Compared to Impacts of Proposed BMP Update Primary Components**

<b>BMP Update Alternative (Secondary) Component</b>	<b>Proposed BMP Update (Primary) Component</b>				
	Increased Recycled Water Storage at Treatment Plant	Harkins Slough Recharge Facility Upgrades	Watsonville Slough with Recharge Basins	College Lake with Inland Pipeline to CDS	Murphy Crossing with Recharge Basins
CDS Expansion	+	+	+	+	+
Winter Recycled Water Deep Aquifer ASR	+	+	+	+	+
River Conveyance of Water for Recharge at Murphy Crossing	+	--	-	-	=
San Benito County Groundwater Demineralization at Watsonville Wastewater Treatment Plant	+	-	-	-	-
Expanded College Lake, Pinto Lake, Corralitos Creek, Watsonville Slough, and ASR	+	+	+	+	+
Seawater Desalination	=	-	-	-	-
Bolsa de San Cayetano with Pajaro River Diversion	+	+	+	+	+
<b>Key:</b> + The Alternative (Secondary) Component contains more severe and/or additional impacts due to conversion of agricultural land when compared to the Primary Component. - The Alternative (Secondary) Component contains less severe and/or fewer impacts due to conversion of agricultural land when compared to the Primary Component. = The Alternative (Secondary) Component due to conversion of agricultural land are similar to, or the same as, the Primary Component.					

**Biological Resources**

**Table 5-3** compares biological resources impacts of the BMP Update alternative or secondary components to those found to occur with implementation of the primary components. The proposed project had significant impacts to biological resources due to temporary and permanent direct changes to habitat for Harkins Slough Recharge Facility Upgrades, Watsonville Slough with Recharge Basins, College Lake with Inland Pipeline to CDS, and Murphy Crossing with Recharge Basins components of the BMP Update. Many of the secondary components would also have the potential to impact biological resources that would be the same or more severe than the primary components. Those secondary alternatives that would result in more severe or a greater number of impacts are shown with “+”, respectively, in **Table 5-3**. Those resulting in the same or similar impacts are shown with “=” and those with fewer or less impact or no impact to agriculture are shown in with a “—”. Replacing the primary components that significantly impact one biological resource with alternative (secondary) components that would not impact biological resources would potentially avoid or lessen significant impacts to those resources. Taking into account feasibility, cost, and timeframe, which are critical to the BMP Update, other combinations or suites of project components may not be environmentally superior to the proposed project due to the inability to meet the BMP Update objectives or reduce biological impacts.

**Table 5-3 Biological Resources Impacts of Alternative Components Compared to Impacts of Proposed BMP Update Primary Components**

<b>BMP Update Alternative (Secondary) Component</b>	<b>Proposed BMP Update (Primary) Component</b>				
	Increased Recycled Water Storage at Treatment Plant	Harkins Slough Recharge Facility Upgrades	Watsonville Slough with Recharge Basins	College Lake with Inland Pipeline to CDS	Murphy Crossing with Recharge Basins
CDS Expansion	+	-	-	-	-
Winter Recycled Water Deep Aquifer ASR	+	-	-	-	-
River Conveyance of Water for Recharge at Murphy Crossing	+	-	-	-	-
San Benito County Groundwater Demineralization at Watsonville Wastewater Treatment Plant	+	=	=	-	-
Expanded College Lake, Pinto Lake, Corralitos Creek, Watsonville Slough, and ASR	+	+	+	+	+
Seawater Desalination	+	+	+	+	+
Bolsa de San Cayetano with Pajaro River Diversion	+	+	+	+	+
<p>Key:</p> <p>+ The Alternative (Secondary) Component contains more severe and/or additional impacts to biological resources when compared to the Primary Component.</p> <p>- The Alternative (Secondary) Component contains less severe and/or fewer impacts to biological resources when compared to the Primary Component.</p> <p>= The Alternative (Secondary) Component impacts to biological resources are similar to, or the same as, the Primary Component.</p>					

**Surface Water, Groundwater & Water Quality**

**Table 5-4** compares surface water, groundwater, and water quality impacts of the BMP Update alternative or secondary components to those found to occur with implementation of the primary components. The proposed BMP Update was found to have potentially significant impacts to surface water (including flooding), groundwater, and water quality resources due to temporary and permanent direct changes to water bodies and flood hazard zones in the case of the Harkins Slough Recharge Facility Upgrades, Watsonville Slough with Recharge Basins, College Lake with Inland Pipeline to CDS, and Murphy Crossing with Recharge Basins components of the BMP Update. Many of the secondary components would also have the potential to impact resources or pose a risk to people/structures that would be the same or more severe. Those secondary alternatives that would result in more severe or a greater number of impacts are shown with “+”, respectively, in **Table 5-4**. Those resulting in the same or similar impacts are shown with “=”; and those with fewer or less impact or no impact to surface water, groundwater, and water quality are shown in with a “—”. Replacing the primary components that significantly impact these resources with alternative (secondary) components that do not impact these resources would potentially avoid or lessen significant impacts to water resources. Taking into account feasibility, cost, and timeframe, which are critical to the BMP Update success, other combinations or suites of project components may not be environmentally superior to the proposed project due to the inability to meet the BMP Update objectives or reduce these impacts.

**Table 5-4 Surface Water, Groundwater & Water Quality Impacts of Alternative Components Compared to Impacts of Proposed BMP Update Primary Components**

	Proposed BMP Update Primary Component				
<b>BMP Update Alternative (Secondary) Component</b>	<b>Increased Recycled Water Storage at Treatment Plant</b>	<b>Harkins Slough Recharge Facility Upgrades</b>	<b>Watsonville Slough with Recharge Basins</b>	<b>College Lake with Inland Pipeline to CDS</b>	<b>Murphy Crossing with Recharge Basins</b>
CDS Expansion	+	+	+	+	+
Winter Recycled Water Deep Aquifer ASR	=	-	-	-	-
River Conveyance of Water for Recharge at Murphy Crossing	=	-	-	-	-
San Benito County Groundwater Demineralization at Watsonville Wastewater Treatment Plant	+	+	+	+	+
Expanded College Lake, Pinto Lake, Corralitos Creek, Watsonville Slough, and ASR	+	+	+	=	+
Seawater Desalination	+	+	+	+	+
Bolsa de San Cayetano with Pajaro River Diversion	+	+	+	+	+
<p>Key:</p> <p>+ The Alternative (Secondary) Component contains more severe and/or additional impacts to Surface Water, Groundwater &amp; Water Quality when compared to the Primary Component.</p> <p>- The Alternative (Secondary) Component contains less severe and/or fewer impacts to Surface Water, Groundwater &amp; Water Quality when compared to the Primary Component.</p> <p>= The Alternative (Secondary) Component impacts to Surface Water, Groundwater &amp; Water Quality are similar to, or the same as, the Primary Component</p>					

### **Construction-Related Impacts**

**Table 5-5** compares construction-related impacts of the BMP Update alternative or secondary components to those found to occur with implementation of the primary components. The proposed BMP Update was found to result in potentially significant impacts to air quality, noise, traffic conditions and utilities due to temporary construction activities for Increased Recycled Water Storage at Treatment Plant, Harkins Slough Recharge Facility Upgrades, Watsonville Slough with Recharge Basins, College Lake with Inland Pipeline to CDS, and Murphy Crossing with Recharge Basins components of the BMP Update. Many of the secondary components would also have the potential to have impacts in these areas that would be the same (on an acre-by-acre basis) or more severe. Those secondary alternatives that would result in more severe or a greater number of impact are shown with “+”, respectively, in **Table 5-5**. Those resulting in the same or similar impacts are shown with “=”; and those with fewer or less impact or no impact related to construction activities are shown in with a “—”. Replacing the primary components that significantly impact the environmental during construction with alternative (secondary) components could potentially avoid or lessen significant short-term, construction impacts. Taking into account feasibility, cost, and timeframe, which are critical to the BMP Update success, other combinations or suites of BMP Update components may not be environmentally superior to the proposed project due to the inability to meet the BMP Update objectives or reduce these impacts.

**Table 5-5 Construction Impacts of Alternative Components Compared to Impacts of Proposed BMP Update Primary Components**

	<b>Proposed BMP Update Primary Component</b>				
<b>BMP Update Alternative (Secondary) Component</b>	<b>Increased Recycled Water Storage at Treatment Plant</b>	<b>Harkins Slough Recharge Facility Upgrades</b>	<b>Watsonville Slough with Recharge Basins</b>	<b>College Lake with Inland Pipeline to CDS</b>	<b>Murphy Crossing with Recharge Basins</b>
CDS Expansion	+	+	+	=	+
Winter Recycled Water Deep Aquifer ASR	+	-	+	=	+
River Conveyance of Water for Recharge at Murphy Crossing	+	-	-	-	-
San Benito County Groundwater Demineralization at Watsonville Wastewater Treatment Plant	+	-	-	-	-
Expanded College Lake, Pinto Lake, Corralitos Creek, Watsonville Slough, and ASR	+	+	+	+	+
Seawater Desalination	+	+	+	+	+
Bolsa de San Cayetano with Pajaro River Diversion	+	+	+	+	+
<b>Key:</b> + The Alternative (Secondary) Component contains more severe and/or additional construction-related impacts when compared to the Primary Component. - The Alternative (Secondary) Component contains less severe and/or fewer construction-related impacts when compared to the Primary Component. = The Alternative (Secondary) Component construction-related impacts are similar to, or the same as, the Primary Component.					

## 5.8 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA requires that an environmentally superior alternative to the Proposed Project be specified, if one is identified. In general, the environmentally superior alternative is supposed to minimize adverse impacts to the environment while achieving most of the basic objectives of the project. The "No Project" alternative could lessen some of the direct significant and unavoidable impacts to agricultural land (conversion of agricultural land to non-agricultural use) associated with the Proposed BMP Update. However, this alternative does not achieve the basic project objective and, in fact, the EIR analysis found that seawater intrusion conditions in the Pajaro Valley groundwater basin would continue to worsen under the No Project Alternative. CEQA Guidelines §15126.6(e)(2) states: "If the environmentally superior alternative is the 'no project' alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives."

Based on the above comparative alternatives analyses, there are several secondary components or alternatives that would have less environmental impacts than specific primary components included in the portfolio of BMP Update projects for certain resource issues/topics. As shown in **Tables 5-2 through 5-5**, some secondary components could reduce environmental impacts in some topics/issues. However, each would involve trade-off environmental impacts and trade-offs related to differences in siting, design, proximity to other BMP components, technical and economic feasibility, permitting/regulatory constraints, and ability to meet basic project objectives. Alternative locations for several of the components were described in Section 5.6, Alternative Locations for BMP Update Components, that would meet the basic project objectives and would potentially reduce significant impacts were thoroughly investigated for the Watsonville Slough with Recharge Basins component, but none have yet to be defined to the extent that they can be found to be economically and technically feasible and reduce environmental impacts, as described above.

All of the alternatives involve a series of trade-offs in terms of feasibility, severity of environmental impacts, and attainment of project objectives. Based on the above analysis, there is no clear Environmentally Superior Alternative that would be capable of eliminating or avoiding the significant and unavoidable impact of loss of agricultural land and could feasibly meet the project objectives. Given the basic objectives of the project to provide a reliable water source, minimize future degradation of water resources, and prevent the long-term loss of agricultural productivity, the proposed BMP Update could be considered the Environmentally Superior Alternative for the following reasons:

- 1) all of the significant impacts of the project can be reduced to a less than significant level with mitigation, with the exception of conversion of agricultural land to non-agricultural uses, and
- 2) eliminating the most implementable and feasible BMP Update components would likely result in far greater long-term impacts to agricultural land due to continued saltwater intrusion and basin overdraft. Ultimately, the impacts of ongoing overdraft basin-wide would require pumping reductions to achieve a balanced basin, whether through regulatory pumping restrictions or adjudication.

Based on the complete record of the alternatives analyses and comparison of the proposed BMP Update components described in Section 2, Project Description to all other considered alternatives, the proposed BMP Update would feasibly meet the project objectives and would likely result in fewer and less severe environmental impacts overall, thus is considered the Environmentally Superior Alternative.



## **APPENDIX BIO**

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### Biological Resources Background Material



## Selected Elements by Scientific Name

### California Department of Fish and Wildlife

### California Natural Diversity Database



**Query Criteria:** Quad< IS </span>(Watsonville West (3612187)<span style="color:Red"> OR </span>Loma Prieta (3712117)<span style="color:Red"> OR </span>Laurel (3712118)<span style="color:Red"> OR </span>Mt. Madonna (3712116)<span style="color:Red"> OR </span>Soquel (3612188)<span style="color:Red"> OR </span>Watsonville East (3612186)<span style="color:Red"> OR </span>Moss Landing (3612177)<span style="color:Red"> OR </span>Prunedale (3612176))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
<b><i>Accipiter cooperii</i></b> Cooper's hawk	ABNKC12040	None	None	G5	S4	WL
<b><i>Adela oplerella</i></b> Opler's longhorn moth	IILEE0G040	None	None	G2	S2	
<b><i>Agelaius tricolor</i></b> tricolored blackbird	ABPBXB0020	None	Threatened	G2G3	S1S2	SSC
<b><i>Ambystoma californiense</i></b> California tiger salamander	AAAAA01180	Threatened	Threatened	G2G3	S2S3	WL
<b><i>Ambystoma macrodactylum croceum</i></b> Santa Cruz long-toed salamander	AAAAA01082	Endangered	Endangered	G5T1T2	S1S2	FP
<b><i>Amsinckia lunaris</i></b> bent-flowered fiddleneck	PDBOR01070	None	None	G3	S3	1B.2
<b><i>Aneides niger</i></b> Santa Cruz black salamander	AAAAD01070	None	None	G3	S3	SSC
<b><i>Anniella pulchra</i></b> northern California legless lizard	ARACC01020	None	None	G3	S3	SSC
<b><i>Antrozous pallidus</i></b> pallid bat	AMACC10010	None	None	G5	S3	SSC
<b><i>Aquila chrysaetos</i></b> golden eagle	ABNKC22010	None	None	G5	S3	FP
<b><i>Arctostaphylos andersonii</i></b> Anderson's manzanita	PDERI04030	None	None	G2	S2	1B.2
<b><i>Arctostaphylos hookeri ssp. hookeri</i></b> Hooker's manzanita	PDERI040J1	None	None	G3T2	S2	1B.2
<b><i>Arctostaphylos pajaroensis</i></b> Pajaro manzanita	PDERI04100	None	None	G1	S1	1B.1
<b><i>Arctostaphylos silvicola</i></b> Bonny Doon manzanita	PDERI041F0	None	None	G1	S1	1B.2
<b><i>Asio flammeus</i></b> short-eared owl	ABNSB13040	None	None	G5	S3	SSC
<b><i>Athene cunicularia</i></b> burrowing owl	ABNSB10010	None	None	G4	S3	SSC
<b><i>Bombus caliginosus</i></b> obscure bumble bee	IIHYM24380	None	None	G4?	S1S2	
<b><i>Bombus occidentalis</i></b> western bumble bee	IIHYM24250	None	Candidate Endangered	G2G3	S1	
<b><i>Calyptridium parryi var. hesseae</i></b> Santa Cruz Mountains pussypaws	PDPOR09052	None	None	G3G4T2	S2	1B.1



# Selected Elements by Scientific Name

## California Department of Fish and Wildlife

### California Natural Diversity Database



Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
<b>Carex comosa</b> bristly sedge	PMCYP032Y0	None	None	G5	S2	2B.1
<b>Ceanothus ferrisiae</b> Coyote ceanothus	PDRHA041N0	Endangered	None	G1	S1	1B.1
<b>Central Dune Scrub</b> Central Dune Scrub	CTT21320CA	None	None	G2	S2.2	
<b>Central Maritime Chaparral</b> Central Maritime Chaparral	CTT37C20CA	None	None	G2	S2.2	
<b>Centromadia parryi ssp. congdonii</b> Congdon's tarplant	PDAST4R0P1	None	None	G3T1T2	S1S2	1B.1
<b>Charadrius alexandrinus nivosus</b> western snowy plover	ABNNB03031	Threatened	None	G3T3	S2S3	SSC
<b>Chorizanthe pungens var. hartwegiana</b> Ben Lomond spineflower	PDPGN040M1	Endangered	None	G2T1	S1	1B.1
<b>Chorizanthe pungens var. pungens</b> Monterey spineflower	PDPGN040M2	Threatened	None	G2T2	S2	1B.2
<b>Chorizanthe robusta var. hartwegii</b> Scotts Valley spineflower	PDPGN040Q1	Endangered	None	G2T1	S1	1B.1
<b>Chorizanthe robusta var. robusta</b> robust spineflower	PDPGN040Q2	Endangered	None	G2T1	S1	1B.1
<b>Cicindela ohlone</b> Ohlone tiger beetle	IICOL026L0	Endangered	None	G1	S1	
<b>Cirsium fontinale var. campylon</b> Mt. Hamilton thistle	PDAST2E163	None	None	G2T2	S2	1B.2
<b>Clarkia concinna ssp. automixa</b> Santa Clara red ribbons	PDONA050A1	None	None	G5?T3	S3	4.3
<b>Coastal and Valley Freshwater Marsh</b> Coastal and Valley Freshwater Marsh	CTT52410CA	None	None	G3	S2.1	
<b>Coastal Brackish Marsh</b> Coastal Brackish Marsh	CTT52200CA	None	None	G2	S2.1	
<b>Coelus globosus</b> globose dune beetle	IICOL4A010	None	None	G1G2	S1S2	
<b>Cordylanthus rigidus ssp. littoralis</b> seaside bird's-beak	PDSCR0J0P2	None	Endangered	G5T2	S2	1B.1
<b>Corynorhinus townsendii</b> Townsend's big-eared bat	AMACC08010	None	None	G3G4	S2	SSC
<b>Coturnicops noveboracensis</b> yellow rail	ABNME01010	None	None	G4	S1S2	SSC
<b>Danaus plexippus pop. 1</b> monarch - California overwintering population	IILEPP2012	None	None	G4T2T3	S2S3	
<b>Dicamptodon ensatus</b> California giant salamander	AAAAH01020	None	None	G3	S2S3	SSC



# Selected Elements by Scientific Name

## California Department of Fish and Wildlife

### California Natural Diversity Database



Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
<b><i>Dipodomys venustus venustus</i></b> Santa Cruz kangaroo rat	AMAFD03042	None	None	G4T1	S1	
<b><i>Dudleya abramsii ssp. setchellii</i></b> Santa Clara Valley dudleya	PDCRA040Z0	Endangered	None	G4T2	S2	1B.1
<b><i>Elanus leucurus</i></b> white-tailed kite	ABNKC06010	None	None	G5	S3S4	FP
<b><i>Emys marmorata</i></b> western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
<b><i>Ericameria fasciculata</i></b> Eastwood's goldenbush	PDAST3L080	None	None	G2	S2	1B.1
<b><i>Eriogonum nudum var. decurrens</i></b> Ben Lomond buckwheat	PDPGN08492	None	None	G5T1	S1	1B.1
<b><i>Eryngium aristulatum var. hooveri</i></b> Hoover's button-celery	PDAP10Z043	None	None	G5T1	S1	1B.1
<b><i>Erysimum ammophilum</i></b> sand-loving wallflower	PDBRA16010	None	None	G2	S2	1B.2
<b><i>Erysimum teretifolium</i></b> Santa Cruz wallflower	PDBRA160N0	Endangered	Endangered	G1	S1	1B.1
<b><i>Eucyclogobius newberryi</i></b> tidewater goby	AFCQN04010	Endangered	None	G3	S3	SSC
<b><i>Euphilotes enoptes smithi</i></b> Smith's blue butterfly	IILEPG2026	Endangered	None	G5T1T2	S1S2	
<b><i>Euphydryas editha bayensis</i></b> Bay checkerspot butterfly	IILEPK4055	Threatened	None	G5T1	S1	
<b><i>Falco peregrinus anatum</i></b> American peregrine falcon	ABNKD06071	Delisted	Delisted	G4T4	S3S4	FP
<b><i>Fissidens pauperculus</i></b> minute pocket moss	NBMUS2W0U0	None	None	G3?	S2	1B.2
<b><i>Fritillaria liliacea</i></b> fragrant fritillary	PMLIL0V0C0	None	None	G2	S2	1B.2
<b><i>Gilia tenuiflora ssp. arenaria</i></b> Monterey gilia	PDPLM041P2	Endangered	Threatened	G3G4T2	S2	1B.2
<b><i>Hoita strobilina</i></b> Loma Prieta hoita	PDFAB5Z030	None	None	G2?	S2?	1B.1
<b><i>Holocarpa macradenia</i></b> Santa Cruz tarplant	PDAST4X020	Threatened	Endangered	G1	S1	1B.1
<b><i>Horkelia cuneata var. sericea</i></b> Kellogg's horkelia	PDROS0W043	None	None	G4T1?	S1?	1B.1
<b><i>Lasthenia californica ssp. macrantha</i></b> perennial goldfields	PDAST5L0C5	None	None	G3T2	S2	1B.2
<b><i>Lavinia symmetricus subditus</i></b> Monterey roach	AFCJB19026	None	None	G4T2T3	S2S3	SSC



Selected Elements by Scientific Name  
California Department of Fish and Wildlife  
California Natural Diversity Database



Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
<b><i>Lessingia micradenia</i> var. <i>glabrata</i></b> smooth lessingia	PDAST5S062	None	None	G2T2	S2	1B.2
<b><i>Lindieriella occidentalis</i></b> California lindieriella	ICBRA06010	None	None	G2G3	S2S3	
<b><i>Malacothamnus arcuatus</i></b> arcuate bush-mallow	PDMAL0Q0E0	None	None	G2Q	S2	1B.2
<b><i>Monardella sinuata</i> ssp. <i>nigrescens</i></b> northern curly-leaved monardella	PDLAM18162	None	None	G3T2	S2	1B.2
<b><i>Monolopia gracilens</i></b> woodland woollythreads	PDAST6G010	None	None	G3	S3	1B.2
<b><i>Neotoma fuscipes annectens</i></b> San Francisco dusky-footed woodrat	AMAFF08082	None	None	G5T2T3	S2S3	SSC
<b>North Central Coast Drainage Sacramento Sucker/Roach River</b> North Central Coast Drainage Sacramento Sucker/Roach River	CARA2623CA	None	None	GNR	SNR	
<b>Northern Coastal Salt Marsh</b> Northern Coastal Salt Marsh	CTT52110CA	None	None	G3	S3.2	
<b>Northern Maritime Chaparral</b> Northern Maritime Chaparral	CTT37C10CA	None	None	G1	S1.2	
<b><i>Oncorhynchus kisutch</i> pop. 4</b> coho salmon - central California coast ESU	AFCHA02034	Endangered	Endangered	G4	S2?	
<b><i>Oncorhynchus mykiss irideus</i> pop. 8</b> steelhead - central California coast DPS	AFCHA0209G	Threatened	None	G5T2T3Q	S2S3	
<b><i>Oncorhynchus mykiss irideus</i> pop. 9</b> steelhead - south-central California coast DPS	AFCHA0209H	Threatened	None	G5T2Q	S2	
<b><i>Pandion haliaetus</i></b> osprey	ABNKC01010	None	None	G5	S4	WL
<b><i>Pedicularis dudleyi</i></b> Dudley's lousewort	PDSCR1K0D0	None	Rare	G2	S2	1B.2
<b><i>Penstemon rattanii</i> var. <i>kleei</i></b> Santa Cruz Mountains beardtongue	PDSCR1L5B1	None	None	G4T2	S2	1B.2
<b><i>Pentachaeta bellidiflora</i></b> white-rayed pentachaeta	PDAST6X030	Endangered	Endangered	G1	S1	1B.1
<b><i>Phrynosoma blainvillii</i></b> coast horned lizard	ARACF12100	None	None	G3G4	S3S4	SSC
<b><i>Piperia yadonii</i></b> Yadon's rein orchid	PMORC1X070	Endangered	None	G1	S1	1B.1
<b><i>Plagiobothrys chorisianus</i> var. <i>chorisianus</i></b> Choris' popcornflower	PDBOR0V061	None	None	G3T1Q	S1	1B.2
<b><i>Plagiobothrys diffusus</i></b> San Francisco popcornflower	PDBOR0V080	None	Endangered	G1Q	S1	1B.1
<b><i>Polygonum hickmanii</i></b> Scotts Valley polygonum	PDPGN0L310	Endangered	Endangered	G1	S1	1B.1



Selected Elements by Scientific Name  
California Department of Fish and Wildlife  
California Natural Diversity Database



Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
<b><i>Rallus obsoletus obsoletus</i></b> California Ridgway's rail	ABNME05011	Endangered	Endangered	G5T1	S1	FP
<b><i>Rana boylei</i></b> foothill yellow-legged frog	AAABH01050	None	Candidate Threatened	G3	S3	SSC
<b><i>Rana draytonii</i></b> California red-legged frog	AAABH01022	Threatened	None	G2G3	S2S3	SSC
<b><i>Reithrodontomys megalotis distichlis</i></b> Salinas harvest mouse	AMAFF02032	None	None	G5T1	S1	
<b><i>Riparia riparia</i></b> bank swallow	ABPAU08010	None	Threatened	G5	S2	
<b><i>Rosa pinetorum</i></b> pine rose	PDROS1J0W0	None	None	G2	S2	1B.2
<b><i>Sorex ornatus salarius</i></b> Monterey shrew	AMABA01105	None	None	G5T1T2	S1S2	SSC
<b><i>Spirinchus thaleichthys</i></b> longfin smelt	AFCHB03010	Candidate	Threatened	G5	S1	
<b><i>Streptanthus albidus ssp. peramoenus</i></b> most beautiful jewelflower	PDBRA2G012	None	None	G2T2	S2	1B.2
<b><i>Taxidea taxus</i></b> American badger	AMAJF04010	None	None	G5	S3	SSC
<b><i>Thaleichthys pacificus</i></b> eulachon	AFCHB04010	Threatened	None	G5	S3	
<b><i>Trifolium buckwestiorum</i></b> Santa Cruz clover	PDFAB402W0	None	None	G2	S2	1B.1
<b><i>Trifolium hydrophilum</i></b> saline clover	PDFAB400R5	None	None	G2	S2	1B.2
<b><i>Trifolium polyodon</i></b> Pacific Grove clover	PDFAB402H0	None	Rare	G1	S1	1B.1
<b><i>Trimerotropis infantilis</i></b> Zayante band-winged grasshopper	IIORT36030	Endangered	None	G1	S1	
<b><i>Tryonia imitator</i></b> mimic tryonia (=California brackishwater snail)	IMGASJ7040	None	None	G2	S2	

Record Count: 98



\*The database used to provide updates to the Online Inventory is under construction. [View updates and changes made since May 2019 here.](#)

## Plant List

61 matches found. [Click on scientific name for details](#)

### Search Criteria

Found in Quads 3712118, 3712117, 3712116, 3612188, 3612187, 3612186 3612177 and 3612176;

[Modify Search Criteria](#) [Export to Excel](#) [Modify Columns](#) [Modify Sort](#) [Display Photos](#)

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
<a href="#">Amsinckia lunaris</a>	bent-flowered fiddleneck	Boraginaceae	annual herb	Mar-Jun	1B.2	S3	G3
<a href="#">Arctostaphylos andersonii</a>	Anderson's manzanita	Ericaceae	perennial evergreen shrub	Nov-May	1B.2	S2	G2
<a href="#">Arctostaphylos hookeri ssp. hookeri</a>	Hooker's manzanita	Ericaceae	perennial evergreen shrub	Jan-Jun	1B.2	S2	G3T2
<a href="#">Arctostaphylos pajaroensis</a>	Pajaro manzanita	Ericaceae	perennial evergreen shrub	Dec-Mar	1B.1	S1	G1
<a href="#">Arctostaphylos regismontana</a>	Kings Mountain manzanita	Ericaceae	perennial evergreen shrub	Dec-Apr	1B.2	S2	G2
<a href="#">Arctostaphylos silvicola</a>	Bonny Doon manzanita	Ericaceae	perennial evergreen shrub	Jan-Mar	1B.2	S1	G1
<a href="#">Calandrinia breweri</a>	Brewer's calandrinia	Montiaceae	annual herb	(Jan)Mar-Jun	4.2	S4	G4
<a href="#">Calyptridium parryi var. hesseae</a>	Santa Cruz Mountains pussypaws	Montiaceae	annual herb	May-Aug	1B.1	S2	G3G4T2
<a href="#">Carex comosa</a>	bristly sedge	Cyperaceae	perennial rhizomatous herb	May-Sep	2B.1	S2	G5
<a href="#">Carex saliniformis</a>	deceiving sedge	Cyperaceae	perennial rhizomatous herb	May-Jun(Jul)	1B.2	S2	G2
<a href="#">Castilleja latifolia</a>	Monterey Coast paintbrush	Orobanchaceae	perennial herb (hemiparasitic)	Feb-Sep	4.3	S4	G4
<a href="#">Ceanothus ferrisiae</a>	Coyote ceanothus	Rhamnaceae	perennial evergreen shrub	Jan-May	1B.1	S1	G1
<a href="#">Ceanothus rigidus</a>	Monterey ceanothus	Rhamnaceae	perennial evergreen shrub	Feb-Apr(Jun)	4.2	S4	G4
<a href="#">Centromadia parryi ssp. congdonii</a>	Congdon's tarplant	Asteraceae	annual herb	May-Oct(Nov)	1B.1	S1S2	G3T1T2
<a href="#">Chorizanthe pungens var. hartwegiana</a>	Ben Lomond spineflower	Polygonaceae	annual herb	Apr-Jul	1B.1	S1	G2T1
	Monterey spineflower	Polygonaceae	annual herb	Apr-Jun(Jul-	1B.2	S2	G2T2

<u>Chorizanthe pungens var. pungens</u>				Aug)			
<u>Chorizanthe robusta var. hartwegii</u>	Scotts Valley spineflower	Polygonaceae	annual herb	Apr-Jul	1B.1	S1	G2T1
<u>Chorizanthe robusta var. robusta</u>	robust spineflower	Polygonaceae	annual herb	Apr-Sep	1B.1	S1	G2T1
<u>Cirsium fontinale var. campylon</u>	Mt. Hamilton fountain thistle	Asteraceae	perennial herb	(Feb)Apr-Oct	1B.2	S2	G2T2
<u>Clarkia breweri</u>	Brewer's clarkia	Onagraceae	annual herb	Apr-Jun	4.2	S4	G4
<u>Clarkia concinna ssp. automixa</u>	Santa Clara red ribbons	Onagraceae	annual herb	(Apr)May-Jun(Jul)	4.3	S3	G5?T3
<u>Cordylanthus rigidus ssp. littoralis</u>	seaside bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	Apr-Oct	1B.1	S2	G5T2
<u>Cypripedium fasciculatum</u>	clustered lady's-slipper	Orchidaceae	perennial rhizomatous herb	Mar-Aug	4.2	S4	G4
<u>Cypripedium montanum</u>	mountain lady's-slipper	Orchidaceae	perennial rhizomatous herb	Mar-Aug	4.2	S4	G4
<u>Dudleya abramsii ssp. setchellii</u>	Santa Clara Valley dudleya	Crassulaceae	perennial herb	Apr-Oct	1B.1	S2	G4T2
<u>Elymus californicus</u>	California bottle-brush grass	Poaceae	perennial herb	May-Aug(Nov)	4.3	S4	G4
<u>Ericameria fasciculata</u>	Eastwood's goldenbush	Asteraceae	perennial evergreen shrub	Jul-Oct	1B.1	S2	G2
<u>Eriogonum nudum var. decurrens</u>	Ben Lomond buckwheat	Polygonaceae	perennial herb	Jun-Oct	1B.1	S1	G5T1
<u>Eryngium aristulatum var. hooveri</u>	Hoover's button-celery	Apiaceae	annual / perennial herb	(Jun)Jul(Aug)	1B.1	S1	G5T1
<u>Erysimum ammophilum</u>	sand-loving wallflower	Brassicaceae	perennial herb	Feb-Jun	1B.2	S2	G2
<u>Erysimum teretifolium</u>	Santa Cruz wallflower	Brassicaceae	perennial herb	Mar-Jul	1B.1	S1	G1
<u>Fissidens pauperculus</u>	minute pocket moss	Fissidentaceae	moss		1B.2	S2	G3?
<u>Fritillaria liliacea</u>	fragrant fritillary	Liliaceae	perennial bulbiferous herb	Feb-Apr	1B.2	S2	G2
<u>Gilia tenuiflora ssp. arenaria</u>	Monterey gilia	Polemoniaceae	annual herb	Apr-Jun	1B.2	S2	G3G4T2
<u>Grindelia hirsutula var. maritima</u>	San Francisco gumplant	Asteraceae	perennial herb	Jun-Sep	3.2	S1	G5T1Q
<u>Hoita strobilina</u>	Loma Prieta hoita	Fabaceae	perennial herb	May-Jul(Aug-Oct)	1B.1	S2?	G2?
<u>Holocarpha macradenia</u>	Santa Cruz tarplant	Asteraceae	annual herb	Jun-Oct	1B.1	S1	G1
<u>Horkelia cuneata var. sericea</u>	Kellogg's horkelia	Rosaceae	perennial herb	Apr-Sep	1B.1	S1?	G4T1?
<u>Iris longipetala</u>	coast iris	Iridaceae	perennial rhizomatous herb	Mar-May	4.2	S3	G3
<u>Lasthenia californica ssp. macrantha</u>	perennial goldfields	Asteraceae	perennial herb	Jan-Nov	1B.2	S2	G3T2
<u>Lessingia micradenia var. glabrata</u>	smooth lessingia	Asteraceae	annual herb	(Apr-Jun)Jul-Nov	1B.2	S2	G2T2
<u>Lomatium parvifolium</u>	small-leaved lomatium	Apiaceae	perennial herb	Jan-Jun	4.2	S4	G4
<u>Malacothamnus arcuatus</u>	arcuate bush-mallow	Malvaceae	perennial	Apr-Sep	1B.2	S2	G2Q



			evergreen shrub					
<a href="#"><u>Malacothamnus hallii</u></a>	Hall's bush-mallow	Malvaceae	perennial evergreen shrub	(Apr)May- Sep(Oct)	1B.2	S2	G2	
<a href="#"><u>Micropus amphibolus</u></a>	Mt. Diablo cottonweed	Asteraceae	annual herb	Mar-May	3.2	S3S4	G3G4	
<a href="#"><u>Monolopia gracilens</u></a>	woodland woolythreads	Asteraceae	annual herb	(Feb)Mar-Jul	1B.2	S3	G3	
<a href="#"><u>Pedicularis dudleyi</u></a>	Dudley's lousewort	Orobanchaceae	perennial herb	Apr-Jun	1B.2	S2	G2	
<a href="#"><u>Penstemon rattanii var. kleei</u></a>	Santa Cruz Mountains beardtongue	Plantaginaceae	perennial herb	May-Jun	1B.2	S2	G4T2	
<a href="#"><u>Pentachaeta bellidiflora</u></a>	white-rayed pentachaeta	Asteraceae	annual herb	Mar-May	1B.1	S1	G1	
<a href="#"><u>Piperia michaelii</u></a>	Michael's rein orchid	Orchidaceae	perennial herb	Apr-Aug	4.2	S3	G3	
<a href="#"><u>Piperia yadonii</u></a>	Yadon's rein orchid	Orchidaceae	perennial herb	(Feb)May- Aug	1B.1	S1	G1	
<a href="#"><u>Plagiobothrys chorisianus var. chorisianus</u></a>	Choris' popcornflower	Boraginaceae	annual herb	Mar-Jun	1B.2	S1	G3T1Q	
<a href="#"><u>Plagiobothrys diffusus</u></a>	San Francisco popcornflower	Boraginaceae	annual herb	Mar-Jun	1B.1	S1	G1Q	
<a href="#"><u>Polygonum hickmanii</u></a>	Scotts Valley polygonum	Polygonaceae	annual herb	May-Aug	1B.1	S1	G1	
<a href="#"><u>Ranunculus lobbii</u></a>	Lobb's aquatic buttercup	Ranunculaceae	annual herb (aquatic)	Feb-May	4.2	S3	G4	
<a href="#"><u>Rosa pinetorum</u></a>	pine rose	Rosaceae	perennial shrub	May,Jul	1B.2	S2	G2	
<a href="#"><u>Sidalcea malachroides</u></a>	maple-leaved checkerbloom	Malvaceae	perennial herb	(Mar)Apr-Aug	4.2	S3	G3	
<a href="#"><u>Streptanthus albidus ssp. peramoenus</u></a>	most beautiful jewelflower	Brassicaceae	annual herb	(Mar)Apr- Sep(Oct)	1B.2	S2	G2T2	
<a href="#"><u>Trifolium buckwestiorum</u></a>	Santa Cruz clover	Fabaceae	annual herb	Apr-Oct	1B.1	S2	G2	
<a href="#"><u>Trifolium hydrophilum</u></a>	saline clover	Fabaceae	annual herb	Apr-Jun	1B.2	S2	G2	
<a href="#"><u>Trifolium polyodon</u></a>	Pacific Grove clover	Fabaceae	annual herb	Apr-Jun(Jul)	1B.1	S1	G1	

### Suggested Citation

California Native Plant Society, Rare Plant Program. 2020. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website <http://www.rareplants.cnps.org> [accessed 23 January 2020].

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#### Questions and Comments

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# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Ventura Fish And Wildlife Office  
2493 Portola Road, Suite B  
Ventura, CA 93003-7726  
Phone: (805) 644-1766 Fax: (805) 644-3958



In Reply Refer To:

January 23, 2020

Consultation Code: 08EVEN00-2020-SLI-0223

Event Code: 08EVEN00-2020-E-00431

Project Name: Pajaro Valley Water Harkins and Struve Slough

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

### To Whom It May Concern:

The enclosed list identifies species listed as threatened and endangered, species proposed for listing as threatened or endangered, designated and proposed critical habitat, and species that are candidates for listing that may occur within the boundary of the area you have indicated using the U.S. Fish and Wildlife Service's (Service) Information Planning and Conservation System (IPaC). The species list fulfills the requirements under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the species list should be verified after 90 days. We recommend that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists following the same process you used to receive the enclosed list. Please include the Consultation Tracking Number in the header of this letter with any correspondence about the species list.

Due to staff shortages and excessive workload, we are unable to provide an official list more specific to your area. Numerous other sources of information are available for you to narrow the list to the habitats and conditions of the site in which you are interested. For example, we recommend conducting a biological site assessment or surveys for plants and animals that could help refine the list.

If a Federal agency is involved in the project, that agency has the responsibility to review its proposed activities and determine whether any listed species may be affected. If the project is a major construction project\*, the Federal agency has the responsibility to prepare a biological assessment to make a determination of the effects of the action on the listed species or critical habitat. If the Federal agency determines that a listed species or critical habitat is likely to be adversely affected, it should request, in writing through our office, formal consultation pursuant to section 7 of the Act. Informal consultation may be used to exchange information and resolve conflicts with respect to threatened or endangered species or their critical habitat prior to a

written request for formal consultation. During this review process, the Federal agency may engage in planning efforts but may not make any irreversible commitment of resources. Such a commitment could constitute a violation of section 7(d) of the Act.

Federal agencies are required to confer with the Service, pursuant to section 7(a)(4) of the Act, when an agency action is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat (50 CFR 402.10(a)). A request for formal conference must be in writing and should include the same information that would be provided for a request for formal consultation. Conferences can also include discussions between the Service and the Federal agency to identify and resolve potential conflicts between an action and proposed species or proposed critical habitat early in the decision-making process. The Service recommends ways to minimize or avoid adverse effects of the action. These recommendations are advisory because the jeopardy prohibition of section 7(a)(2) of the Act does not apply until the species is listed or the proposed critical habitat is designated. The conference process fulfills the need to inform Federal agencies of possible steps that an agency might take at an early stage to adjust its actions to avoid jeopardizing a proposed species.

When a proposed species or proposed critical habitat may be affected by an action, the lead Federal agency may elect to enter into formal conference with the Service even if the action is not likely to jeopardize or result in the destruction or adverse modification of proposed critical habitat. If the proposed species is listed or the proposed critical habitat is designated after completion of the conference, the Federal agency may ask the Service, in writing, to confirm the conference as a formal consultation. If the Service reviews the proposed action and finds that no significant changes in the action as planned or in the information used during the conference have occurred, the Service will confirm the conference as a formal consultation on the project and no further section 7 consultation will be necessary. Use of the formal conference process in this manner can prevent delays in the event the proposed species is listed or the proposed critical habitat is designated during project development or implementation.

Candidate species are those species presently under review by the Service for consideration for Federal listing. Candidate species should be considered in the planning process because they may become listed or proposed for listing prior to project completion. Preparation of a biological assessment, as described in section 7(c) of the Act, is not required for candidate species. If early evaluation of your project indicates that it is likely to affect a candidate species, you may wish to request technical assistance from this office.

Only listed species receive protection under the Act. However, sensitive species should be considered in the planning process in the event they become listed or proposed for listing prior to project completion. We recommend that you review information in the California Department of Fish and Wildlife's Natural Diversity Data Base. You can contact the California Department of Fish and Wildlife at (916) 324-3812 for information on other sensitive species that may occur in this area.

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[\*A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.]

Attachment(s):

- Official Species List

# Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**Ventura Fish And Wildlife Office**

2493 Portola Road, Suite B

Ventura, CA 93003-7726

(805) 644-1766

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## Project Summary

Consultation Code: 08EVEN00-2020-SLI-0223

Event Code: 08EVEN00-2020-E-00431

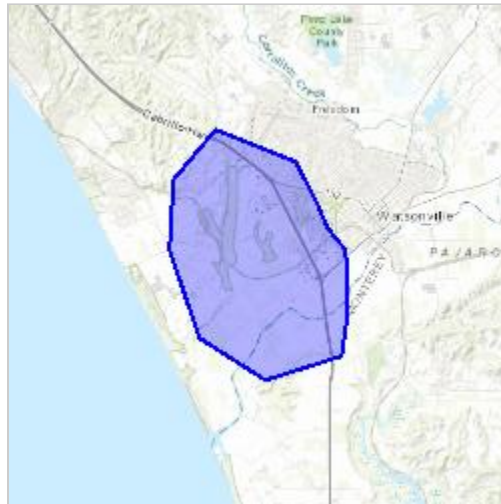
Project Name: Pajaro Valley Water Harkins and Struve Slough

Project Type: WATER SUPPLY / DELIVERY

Project Description: Pump station upgrade and new pump and pipeline

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/36.90007000491062N121.79473732202442W>



Counties: Monterey, CA | Santa Cruz, CA

## Endangered Species Act Species

There is a total of 18 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries<sup>1</sup>, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

## Mammals

NAME	STATUS
San Joaquin Kit Fox <i>Vulpes macrotis mutica</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/2873">https://ecos.fws.gov/ecp/species/2873</a>	Endangered

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## Birds

NAME	STATUS
California Clapper Rail <i>Rallus longirostris obsoletus</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/4240">https://ecos.fws.gov/ecp/species/4240</a>	Endangered
California Least Tern <i>Sterna antillarum browni</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/8104">https://ecos.fws.gov/ecp/species/8104</a>	Endangered
Least Bell's Vireo <i>Vireo bellii pusillus</i> There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/5945">https://ecos.fws.gov/ecp/species/5945</a>	Endangered
Marbled Murrelet <i>Brachyramphus marmoratus</i> Population: U.S.A. (CA, OR, WA) There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/4467">https://ecos.fws.gov/ecp/species/4467</a>	Threatened
Southwestern Willow Flycatcher <i>Empidonax traillii extimus</i> There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/6749">https://ecos.fws.gov/ecp/species/6749</a>	Endangered
Western Snowy Plover <i>Charadrius nivosus nivosus</i> Population: Pacific Coast population DPS-U.S.A. (CA, OR, WA), Mexico (within 50 miles of Pacific coast) There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/8035">https://ecos.fws.gov/ecp/species/8035</a>	Threatened

## Reptiles

NAME	STATUS
San Francisco Garter Snake <i>Thamnophis sirtalis tetrataenia</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/5956">https://ecos.fws.gov/ecp/species/5956</a>	Endangered



## Amphibians

NAME	STATUS
California Red-legged Frog <i>Rana draytonii</i> There is <b>final</b> critical habitat for this species. Your location overlaps the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/2891">https://ecos.fws.gov/ecp/species/2891</a>	Threatened
California Tiger Salamander <i>Ambystoma californiense</i> Population: U.S.A. (Central CA DPS) There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/2076">https://ecos.fws.gov/ecp/species/2076</a>	Threatened
Santa Cruz Long-toed Salamander <i>Ambystoma macrodactylum croceum</i> There is <b>proposed</b> critical habitat for this species. The location of the critical habitat is not available. Species profile: <a href="https://ecos.fws.gov/ecp/species/7405">https://ecos.fws.gov/ecp/species/7405</a>	Endangered

## Fishes

NAME	STATUS
Tidewater Goby <i>Eucyclogobius newberryi</i> There is <b>final</b> critical habitat for this species. Your location overlaps the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/57">https://ecos.fws.gov/ecp/species/57</a>	Endangered

## Crustaceans

NAME	STATUS
Vernal Pool Fairy Shrimp <i>Branchinecta lynchi</i> There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/498">https://ecos.fws.gov/ecp/species/498</a>	Threatened

## Flowering Plants

NAME	STATUS
Marsh Sandwort <i>Arenaria paludicola</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/2229">https://ecos.fws.gov/ecp/species/2229</a>	Endangered
Menzies' Wallflower <i>Erysimum menziesii</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/2935">https://ecos.fws.gov/ecp/species/2935</a>	Endangered
Monterey Gilia <i>Gilia tenuiflora ssp. arenaria</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/856">https://ecos.fws.gov/ecp/species/856</a>	Endangered
Monterey Spineflower <i>Chorizanthe pungens var. pungens</i> There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/396">https://ecos.fws.gov/ecp/species/396</a>	Threatened
Santa Cruz Tarplant <i>Holocarpha macradenia</i> There is <b>final</b> critical habitat for this species. Your location overlaps the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/6832">https://ecos.fws.gov/ecp/species/6832</a>	Threatened

## Critical habitats

There are 3 critical habitats wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
California Red-legged Frog <i>Rana draytonii</i> <a href="https://ecos.fws.gov/ecp/species/2891#crithab">https://ecos.fws.gov/ecp/species/2891#crithab</a>	Final
Santa Cruz Tarplant <i>Holocarpha macradenia</i> <a href="https://ecos.fws.gov/ecp/species/6832#crithab">https://ecos.fws.gov/ecp/species/6832#crithab</a>	Final
Tidewater Goby <i>Eucyclogobius newberryi</i> <a href="https://ecos.fws.gov/ecp/species/57#crithab">https://ecos.fws.gov/ecp/species/57#crithab</a>	Final

**TABLE BIO-1**  
**LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS STUDY AREA**

Common Name Scientific Name	Listing Status USFWS/CDFW/ CRPR, Other	General Habitat Requirements	Potential for Species Occurrence Within the Study Area
<b>Plants</b>			
Bent-flowered fiddleneck <i>Amsinckia lunaris</i>	--/--/1B.2	Cismontane woodland, valley and foothill grassland, coastal bluff scrub. 3 – 795 m.	<b>Unlikely.</b> Known from southwest of Swanton; historic record from Polo Ranch in Scotts Valley. No suitable habitat in study area.
Anderson's manzanita <i>Arctostaphylos andersonii</i>	--/--/1B.2	Broadleaved upland forest, chaparral, north coast coniferous forest. Open sites, redwood forest. 95-765 m.	<b>Unlikely.</b> Known from Forest of Nisene Marks State Park and Mt. Madonna area. No suitable habitat in study area.
Hooker's manzanita <i>Arctostaphylos hookeri</i> ssp. <i>hookeri</i>	--/--/1B.2	Closed-cone coniferous forest, chaparral, cismontane woodland, and coastal scrub. Sandy soils, sandy shales, sandstone outcrops. 30-550 m.	<b>Unlikely.</b> Known from Buena Vista Road and Mar Monte areas. No suitable habitat in study area.
Pajaro manzanita <i>Arctostaphylos pajaroensis</i>	--/--/1B.1	Sandy soils in chaparral. Perennial evergreen shrub. 30 – 170 m.	<b>Unlikely.</b> Known from 0.75 mile west of Corralitos Lagoon, north of Larkin Valley and northwest of Watsonville and San Miguel Canyon Road Area. No suitable habitat in study area.
Santa Cruz Mountain pussypaws <i>Calyptridium parryi</i> var. <i>hesseae</i>	--/--/1B.1	Chaparral, cismontane woodland. Sandy or gravelly openings. 300-1535 m.	<b>Unlikely.</b> Known from Loma Prieta. No suitable habitat in study area.
Marsh sandwort <i>Arenaria paludicola</i>	FE/CE/1B.1	Sandy openings in marshes and swamps (freshwater or brackish). Perennial stoloniferous (grows via runners) herb. El. 30 - 505 m.	<b>Low.</b> Poor habitat present in study area. Known from historic occurrences in the Henry Cowell Redwoods State Park.
Bristly sedge <i>Carex comosa</i>	--/--/2B.1	Marshes and swamps, coastal prairie, valley and foothill grassland. Lake margins, wet places; site below sea level is on a Delta island. -5-1010 m.	<b>Low.</b> Known from the Forest of Nisene Marks State Park, about 10 miles away from study area. Suitable habitat within Harkins Slough and Watsonville Slough.
Deceiving sedge <i>Carex saliniformis</i>	--/--/1B.2	Coastal prairie, coastal scrub (mesic); meadows and seeps; coastal salt marshes and swamps. Perennial herb.	<b>Low.</b> Historic record from Camp Evers. Suitable habitat within Harkins Slough and Watsonville Slough. No nearby recent occurrences.
Congdon's tarplant <i>Centromadia parryi</i> ssp. <i>congonii</i>	--/--/1B.1	Terraces, swales, floodplains, grassland, and disturbed sites. 0-245 m.	<b>Moderate.</b> Margins of Sloughs and ruderal areas provide habitat. Nearby recent CNDDB occurrence is 1.5 miles from suitable habitat within study area.
Ben Lomond spineflower <i>Chorizanthe pungens</i> var. <i>hartwegiana</i>	FE/--/1B.1	Lower montane coniferous forest. Zayante coarse sands in maritime ponderosa pine sandhills. 105-475 m.	<b>Unlikely.</b> Known from Ben Lomond sandhills, Felton, Bonny Doon. No suitable habitat in study area.
Monterey spineflower <i>Chorizanthe pungens</i> var. <i>pungens</i>	FT/--/1B.2	Sandy soil in chaparral (maritime), cismontane woodland, coastal dunes, coastal scrub, and valley and foothill grassland. Annual herb. El. 3 – 450 m.	<b>Low.</b> Recent nearby CNDDB occurrence is 0.5 mile from study area. Sandy substrate observed within Harkins Slough and Watsonville recharge basins areas; long-term agricultural activities reduce potential for occurrence.
Scott's Valley spineflower <i>Chorizanthe robusta</i> var. <i>hartwegii</i>	FE/--/1B.1	Lower Montane coniferous forest, sand substrate. 105-245 m.	<b>Unlikely.</b> No nearby recent occurrences. Sandy substrate observed within Harkins Slough and Watsonville recharge basins areas; long-term agricultural activities reduce potential for occurrence.

**TABLE BIO-1 (CONTINUED)**  
**LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS**

Common Name Scientific Name	Listing Status USFWS/CDFW/ CRPR, Other	General Habitat Requirements	Potential for Species Occurrence Within the Study Area
<b>Plants (cont.)</b>			
Robust spineflower <i>Chorizanthe robusta</i> var. <i>robusta</i>	FE/--/1B.1	Cismontane woodland, coastal dunes, coastal scrub, chaparral. Sand or gravel substrate. 10-300 m.	<b>Low.</b> Sandy substrate is present within the Watsonville recharge basins areas but is likely too disturbed from long-term agricultural and groundwater recharge activities to provide suitable habitat. Known from CNDDDB non-specific location on the edge of Harkins Slough on private property.
Seaside bird's-beak <i>Cordylanthus rigidus</i> ssp. <i>Littoralis</i>	--/CE/1B.1	Closed-cone coniferous forest, chaparral, cismontane woodland, coastal scrub, coastal dunes. Sandy, often disturbed sites, usually within chaparral or coastal scrub. 30-520 m.	<b>Low.</b> Sandy substrate observed within Harkins Slough and Watsonville recharge basins areas; long-term agricultural activities reduce potential for occurrence.
Eastwood's goldenbush <i>Ericameria fasciculata</i>	--/--/1B.1	Closed-cone coniferous forest, chaparral (maritime), coastal scrub, coastal dunes. In sandy openings. 30-215 m.	<b>Low.</b> Known from Manzanita County Park, Prunedale. Poor habitat in sandy substrate areas within Harkins Slough and Watsonville recharge basins areas; long-term agricultural activities reduce potential for occurrence. Nearest recent CNDDDB occurrence is 3.5 miles away.
Ben Lomond buckwheat <i>Eriogonum nudum</i> var. <i>decurrens</i>	--/--/1B.1	Chaparral, cismontane woodland, lower montane coniferous forest. Ponderosa pine sandhills in Santa Cruz County. 180-505 m.	<b>Unlikely.</b> Poor habitat in sandy substrate areas within Harkins Slough and Watsonville recharge basins areas. Study area elevation outside documented range. No nearby recent occurrences.
Hoover's button-celery <i>Eryngium aristulatum</i> var. <i>hooveri</i>	--/--/1B.1	Vernal pools and seasonal wetlands, occasionally alkaline. El. <50 m.	<b>Low.</b> Seasonal wetlands are present within study area. Nearest recent CNDDDB occurrence is 12.5 miles away.
Sand-loving wallflower <i>Erysimum ammophilum</i>	--/--/1B.2	Chaparral (maritime), coastal dunes, coastal scrub. Sandy openings. 3-320 m.	<b>Low.</b> Known from Sunset State Beach, along Shell Road. Poor habitat in sandy substrate areas within Harkins Slough and Watsonville recharge basins areas; long-term agricultural activities reduce potential for occurrence.
Menzie's wallflower <i>Erysimum menziesii</i>	FE/CE/1B.1	Coastal dunes. 0-35 m.	<b>Low.</b> Known from southern end of Monterey Bay around Marina State Beach. Long-term agricultural activities on historic dunes reduce potential for occurrence.
Santa Cruz wallflower <i>Erysimum teretifolium</i>	FE/CE/1B.1	Lower montane coniferous forest, chaparral. Inland marine sands (Zayante coarse sand). 180-515 m.	<b>Unlikely.</b> Known from Felton, Ben Lomond sandhills. Poor habitat in sandy substrate areas within Harkins Slough and Watsonville recharge basins areas; long-term agricultural activities reduce potential for occurrence.
Minute pocket moss <i>Fissidens pauperculus</i>	--/--/1B.2	North coast coniferous forest. Moss growing on damp soil along the coast. In dry streambeds and on stream banks. 30-1025 m.	<b>Unlikely.</b> Known from Loma Prieta Grade Trail, Forest of Nisene Marks State Park. No suitable habitat in study area.
Fragrant fritillary <i>Fritillaria liliacea</i>	--/--/1B.2	Coastal prairie and scrub, grasslands, often on serpentine soils. El. 3 - 410 m.	<b>Unlikely.</b> Known from Rancho San Juan Area, about 2 miles southeast of Prunedale; 1 mile south of Aromas. No suitable habitat in study area.

**TABLE BIO-1 (CONTINUED)**  
**LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS**

Common Name Scientific Name	Listing Status USFWS/CDFW/ CRPR, Other	General Habitat Requirements	Potential for Species Occurrence Within the Study Area
<b>Plants (cont.)</b>			
Monterey gilia <i>Gilia tenuiflora</i> ssp. <i>arenaria</i>	FE/CT/1B.2	Coastal dunes, coastal scrub, chaparral (maritime), cismontane woodland. Sandy openings in bare, wind-sheltered areas. Often near dune summit or in the hind dunes; two records from Pleistocene inland dunes. 5-245 m.	<b>Low.</b> Known from Sunset Beach State Park, about 1.7 miles south of Sunset Beach Road. Sandy substrate is present within the Watsonville recharge basin areas but is likely too disturbed from long-term agricultural and groundwater recharge activities to provide suitable habitat.
Loma Prieta hoita <i>Hoita strobilina</i>	--/--/1B.1	Usually serpentinite and mesic in chaparral, cismontane woodlands, and riparian woodland. Perennial herb. El. 30 - 860 m.	<b>Unlikely.</b> Known from Loma Prieta Peak. No suitable habitat in study area.
Santa Cruz tarplant <i>Holocarpa macradenia</i>	FT/CE/1B.1	Often clay and sandy soils in coastal prairie, coastal scrub, and valley and foothill grassland. Annual herb. El. 10 - 220 m.	<b>Moderate.</b> Known from 3 locations within one mile of study area. Ruderal vegetation community present within study area provides suitable habitat.
Kellogg's horkelia <i>Horkelia cuneate</i> var. <i>sericea</i>	--/--/1B.1	Closed-cone coniferous forest, coastal scrub, coastal dunes, chaparral. Old dunes, coastal sandhills; openings. Sandy or gravelly soils. 5-430 m.	<b>Low.</b> Known from NW of Watsonville, about 2 miles W of Watsonville Airport, about 0.7 mile NE of Ellicott reserve. Poor habitat in sandy substrate areas within Harkins Slough and Watsonville recharge basins areas; long-term agricultural activities reduce potential for occurrence.
Perennial goldfields <i>Lasthenia californica</i> ssp. <i>macrantha</i>	--/--/1B.2	Grassland and dunes along immediate coast. 5-185 m.	<b>Unlikely.</b> Poor habitat in sandy substrate areas within Harkins Slough and Watsonville recharge basins areas; long-term agricultural activities reduce potential for occurrence.
Arcuate bush-mallow <i>Malacothamnus arcuatus</i>	--/--/1B.2	Chaparral and cismontane woodland. Perennial evergreen shrub. El. 15 - 355 m.	<b>Unlikely.</b> Known from Loma Prieta Peak. No suitable habitat in study area.
Hall's bush-mallow <i>Malacothamnus hallii</i>	--/--/1B.2	Chaparral and coastal scrub. Perennial evergreen scrub. El. 10 - 760 m.	<b>Unlikely.</b> Poor habitat present within study area. No recent nearby occurrences.
Northern curly-leaved monardella <i>Monardella sinuate</i> ssp. <i>nigrescens</i>	--/--/1B.2	Coastal dunes, coastal scrub, chaparral, lower montane coniferous forest. Sandy soils. 10-245 m.	<b>Unlikely.</b> Known from the Henry Cowell Redwoods State Park, approximately 15 miles away. Poor suitable habitat present within study area.
Woodland woollythreads <i>Monolopia gracilens</i>	--/--/1B.2	Serpentine grassland, open chaparral, oak woodland. El. 100-1200 m.	<b>Unlikely.</b> No suitable habitat within study area.
Dudley's lousewort <i>Pedicularis dudleyi</i>	--/CR/1B.2	Chaparral (maritime), cismontane woodland, north coast coniferous forest, and valley and foothill grasslands. Perennial herb. El. 60 – 900 m.	<b>Unlikely.</b> Historic record from Aptos. No suitable habitat in study area.
Santa Cruz Mountains beardtongue <i>Penstemon rattanii</i> var. <i>kleei</i>	FE/CE/1B.1	Chaparral, lower montane coniferous forest, north coast coniferous forest. Sandy shale slopes; sometimes in the transition between forest and chaparral. 455-915 m.	<b>Unlikely.</b> Known from Loma Prieta; ridge at headwaters of Aptos Creek by Sulphur Spring. No suitable habitat in study area.
White-rayed pentachaeta <i>Pentachaeta bellidiflora</i>	FE/CE/1B.1	Cismontane woodland and valley and foothill grassland (often serpentinite). Annual herb. El. 35 – 620 m.	<b>Unlikely.</b> Historic record from Eagle Rock. No suitable habitat in study area.

**TABLE BIO-1 (CONTINUED)**  
**LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS**

Common Name Scientific Name	Listing Status USFWS/CDFW/ CRPR, Other	General Habitat Requirements	Potential for Species Occurrence Within the Study Area
<b>Plants (cont.)</b>			
Yadon's rein orchid <i>Piperia yadonii</i>	FE/--/1B.1	Closed-cone coniferous forest, chaparral, coastal bluff scrub. On sandstone and sandy soil, but poorly drained and often dry. 10-505 m.	<b>Low.</b> Known from various locations in the vicinity, but outside, of the study area (Pajaro Hills; upper Elkhorn Slough). Poor habitat in sandy substrate areas Watsonville recharge basins areas; long-term agricultural activities reduce potential for occurrence.
Choris' popcornflower <i>Plagiobothrys chorisianus</i> var. <i>chorisianus</i>	--/--/1B.2	Mesic in chaparral, coastal prairie, and coastal scrub. Annual herb. El. 3 – 160 m.	<b>Low.</b> Poor suitable habitat present. Known from Moss Landing and Elkhorn.
San Francisco popcornflower <i>Plagiobothrys diffusus</i>	--/CE/1B.1	Moist places, seeps. Annual herb. El. 60 – 360 m.	<b>Low.</b> Known from Watsonville Airport. Poor habitat present in study area.
Scott's Valley polygonum <i>Polygonum hickmanii</i>	FE/CE/1B.1	Open, seasonally dry grassland. 210-230 m.	<b>Unlikely.</b> Known only from Scotts Valley. Poor suitable habitat in study area.
Pine rose <i>Rosa pinetorum</i>	--/--/1B.2	Pine woodland. 5-1090 m.	<b>Unlikely.</b> Historic occurrence from Pajaro Hills. No suitable habitat in study area.
Santa Cruz clover <i>Trifolium buckwestiorum</i>	--/--/1B.1	Grassy or disturbed areas. 30-805 m.	<b>Low.</b> Known from Cusick Meadow in Forest of Nisene Marks State Park, Tarpy Flats, S side of highway 68, Manzanita County Park. Suitable habitat present within study area. Closest recent occurrence is 11 miles away from study area.
Saline clover <i>Trifolium hydrophilum</i>	--/--/1B.2	Marshes and swamps, valley and foothill grassland (alkaline) and vernal pools. Annual herb. El. 0 - 300 m.	<b>Unlikely.</b> Known from Soda Lake, just N of Hwy 129; Moro Cojo Slough, E. of Hwy 1; wetlands east of Jetty Road and Hwy 1. No suitable habitat in study area.
<b>Invertebrates</b>			
Western bumblebee <i>Bombus occidentalis</i>	--/SCE/Xerces IM	Inhabits open grassy areas, urban parks and gardens, chaparral and shrub areas, and mountain meadows. Generalist forager that visits wide variety of plants. <i>B. occidentalis</i> records are primarily associated with plants in the Leguminosae (=Fabaceae), Compositae (=Asteraceae), Rhamnaceae, and Rosaceae families.	<b>Low.</b> Little to no suitable habitat present in study area. Host plants from the family Asteraceae and Fabaceae not observed during reconnaissance surveys and not recorded in the study area (CNDDDB, 2020).
Ohlone tiger beetle <i>Cicindela ohlone</i>	FE/--/--	Only known from coastal terraces which support native grassland, in particular purple needlegrass and California oatgrass. Only five remaining populations in the middle of Santa Cruz County.	<b>Unlikely.</b> Study area is not within range of this species.
Globose dune beetle <i>Coelus globosus</i>	--/*/IUCN Vulnerable	Inhabitant of coastal sand dune habitat; erratically distributed from Ten Mile Creek in Mendocino County south to Ensenada, Mexico. Inhabits foredunes and sand hummocks; it burrows beneath the sand surface and is most common beneath dune vegetation.	<b>Low.</b> Observed in beach sand/foredunes at Palm Beach access in 1990 and at Sunset Beach in 1970 (CNDDDB, 2020).
Smith's blue butterfly <i>Euphilotes enoptes smithi</i>	FE/--/Xerces CI	Coastal dunes and inland in coastal scrub, grassland, and chamise chaparral where host plants are present. Requires <i>Eriogonum parvifolium</i> and <i>E. latifolium</i> to complete its life cycle.	<b>Unlikely.</b> Coastal dune and scrub habitat is absent from the study area.

**TABLE BIO-1 (CONTINUED)**  
**LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS**

Common Name Scientific Name	Listing Status USFWS/CDFW/ CRPR, Other	General Habitat Requirements	Potential for Species Occurrence Within the Study Area
<b>Invertebrates (cont.)</b>			
Bay checkerspot butterfly <i>Euphdryas editha bayensis</i>	FT/--/Xerces CI	Shallow, serpentine-derived soil. The primary larvae host plant is dwarf plantain ( <i>Plantago erecta</i> ). The secondary host plant is purple owl's clover ( <i>Castilleja densiflora</i> ). Historically occurred along the ridges of the San Francisco peninsula from Twin Peaks to southern Santa Clara County.	<b>Unlikely.</b> Suitable serpentine-derived soils not present in the study area.
Monarch – California overwintering population <i>Danaus plexippus</i> pop. 1	--*/Xerces IM	Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, cypress), with nectar and water sources nearby. Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico.	<b>Low.</b> Potential overwintering site in eucalyptus trees along road to Harkins Slough intake station, but no observations from this site (CNDDDB, 2020). A few individuals recorded in eucalyptus/cypress grove at mouth of Pajaro River in 2014. Historic site near Manresa State Beach where 1000s roosted in the mid-1980s through 1991, but not observed from 1992-2014 (CNDDDB, 2020).
Zyante band-winged grasshopper <i>Trimerotropis infantilis</i>	FE/--/IUCN Endangered	Isolated sandstone deposits in the Santa Cruz Mountains (the Zayante Sand Hills ecosystem)	<b>Unlikely.</b> Study area is not within species' range.
<b>Fish</b>			
Green Sturgeon – Southern DPS <i>Acipenser medirostris</i>	FT/--/--	Anadromous, but tend to spend more time in the ocean than most species. Spawns several times in their lives, in natal rivers every 3-5 years. Can live up to 70 years old, reaching maturity at 15 years. Ranges from Alaska to Mexico, but higher concentrations are located north of Point Conception. sDPS spawn in the Sacramento River.	<b>Unlikely.</b> Although rare straying into the Pajaro River Estuary may occur, the species has not been reported from the Pajaro River basin.
Tidewater goby <i>Eucyclogobius newberryi</i>	FE/SSC/--	Typically, an annual benthic species that occurs in loose aggregations of a few to several hundreds or thousands of individuals. Peak breeding activities in late April to May. Inhabits coastal lagoons and brackish bays at the mouth of freshwater streams. Vegetation within habitat is generally sparse.	<b>Observed.</b> Known to occur in the Pajaro River Lagoon and lowermost reach of Watsonville Slough downstream of the Shell Road Pump Station. Surveys have not been conducted upstream of Shell Road..
Pacific lamprey <i>Lampetra tridentata</i>	--/SSC/--	Found in Pacific Coast streams throughout California. This anadromous species requires cold, clear water and gravel substrates for spawning. Ammocoetes burrow into soft sand or mud for rearing.	<b>Observed.</b> Known to occur in Salsipuedes and Corralitos creeks, likely present in mainstem Pajaro River. Seasonally migrate through Pajaro River Estuary.
Monterey hitch <i>Lavinia exilicauda harengus</i>	--/SSC/--	Found in the Salinas and Pajaro River watersheds, this subspecies can occupy a wide variety of habitats, but is most abundant in lowland areas with large pools or in small reservoirs that mimic these conditions.	<b>Moderate.</b> Known to occur in mainstem Pajaro River and upstream tributaries such as Uvas, Llagas and Pacheco creeks. May seasonally inhabit Pajaro River Lagoon..
Monterey roach <i>Lavinia symmetricus subditus</i>	--/SSC/--	This subspecies occurs only in tributaries to Monterey Bay (Salinas, Pajaro, and San Lorenzo rivers). Typically found in pools with warm water, but tolerant of wide range of habitats and conditions such, including temperatures up to 35°C and dissolved oxygen as low as 1-2 parts per million. Require gravel beds or riffles for egg deposition.	<b>Unlikely.</b> Absent from the mainstem Pajaro River but present in upstream tributary watersheds such as Uvas Creek, Llagas Creek, etc. Unlikely to occur in Pajaro River Lagoon/Watsonville Slough system.

**TABLE BIO-1 (CONTINUED)**  
**LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS**

Common Name Scientific Name	Listing Status USFWS/CDFW/ CRPR, Other	General Habitat Requirements	Potential for Species Occurrence Within the Study Area
<b>Fish (cont.)</b>			
Coho salmon – Central California Coast ESU <i>Oncorhynchus kisutch</i>	FE/CT/--	Spends first half of life cycle rearing and feeding in streams and small freshwater tributaries with stable gravel substrates. The remainder of life is spent foraging in estuaries and marine waters. Returns to natal streams to spawn and then die.  This ESU includes naturally spawned salmon originating from rivers south of Punta Gorda, CA to Aptos Creek, as well as salmon originating from tributaries to San Francisco Bay.	<b>Unlikely.</b> This species occurs in northern Monterey Bay but does not spawn in the Pajaro River watershed.
Steelhead – South-central California Coast DPS <i>Oncorhynchus mykiss</i>	FT/--/--	Occurs in rivers and streams with gravel-bottomed, fast-flowing, well-oxygenated fresh water. Juveniles spend several years in freshwater maturing before migrating to the ocean. They remain in the ocean for 3 years before returning to freshwater to spawn. Spawning habitat consists of gravel substrates free of excessive silt.  This DPS includes naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from the Pajaro River to, but not including, the Santa Maria River.	<b>Observed.</b> Steelhead from this DPS are known to rear and spawn in the Pajaro River watershed, including College Lake and its tributary streams. Utilize the Lagoon seasonally but unlikely to occur in the Watsonville Slough system.
Longfin smelt <i>Spirinchus thaleichthys</i>	FC/CT,SSC/--	Anadromous smelt that occurs in the middle or bottom of water column in salt or brackish water. Concentrated in Suisun Bay, Montezuma Slough, and the lower reaches of the Sacramento and San Joaquin Rivers. May also be found throughout San Francisco Bay, Humboldt Bay, Eel river estuary and other local coastal areas. Spawning occurs in freshwater rivers, where they die afterwards.	<b>Unlikely.</b> No known occurrences in Pajaro River basin.
Eulachon <i>Thaleichthys pacificus</i>	FT/--/--	Anadromous smelt that spend most of life in the ocean, returning after 2 – 5 years to spawn in freshwater rivers. Eggs incubate in the spawning habitat of coarse sand, until larvae drift downstream to estuarine habitats. Juveniles disperse into ocean waters where they can be found on the continental shelf waters.	<b>Unlikely.</b> No known occurrences in Pajaro River basin.
<b>Amphibians</b>			
California tiger salamander <i>Ambystoma californiense</i>	FT/CT/--	Wintering sites occur in grasslands occupied by burrowing mammals; breeds in ponds, vernal pools, and slow-moving or receding streams.	<b>Unlikely.</b> Suitable breeding habitat is not present in the study area.
Santa Cruz long-toed salamander <i>Ambystoma macrodactylum croceum</i>	FE/CE, CFP/--	Breeds in a handful of isolated seasonal ponds in Santa Cruz and Monterey Counties. Adults found in dense riparian vegetation such as willows, thick coastal scrub and oak woodland. Adults spend much of their lives underground utilizing tunnels of burrowing mammals such as moles and ground squirrels, moving to aquatic habitats to breed.	<b>Low.</b> Dense riparian habitat is present along Struve and Harkins Sloughs, but species has not been documented in the study area. Nearest known occurrence is approximately 2.5 miles from the study area (CNDDDB, 2020).
Foothill yellow-legged frog <i>Rana boylei</i>	--/SCT,SSC/--	Rarely occurs far from permanent water. Rocky streams and rivers with rocky substrate and open sunny banks in forests, chaparral, and woodlands. Sometimes found in isolated pools, vegetated backwaters, and deep, shaded, spring-fed pools. Attaches egg clusters to gravel or rocks in moving water near stream margins.	<b>Unlikely.</b> Suitable rocky stream and riverine habitat for this species is not present in the study area. No CNDDDB or museum records for this species in the study area, and no observations despite conducting western pond turtle and California red-legged frogs surveys.



**TABLE BIO-1 (CONTINUED)**  
**LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS**

Common Name Scientific Name	Listing Status USFWS/CDFW/ CRPR, Other	General Habitat Requirements	Potential for Species Occurrence Within the Study Area
<b>Amphibians (cont.)</b>			
California red-legged frog <i>Rana draytonii</i>	FT/SSC/--	Breed in stock ponds, pools, and slow-moving streams.	<b>Present.</b> Species known to occur in the Watsonville Slough complex (CNDDDB, 2020). Adults and subadults observed in mainstem Pajaro River from Pajaro Lagoon to 7 miles upstream of State Route 1 at Murphy's Crossing (KEC, 2020). Breeding surveys conducted by KEC, Bioresearch Associates, and Bryan Mori Biological Consulting in 2012-2016 have documented CRF breeding activity in Middle Watsonville Slough, lower Harkins Slough, Hanson Slough, and two ponds at the Land Trust of Santa Cruz – Watsonville Slough Farm (0.2 mi N of the proposed Struve Slough screened intake and pump station) as recently as 2017 (CNDDDB, 2020). In March 2013, CRF breeding was recorded 1000 ft upstream of the existing Harkins Slough intake facility in both Watsonville Slough and Harkins Slough. Adult and subadult frogs have been observed over-summering in the Harkins Slough Pump Station channel, within the pump station facility.
<b>Reptiles</b>			
Northern California legless lizard <i>Anniella pulchra</i>	--/SSC/--	Coastal dune, valley-foothill, chaparral, and coastal scrub habitats in areas with sandy or loose loam soils.	<b>Low.</b> Species known to occur in recent years in sand dunes within 0.36 miles of the proposed recharge basins (CNDDDB, 2020). Habitat for this species is present in the alluvial deposits along the Pajaro River and in dune scrub at the river mouth. Potential habitat also exists in the farmed historic dunes at the proposed recharge basin area, although intensive farming and foot traffic significantly decreases the quality of this habitat.
Western pond turtle <i>Actinemys marmorata</i>	--/SSC/--	Found in ponds, lakes, rivers, streams, creeks, marshes, and irrigation ditches with abundant vegetation and either rocky or muddy bottoms in woodland, forest, and grassland. In streams, prefers pools to shallower areas. Logs, rocks, cattail mats, and exposed banks required for basking. Lays eggs in sandy soils along stream or pond margins.	<b>Moderate.</b> Species known to occur in Watsonville Slough (CNDDDB, 2011). Field studies on the Pajaro River conducted from 2009-2019 indicate an estimated population of between 148 and 182 western pond turtles in the Pajaro River Flood Control Channel portion of the PVWMA BMP EIR study area (KEC, 2020).
Coast horned lizard <i>Phrynosoma blainvillii</i>	--/SSC/--	Inhabits open habitats including grasslands or shrublands with loose sandy or loamy soils	<b>Low.</b> Species is rare in the vicinity of the study area. One individual observed in July 2012 on the Pajaro levee slope, 5 miles upstream of SR 1 (KEC, 2020) No CNDDDB records within 3 miles of the study area (CNDDDB, 2020), but potential habitat is present in alluvial deposits along the Pajaro River.
<b>Birds</b>			
Tricolored blackbird <i>Agelaius tricolor</i>	--/CT, SSC/BCC (Nesting colony)	Highly colonial species, most numerous in Central Valley and vicinity. Largely endemic to California. 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. Requires open water, protected nesting substrate, and foraging area with insect prey within a few km of the colony.	<b>Low.</b> This species may occur in emergent vegetation in the study area during winter, in mixed flocks with other blackbirds. Suitable nesting habitat is present in blackberry hedges and freshwater emergent wetland habitat in the study area, but there are no records of nesting colonies in the study area since 1988. (CNDDDB, 2020).

**TABLE BIO-1 (CONTINUED)**  
**LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS**

Common Name <i>Scientific Name</i>	Listing Status USFWS/CDFW/ CRPR, Other	General Habitat Requirements	Potential for Species Occurrence Within the Study Area
<b>Birds (cont.)</b>			
Golden eagle <i>Aquila chrysaetos</i>	--/CFP/BCC (Nesting and wintering)	Typically inhabits rolling foothills and mountain terrain, wide arid plateaus deeply cut by steams and canyons, open mountain slopes, cliffs and rock outcroppings, sage-juniper flats and deserts from elevations of sea level to 11,500 feet. Builds large platform nest on cliffs of all heights and in large trees in open areas. Nest size is from 10 feet across to 3 feet high of sticks, twigs, and greenery. Most are resident, but some may migrate into downslope for winter. The majority of California provides year-round habitat for this species.	<b>Unlikely.</b> Suitable nesting habitat not present within several miles of study area, though some foraging maybe possible over agricultural fields supporting small mammals. Closest nest occurrence is approximately 10 miles southeast near Sugarloaf Peak.
Short-eared owl <i>Asio flammeus</i>	--/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.	<b>Low.</b> This species is a rare migrant and winter visitor in the region, and does not nest in the study area. Observed in Watsonville Slough in September 2012 (KEC, 2020.). This species may forage over agricultural fields or grassland in the study area in winter or during migration.
Burrowing owl <i>Athene cunicularia</i>	--/SSC/BCC 3503.5 (Burrow sites and some wintering sites)	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	<b>Low (breeding season) Moderate (winter season).</b> Occasional non-breeding visitor from October through February (Suddjian et al., 2007 cited in PVWMA BMP Update Draft EIR, 2013). Has been observed along railroad tracks south of Watsonville Slough in winter (KEC, 2020). Suitable burrows observed in this area during site visit in January 2020.
Marbled murrelet <i>Brachyramphus marmoratus</i>	FT/CE/--	Only breeds along California coast. Nests in mature, dense forests of redwood and Douglas fir. Can be seen as far as 4 – 5 miles inland. Prefers to nest in tall trees. Nests made of moss and lichen. Southernmost extent of range is in San Mateo County.	<b>Unlikely.</b> The study area is out of range of this species and no suitable habitat is present in the study area.
Western snowy plover <i>Charadrius alexandrius nivosus</i>	FT/SSC/BCC	Sandy coastal beaches, salt pans, coastal dredged spoils sites, dry salt ponds, salt pond levees and gravel bars. Nests in sandy substrate and forages in sandy marine and estuarine bodies.	<b>Unlikely.</b> Suitable sandy or gravelly habitat is not present in the study area, but species has been known to nest at the Pajaro River mouth, most recently in 1978.
Yellow rail <i>Coturnicops noveboracensis</i>	--/SSC/BCC	Species is a winter visitor around the San Francisco Bay, and is present year round in the extreme central north of California. Breeding requires sedge marsh/ meadows with moist soil and shallow standing water.	<b>Unlikely.</b> Coastal marsh habitat is not present in the study area, and species has not been reported in the vicinity.
White-tailed kite <i>Elanus leucurus</i>	--/CFP/-- (Nesting)	Inhabits herbaceous and open stages of most habitats in cismontane California. A yearly resident in coastal and valley lowlands. Nests in top of a dense oak, willow, or other tree stand 20-100 feet above ground. Prey is mostly voles and other small, diurnal mammals, occasionally birds, insects, reptiles, and amphibians.	<b>High.</b> Suitable nesting habitat is present in vegetation along Watsonville, Struve and Harkins Sloughs. This species is frequently observed in the study area year-round (eBird, 2020) and has nested in the willows at the Hanson Slough-Middle Watsonville Slough confluence (KEC, 2020)
Southwestern willow flycatcher <i>Empidonax traillii extimus</i>	FE/CE/-- (Nesting)	Most often occurs in broad, open river valley or large mountain meadows with shrubby willows. Prefers extensive willow thickets on edge of wet meadows, ponds or backwaters for nesting and roosting.	<b>Unlikely.</b> Suitable willow thicket habitat is present but species has not been recorded in the vicinity of the study area (eBird, 2020) and not known to nest in the project region (Suddjian et al., 2007).

**TABLE BIO-1 (CONTINUED)**  
**LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS**

Common Name Scientific Name	Listing Status USFWS/CDFW/ CRPR, Other	General Habitat Requirements	Potential for Species Occurrence Within the Study Area
<b>Birds (cont.)</b>			
American peregrine falcon <i>Falco peregrinus anatum</i>	--/CFP/-- (Nesting)	Breeds in woodland, forest and coastal habitats near wetlands, lakes, rivers, or other water on high cliffs, banks, dunes or mounds. Nest is a scrape on a depression nor ledge in an open site. Will nest on man-made structures, and occasionally uses tree or snag cavities. Riparian areas and coastal inland wetlands are important yearlong habitats.	<b>Unlikely.</b> Occurs uncommonly, but year-round, in the study area. Seen frequently in September/October, infrequently the remainder of the year (eBird, 2020).
Bald Eagle <i>Haliaeetus leucocephalus</i>	--/CE,CFP/--	Forages in rivers and lakes for large fish. Nests along coastal cliffs and in trees at lakes and rivers.	<b>High.</b> Suitable nesting habitat is present in study area in eucalyptus groves along the slough margins. BAEA are now considered resident in San Cruz County. Since 2014, an annually active nest has been documented in Gallighan Slough 1.3 miles upstream of the Harkins Slough Pump Station. Breeding has been successful 5 of 6 years (KEC, 2020). May forage in Harkins and Struve Sloughs. Occurs uncommonly, but year-round, in the study area (eBird, 2020).
Bryant's savannah sparrow <i>Passerculus sandwichensis alaudinus</i>	--/SSC/--	Coastal marshes and foothill grasslands within the fog belt from Humboldt Bay to Morro Bay. Nests on the ground in grass cup nests beneath dense grasses or weeds. Feeds on insects, small mollusks and seeds as seasonally available.	<b>Low.</b> Suitable nesting habitat within the study area is limited to Pajaro Lagoon where species has been recorded, but primarily in non-nesting season August – January (eBird, 2020).
Osprey <i>Pandion haliaetus</i>	--/WL/--	Ocean shore, bays, freshwater lakes, and larger streams. Large nests built in tree-tops within 15 miles of a good fish-producing body of water. In urban areas, known to build nests on man-made structures such as light fixtures and cranes.	<b>High.</b> Active nesting occurs at Harkins Slough Road crossing at Harkins Slough on a PGE-placed nest platform and at 2 locations at College Lake. Occurs year-round, in the study area. Seen foraging frequently and consistently in July through October. Osprey documented in 2020 nesting in Harkins Slough and on a PG&E pole along West Beach Road near Pajaro Dune and the lower Watsonville Slough tidal outlet channel (KEC, 2020).
California Ridgway's rail <i>Rallus obsoletus obsoletus</i>	FE/CE,CFP/--	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.	<b>Unlikely.</b> Study area does not provide coastal salt marsh habitat for this species.
Bank swallow <i>Riparia riparia</i>	--/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.	<b>Unlikely.</b> One occurrence record in Watsonville from the 1950s along the Pajaro River is no longer active. No suitable nesting habitat present in the study area. Individuals may forage or migrate through.
Yellow warbler <i>Setophaga petechia</i>	--/SSC/BCC	Generally occupy riparian vegetation in close proximity to water along streams and in wet meadows.	<b>High.</b> Known to breed in dense willow riparian habitat along the Pajaro River. Potential to occur in riparian forest within the study area. Observed during the breeding season in Harkins and Struve Sloughs (eBird, 2020).
California least tern <i>Sterna antillarum browni</i>	FE/CE,CFP/-- (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.	<b>Unlikely.</b> Nesting habitat is not present in the study area. Individuals may occur during migration at Harkins Slough and Watsonville Slough and along the Pajaro River.

**TABLE BIO-1 (CONTINUED)**  
**LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS**

Common Name Scientific Name	Listing Status USFWS/CDFW/ CRPR, Other	General Habitat Requirements	Potential for Species Occurrence Within the Study Area
<b>Birds (cont.)</b>			
Least Bell's vireo <i>Vireo bellii pusillus</i>	FE/CE/--	Nests in low, dense riparian growth along water or along dry parts of intermittent streams. Typically associated with willow, cottonwood, baccharis, and wild blackberry. This race is endemic to California and northern Baja California, and is a local summer resident below 600 m in valley and foothill riparian habitat, and lower portions of canyons in San Benito and Monterey County. Nest is placed on slender branch of willow or other shrub.	<b>Unlikely.</b> Nearest recorded occurrences are along Highway 101 to the east, but suitable dense riparian habitat is present onsite. Not recorded in Santa Cruz County.
<b>Mammals</b>			
Pallid bat <i>Antrozous pallidus</i>	--/SSC/--	Day roosts are mainly in caves, crevices, and mines. Also found in buildings and under bark. Forages in open lowland areas.	<b>Low.</b> Limited suitable roosting habitat is present in trees along access road to Harkins Slough and the Pajaro River. Not recorded in the study area (CNDDDB, 2020).
Townsend's big-eared bat <i>Corynorhinus townsendii</i>	--/SSC--	Roosts in caves, mines, buildings, or other human-made structures. Forages in open lowland areas.	<b>Unlikely.</b> Species may forage over study area but suitable roosting habitat is not present in study area. Not recorded in the study area (CNDDDB, 2020).
Santa Cruz kangaroo rat <i>Dipodomys venustus venustus</i>	--/*/--	Occurs in the cool, maritime mountains of west-central California. Chaparral habitat in the low foothills of the Santa Cruz Mountains, on substrates of sands, loams, and sandy loams. Current distribution is uncertain, but probably includes remnant patches of habitat on Mount Hermon, and possible at Boony Doon. Species' distribution conforms closely to the distribution of open chaparral habitat (including <i>Arctostaphylos</i> sp. and <i>Ceanothus</i> sp.) occurring on sandy soils (Zayante or Santa Margarita soils). Digs burrows, but not in orchards or other actively cultivated land.	<b>Unlikely.</b> Study area is outside of species' known range and suitable habitat is not present in the study area.
Western red bat <i>Lasiurus blossevillei</i>	--/SSC/--	Roosts in foliage of deciduous trees and shrubs near streams, open fields and orchards.	<b>Moderate.</b> No records present in the region but suitable habitat is present along Harkins Slough, Struve Slough, the Pajaro River, and the access road to the Harkins Slough filter plant.
San Francisco Dusky-footed woodrat <i>Neotoma fuscipes annectens</i>	--/SSC/--	Occurs in wooded habitats with dense understory of native species.	<b>Low.</b> Woodrat houses not observed during reconnaissance survey of Struve Slough and Harkins Slough riparian habitat (ESA, 2020). Woodrat houses are known to occur in the Watsonville slough area in oak woodland, riparian thickets, and poison oak/hemlock uplands, but not in the proposed project impact areas. Woodrat houses are present along the Pajaro River downstream of SR 1 in dense willow-dominated riparian vegetation.
American badger <i>Taxidea taxus</i>	--/SSC/--	Most abundant in drier open stages of shrubland, grassland or forested habitats with loose, friable soil for burrowing.	<b>Unlikely.</b> Suitable habit not present in the study area.

**TABLE BIO-1 (CONTINUED)**  
**LIST OF SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS**

Common Name <i>Scientific Name</i>	Listing Status USFWS/CDFW/ CRPR, Other	General Habitat Requirements	Potential for Species Occurrence Within the Study Area
<b>Mammals (cont.)</b>			
Mountain lion <i>Puma concolor</i> (Southern California/Central Coast Evolutionarily Significant Unit [ESU])	--/SCT/--	Primarily solitary, territorial cats that occur in low density that require large areas of relatively undisturbed habitats. Habitats often consist of pine forests, riparian and oak woodlands, streams, chaparral, and grasslands, though also known to occur in desert habitats. Primary prey is large ungulates, especially deer.	<b>Low.</b> The Santa Cruz Mountains are the core area for the Central Coast North (CC-N) population. The northern end of the Watsonville Slough complex abuts a narrow corridor of undeveloped space connecting to the Santa Cruz Mountains between SR 1 and agricultural fields. Agricultural fields also are present west and south of the project area, and the City of Watsonville lies to the east. Therefore, there is a low potential to have mountain lions enter the project area.

**Definitions:**

Unlikely = Study area and/or immediate vicinity do not support suitable habitat for a particular species. Study area is outside of the species known range.  
Low Potential = The study area and/or immediate vicinity only provide limited habitat. In addition, the species' known range may be outside of the study area.  
Moderate Potential = The study area and/or immediate vicinity provide suitable habitat.  
High Potential = The study area and/or immediate vicinity provide ideal habitat conditions.

**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  
BCC = Bird of Conservation Concern

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  
CFP = CDFW designated "Fully Protected" Species  
SCE = Candidate for listing as Endangered by the State of California  
SCT = Candidate for listing as Threatened by the State of California  
SSC = California Species of Special Concern  
CR = Listed as Rare by the State of California  
WL = Watch list

\* = no listing status, but included on the CDFW Special Animals List  
3503.5 = Eggs, Nests, and Nestlings of Falconiformes and Strigiformes Protected under Section 3503.5 of the California Fish and Game Code  
3511 = Fully Protected Species under Section 3511 of the California Fish and Game Code

SOURCES: CDFW, 2020; CNPS, 2020; eBird (hotspots: Harkins Slough; Watsonville Slough and Struve Slough Confluence), 2020; ESA, 2020; University of California, 2020; USFWS, 2020; Kittleson Environmental Consulting (KEC), 2020.

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

Threat Sub-Rankings –

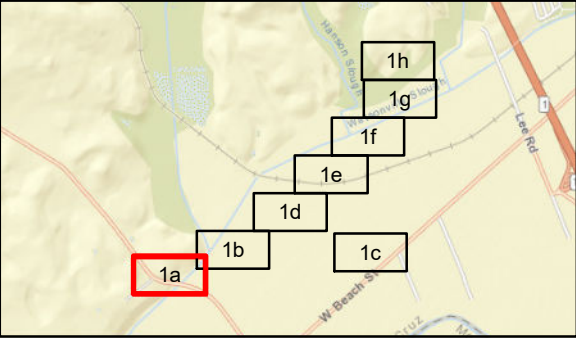
0.1: Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)  
0.2: Fairly endangered in California (20-80% occurrences threatened/ moderate degree and immediacy of threat)  
0.3: Not very threatened in California (<20% of occurrences threatened/low degree and immediacy of threat or no current threats known)

Xerces Society for Invertebrate Conservation (Xerces):

CI = Critically imperiled  
IM = Imperiled  
VU = Vulnerable  
DD = Data Deficit

IUCN=International Union for Conservation of Nature



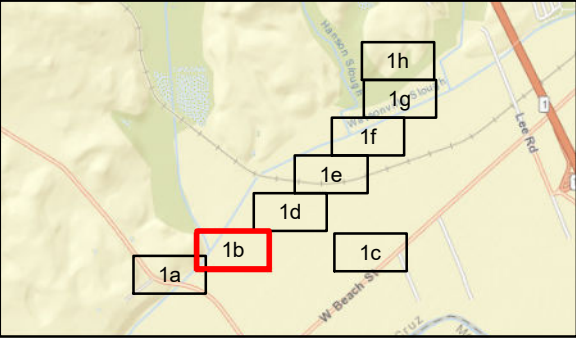
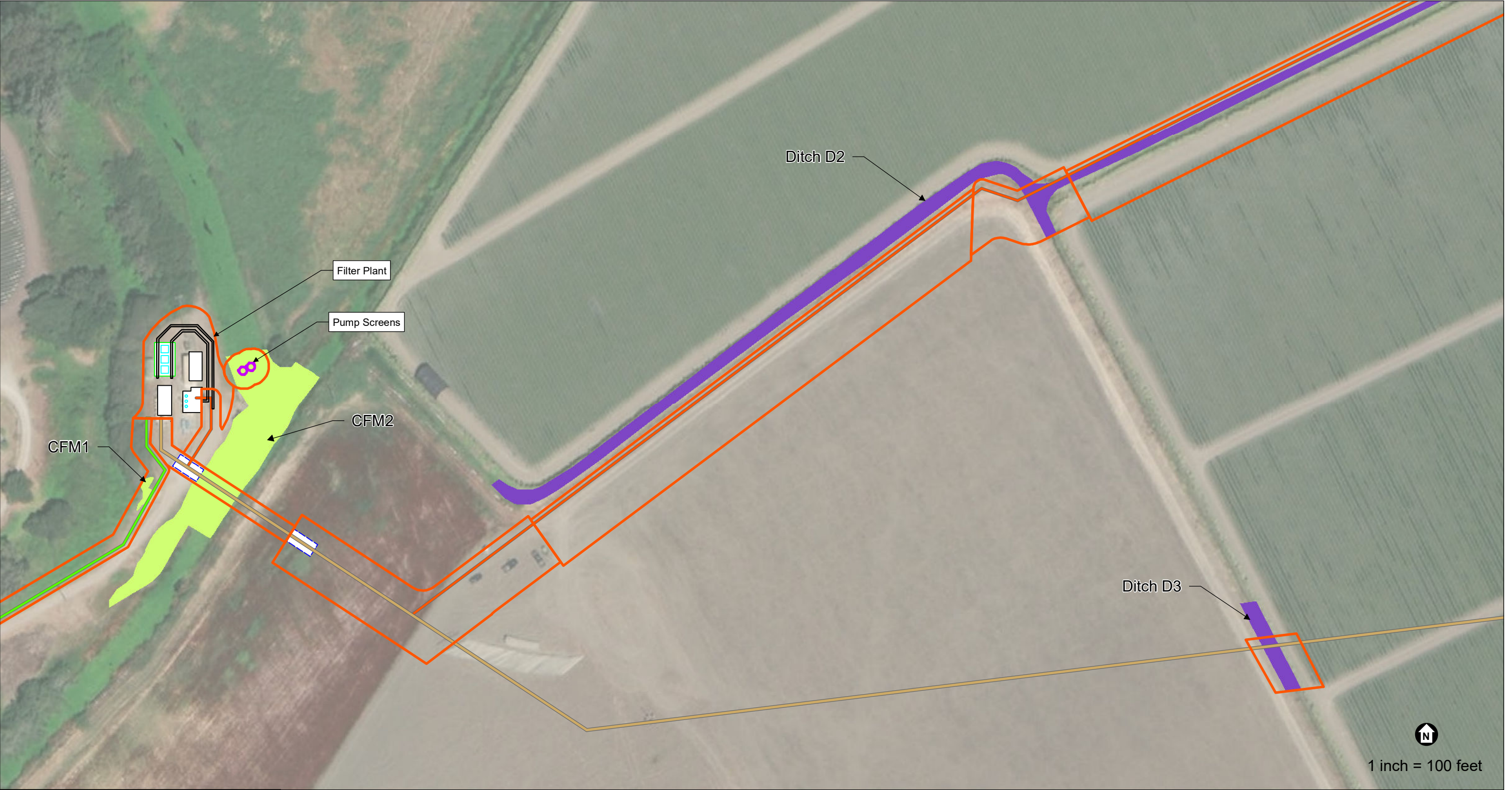


- |                                 |   |   |   |
|---------------------------------|---|---|---|
| ● Existing Recovery Wells       | — Proposed Filter Plant to Recharge Basins Pipeline | □ Temporary Disturbance Area                              | ■ Coastal Freshwater Marsh (0.33 acre)      |
| ● Candidate Recovery Well Sites | — Existing Pipeline                                 | □ Permanent Disturbance Area                              | ■ Cropland/Agriculture Wetland (2.26 acres) |
| × — Fence                       | — Backwash and Raw Water Pipeline                   | ■ Watsonville Slough (1.94 acres; 100 linear feet)        | ■ Ditch (0.91 acre; 4,945 linear feet)      |
| — Proposed Pipeline             | — Struve Slough to Filter Plant Pipeline            | ■ Central Coast Arroyo Willow Riparian Forest (0.71 acre) |   |
| — 12 foot Access Road           |   |   |   |

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure BIO-1a**  
Temporary and Permanent Impacts to Potentially Jurisdictional Wetland and Waters



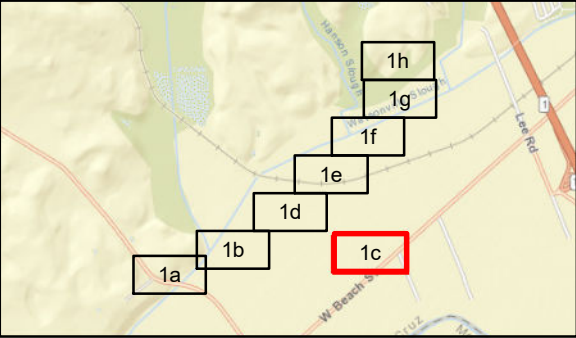
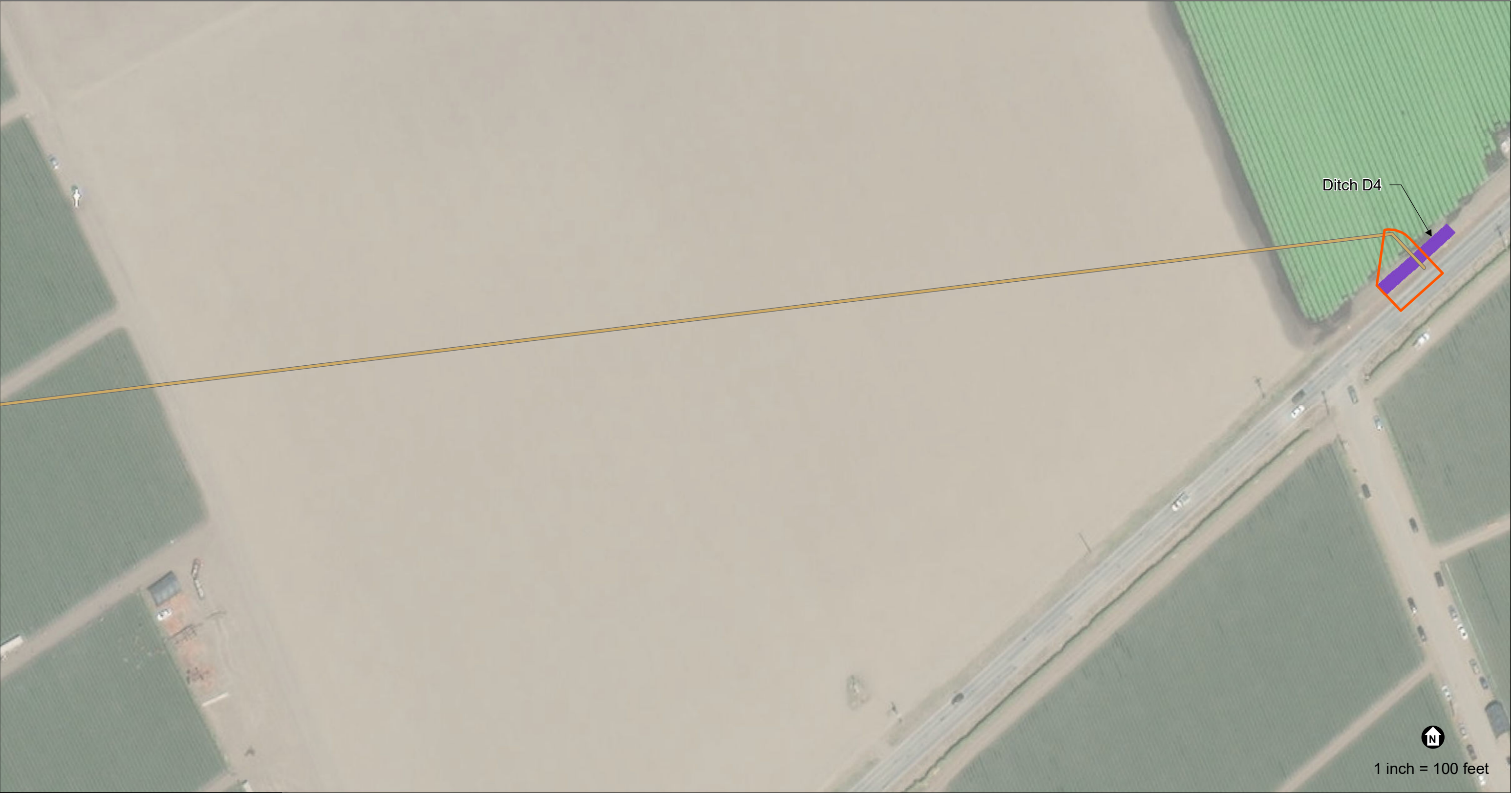


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| <ul style="list-style-type: none"><li>Existing Recovery Wells</li><li>Candidate Recovery Well Sites</li><li>Fence</li><li>Proposed Pipeline</li><li>12 foot Access Road</li></ul> | <ul style="list-style-type: none"><li>Proposed Filter Plant to Recharge Basins Pipeline</li><li>Existing Pipeline</li><li>Backwash and Raw Water Pipeline</li><li>Struve Slough to Filter Plant Pipeline</li></ul> | <ul style="list-style-type: none"><li>Temporary Disturbance Area</li><li>Permanent Disturbance Area</li><li>Watsonville Slough (1.94 acres; 100 linear feet)</li><li>Central Coast Arroyo Willow Riparian Forest (0.71 acre)</li></ul> | <ul style="list-style-type: none"><li>Coastal Freshwater Marsh (0.33 acre)</li><li>Cropland/Agriculture Wetland (2.26 acres)</li><li>Ditch (0.91 acre; 4,945 linear feet)</li></ul> |
|---|--|--|---|

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure BIO-1b**  
Temporary and Permanent Impacts to Potentially Jurisdictional Wetland and Waters



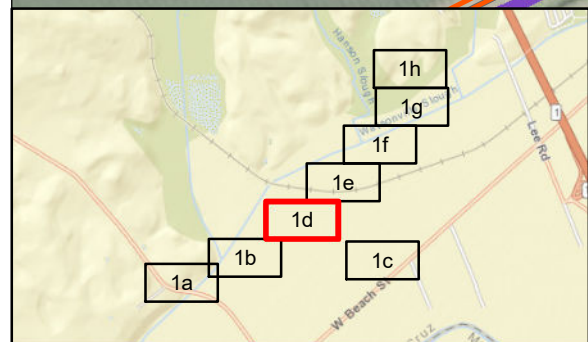


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| <ul style="list-style-type: none"><li>● Existing Recovery Wells</li><li>● Candidate Recovery Well Sites</li><li>× — Fence</li><li>— Proposed Pipeline</li><li>— 12 foot Access Road</li></ul> | <ul style="list-style-type: none"><li>— Proposed Filter Plant to Recharge Basins Pipeline</li><li>— Existing Pipeline</li><li>— Backwash and Raw Water Pipeline</li><li>— Struve Slough to Filter Plant Pipeline</li></ul> | <ul style="list-style-type: none"><li>Temporary Disturbance Area</li><li>Permanent Disturbance Area</li><li>Watsonville Slough (1.94 acres; 100 linear feet)</li><li>Central Coast Arroyo Willow Riparian Forest (0.71 acre)</li></ul> | <ul style="list-style-type: none"><li>Coastal Freshwater Marsh (0.33 acre)</li><li>Cropland/Agriculture Wetland (2.26 acres)</li><li>Ditch (0.91 acre; 4,945 linear feet)</li></ul> |
|---|--|--|---|

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure BIO-1c**  
Temporary and Permanent Impacts to Potentially Jurisdictional Wetland and Waters





- Existing Recovery Wells
- Candidate Recovery Well Sites
- × — Fence
- Proposed Pipeline
- 12 foot Access Road

- Proposed Filter Plant to Recharge Basins Pipeline
- Existing Pipeline
- Backwash and Raw Water Pipeline
- Struve Slough to Filter Plant Pipeline

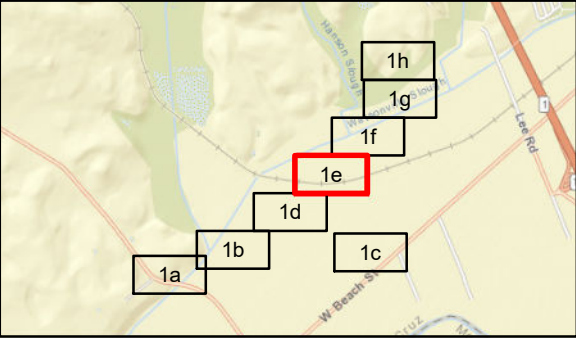
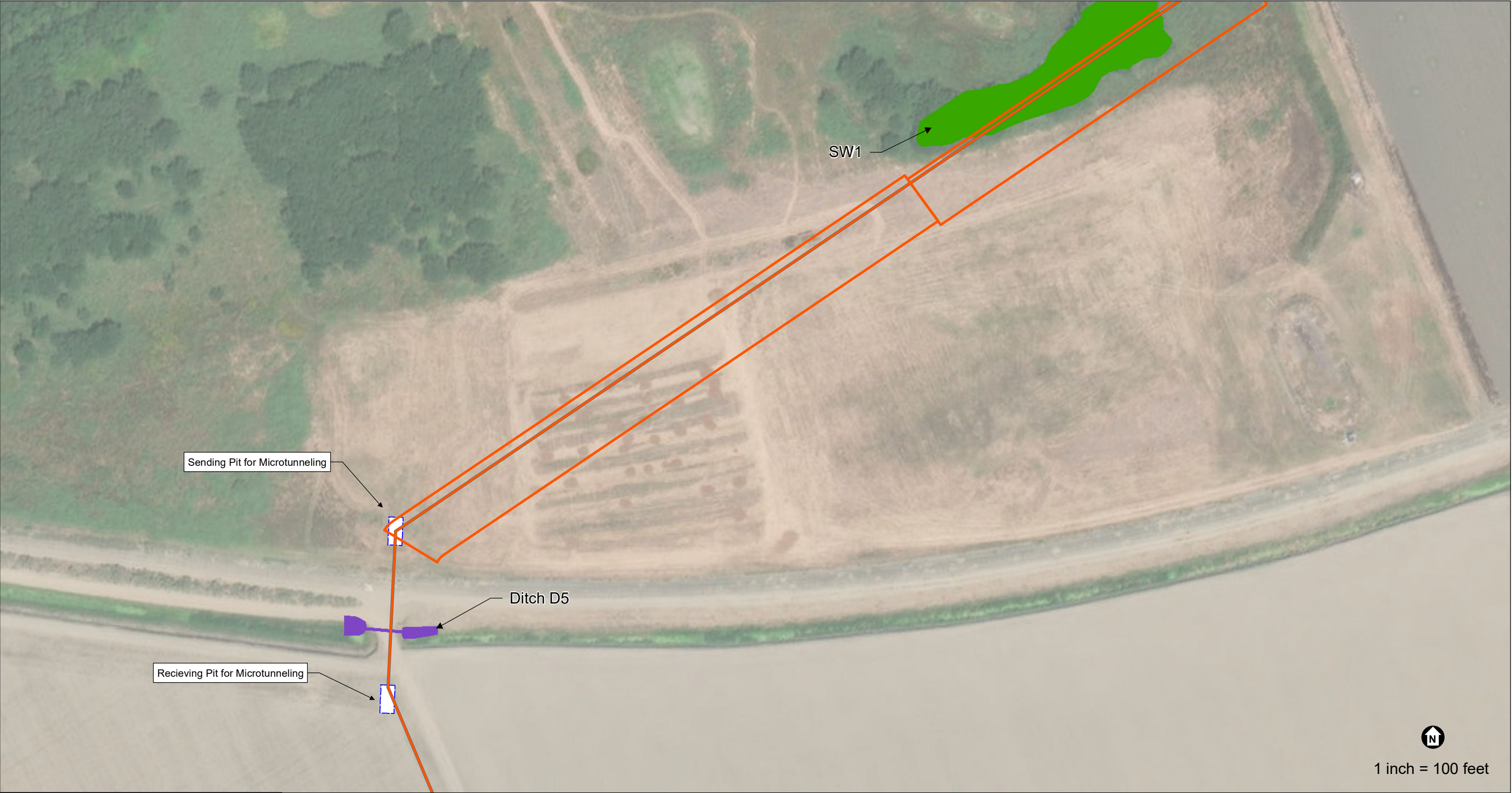
- Temporary Disturbance Area
- Permanent Disturbance Area
- Watsonville Slough (1.94 acres; 100 linear feet)
- Central Coast Arroyo Willow Riparian Forest (0.71 acre)

- Coastal Freshwater Marsh (0.33 acre)
- Cropland/Agriculture Wetland (2.26 acres)
- Ditch (0.91 acre; 4,945 linear feet)

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure BIO-1d**  
Temporary and Permanent Impacts to Potentially Jurisdictional Wetland and Waters



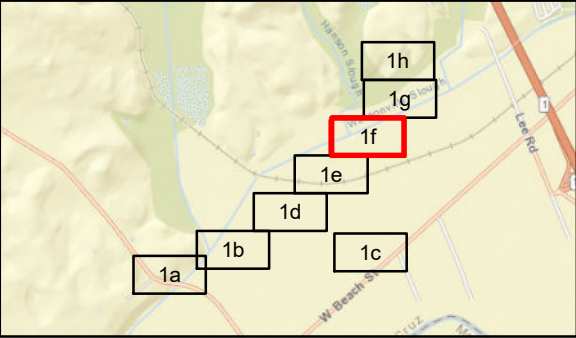
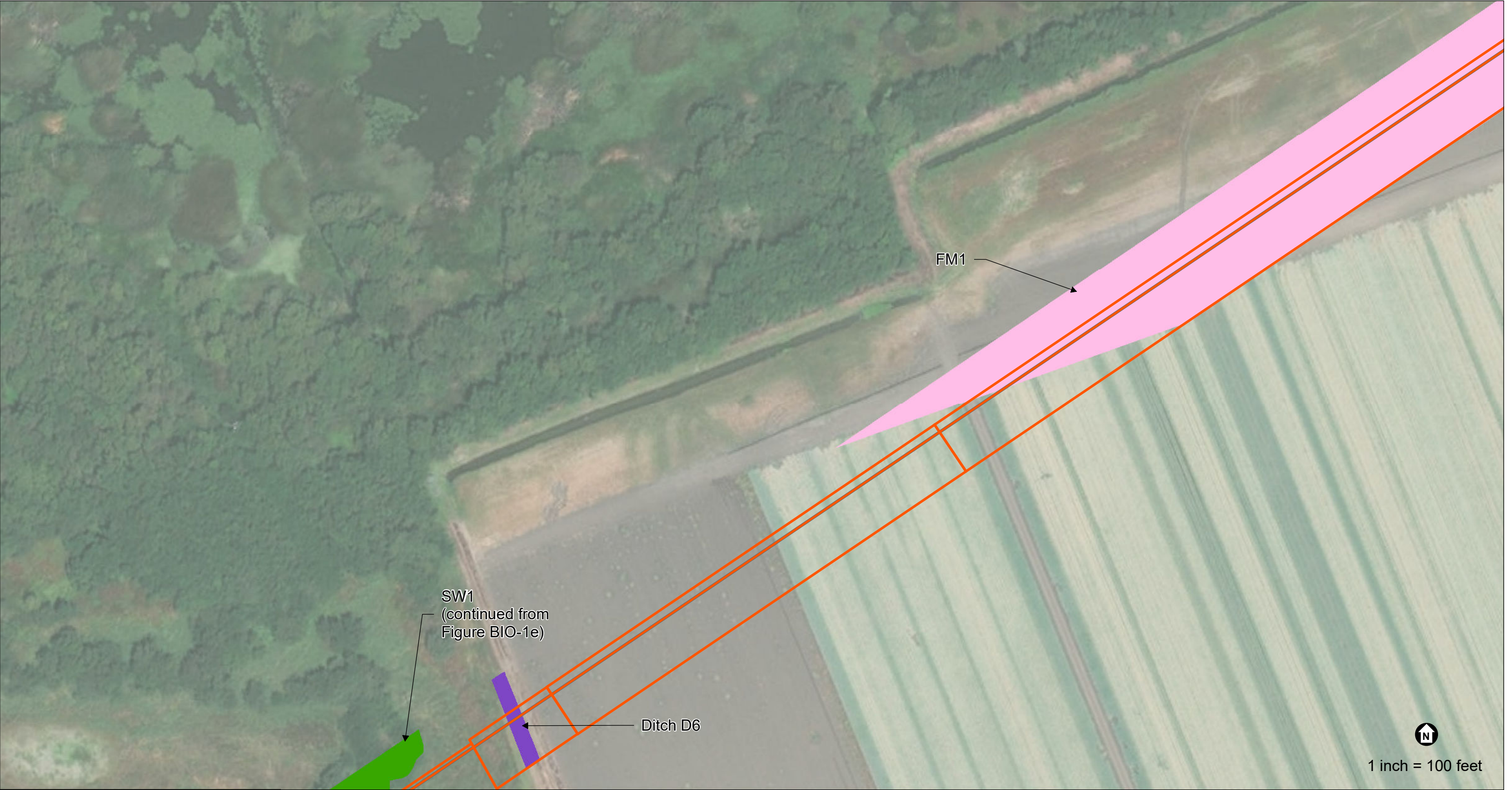


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|---|--|--|---|
| <ul style="list-style-type: none"><li>● Existing Recovery Wells</li><li>● Candidate Recovery Well Sites</li><li>× — Fence</li><li>— Proposed Pipeline</li><li>— 12 foot Access Road</li></ul> | <ul style="list-style-type: none"><li>— Proposed Filter Plant to Recharge Basins Pipeline</li><li>— Existing Pipeline</li><li>— Backwash and Raw Water Pipeline</li><li>— Struve Slough to Filter Plant Pipeline</li></ul> | <ul style="list-style-type: none"><li>Temporary Disturbance Area</li><li>Permanent Disturbance Area</li><li>Watsonville Slough (1.94 acres; 100 linear feet)</li><li>Central Coast Arroyo Willow Riparian Forest (0.71 acre)</li></ul> | <ul style="list-style-type: none"><li>Coastal Freshwater Marsh (0.33 acre)</li><li>Cropland/Agriculture Wetland (2.26 acres)</li><li>Ditch (0.91 acre; 4,945 linear feet)</li></ul> |
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Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure BIO-1e**  
Temporary and Permanent Impacts to Potentially Jurisdictional Wetland and Waters



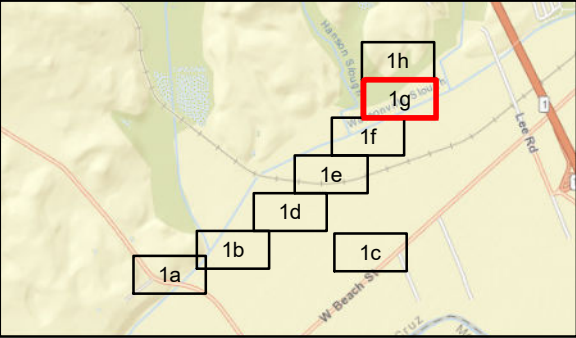
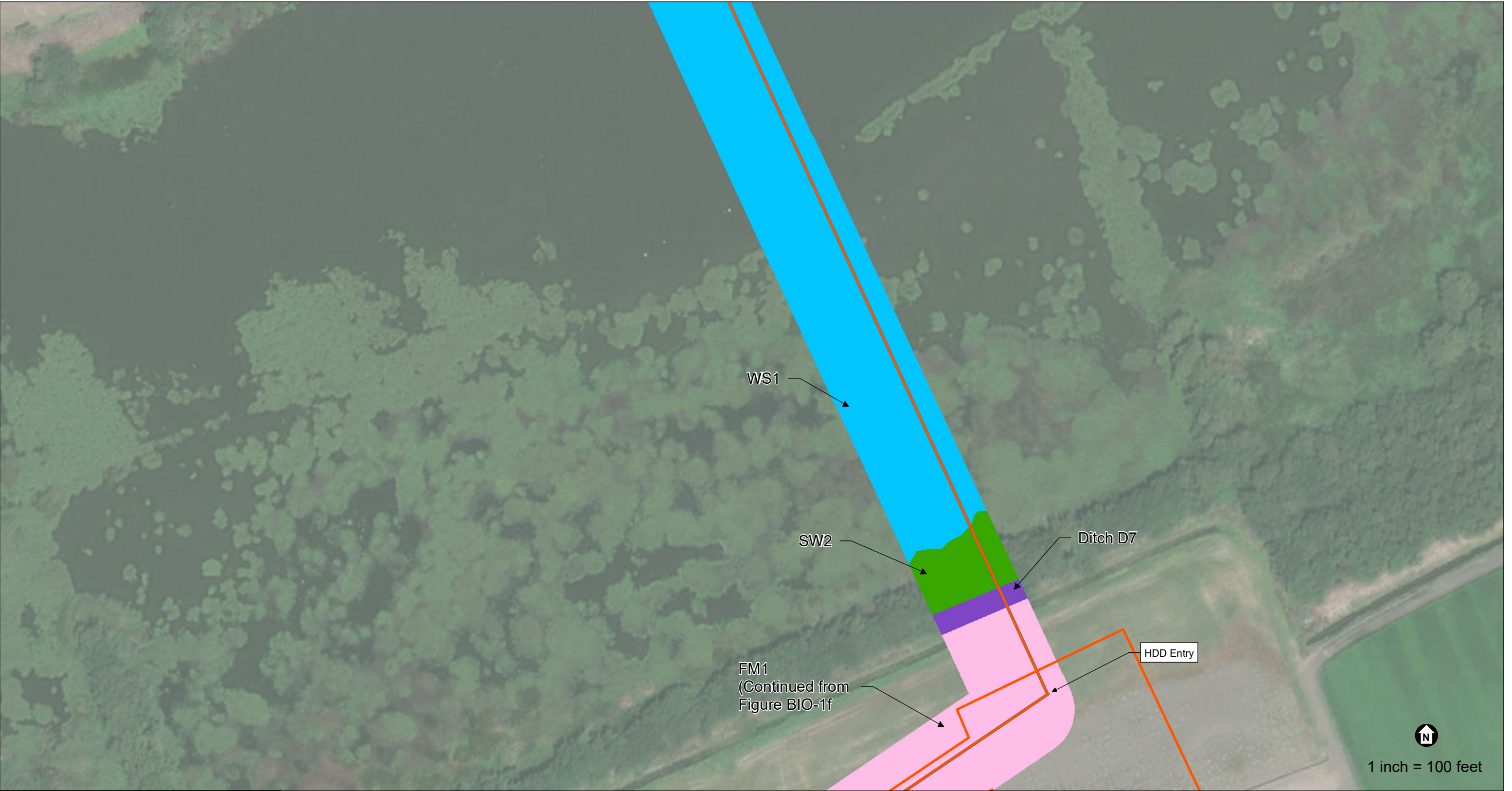


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|---------------------------------|---|---|---|
| ● Existing Recovery Wells       | — Proposed Filter Plant to Recharge Basins Pipeline | □ Temporary Disturbance Area                              | ■ Coastal Freshwater Marsh (0.33 acre)      |
| ● Candidate Recovery Well Sites | — Existing Pipeline                                 | □ Permanent Disturbance Area                              | ■ Cropland/Agriculture Wetland (2.26 acres) |
| × — Fence                       | — Backwash and Raw Water Pipeline                   | ■ Watsonville Slough (1.94 acres; 100 linear feet)        | ■ Ditch (0.91 acre; 4,945 linear feet)      |
| — Proposed Pipeline             | — Struve Slough to Filter Plant Pipeline            | ■ Central Coast Arroyo Willow Riparian Forest (0.71 acre) |   |
| — 12 foot Access Road           |   |   |   |

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure BIO-1f**  
Temporary and Permanent Impacts to Potentially Jurisdictional Wetland and Waters



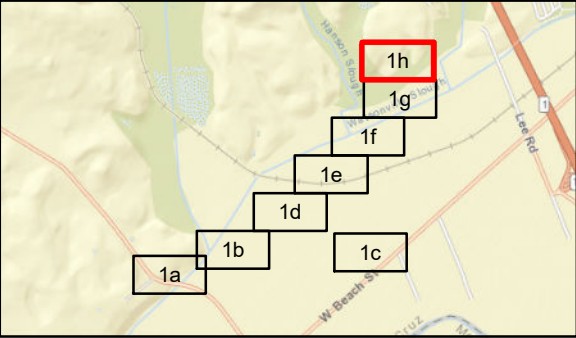
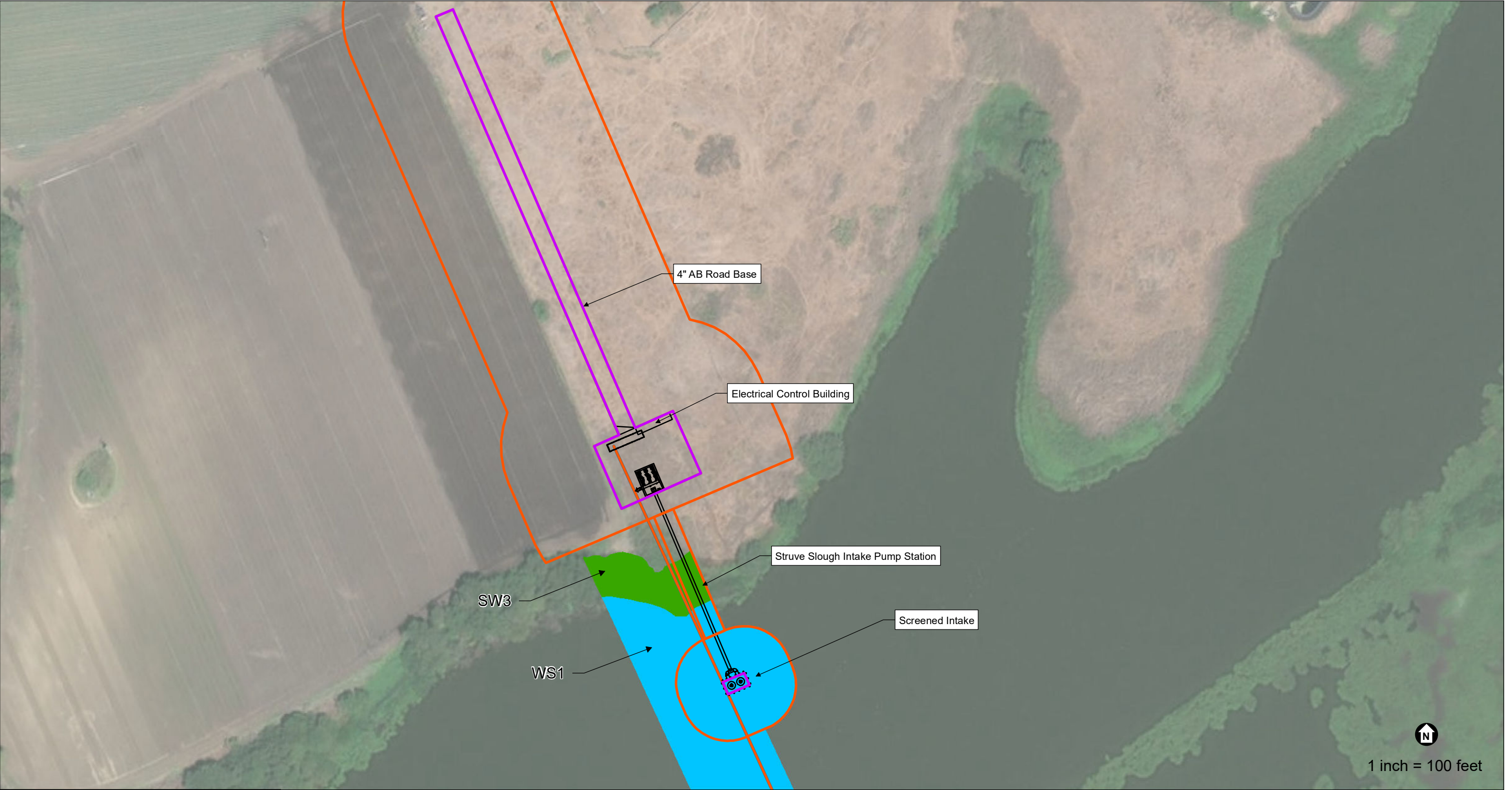


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|---|---|---|---|
| <ul style="list-style-type: none"> <li>Existing Recovery Wells</li> <li>Candidate Recovery Well Sites</li> <li>Fence</li> <li>Proposed Pipeline</li> <li>12 foot Access Road</li> </ul> | <ul style="list-style-type: none"> <li>Proposed Filter Plant to Recharge Basins Pipeline</li> <li>Existing Pipeline</li> <li>Backwash and Raw Water Pipeline</li> <li>Struve Slough to Filter Plant Pipeline</li> </ul> | <ul style="list-style-type: none"> <li>Temporary Disturbance Area</li> <li>Permanent Disturbance Area</li> <li>Watsonville Slough (1.94 acres; 100 linear feet)</li> <li>Central Coast Arroyo Willow Riparian Forest (0.71 acre)</li> </ul> | <ul style="list-style-type: none"> <li>Coastal Freshwater Marsh (0.33 acre)</li> <li>Cropland/Agriculture Wetland (2.26 acres)</li> <li>Ditch (0.91 acre; 4,945 linear feet)</li> </ul> |
|---|---|---|---|

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure BIO-1g**  
Temporary and Permanent Impacts to Potentially Jurisdictional Wetland and Waters





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| <ul style="list-style-type: none"><li>Existing Recovery Wells</li><li>Candidate Recovery Well Sites</li><li>Fence</li><li>Proposed Pipeline</li><li>12 foot Access Road</li></ul> | <ul style="list-style-type: none"><li>Proposed Filter Plant to Recharge Basins Pipeline</li><li>Existing Pipeline</li><li>Backwash and Raw Water Pipeline</li><li>Struve Slough to Filter Plant Pipeline</li></ul> | <ul style="list-style-type: none"><li>Temporary Disturbance Area</li><li>Permanent Disturbance Area</li><li>Watsonville Slough (1.94 acres; 100 linear feet)</li><li>Central Coast Arroyo Willow Riparian Forest (0.71 acre)</li></ul> | <ul style="list-style-type: none"><li>Coastal Freshwater Marsh (0.33 acre)</li><li>Cropland/Agriculture Wetland (2.26 acres)</li><li>Ditch (0.91 acre; 4,945 linear feet)</li></ul> |
|---|--|--|---|

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure BIO-1h**  
Temporary and Permanent Impacts to Potentially Jurisdictional Wetland and Waters

## **APPENDIX HYD**

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### Hydrology Supporting Information

# Attachment A: 2020 Pajaro Lagoon QCM Update incorporating revised Struve and Harkins Slough information

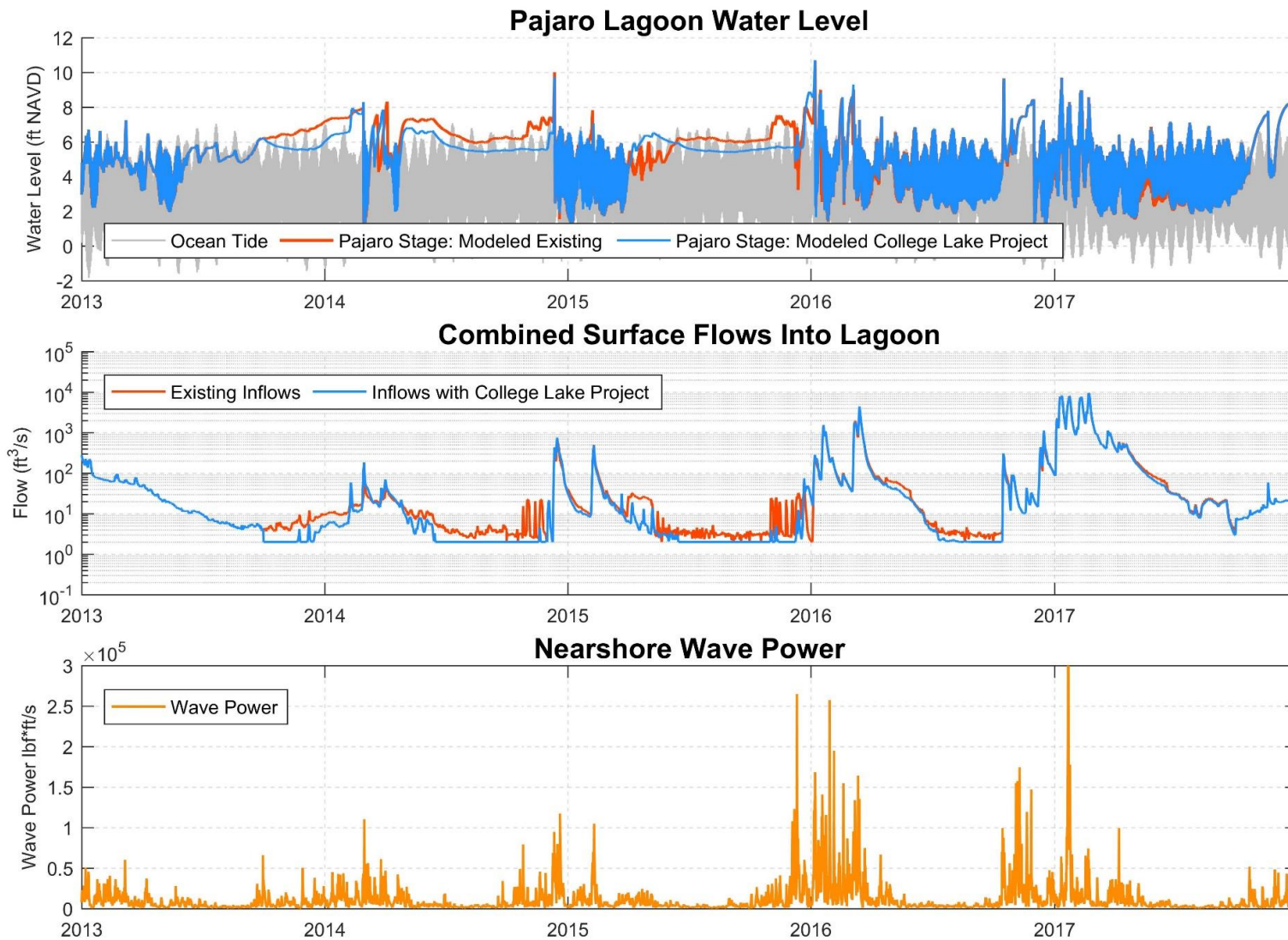
The Pajaro River/Watsonville Slough lagoon QCM was updated in April 2020 to incorporate revised inflows along Watsonville Slough for baseline conditions and revised project conditions on Struve and Harkins sloughs. These updated flows on the slough as it enters the coastal lagoon are based on a HEC-RAS simulation of Watsonville Slough performed by ESA based on a prior model from Balance Hydrologics. The HEC-RAS model is described in a separate section.

As part of this update, baseline and project conditions were altered on Watsonville Slough, slightly changing the incoming flows to the tidal lagoon near the mouth of the Pajaro River. The prior lagoon QCM was also expanded to simulate the period from October 1<sup>st</sup>, 2002 to September 30<sup>th</sup>, 2018. The new simulations included the following cases:

- 1) **Baseline:** no change in inflows to the lagoon from 2002 to 2018,
- 2) **Watsonville Slough Only:** Watsonville Slough projects (Harkins and Struve) considered. Pajaro River flows into the lagoon do not consider College Lake and Murphy Crossing.
- 3) **Cumulative Conditions:** Inflows to the lagoon consider all Watsonville and Pajaro projects (Harkins, Struve, College Lake, Murphy Crossing).

The model results are summarized in Figures A1 through A3 below. Ultimately, the effects of the combined Watsonville Slough projects on Harkins and Struve sloughs have a minimal effect on water levels in the lagoon, and timing and duration of seasonal mouth closure events. Results on changes to the lagoon water level and closure from all projects on Pajaro and Watsonville Slough (the ‘Cumulative Conditions’ case), are similar to those described in the prior QCM memorandum, and shown in Figure A3.

Since modified flows to the lagoon from the College Lake were only available from cbec for the period from 2013 to 2017, the results in figure A3 only compare the different cases for this period of time. However, Figure A2 shows the results of the baseline and Watsonville Slough Only cases, which indicates that over the longer 2002 to 2018 time period, the effects of the Harkins and Struve slough projects are negligible.



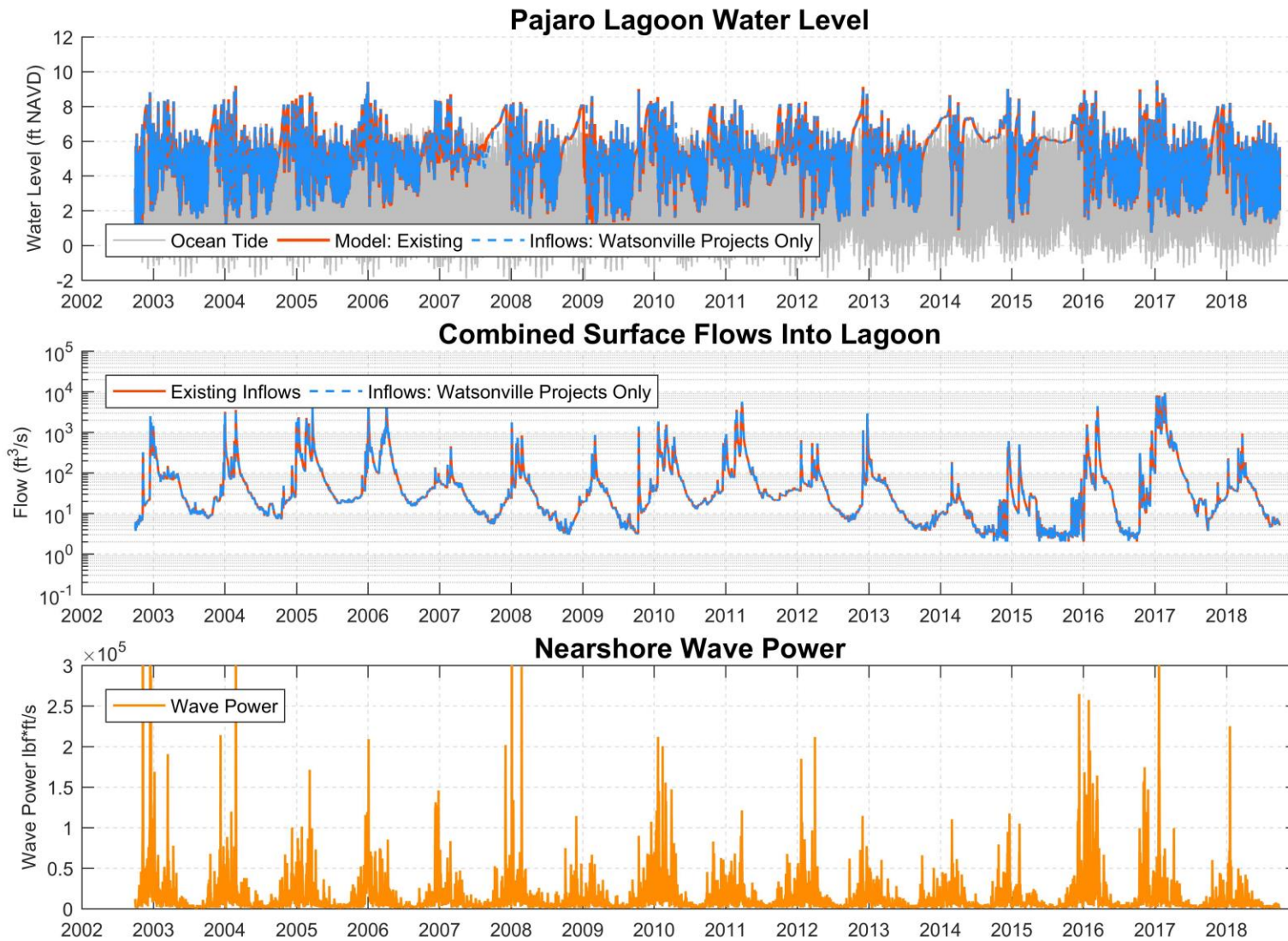
SOURCE: surface flows at Pajaro and Salsipuedes confluence provided by CBEC (2018) and supplemented with estimates of Watsonville Slough flows based on Balance (2014) and ag return flows based on Hanson et al. (2014). Wave conditions obtained from CDIP (see Table 1)

PVWMA BMP Program Management. D160822.00

**Figure A1**

Comparison of modeled water levels in the lagoon for existing and project conditions (top), compared against inflows (mid), and nearshore wave power (bottom).



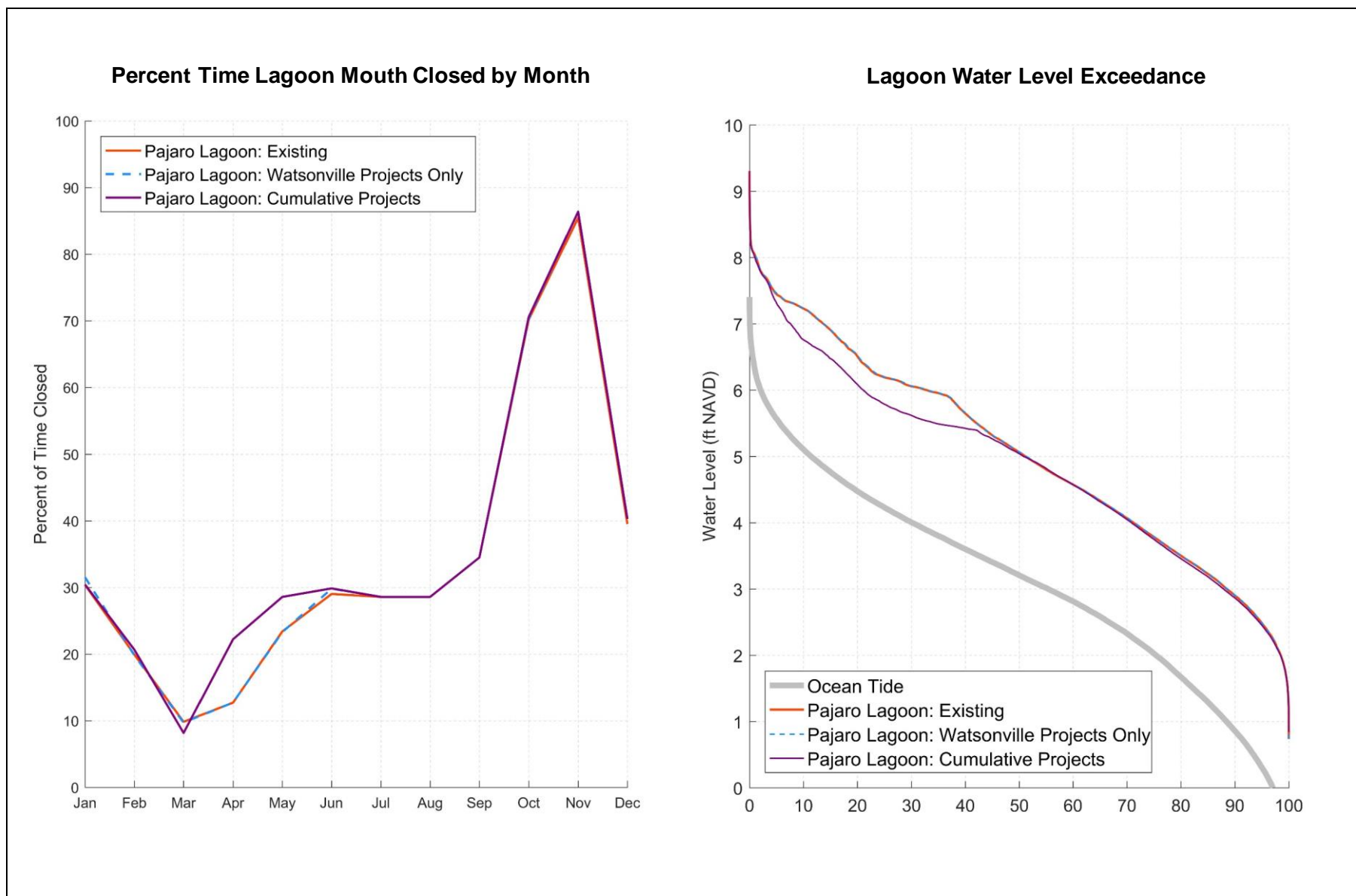


SOURCE: surface flows at Pajaro and Salsipuedes confluence provided by CBEC (2018) and supplemented with estimates of Watsonville Slough flows based on Balance (2014) and ag return flows based on Hanson et al. (2014). Wave conditions obtained from CDIP (see Table 1)

PVWMA BMP Program Management, D160822.00

**Figure A2**

Comparison of modeled water levels in the lagoon for existing and Watsonville Slough Only project conditions (top), compared against inflows (mid), and nearshore wave power (bottom).



SOURCE: flows provided by CBEC (2018).

NOTE: Artificial breaching was assumed whenever lagoon water levels reached 8 feet NAVD88.

PVWMA BMP Program Management, D160822.00

**Figure A3**

Comparison of predicted closure days per month (left panel) and water level exceedance (right panel) with and without the projects on Watsonville Slough and the Pajaro River.

# memorandum

date April 12, 2019

to Brian Lockwood, General Manager, Pajaro Valley Water Management Agency

cc Jill Hamilton

from Dane Behrens, PhD, PE, Environmental Science Associates

subject Lagoon Quantified Conceptual Model Memorandum for Pajaro River Lagoon

## 1.Introduction

ESA has developed a hydrologic/geomorphic model of the Pajaro River Lagoon and its barrier beach to assess the potential effects of upstream water management projects on lagoon hydrologic conditions. This model was developed to support the broader CEQA assessment that is being conducted by ESA for the Pajaro Valley Water Management Agency (PV Water), as it develops projects to optimize groundwater management within the basin.

This document discusses the development and initial application of the ESA's lagoon quantified conceptual model (QCM) for the Pajaro River Lagoon. The QCM has been developed incrementally for several years (see Battalio et al. 2006; Rich and Keller, 2013, Behrens et al. 2015), and has been applied to support restoration activities in a number of coastal lagoons throughout the state of California. The model applies an interconnected water balance for the lagoon and sediment balance of the beach and lagoon mouth, which together allow users to understand how changes to hydrology, management choices, and climate change can influence lagoon conditions.

### 1.1 Project Descriptions

Four proposed projects that address local water supply and the overall groundwater balance within the basin are currently being considered. The intent of the model described in this memorandum is to act as a decision support tool to understand how each of the projects could influence conditions in the lagoon. The projects currently being considered are outlined below.

## College Lake Integrated Resources Management Project

The proposed College Lake Integrated Resources Management Project (Project) is one of the three priority supplemental water supply projects outlined in the Pajaro Valley Water Management Agency's (PV Water) Basin Management Plan Update (BMP Update, adopted in 2014). The primary purposes of the Project are to help balance the groundwater basin and prevent further seawater intrusion through meeting water supply needs in PV Water's service area by developing College Lake as a water storage and supply source. College Lake is located in unincorporated Santa Cruz County approximately one-mile northeast of the Watsonville city limits and is north of Holohan Road and west of Highway 152.

The proposed components to be constructed and operated as part of the Project include the weir structure and intake pump station, water treatment plant (WTP), and the College Lake pipeline. The weir structure is being designed to accommodate fish passage and bypass flows. The adjustable weir would be capable of raising the College Lake water level by up to 2.4 feet to a water surface elevation (WSE) of 62.5 feet. This would increase the total storage capacity at 62.5 feet WSE to approximately 1,764 acre feet (AF). A screened intake would be constructed within the weir structure to divert water to the intake pump station. The screen is intended to comply with National Oceanic and Atmospheric Administration National Marine Fisheries Service and California Department of Fish and Wildlife screening criteria for anadromous salmonids. The intake pump station would deliver raw (untreated) water impounded behind the weir to the proposed WTP. The WTP would remove sediment, filter and disinfect the diverted surface water. Treated water would be pumped into the proposed 5.5-mile long College Lake pipeline, which would deliver irrigation water to local agricultural users via PV Water's Coastal Distribution System (CDS) located west of Highway 1.

## Harkins Slough Recharge Facilities Upgrade

The existing facility diverts water from Harkins Slough to a filter plant and recharge basin for storage in a surficial groundwater aquifer, and subsequent recovery for agricultural irrigation use in the CDS. The upgrade includes installing new recovery wells at the existing recharge basin, upgrading the existing pump station and filter plant, and constructing new recharge basins. Annual average diversions are projected to be 1,470 AF and would occur November 1 to May 31.<sup>1</sup> Proposed improvements would be constructed in 2020 through 2023.

## Watsonville Slough with Recharge Basins

This component of the BMP Update would divert water from the Watsonville Slough system from November 1 to May 31. The water would be stored in a surficial groundwater aquifer via infiltration through a recharge basin(s). The project includes a new diversion point in the slough system. A pump station at the diversion point would divert the water to a filtration facility via a pipeline. Recovery wells constructed around the proposed recharge basin(s) would extract water during the irrigation season. As planned, this project would require construction of a diversion structure, inlet pump station, intake pipeline, expansion of the existing filtration facility, booster pump station, recharge basin(s), and recovery wells. Annual average diversions are projected to be 1,690 AF and would

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<sup>1</sup> Carollo Engineers, *Pajaro Valley Water Management Agency BMP Program Management Services Harkins and Watsonville Slough Intakes and Diversion Structures Conceptual Design*, Draft, June 2017.

occur November 1 to May 31.<sup>2</sup> This project would be constructed in 2023 and 2024 with the last recharge basin constructed in 2026.

## Murphy Crossing with Recharge Basins

This component of the BMP Update would divert water from the Pajaro River between November 1<sup>st</sup> and May 31<sup>st</sup>, when the Pajaro River water quality is within an acceptable range and stream flows are above the required minimum necessary to maintain steelhead habitat. Based on prior guidance provided by Prof. Jerry Smith in 1997, the Murphy Crossing project is expected to only operate when sufficient bypass flows are available in the Pajaro River for steelhead (minimum of 45 cfs from November 1<sup>st</sup> through March 31<sup>st</sup>, and 20 cfs from April 1<sup>st</sup> through May 31<sup>st</sup>). The project includes the construction of an infiltration gallery, pump station, monitoring wells, recharge basins, and a connector pipeline from pump station to recharge basins. An infiltration gallery located upstream of the Murphy Crossing bridge would capture water and transport it to four recharge basins. The recharge basins would be located just north of the intersection of State Route 129 and Murphy Road. Annual average diversions are projected to be 500 AF and would occur November 1 to May 31.<sup>3</sup> This project requires further design development, interagency agreements, acquisition of water rights, and resource agency permits and would not be constructed until 2025-2035.

## 1.2 Goals of this Document

The goals of this memorandum are to:

- (1) Develop an initial inventory of data relevant for lagoon function, including nearshore coastal processes, freshwater inflows, lagoon sonde data, and beach/lagoon topography
- (2) Develop and document a QCM of mouth morphology/lagoon hydrology for Pajaro River Lagoon (including both the Pajaro River and Watsonville Slough segments)
- (3) Assess potential impacts of the proposed supplemental supply projects on mouth closure seasonality and water column conditions in the lagoon.

In addition to mouth closure, changes to lagoon water levels are also discussed, as they relate to the potential freshwater habitat available in the lagoon. Other aspects, such as water column salinity and temperature, are not discussed at this phase, although these can be assessed in the future as data are provided for model verification.

Section 2 discusses the model approach and aspects of the development. Section 3 outlines the data sources. Sections 4 and 5 provide preliminary results from the model hindcast of 2011-2017 and model simulations for project conditions for the water years of 2014 through 2017. These draft results can be refined further as more data become available and/or as the definition of projects within the watershed evolve.

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<sup>2</sup> Carollo Engineers, *Pajaro Valley Water Management Agency BMP Program Management Services Harkins and Watsonville Slough Intakes and Diversion Structures Conceptual Design*, Draft, June 2017.

<sup>3</sup> Detailed hydraulic modeling has not been conducted for the Murphy Crossing project. For purposes of analysis, it is assumed that the volume of water diverted would be equal to the yield estimated for the project in the Basin Management Plan.

## 2. Lagoon Modeling Approach

### 2.1. Model Development

To provide an understanding of how the Pajaro River Lagoon would respond to future changes, ESA developed a quantified conceptual model (QCM) for the site, which predicts lagoon mouth morphology and the resulting water levels of the lagoon. A QCM is a simplified time-series model which implements a lagoon water balance alongside parametric model of the lagoon mouth and beach.

The current QCM approach is an adapted and refined version of earlier approaches for tidal conditions from Crissy Field Lagoon (Battalio et al. 2006) and for fluvial conditions for the Carmel River (Rich and Keller 2013), and builds on lessons learned from both approaches. In recent years, ESA has further developed the QCM as a more complete tool to assess systems with both tidal and fluvial characteristics (Behrens et al. 2015). It is typically used as a decision support tool to better understand impacts of lagoon management and climate change, and has been applied at a number of sites throughout California since 2012. It is currently being utilized as a decision support tool by the San Mateo County Resource Conservation District to test restoration approaches in Pescadero Lagoon (ESA 2017) and as a climate change planning tool by the Carmel Area Wastewater District in the Carmel River Lagoon. It has been used in a similar capacity at Los Peñasquitos Lagoon (ESA 2016) and Devereux Slough (ESA 2015), in southern California, and at a number of other sites in central and southern California.

The QCM approach is centered on a water budget for the lagoon, which is coupled with a sediment budget for the lagoon mouth. The model is based on two core concepts:

- All water flows entering and leaving the lagoon should balance.
- The net erosion/sedimentation of the inlet channel results from a balance of erosive (fluvial and tidal) and constructive/deconstructive coastal (wave) processes.

The model uses time series of nearshore waves and tides, watershed runoff, and evapotranspiration data as boundary conditions. Using these as forcing conditions with information about a lagoon's topography, the model dynamically simulates time series of lagoon water levels, along with inlet, beach, and lagoon state. With each time step, the net inflows or outflows to the system are estimated, along with the net sedimentation or erosion in the mouth. The flow terms vary depending on whether the mouth of the lagoon is open or closed. During closed conditions, inflows include watershed runoff and wave overwash into the lagoon, while outflows include beach berm seepage and evapotranspiration. These processes are represented in Figure 1. For more information on how the model resolves different processes, refer to Behrens et al. (2015).

During open-mouth conditions, flows between the lagoon and ocean are resolved differently depending on the ocean water level and inlet thalweg (low points in a channel). When the thalweg is deep enough that ocean and lagoon water levels can communicate directly, a solution to a simplified one-dimensional momentum equation is applied to resolve velocities (see Behrens et al. 2015). When ocean levels drop below the thalweg elevation (i.e. causing one-way drainage outflow from the lagoon to the ocean), outflows are resolved using the approach of Williams and Stacey (2016). Seepage flows through the beach are characterized using a Darcian approach (Rich

and Keller 2013). Wave overwash is estimated by calculating wave runup on the beach face, and pairing this with the predicted beach crest height to get an overtopping rate based on the methodology of Laudier et al. (2011).

The model is trained by adjusting empirical coefficients that control the amount of sediment trapped in the mouth, beach berm growth, and frictional losses in the channel during outflow. Flow terms such as wave overwash and berm seepage are also adjusted to allow variations in lagoon water levels to match observations.

As the model steps forward in time, it continuously transitions the mouth through tidal, perched, and closed conditions. When deposition in the inlet bed exceeds erosion, the bed rises vertically, eventually perching above most tidal elevations and closing. Mouth closure occurs in the model when sediment fills the bed higher than lagoon water levels. Breaching occurs in the model when the lagoon fills from accumulation of either watershed runoff or wave overwash, and water levels overtop the beach berm crest, eroding a new lagoon mouth.

Model accuracy is tested by comparing modeled lagoon water level time series against observed water levels, and by comparing the timing and length of predicted inlet closure events to those of historical records. Closure time series and lagoon water level time series usually provide a good indication of which processes are dominating the system at a given time, such as runoff during floods, or powerful waves prior to closure. Thus, reproducing these time series is taken to mean that the dominant processes are meaningfully represented. As discussed below, the model also incorporates records of manual breaching of the lagoon mouth, to account for the effect of these events on lagoon water levels and closure seasonality. Model accuracy is discussed in Section 4.2.

## **2.2. Treatment of Mouth Breach Events**

The Pajaro River Lagoon experiences seasonal mouth closure events in most years, beginning near the end of the wet season, when wave-driven sedimentation in the lagoon mouth overpowers the erosive capacity of tidal and fluvial currents. Based on data compiled by Balance Hydrologics (Balance), the dry season typically ends between April and June (See Table 4-1 in Balance (2014)). These events can last from several days to several months, and end with a ‘breach’ event when a new mouth erodes in the beach. Both natural and artificial breach events happen in the lagoon. Natural breaches occur when ponded water in the lagoon rises to the elevation of the lowest point in the beach crest, causing spilling to the ocean and erosion of a new mouth. As with other lagoons in California, artificial breaching at the Pajaro River Lagoon is achieved by digging a trench in the beach with heavy equipment, artificially creating a low point in the beach for flows to begin spilling over.

Normally, the Santa Cruz County Department of Public Works breaches the mouth with heavy equipment when the mouth has been closed for an extended period of time and runoff is anticipated to fill the lagoon to levels that would create a public safety risk, and potentially flood adjacent farmland and the Pajaro Dunes community. Under conditions with expected runoff, the mouth is thought to be more likely to remain open after the breach, and conditions in the lagoon are thought to be less likely to become saline (pers. comm. G.Kittleson). Breaching tends to occur during or immediately prior to the first major rainfall event after the dry season, which often occurs between December and February. In most cases, breaching takes place at elevations of 8 to 9 feet NAVD88. To account for manual breaching in the model, we applied a list of recent breach events compiled by cbec inc, eco engineers (cbec). On the date of a known artificial breach, we manually lowered the elevation of the beach, to simulate the digging of a trench with heavy equipment, and allowed the model to erode the new lagoon mouth dynamically based on the hydraulic conditions that result from the newly connected lagoon (high water elevation) and ocean (lower water elevation).

## 2.3. Boundary Conditions

Boundary conditions used in the model are illustrated in Figure 2, and include:

- Combined fluvial inflows from the Pajaro River (below the confluence with Salsipuedes Creek) and Watsonville Slough
- Ocean tides
- Nearshore wave conditions, and
- Evapotranspiration

The Pajaro River and Watsonville Slough are treated as separate basins (i.e. interconnected water balances). For the purposes of this study, the ‘lagoon’ is assumed to include both water bodies, since both experience tides during open-mouth lagoon conditions and water levels inundate both areas when the beach blocks the mouth.

## 2.4. Key Assumptions and Considerations

For this assessment, the main assumptions and considerations include the following:

- For simplicity when comparing existing and project conditions, we assume that breaching occurs whenever water levels in the lagoon reach 8 feet NAVD88. We assume this is more appropriate than assuming that recorded artificial breach events would have happened on the same dates for both existing and project conditions. This is because breach timing is highly dependent on anticipated flood levels, which could change slightly if inflows to the lagoon are altered.
- Surveys used to generate the hypsometric curve are assumed to be generally representative of 2011-2017 conditions, although sedimentation, flushing during floods, and migration of the lagoon mouth will cause change in the lagoon hypsometry that are not reflected here.
- The slope of the water surface in the lagoon is assumed to be small under most flow conditions (i.e. that the surface can be assumed flat for the purpose of volume calculations). This assumption is not valid during high fluvial flows, and modeled water levels are expected to be representative of the gauge locations (i.e. not farther upstream).
- Vertical gains and losses from interaction between surface flows and the local aquifer are assumed to be small below San Andreas Road on Watsonville Slough and below the confluence with Salsipuedes Creek on the Pajaro River (pers. comm. W. Henson, USGS).
- Additional surface flow inputs include tide drain flows from farms adjacent to the lagoon, and from semi-routed surface water runoff (Hanson et al. 2014). Using the Pajaro Valley Hydrologic Model (PVHM), the USGS estimate tile drain flows to amount to 4,906 Acre-feet per year, and semi-routed surface water runoff at 3,329 acre-feet per year. Based on the seasonality of these terms provided by USGS (pers. comm. W. Henson), these combined returns would amount to about 1-4 cu. ft. per second (cfs), depending on the wetness of the year. Since model results are not available after 2010, we have applied a representative value of 2 cfs here, for simplicity.



- The water volume upstream of the Shell Road hydraulic control structure on Watsonville Slough was included in the hypsometric relationship for the lagoon. This straight segment of the slough above Shell Road receives freshwater runoff estimated by Balance (2014) at San Andreas Road.
- Since water levels were only collected on Watsonville Slough, they are presumed to be representative of lagoon conditions only during mid- to high-tides in the lagoon and during typical closed-lagoon conditions (when water ponds behind the beach and inundates both the slough and river). However, these data do not show low water levels that may occur in the lagoon at low tide. This is because the bed of Watsonville Slough is higher than the bed of the Pajaro River, and thus the gauges located in the slough show a truncated version of low tides during open-mouth lagoon conditions.

### 3. Data Sources

Data sources for the model are outlined in Table 1, and illustrated in Figure 2. Some aspects of the data collection and inventory are described below.

**Table 1.** Data availability for Pajaro River Lagoon

Parameter	Source/Location	Availability
<b>Coastal Influences</b>		
Offshore Waves	<ul style="list-style-type: none"> <li>NDBC Monterey Buoy (#46042)</li> </ul>	Directional:1987- present Full spectral:1996- present
Nearshore Wave Estimates	<ul style="list-style-type: none"> <li>CDIP</li> <li>ESA PWA (2014)</li> </ul>	2000-present
Ocean Tide Stage	<ul style="list-style-type: none"> <li>NOAA Monterey Gauge (#9413450)</li> </ul>	1986-present
<b>Beach and Lagoon Mouth</b>		
Inlet Condition (Open/Closed)	<ul style="list-style-type: none"> <li>Record of breach events compiled by cbec</li> <li>Mouth closure periods also inferred from 2012-2017 from lagoon water level time series</li> </ul>	1988-present
Beach/Lagoon topography	<ul style="list-style-type: none"> <li>Coastal LiDAR from NOAA and USGS: (2010, 2016)</li> <li>ESA (2018): topographic survey cross sections of Watsonville Slough</li> <li>Schaaf &amp; Wheeler (2001): Pajaro River thalweg profile</li> </ul>	2001, 2010, 2016, 2018
<b>Lagoon Hydrology</b>		
Runoff	<ul style="list-style-type: none"> <li>USGS Pajaro R Gauge at Chittenden (#11159000)</li> <li>Hanson et al. (2014): estimates of agricultural return flows</li> <li>Balance Hydrologics: Watsonville Slough flows (2003-2012)</li> <li>cbec (2018): existing and project inflows at confluence of Salsipuedes Creek and Pajaro River (2014-2017 WYs)</li> </ul>	1951-present
Evapotranspiration	<ul style="list-style-type: none"> <li>CIMIS #209 (Watsonville West II)</li> </ul>	2007-present
Lagoon Water Level	<ul style="list-style-type: none"> <li>Moss Landing Marine Labs: (2011-2012)</li> <li>Balance Hydrologics: (2011-2013)</li> <li>PV Water (2018): 2012-2016</li> <li>Balance Hydrologics: 2016-2017</li> </ul>	2011-2017
<b>Water Quality</b>		
Conductivity	<ul style="list-style-type: none"> <li>Balance Hydrologics (2014)</li> </ul>	2011-present

### **3.1. Lagoon Hydrology**

Resolving each of the surface water inflows into the lagoon required applying assumptions based on the data collection and reporting by PV Water, the USGS, Balance Hydrologics, and cbec. To resolve surface flows on Watsonville Slough, the annual outflow at the San Andreas Road crossing measured by Balance (2014) was compared against annual flows measured at the USGS Chittenden Gauge on the Pajaro River. For the years 2003-2012, this suggests that Watsonville Slough flows are on the order of 3-4 percent of Pajaro Flows at Chittenden, although the ratio varied from year to year. This amount is greater than would be estimated from a basin size comparison alone between the two locations. Given the complex hydrogeology and surface and groundwater management practices in each basin, it is expected that this estimation has a high uncertainty. However, since inflows to the lagoon are dominated by the Pajaro River, the effect of the uncertainty in Watsonville Slough flows on the overall uncertainty in the water balance is assumed small.

Inflows for existing and project conditions on the Pajaro River were made available by cbec (2018) for the water years 2014 through 2017. Inflows during prior years were estimated by scaling flows from the USGS Chittenden gauge based on the added watershed area of Salsipuedes Creek. Since these estimates for prior years do not account for management of College Lake, it is assumed that their accuracy is lower, and they are included here to allow qualitative comparison of lagoon conditions during those years.

### **3.2. Beach and Lagoon Topography**

Hypsometric (i.e. relating water surface elevation to stored water volume) curves for Watsonville Slough and the Pajaro River were developed using a combination of coastal LiDAR, a 2018 ESA survey of Watsonville Slough, and a Pajaro River thalweg profile available from Schaaf and Wheeler (2001). Recent bathymetric information for Pajaro River was not available, and the hypsometry of this segment of the model could be improved in the future if a new survey is conducted. The extent of the Pajaro River included in the hypsometric curve was chosen based on the extent upstream that the thalweg surpasses 10 feet NAVD, which is near the City of Watsonville.

Beach conditions (width, length, beach face slope) were characterized using coastal LiDAR collected in 2010 (NOAA 2012), and 2016 (USGS 2016).

## **4. Hindcast of 2011 to 2017 Conditions**

### **4.1. Observed Lagoon Conditions**

The QCM was used to hindcast conditions from January, 2011 to December, 2017. Since estimated inflows to the lagoon for water years 2012 and 2013 were not provided by cbec, modeled lagoon conditions are included for those years only for qualitative comparison. The main purpose of the hindcast is to hone the model for water years 2014-2017 and understand the level of uncertainty in model predictions during those years.

As discussed by cbec (2018) and others, water years 2014-2017 include a wide range of inflow conditions, spanning a critically dry year (2014) and excessively wet year (2017). As shown in Figure 3, this led to markedly different conditions in the lagoon mouth condition and water levels.

In the relatively dry water years of 2014 and 2015, the mouth was primarily closed, and inflows ponded behind the closed beach. During the few winter storm events, the mouth remained open for several months, before closing due to wave action in early spring. In both years, low base flows were eventually overmatched by beach seepage and evaporative losses in the model, visible as seasonal low points in water levels in early fall. In the wetter water years of 2016 and 2017, higher winter flows scoured a deeper mouth, allowing the lagoon to remain open to tides for substantially longer periods of time. Powerful waves during the El Niño winter of 2015-2016 partially blocked outflows from the lagoon, leading to high water levels in the open lagoon. Although waves in the fall of 2016 were powerful enough to close the mouth, high base flows at the time caused the lagoon to fill rapidly and breach (erode a new mouth after overtopping the beach).

The results suggest that without artificial breaching, lagoon water levels could be higher during seasonal mouth-closure events than those that have been observed recently. After mouth closure, waves continue to cause the beach to grow through the dry season. The available coastal LiDAR suggests that areas of the beach that are distant from the location of the mouth can grow to 10-14 feet NAVD88. Recurrent breaching of the mouth creates an artificial low point in the beach that is slowly rebuilt every year, but this area does not grow to the height of northern portions of the beach that are less frequently disturbed. Because of this, the mouth is sometimes able to breach naturally at low elevations (less than 8 feet NAVD88), whereas under natural conditions the elevation threshold for natural breaching might be much higher.

## 4.2. Model Comparison

Overall, the model compares well against the available data (Figure 4), although further refinement is expected as more data are collected. During relatively wet conditions, the model reproduces the observed deep scouring of the mouth and periods of strong tidal communication between the lagoon and the ocean. The model also approximates the progressive shallowing of the mouth (cutting off low tides in the lagoon) prior to seasonal closure events, capturing the transitional weeks of muted tides that lead up to closure events in most years.

Overall, the timing of closure events were typically approximated to within about 1 week of the observed dates. While artificial mouth breaching events were incorporated in the model, a number of natural breach events were also correctly predicted, when water levels in the lagoon filled to the level of the beach before waves could build it to typical elevations associated with flooding. Short-lived (less than one week duration) closure events that occurred in winter or spring prior to final seasonal closure were sometimes not captured by the model, or were predicted in error, which is expected given the simplicity of the model and complexity of lagoon mouth morphology on the open coast.

Water levels in the lagoon during mouth closure events were typically captured to within one foot of observations. However, since many mouth-breach events tended to occur during coincident high-runoff and high-wave conditions, the complex hydraulics sometimes led to higher errors. These events happened during the first major rainfall-runoff event of the year, typically in the months of January-February, when wave conditions are also seasonally powerful. The interaction between powerful waves and high runoff in the mouth lead to complex hydraulics that are difficult to predict with a simple approach.

The left panel of Figure 5 compares the modeled number of days of mouth closure for water years 2014-2017 against observations. Monthly predictions over this period were generally close, although the model under-predicted the number of closure days in April and May. During the four-year modeling timespan, the mouth was observed closed for about 7 days on average in April and about 14 days on average in May, compared with model predictions of 4 and 9 days, respectively. For all other months, predictions were within 1-2 days of the observations.

The right panel of Figure 5 compares the observed and modeled water level exceedance in Watsonville Slough for water years 2014-2017. Water levels in the slough and in the Pajaro River tend to be much higher than the exceedance curve for ocean tides as a result of mouth closure and ponding behind the closed beach. Overall, the model and observed exceedance curves tended to be within 0.1-0.2 feet of each other for most elevations, although errors were slightly higher (~ 0.5 feet) for lagoon stages of about 7 feet NAVD.

We expect that the model could be refined further in the future if needed, as more data are collected. Given the complexity of coastal lagoon hydrology, the model is intended to provide a meaningful statistical representation of seasonal water levels and closure conditions, while exact daily or hourly conditions are much harder to capture.

## 5. Results for Project Conditions

### 5.1. College Lake Project

As discussed by cbec (2018), the College Lake Project would result in a change in management of flows entering and leaving College Lake as the result of constructing an adjustable weir at its outlet point. This would in turn affect inflows to the Pajaro River near the upstream extent of its lagoon.

Inflow time series for existing and project conditions were provided to ESA on October 31<sup>st</sup>, 2018. After the QCM was refined and used to hindcast conditions for the water years 2014 through 2017 (see Section 4 above), we applied the model over the same time period with the altered inflows to the lagoon. Figure 6 illustrates the predicted water levels in the lagoon for both conditions.

Predicted changes to lagoon conditions varied from year to year. The following list details some of the major observations:

- The effects of the project depend heavily on the relative annual wetness of conditions. Differences in closure timing and water levels were negligible in the 2016 and 2017 water years (wet years). Differences were noticeable in both conditions in the 2014 and 2015 water years (dry years).
- Seasonal water levels in the lagoon tended to be lower with the project during seasonal closure events in the 2014 and 2015 water years (dry years), but were nearly identical during closure events in 2016 and 2017 (wet years).
- In the spring of 2015, reduced flows to the lagoon during the last rainstorm of the year (impounded behind the College Lake weir) allowed waves to close the lagoon earlier by about 5-6 weeks.

- In 2014, seasonal closure occurred at roughly the same time for existing and project conditions, which is likely due to the fact that wave conditions were conducive to mouth closure at that time, regardless of inflows.
- Water level predictions are sensitive to the assumed amount of agricultural return flows entering the lagoon (based on Hanson et al. 2014), which prevented inflows to the lagoon from dropping to zero in summer.
- The project did not result in delays in the seasonal breach events, since inflows during the first major rainfall event of each year was sufficient to fill and breach the lagoon regardless of prior College Lake releases.

Figure 7 (left panel) provides a summary of monthly closure conditions for the modeling period. The increase in expected closure days in April and May is a result of the earlier closure in the spring of 2015. Given the small sample size, it is unclear how relevant this result is. While the predicted change is within the expected uncertainty of model predictions for number of closure days per month, it may be possible that during especially dry years, lower inflows could allow waves to close the mouth sooner in the year. With a greater range of years, the threshold for dryness that would influence this shift would become more clear. It is possible that most years would not experience this shift.

Figure 7 (right panel) compares the water level exceedance for the 2014-2017 water years with and without the project. Lower water levels are a result of reducing inflows to the lagoon in spring, which made it easier for seepage through the berm and evapotranspiration to remove water from the lagoon. These results also have an expected degree of uncertainty given the small sample size of years, and the assumption that groundwater contributions to surface flows are small. It is possible that a reduction in surface water levels would increase groundwater flows to the lagoon (due to a higher head gradient between the local groundwater table and surface water in the lagoon at the channel edges).

The results suggest that the timing of breach events would not have been impacted significantly within the modeling time period. Although some of the late dry-season flow releases that occurred under existing conditions in 2014 and 2015 raised water levels in the lagoon, full breaching of the lagoon mouth did not occur until later, when the first major rainfall event of each of those years occurred. Although the project scenario left lower water levels in the lagoon at the time that these storms arrived, the ensuing runoff was more than sufficient to raise water levels to the height of the beach (and thus induce breaching).

## 5.2. Cumulative Effects from Additional Projects

Figures 8 and 9 show the results of the four cumulative projects on Pajaro River Lagoon water levels and mouth closure frequency. Given the flow bypass requirements of the Murphy Crossing project, and the low amount of flow arriving to the Pajaro River Lagoon from Watsonville and Harkins Sloughs, the cumulative projects are expected to have a relatively minor impact on lagoon conditions. Figure 8 indicates that water levels were almost identical to the College Lake Project conditions. Figure 9 indicates a minor increase in the amount of time that the lagoon was predicted to experience mouth closure.

## 6. List of Preparers

Dane Behrens, PhD, P.E.

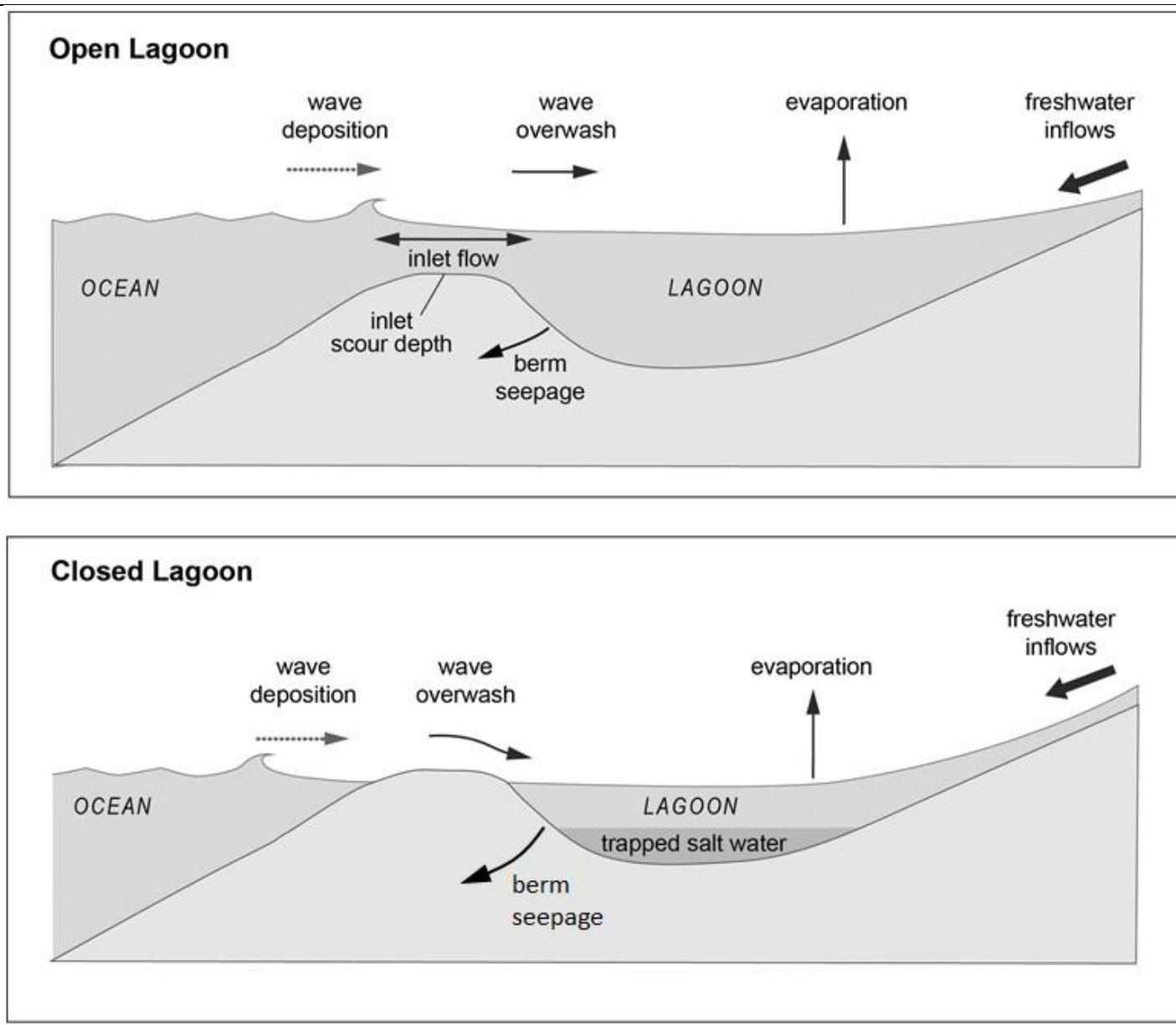
Bob Battalio, P.E.

James Jackson, P.E.

Karen Lancelle

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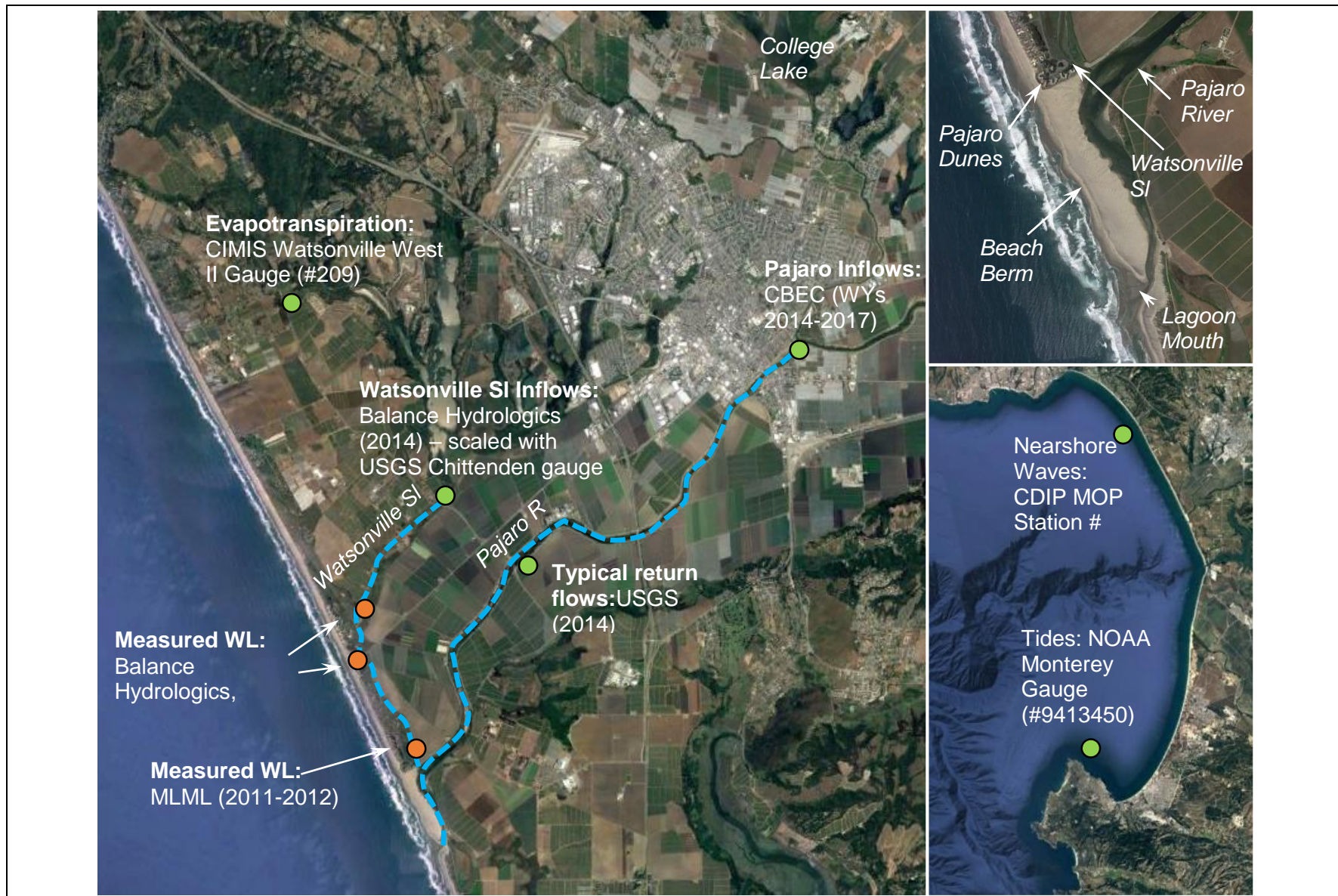


SOURCE: Behrens et al. (2015)

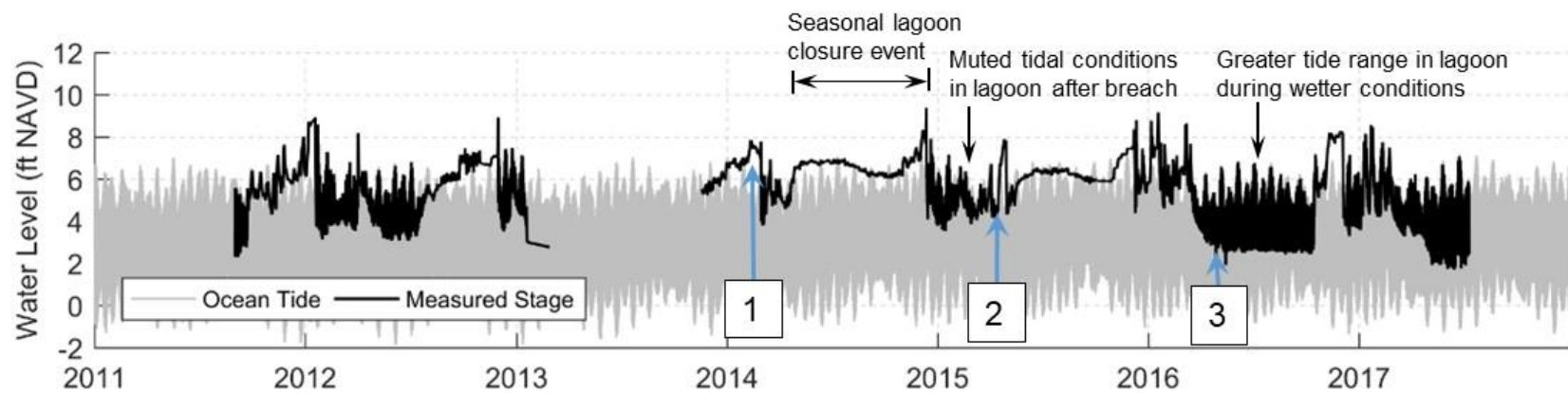
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**Figure 1**  
Schematic of coastal lagoon hydrology during open- and closed-mouth conditions.





**Figure 2**  
Sources of data used for the Pajaro lagoon model.

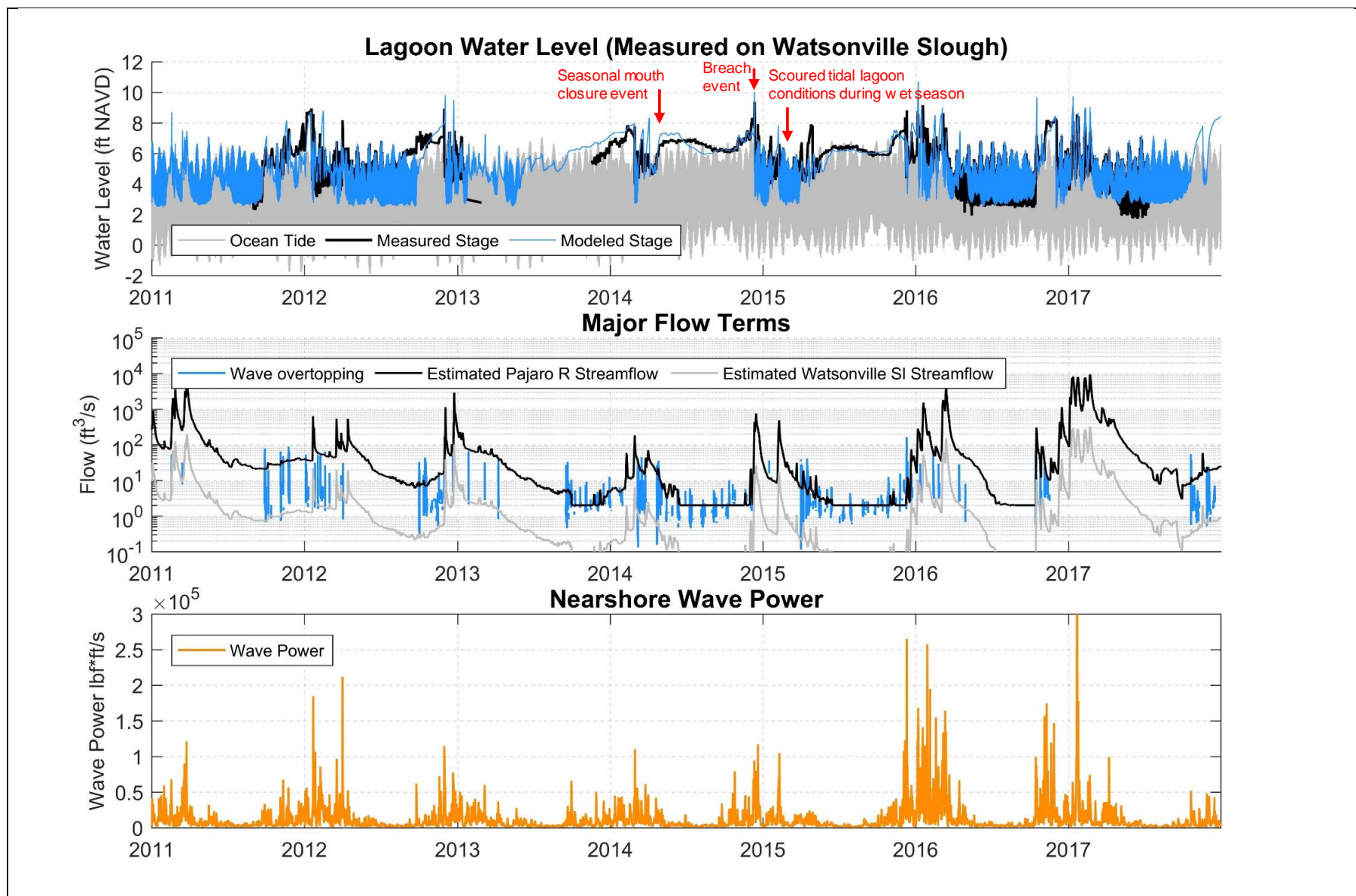


SOURCE: Water levels provided by Moss Landing Marine Labs, Balance Hydrologics, and PVWMA

PVWMA BMP Program Management. D160822.00

**Figure 3**  
Lagoon conditions observed from 2011 to 2017.

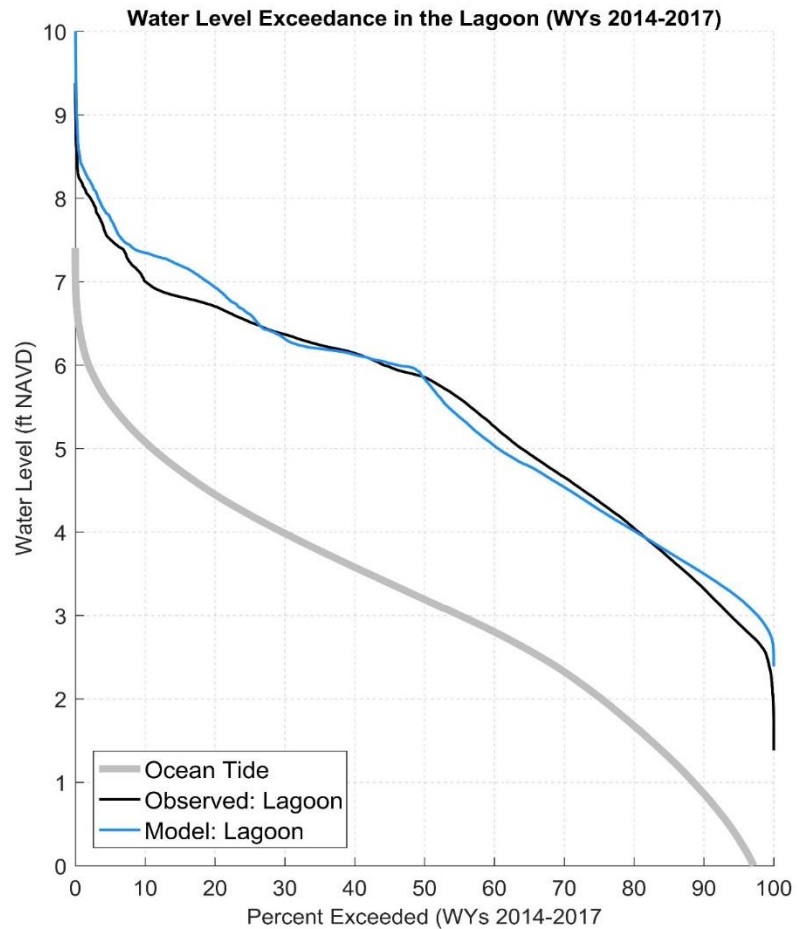
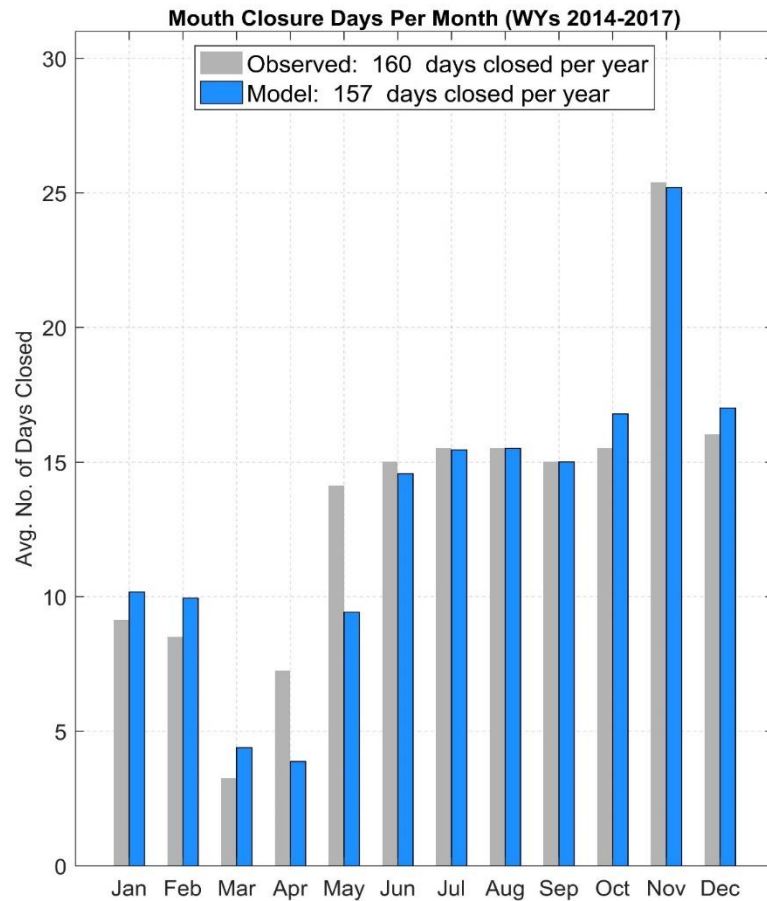




SOURCE: See Table 1 for sources

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**Figure 4**  
 Model hindcast of 2011-2017 lagoon water levels (top), compared against dominant flow terms (mid) and nearshore wave power (bottom).

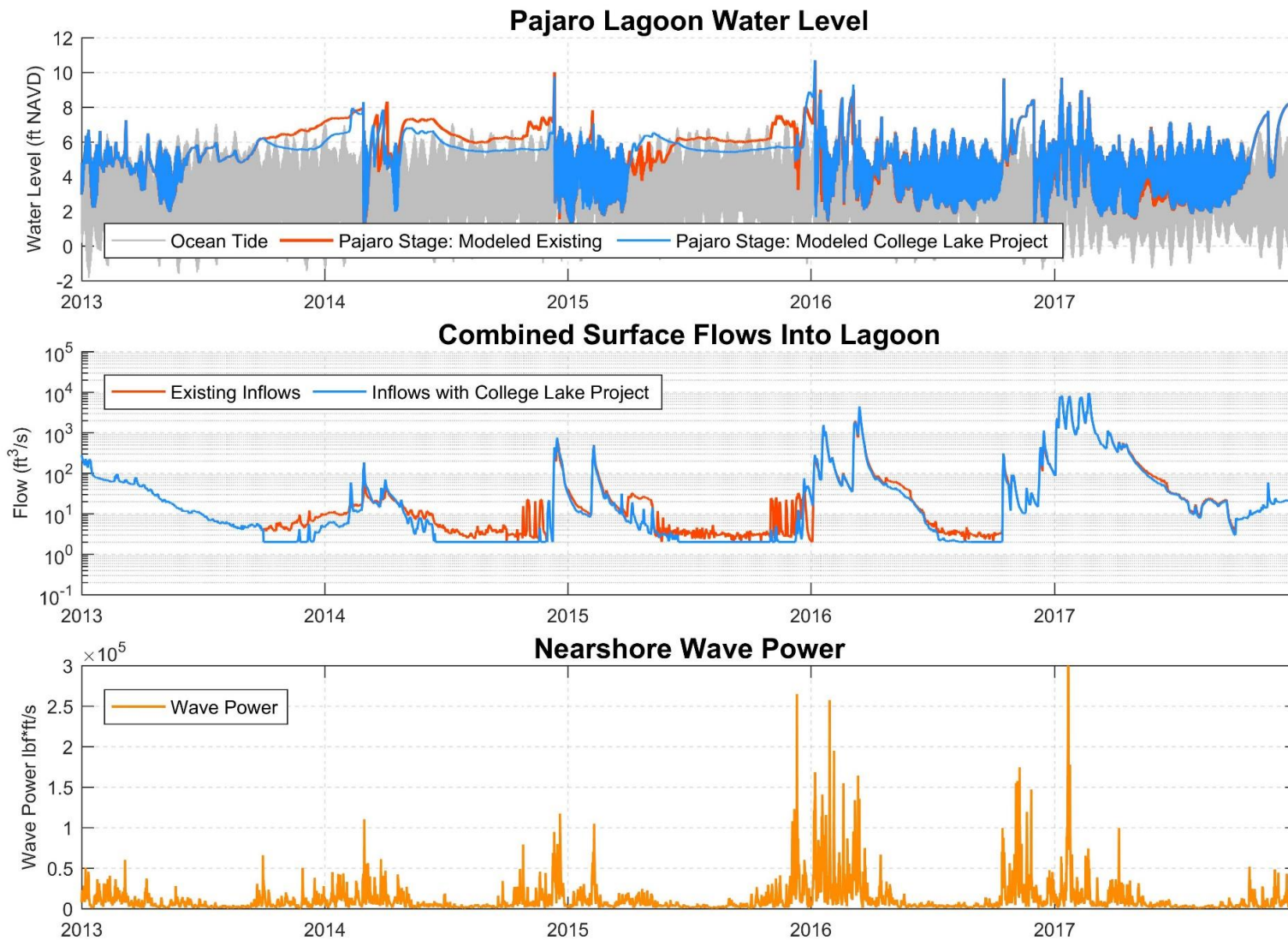


SOURCE: Water level and mouth closure sources listed in Table 1

NOTE: lagoon water levels are based on measurements in Watsonville Slough, and are not representative of low tide levels that may occur in the Pajaro River.

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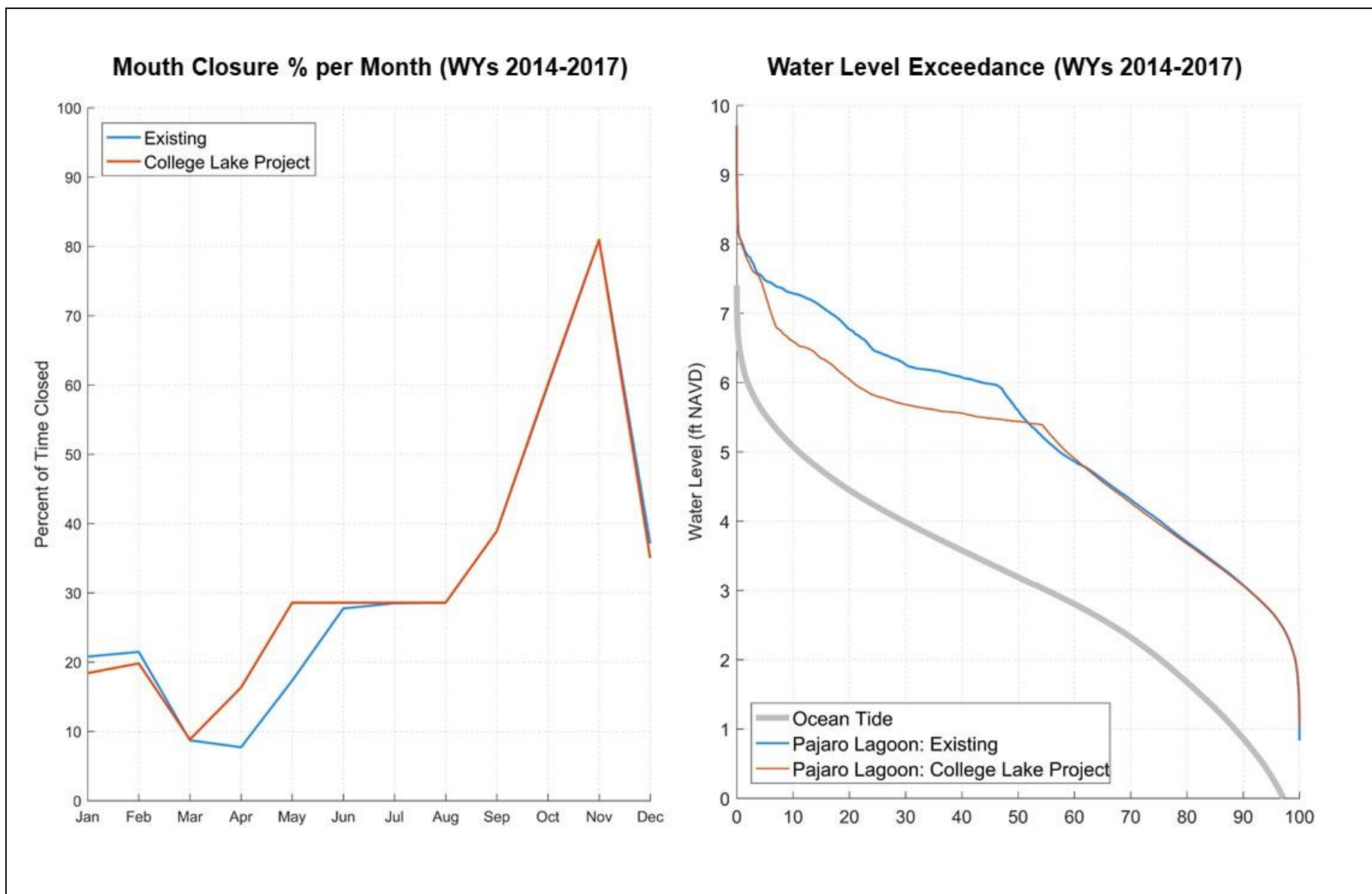
**Figure 5**  
Comparison of modeled and predicted mouth closure days per month (left panel) and water level exceedance (right panel) for water years 2014-2017.



SOURCE: surface flows at Pajaro and Salsipuedes confluence provided by CBEC (2018) and supplemented with estimates of Watsonville Slough flows based on Balance (2014) and ag return flows based on Hanson et al. (2014). Wave conditions obtained from CDIP (see Table 1)

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**Figure 6**  
 Comparison of modeled water levels in the lagoon for existing and College Lake Project conditions (top), compared against inflows (mid), and nearshore wave power (bottom).



SOURCE: flows provided by CBEC (2018).

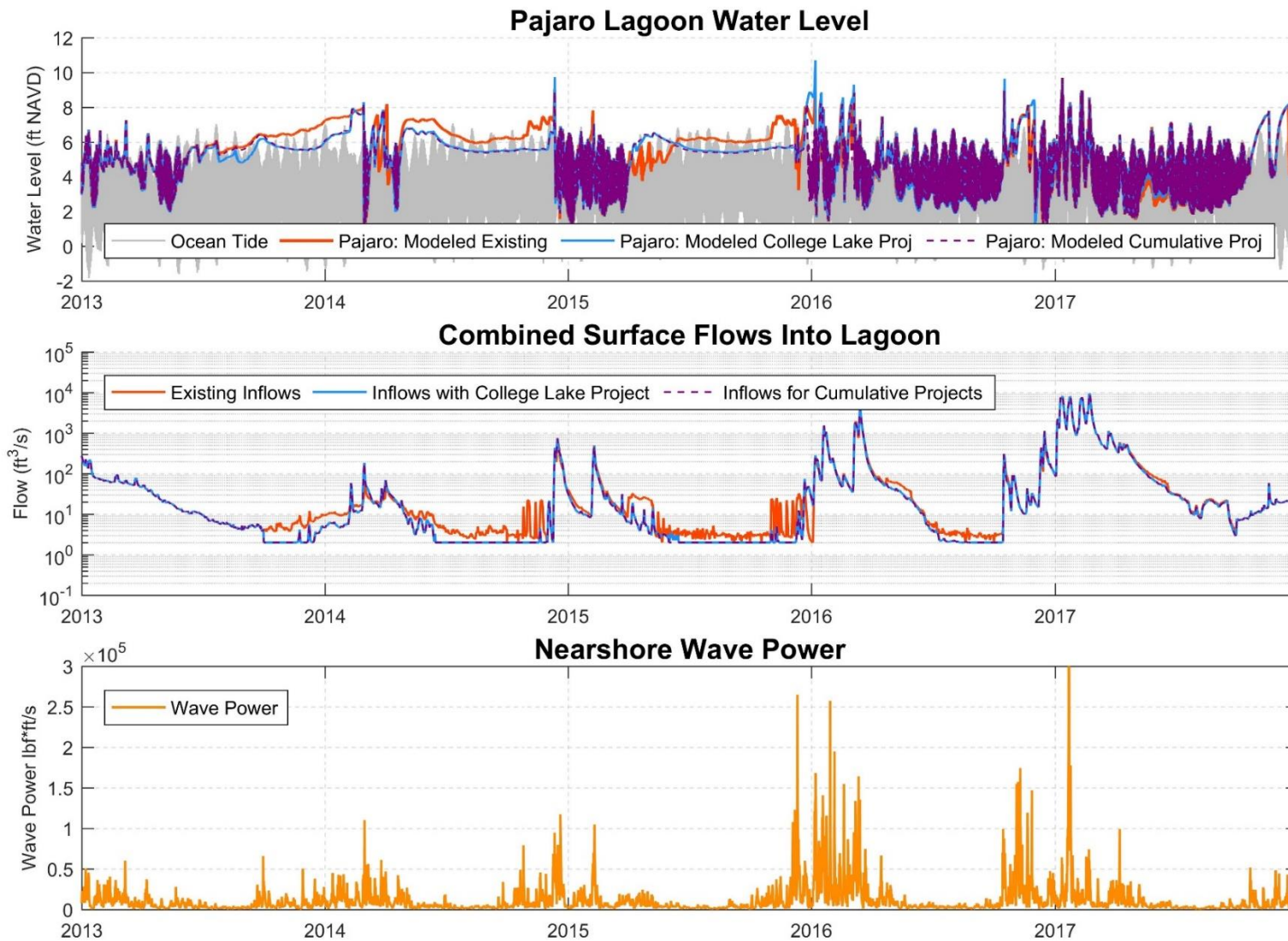
NOTE: Artificial breaching was assumed whenever lagoon water levels reached 8 feet NAVD88.

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**Figure 7**

Comparison of predicted closure days per month (left panel) and water level exceedance (right panel) with and without the College Lake Project for water years 2014-2017.

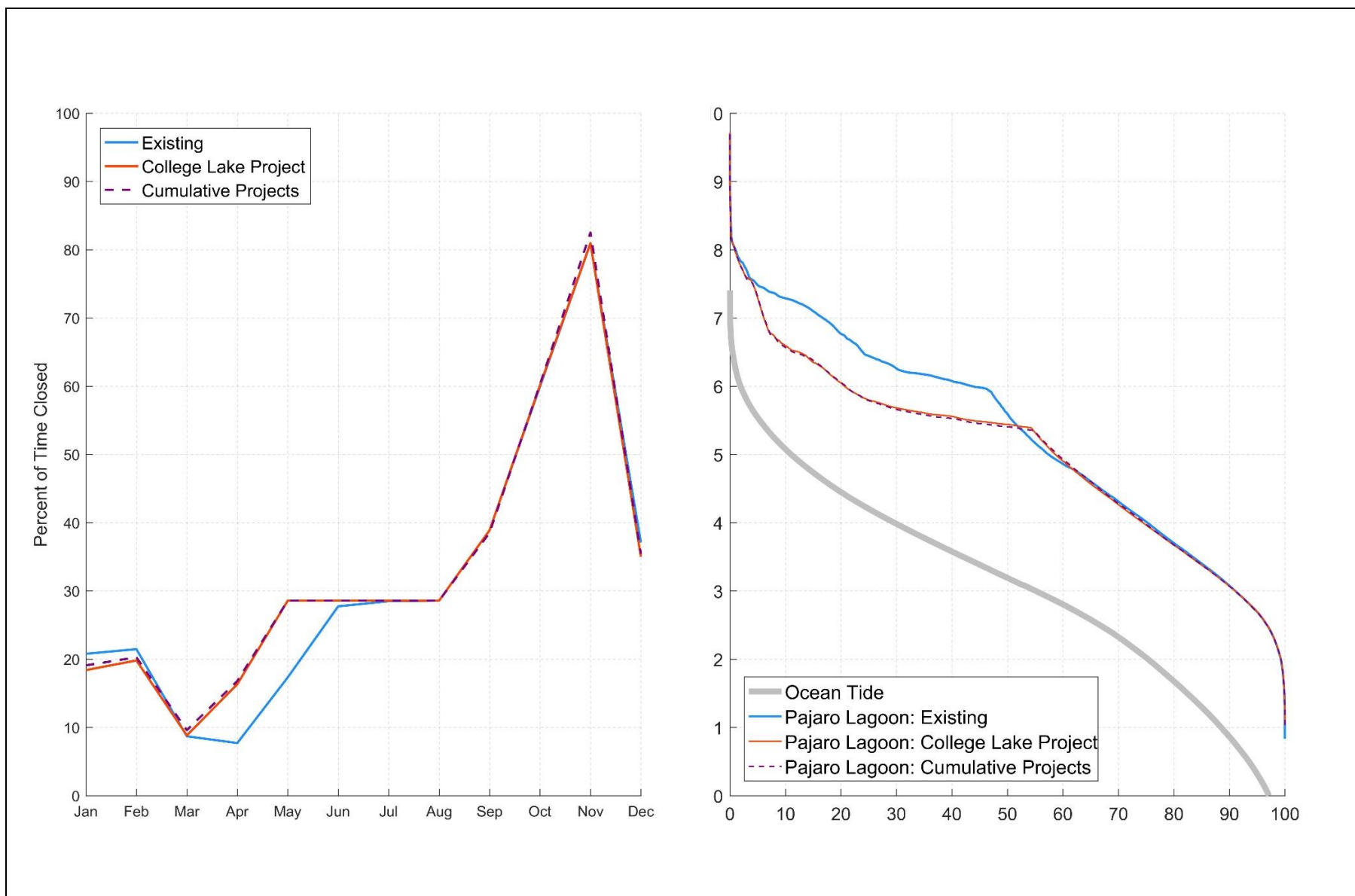




SOURCE: surface flows at Pajaro and Salsipuedes confluence provided by CBEC (2018) and supplemented with estimates of Watsonville Slough flows based on Balance (2014) and ag return flows based on Hanson et al. (2014). Wave conditions obtained from CDIP (see Table 1)

PVWMA BMP Program Management. D160822.00

**Figure 8**  
 Comparison of modeled water levels in the lagoon for existing, College Lake, and cumulative project conditions (top), compared against inflows (mid), and nearshore wave power (bottom).



SOURCE: flows provided by CBEC (2018).

NOTE: Artificial breaching was assumed whenever lagoon water levels reached 8 feet NAVD88.

PVWMA BMP Program Management. D160822.00

**Figure 9**

Comparison of predicted closure days per month (left panel) and water level exceedance (right panel) with and without the College Lake Project and the 4 cumulative projects for water years 2014-2017.



## **APPENDIX NOP**

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### Notice of Preparation and Comments on the Notice of Preparation

This appendix contains a copy of the Notice of Preparation (NOP) for the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects, as well as comments received in response to the NOP.

# **PUBLIC NOTICE**

## **Availability of Notice of Preparation of Environmental Impact Report and Notice of Public Scoping Meetings**

Date: May 31, 2019

*Project Title:* Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

*Location:* Unincorporated Santa Cruz County

*APN:* Harkins Slough Facilities Upgrades Project is in unincorporated Santa Cruz County. Pump Station Upgrades: 052-211-29. Southwest Recharge basin and recovery wells: 052-181-20, 052-181-17, 052-541-02, and 046-151-24. Southeast Recharge Basin and recovery wells: 052-181-18, 052-181-20, and 052-191-58. Struve Slough Project is in unincorporated Santa Cruz County. Screened Intake and Pump Station: 052-081-38. Monitoring Well-7 Recharge Basin and recovery wells: 046-151-37, 052-311-01, and 052-181-19. Pipelines and appurtenant facilities for both projects would be located in unincorporated Santa Cruz County on multiple properties with numerous APNs, identified in the NOP.

*Project Sponsor:* Pajaro Valley Water Management Agency  
36 Brennan Street  
Watsonville, CA 95076

*Lead Agency:* Same as Project Sponsor

*Staff Contact:* Brian Lockwood, General Manager  
Pajaro Valley Water Management Agency  
Fax: (831) 722-3139  
Email: [eir@pvwater.org](mailto:eir@pvwater.org)

The Pajaro Valley Water Management Agency (PV Water) has prepared a Notice of Preparation (NOP) of an environmental impact report (EIR) in connection with the proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects) which consists of the Harkins Slough Facilities Upgrades Project (Harkins Slough Project) and Struve Slough Project to inform the public, responsible and trustee agencies, and interested parties about the Projects and the intent to prepare an EIR. The purpose of an NOP is to provide sufficient information describing a project and the potential environmental effects to enable responsible and trustee agencies to make a meaningful response related to the scope and content of the EIR (CEQA Guidelines Section 15082). The NOP is available for public review and comment online at:

<http://pvwater.org/about-pvwma/bmp-update.php>

Paper copies are also available at PV Water's office, 36 Brennan Street, Watsonville, CA 95076; Watsonville Public Library, 275 Main Street, Suite 100, Watsonville, CA 95076; Watsonville Public Library, Freedom Branch, 2021 Freedom Boulevard, Freedom, CA 95077, and Monterey County Library, Pajaro Branch, 29 Bishop Street, Pajaro, CA 95076.

## Project Summary

The Projects are priority supplemental water supply projects outlined in PV Water's Basin Management Plan (BMP) Update (adopted in 2014). The primary purpose of the Projects is to help balance the Pajaro Valley Groundwater Basin, prevent further seawater intrusion, and meet the water supply needs in PV Water's service area by upgrading and expanding the existing Harkins Slough pump station, developing Struve Slough as a water supply source, and constructing new recharge basins. The Harkins Slough Project components would consist of upgrades to the Harkins Slough pump station, installation of a backwash and raw water pipeline from the filter plant at the Harkins Slough pump station to an existing gravity sewer in West Beach Street, and construction of two new recharge basins and associated recovery wells and pipelines. The Struve Slough Project components would consist of a new screened intake, new pump station, a new pipeline to connect the new pump station to the Harkins Slough pump station, a new pipeline to connect the Harkins Slough pump station to the recharge basins, and a new recharge basin and associated recovery wells and pipelines.

## Public Scoping Process

To ensure that the public and regulatory agencies have an opportunity to ask questions and submit comments as to the scope and content of the EIR, a scoping meeting will be held during the NOP review period, on **Wednesday, June 12, 2019**, in the **Community Room B at the City of Watsonville Civic Plaza (275 Main Street, Fourth Floor, Watsonville, CA 95076)**. The meeting will be held from **4:00 to 5:30 PM**, and will start with a brief presentation providing an overview of the Projects. Following the presentation, interested parties will be provided an opportunity to ask questions and provide comments. Participants are encouraged to submit written comments; comment forms will be supplied at the scoping meeting. Written comments may also be submitted anytime during the NOP scoping period to the mailing address, fax number, or email address listed below.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date, but not later than **5:00 PM on July 1, 2019**. Please include a name, address, email address, and telephone number of a contact person in your agency (if applicable) for all future correspondence on this subject. Please send your comments to:

Pajaro Valley Water Management Agency  
ATTN: Brian Lockwood, General Manager  
36 Brennan Street  
Watsonville, CA 95076

Fax: (831) 722-3139  
E-mail: [eir@pvwater.org](mailto:eir@pvwater.org)

# NOTICE OF PREPARATION

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## Watsonville Slough System Managed Aquifer Recharge and Recovery Projects Environmental Impact Report

### Introduction

In accordance with the provisions of the California Environmental Quality Act (CEQA) and the CEQA *Guidelines*, the Pajaro Valley Water Management Agency (PV Water), as CEQA Lead Agency, is preparing a project level environmental impact report (EIR) for the proposed Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects) which consists of the Harkins Slough Facilities Upgrades Project (Harkins Slough Project) and Struve Slough Project.

PV Water has prepared this Notice of Preparation (NOP) of an EIR in connection with the Projects to inform the public, responsible and trustee agencies, and interested parties about the Projects and the intent to prepare an EIR. The purpose of an NOP is to provide sufficient information describing the Project and the potential environmental effects to enable the responsible agencies to make a meaningful response related to the scope and content of the EIR (CEQA *Guidelines* Section 15082). The purpose of the EIR is to provide information about potential significant physical environmental effects of the Projects, to identify possible ways to minimize the significant effects, and to describe and analyze possible alternatives to the Projects. PV Water is seeking your views regarding the scope and content of the environmental document in connection with the Projects. Written comments will be accepted until **5:00 PM on July 1, 2019**. PV Water will also hold a scoping meeting on **Wednesday, June 12, 2017**, in the **Community Room B at the City of Watsonville Civic Plaza (275 Main Street, Fourth Floor, Watsonville, CA 95076)**. The meeting will be held from **4:00 to 5:30 PM**.

### Project Background

#### Pajaro Valley Water Management Agency

PV Water was formed in 1984 by the Pajaro Valley Water Management Agency Act (Agency Act), for the primary purpose of managing groundwater resources and supplemental water supplies in its service area. The 2014 Sustainable Groundwater Management Act (SGMA) listed PV Water as the exclusive Groundwater Sustainability Agency within its service area (Water Code Section 10723), and in 2015 the PV Water Board of Directors (Board) elected to become a Groundwater Sustainability Agency. PV Water's service area encompasses approximately 70,000 acres in the Pajaro Valley, located in southern Santa Cruz County, northern Monterey County, and a small

portion of San Benito County. Seawater intrusion in the Pajaro Valley Groundwater Basin was first documented in 1953. In the coastal areas and throughout much of the Pajaro Valley Groundwater Basin, overdraft conditions<sup>1</sup> have caused groundwater levels to drop below sea level, creating a landward pressure gradient that causes seawater to move inland. Seawater intrusion has elevated the chloride concentrations in groundwater up to two and a half miles inland from the coast, in some areas contaminating the groundwater to the point that it is unsuitable for agricultural irrigation and domestic (potable) uses without treatment.

PV Water was created to manage existing and supplemental water supplies for its service area. Its objective is to achieve a sustainable groundwater basin by managing local groundwater resources to reduce, and eventually halt, long-term seawater intrusion and overdraft of the groundwater basin while ensuring sufficient water supplies for present and anticipated needs. To achieve this objective, PV Water has prepared and periodically updates a basin-wide groundwater management plan, the Basin Management Plan (BMP), which serves as the guiding document for its major projects and programs. The BMP preparation process includes engaging the public, forming a stakeholder committee, reviewing existing groundwater basin conditions, evaluating the results of implemented projects to reduce overdraft and seawater intrusion, as well as identifying additional projects and management strategies to achieve its stated goals and testing the strategies with the Pajaro Valley Hydrologic Model.

## Previous Basin Management Planning Efforts

PV Water prepared its first BMP in the 1990s. The “1993 BMP” identified a preferred alternative that called for importing a surface water supply to the region from the federal Central Valley Project to substantially augment the use of local surface water supplies. A program environmental impact report (1993 BMP PEIR) was prepared for the 1993 BMP to analyze, at a program-level, these concepts.

A redraft of the BMP was prepared in 2000 but its completion was delayed to allow additional analyses of local water supply options, which were then incorporated into the 2002 Revised BMP. The 2002 Revised BMP EIR provided a program-level analysis of the environmental impacts of two alternatives, and a project-level analysis of local projects. The final strategy of the 2002 Revised BMP adopted by the Board was called the Modified BMP 2000 Alternative and included the following major projects and programs: Harkins Slough Managed Aquifer Recharge and Recovery Facility, Coastal Distribution System (CDS), 54-Inch Import Water Project with Out-of-Basin Banking, Recycled Water Project, and Conservation and Watershed Management Programs. Subsequently, PV Water constructed the Managed Aquifer Recharge and Recovery Facilities (comprised of the Harkins Slough pump station, recharge basin, and associated recovery wells and pipelines), a significant portion of the CDS, supplemental wells, and, in cooperation with the City of Watsonville, the Recycled Water Facility (RWF).

However, while the implementation of the Managed Aquifer Recharge and Recovery Facilities, the RWF, supplemental wells, and the CDS has helped to reduce the magnitude of the groundwater

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<sup>1</sup> Overdraft occurs when the amount of groundwater withdrawn from a basin exceeds the volume of freshwater replenishing the basin.

overdraft and resulting seawater intrusion problems, these problems still persist. In 2005, PV Water contracted with the United States Geological Survey to cooperatively develop a robust, regional hydrologic model to simulate the use and movement of water within the groundwater basin. Based on the hydrologic modeling results, PV Water has established a target of reducing groundwater pumping in the Pajaro Valley Groundwater Basin by 12,100 acre-feet per year (AFY).<sup>2</sup>

## Basin Management Plan Update

In 2010, PV Water formed the 21-member Ad Hoc BMP Committee as a means for the Pajaro Valley community to help guide the Board in the development of an updated BMP (BMP Update) focused on implementing locally controlled solutions (e.g., additional conservation, surface water supplies, and/or reductions in groundwater pumping). The BMP Update planning process began with the development of a comprehensive list of supplemental water supply projects, including some identified in previous BMPs, that could help meet the goals of stopping seawater intrusion and basin overdraft. Potential projects (44 in total) were identified, screened, ranked, and prioritized for feasibility, cost, and other factors. Based on this analysis, seven projects were recommended by the Ad Hoc BMP Committee, and ultimately selected by the Board for inclusion in the BMP Update portfolio. These projects are:

- Conservation;
- Increased Recycled Water Storage at the RWF;
- Increased Recycled Water Deliveries;
- Harkins Slough Recharge Facilities Upgrades (this project was subsequently renamed the Harkins Slough Facilities Upgrades Project);
- Watsonville Slough with Recharge Basins (this project was subsequently renamed the Struve Slough Project to reflect the location of the proposed intake);
- College Lake with Inland Pipeline to Coastal Distribution System (this project was subsequently renamed the College Lake Integrated Resources Management Project); and
- Murphy Crossing with Recharge Basins.

## 2014 Program Environmental Impact Report

To address the potential environmental impacts of the BMP Update components, PV Water prepared the *Final Environmental Impact Report for the Basin Management Plan Update* (State Clearinghouse #2000062030, referred to herein as 2014 BMP Update PEIR), which evaluated the environmental impacts of the seven components at a program level of detail.<sup>3</sup> A program EIR is prepared for a group of potential actions that can be characterized as one large project, such as the BMP Update (CEQA *Guidelines* Section 15168). A program EIR is a first-tier environmental document that assesses and documents the broad environmental impacts of a program with the understanding that a more detailed site-specific review may be required to assess future projects

<sup>2</sup> One acre-foot equals about 326,000 gallons, or enough water to cover an acre of land one foot deep.

<sup>3</sup> The *Final Environmental Impact Report for the Basin Management Plan Update* is available online at <https://www.pvwater.org/bmp-update>. (PV Water, *Final Environmental Impact Report for the Basin Management Plan Update*, prepared by Denise Duffy & Associates, Inc., February 2014.)

implemented under the program. The 2014 BMP Update PEIR evaluated the BMP Update components based on conceptual information available at that time, and established a framework for “tiered” or project-level environmental documents that would be prepared in accordance with the overall program.

The Board certified the 2014 BMP Update PEIR on April 16, 2014 (Resolution 2014-04). The Board then approved the BMP Update and made findings pursuant to CEQA, including a statement of overriding considerations, and adopted a mitigation monitoring and reporting program for the BMP Update (Resolution 2014-05).

## Sustainable Groundwater Management Act<sup>4</sup>

The SGMA was signed into law in September 2014, after the 2014 BMP Update PEIR was certified.<sup>5</sup> SGMA defines sustainable groundwater management as the “management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.”<sup>6</sup> “Undesirable Results” are defined in SGMA and may be summarized as any of the following effects caused by groundwater conditions occurring throughout the basin:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply;
- Significant and unreasonable reduction of groundwater storage;
- Significant and unreasonable seawater intrusion;
- Significant and unreasonable degraded water quality;
- Significant and unreasonable land subsidence; and/or
- Surface water depletions that have significant and unreasonable adverse impacts on the beneficial uses of surface water.<sup>7</sup>

SGMA requires critically overdrafted, high priority basins like the Pajaro Valley Groundwater Basin<sup>8</sup> to be managed under a Groundwater Sustainability Plan by January 31, 2020, and to achieve sustainability by 2040. SGMA also:

- Empowers local agencies to manage groundwater basins sustainably;
- Establishes basic requirements for Groundwater Sustainability Plans; and
- Provides for a review, evaluation and assessment of Groundwater Sustainability Plans by DWR (See Water Code sections 10733-10733.8) and intervention by the State Water Board if

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<sup>4</sup> Cal. Water Code § 10720, et seq.

<sup>5</sup> California Department of Water Resources, Sustainable Groundwater Management Act and Related Statutory Provisions from SB1168 (Pavley), AB1739 (Dickinson), and SB1319 (Pavley) as Chaptered], effective January 1, 2016.

<sup>6</sup> Cal. Water Code § 10721(v).

<sup>7</sup> Cal. Water Code § 10721(x).

<sup>8</sup> Officially, the basin is referred to as the Pajaro Valley Groundwater Subbasin 3-002.01 (Corralitos Basin, Pajaro Valley Subbasin).

the applicable requirements of SGMA have not been met (see Water Code sections 10735-10735.8).

SGMA places the responsibility of sustainable groundwater management on Groundwater Sustainability Agencies, which can be any local agency that has water supply, water management, or land use responsibilities within a groundwater basin, or a combination of such agencies overlying a basin. SGMA designated PV Water as the exclusive local agency to manage groundwater within its statutory boundaries (Water Code Section 10723) and the Board voted to be the Groundwater Sustainability Agency for the Pajaro Valley Groundwater Basin in August 2015. In September 2015, PV Water submitted a formation notice to the California Department of Water Resources and the Department posted this notice.<sup>9,10</sup> In 2016, PV Water submitted the BMP Update and associated documents as an Alternative to a Groundwater Sustainability Plan.<sup>11</sup>

## Harkins Slough Facilities Upgrades Project and Struve Slough Project EIR

Since completing the 2014 BMP Update PEIR, PV Water has developed the Projects in greater detail through planning and conceptual design studies. The Harkins Slough Project and Struve Slough Project will be described in the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects EIR, which will evaluate the proposed design, construction, and operation of the Projects, tiering from the 2014 BMP Update PEIR and incorporating parts of the PEIR by reference. The EIR will be prepared as a supplement to the 2014 BMP Update PEIR pursuant to Section 15163 of the CEQA *Guidelines*. The 2014 BMP Update PEIR is available for review at the PV Water offices (36 Brennan Street, Watsonville, CA 95076) and on PV Water's website at <http://pvwater.org/about-pvwma/bmp-update.php>.

## Current Slough Operations

The Watsonville Slough system consists of six major branch sloughs: Watsonville, Harkins, Hanson, Struve, West Branch of Struve, and Gallighan. The slough system is a network of approximately 800 acres of coastal salt marsh, seasonal wetlands, brackish and freshwater emergent marsh and riparian communities. It receives runoff from a 13,000-acre watershed area.<sup>12</sup>

## Harkins Slough

The Harkins Slough pump station, recharge basin, and associated pipelines were constructed in 2002, to filter water and seasonally store wet weather flows from Harkins Slough in the shallow aquifers of the San Andreas Terrace. Via a Santa Cruz County-owned pump station that is operated by PV Water, the wet weather flows are pumped through pressure sand filters and then to the

<sup>9</sup> PV Water, Sustainable Groundwater Management, 2019. Available online at <https://www.pvwater.org/sgm>. Accessed on April 10, 2019.

<sup>10</sup> California Department of Water Resources, All posted Groundwater Sustainability Agency Notices, last modified October 8, 2015. Available online at <http://sgma.water.ca.gov/portal/gsa/all>. Accessed on April 10, 2019.

<sup>11</sup> California Department of Water Resources, SGMA Portal, Alternatives. Pajaro Valley Water Management Agency, last modified October 8, 2015. Available online at <https://sgma.water.ca.gov/portal/alternative/print/22>. Accessed on April 10, 2019.

<sup>12</sup> PV Water, *Final Environmental Impact Report for the Basin Management Plan Update*, prepared by Denise Duffy & Associates, Inc., February 2014.



existing recharge basin where the water percolates into the ground. Stored water is pumped from a series of recovery wells and is delivered to coastal farms through the CDS during the irrigation season.

There are constraints on existing diversion and recovery operations that adversely affect the yield of the existing Harkins Slough facilities. Historically, PV Water has not been able to divert more than 1,000 acre-feet per year (AFY) to the recharge basin. Water quality issues are one of the primary reasons for the low diversion rates, and in years when water supply and quality are good, infiltration capacity becomes the limiting factor. At the time of construction, the Harkins Slough Project was designed to recover an average of 1,100 AFY from the recovery wells, but PV Water has recovered an average of 200 AFY. Low recovery rates are due to low diversions, decreased infiltration rates, and limited recovery well and pumping capacities,<sup>13</sup> including the recovery wells being located in a localized aquifer below a clay unit that impedes recharge water from entering the aquifer. With the Projects' upgrades and new facilities, PV Water would be able to increase these diversion rates, potentially up to the 2,000 AFY authorized by PV Water's water-right Permit 21039 (Application 30522) for the Harkins Slough Project.

## **Struve Slough**

Struve Slough is not currently used by PV Water for any purposes. Around the banks and upland areas above the sloughs are recreational trails, agricultural, commercial, and residential land uses.

# **Project Description**

## **Project Purpose and Objectives**

The primary purposes of the Projects are to help balance the groundwater basin, prevent further seawater intrusion, and meet water supply needs in PV Water's service area by upgrading the Harkins Slough pump station, developing Struve Slough as a new water supply source, and constructing new recharge basins and associated recovery wells and pipelines. The following objectives were included in the 2014 BMP Update PEIR:

- Prevent seawater intrusion, long-term groundwater overdraft, land subsidence, and water quality degradation;
- Manage existing and supplemental water supplies to control overdraft and provide for present and future water needs;
- Create a reliable, long-term water supply, which has been identified as an important cornerstone of the long-term economic vitality of the Pajaro Valley;
- Develop water conservation programs; and
- To recommend a program that is cost effective and environmentally sound.

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<sup>13</sup> Carollo Engineers, *Harkins Slough Filter Plant Water Quality Study*, Final, August 2017.

PV Water anticipates that the Projects would advance all of these objectives, with the exception of development of water conservation programs, which is being addressed by other PV Water programs.<sup>14</sup>

As discussed above, SGMA was enacted after PV Water’s approval of the 2014 BMP Update. In light of the BMP objectives, the requirements of SGMA, and the mitigation measures adopted as part of its approval of the BMP Update, the Board may consider additional project-specific objectives for the Projects that would be identified in the EIR.

## Project Location

The Projects include the following components that would be located in unincorporated Santa Cruz County (see **Figure 1**). The locations of the following components and related construction staging areas are collectively referred to as the “Project sites.” **Appendix NOP-1** lists by Assessor Parcel Number (APN) the properties that are associated with the Projects.

### Harkins Slough Facilities Upgrades Project

**Figure 2** shows the location and schematic of the Harkins Slough pump station. The existing Harkins Slough pump station is located approximately one mile southwest of the Watsonville city limits, north of San Andreas Road and west of State Route (SR) 1.

- **Harkins Slough Pump Station Upgrades.** The proposed filter plant expansion and pump station upgrades would occur at the existing Harkins Slough pump station at the southern end of Harkins Slough, approximately 900 feet north of San Andreas Road (Figure 2).
- **Backwash and Raw Water Pipeline.** A backwash and raw water pipeline would extend from the Harkins Slough pump station across agricultural fields to connect with an existing 33-inch gravity sewer in West Beach Street (Figure 1). The proposed pipeline alignment follows existing developed road rights-of-way and traverses agricultural land in unincorporated Santa Cruz County.
- **Southwest and Southeast Recharge Basins, Recovery Wells, and Associated Pipelines.** The proposed Southwest and Southeast recharge basins would be located on farmland west of San Andreas Road and north of Dairy Road in unincorporated Santa Cruz County. The Southwest basin site is approximately 850 feet south of the existing recharge basin, while the Southeast basin site is adjacent to the southeast side of the existing recharge basin (refer to **Figure 3**). Both basins would be connected via new pipelines to the existing 24-inch filtered water pipeline that connects the Harkins Slough pump station with the existing recharge basin. Up to ten recovery wells would be installed for each recharge basin.
- **Modifications to Intake.** Prior to publication of the Draft EIR PV Water will explore with resource agencies whether modifications to the existing Harkins Slough intake are warranted.

<sup>14</sup> PV Water’s water conservation programs are designed to reduce water use in the Pajaro Valley. Information on PV Water’s water conservation programs is available at <https://www.pvwater.org/>.

- **Point of Diversion and Place of Use.**<sup>15</sup> Water would continue to be diverted at the existing point of diversion on Harkins Slough pursuant to PV Water’s water-right Permit 21039.

## Struve Slough Project

**Figure 5** shows the locations and schematic of the proposed screened intake and pump station for the Struve Slough Project.

- **Intake and Pump Station.** The proposed screened intake for this Project would be located in Struve Slough. The pump station would be located about 200 feet northwest of the intake on land zoned for agriculture. A pipeline would connect the intake to the pump station.
- **Struve Slough Pipeline.** The proposed Struve Slough pipeline would extend from the proposed pump station to the filters at the Harkins Slough pump station. The proposed alignment traverses agricultural land in unincorporated Santa Cruz County (Figure 1).
- **Filter Plant to Recharge Basins Pipeline.** An approximately one-mile-long pipeline would extend from the filters at the Harkins Slough pump station approximately 900 feet north of San Andreas Road to the recharge basins, parallel to and within the same right-of-way of an existing 24-inch filtered water pipeline. The proposed alignment traverses agricultural land and existing road right-of-way in unincorporated Santa Cruz County (Figure 1).
- **Monitoring Well-7 Recharge Basin, Recovery Wells, and Associated Pipeline.** The proposed Monitoring Well 7 (MW-7) recharge basin would be located on farmland west of San Andreas Road and north of Dairy Road in unincorporated Santa Cruz County. The MW-7 basin site is located about 375 feet northwest of the existing recharge basin, and would be connected via a short pipeline to the proposed filter plant to recharge basins pipeline (refer to Figure 3). Up to ten recovery wells would be placed around the MW-7 recharge basin.
- **Point of Diversion and Place of Use.** As part of the Struve Slough Project, PV Water will file an application with the State Water Resources Control Board for a new water-right permit. The proposed point of diversion would be located in Struve Slough, as depicted in Figure 5. **Figure 4** depicts the proposed place of use, which would include the areas where agricultural water users served by PV Water’s CDS would use Project water.

As part of the Projects, PV Water intends to negotiate with affected property owners to obtain property rights to access and use the Project sites.

## Project Components

### Harkins Slough Facilities Upgrades Project

The components proposed to be constructed and operated as part of the Harkins Slough Project include upgrades at the Harkins Slough pump station, construction of the Southwest and Southeast recharge basins and associated recovery wells and pipelines, and a backwash and raw water pipeline, each of which is described below. PV Water may choose to implement a combination of components associated with the Harkins Slough Project and Struve Slough Project.

<sup>15</sup> The place of use consists of the areas where the appropriated water is to be used.

### ***Harkins Slough Pump Station Upgrades***

Upgrades to the Harkins Slough pump station would include construction of coagulant addition facilities and the addition of new filters (gravity synthetic medium or pressure sand) to reduce the amount of solids sent to the recharge basins, replacement of three existing intermediate pumps with new pumps, replacement of two existing diversion pumps, and additional yard piping improvements. The pump station upgrades may also include upgrades to the pump controls, and potentially the intake, to improve facility reliability. The pump station and filter plant upgrades would be designed to meet Santa Cruz County noise standards. The filter plant would use polyaluminum chloride coagulant for filtration with up to 5,000 gallons of storage. The yard piping upgrades would include approximately 350 feet of new 24-inch diameter pipelines, one which would convey raw (untreated) water to the filters and the other which would convey filtered water from the filters to the pump station. Refer to Figure 2 for a site plan of the Harkins Slough pump station.

### ***Southwest and Southeast Recharge Basins, Recovery Wells, and Pipelines***

The Southwest recharge basin would be approximately 16.7 acres while the Southeast recharge basin would be approximately 12.7 acres. Construction of the Southeast recharge basin may require the demolition of an existing structure and the construction of an approximately 11-foot by 5-foot equalization structure that would stand approximately 8 feet tall. There may be refinements to the Southeast recharge basin boundaries during design subsequent to publication of the NOP. Up to ten recovery wells would be placed near each basin to extract water during the irrigation season. Horizontal wells will also be considered. 20-inch to 36-inch diameter pipelines would convey water from the Harkins Slough pump station to the recharge basins, and from recovery wells to the existing CDS.

### ***Backwash and Raw Water Pipeline***

An approximately 4,600-foot-long backwash and raw water pipeline would be constructed between the Harkins Slough pump station and the existing 33-inch gravity sewer line under West Beach Street for discharge of filter backwash and to allow diversion of raw water from the sloughs to the Watsonville Wastewater Treatment Facility and RWF, collectively known as the Water Resources Center.

## **Struve Slough Project**

The components proposed to be constructed and operated as part of the Struve Slough Project include the screened intake, pump station, Struve Slough pipeline, filter plant to recharge basins pipeline, and MW-7 recharge basin and associated recovery wells and pipeline, each of which is described below.

### ***Screened Intake***

The screened intake at the diversion point in Struve Slough would be installed on an approximately 25 feet by 15 feet pile-supported slab. An approximately 250-foot-long 36-inch diameter high-density polyethylene pipeline would convey water from the intake to the pump station.

### ***Pump Station***

A pump station at Struve Slough would divert water from the intake to the filter plant at the Harkins Slough pump station. The pump station at Struve Slough would have three 200-horsepower pumps (two duty plus one standby) that would be designed to meet Santa Cruz County noise standards. The pump station would be approximately 30 feet long by 20 feet wide, be set at existing grade, and extend about 30 feet below grade. Included at the pump station site would be an electrical controls building that would be about 8 feet wide by 40 feet long and approximately 10 feet tall (refer to Figure 5).

### ***Struve Slough Pipeline***

An approximately 6,360-foot long, 30-inch polyvinyl chloride or high-density polyethylene pipeline would be constructed to convey water from the proposed pump station at Struve Slough to the filters at the Harkins Slough pump station.

### ***Filter Plant to Recharge Basins Pipeline***

PV Water would construct an approximately 5,500-foot-long, 24-inch diameter polyvinyl chloride or high-density polyethylene water pipeline from the filters at the Harkins Slough pump station to an existing pipeline adjacent to the existing recharge basin. The new filter plant to recharge basins pipeline would run parallel to and within the same right-of-way as an existing 24-inch filtered water pipeline. The proposed pipeline would be used in addition to the existing pipeline to accommodate the increased diversions from Harkins and Struve Slough. Approximately 4,400 feet of the pipeline would traverse agricultural land, while 700 feet would be under a paved section of Dairy Road.

### ***MW-7 Recharge Basin, Recovery Wells, and Pipeline***

The MW-7 recharge basin would be approximately 3.9 acres, and would be connected to the either the proposed or existing 24-inch filtered water pipeline that delivers water from the Harkins Slough pump station by a 20-inch filtered water pipeline. Up to ten recovery wells would be placed near the recharge basin, and would extract water to meet irrigation needs in-lieu of groundwater pumping. Horizontal wells will also be considered.

## **Construction**

Construction activities would include staging/laydown, site clearing, earth work, pile driving, structural placement and backfilling, concrete and paving work, dewatering, excavation, and trenching in the Project area.

## **Schedule**

Construction of the Harkins Slough Project is expected to occur in approximately 30 months over a four-year period between 2020 and 2025. Construction of the Struve Slough Project is expected to last one year between 2022 and 2023, with the exception of the MW-7 recharge basin, recovery wells, and associated pipelines, the construction of which is expected to occur over nine months between 2027 and 2028.

## Site Clearing and Preparation

Construction workers would clear and prepare the construction work areas in stages as construction progresses. Before construction starts, the contractor would clear and grade portions of the Projects' areas, removing vegetation and debris as necessary to provide a level surface for equipment access, materials staging, and construction activities.

## Staging and Laydown Areas

Construction equipment and materials would be stored within the construction work areas to the extent feasible, though additional offsite laydown areas may be required. If required, the additional laydown area(s) would be located near the Projects' sites. Construction staging and laydown for the proposed Harkins Slough Facility improvements would use PV Water's property for storage/staging of equipment and materials. Construction staging and laydown for the proposed Struve Slough screened intake would require a one-acre staging area near the footprint of the proposed Struve Slough pump station. Staging and laydown for pipeline construction would occur primarily within the width of the pipeline construction corridor along the pipeline route.

## Project Component Construction

In general, construction of the proposed screened intake, pump station, recharge basins, and recovery wells, and upgrades to the Harkins Slough pump station would involve dewatering; grading and excavation; pile-driving; erecting concrete structures; installing piping, pumps, electrical and mechanical equipment; testing and commissioning facilities; finish work such as erecting enclosures; installing flooring, and fencing; and painting and paving. Installation of the intake in Struve Slough and the pipeline connecting the intake to the pump station would likely require a cofferdam or shoring to create a construction work area. Dust control measures would be taken to reduce fugitive dust emissions during construction, including implementation of adopted Mitigation Measure AQ-1 (refer to **Appendix NOP-2**) which includes a dust control program.

## Pipeline Installation

The construction method for installation of the proposed pipelines would depend on their locations. Conventional cut and cover construction techniques would be used for installing pipelines in existing roadways or agricultural fields. Creeks, drainages, and railroads may require trenchless construction techniques. The type of water year would determine if trenchless construction techniques are necessary to install the pipelines across Watsonville Slough; if water levels are low enough, open-trench pipeline installation could occur.

Typical construction equipment for pipeline installation would include pavement saws, flatbed trucks, backhoes, excavators, pipe cutting and welding equipment, haul trucks for soils transport and materials delivery, compaction equipment, pickup trucks, generators, air compressors, cranes, drill rigs, skip loaders, and pavers.

## Proposed Operations and Maintenance

Operation and maintenance of the Projects would include:

- Diversion of water from Struve Slough at the proposed screened intake, and the conveyance of the water to the proposed pump station and pipelines;
- Continued diversion of water from Harkins Slough pursuant to PV Water's existing water right Permit 21039, and operations of associated pumped conveyance and filtration components;
- Operation and monitoring of the new recharge basins and recovery wells; and
- Inspection and maintenance of the Projects' components.

The goal for the Projects as identified in the BMP Update is to obtain a total average yield of 2,400 AFY to put to beneficial use, which would require an estimated maximum diversion of up to 4,000 AFY. Diversion to storage would be seasonal, occurring between November 1 and May 31 each year.

When sufficient water is available and meets water quality objectives, PV Water would pump water from Harkins Slough and Struve Slough to the upgraded Harkins Slough pump station where it would be filtered at the filter plant. The filtered water would flow through existing and proposed pipelines to the recharge basins. Water would be pumped from the recovery wells and delivered to agricultural users served by the CDS as needed to meet irrigation demand and offset groundwater production.

Backwash water from filter cleaning would be pumped to the existing gravity sewer pipeline in West Beach Street and conveyed to the Water Resources Center for treatment. Under favorable water availability, demand, and quality conditions, the same pipeline could also be used to convey raw water diverted from the sloughs directly to the Water Resources Center where it would be treated and then pumped into the CDS.

The number of employees required to operate and maintain the new and expanded facilities would not increase from current requirements.

## Environmental Commitments Proposed as Part of the Project

Appendix NOP-2 identifies mitigation measures that the Board of Directors adopted on April 16, 2014 (Resolution 2014-05) as part of the mitigation monitoring and reporting program for the BMP Update. Implementation of these measures is proposed as part of the Projects.

## Permits and Approvals

The Projects may require permits and other approvals from the agencies listed below.

Agency or Organization	Action Requiring Permit or Consultation	Permit or Approval	
		Harkins Slough Facilities Upgrades	Struve Slough
Federal			
U.S. Army Corps of Engineers	Impacts to wetlands/waters of the U.S.	Clean Water Act Section 404 Permit	
U.S. Fish and Wildlife Service	Impacts to biological resources	Endangered Species Act Section 7 compliance	
U.S. Fish and Wildlife Service: National Marine Fisheries Service	Construction in wetland and upland areas where federally listed species may be present	Endangered Species Act Section 7 compliance	
State			
State Historic Preservation Officer	Construction in or near cultural resources	National Historic Preservation Act Section 106 compliance	
State Water Resources Control Board: Division of Water Rights	Diversion and beneficial use of surface water	PV Water holds water right Permit 21039; no new water-right permit or amendment to Permit 21039 is necessary.	New Water Right Permit
California Department of Fish and Wildlife	Alteration of streambeds	Section 1602 Lake and Streambed Alteration Agreement	
	Effects of state-listed species	California Endangered Species Act Section 2081 Incidental Take Permit	
Regional Water Quality Control Board	Potential for surface water quality impairment from pollutant discharge	401 Certification and NPDES for Construction	
Local			
Santa Cruz County - Coastal Development Permitting	Construction in coastal zone	Minor Coastal Development Permit	
Santa Cruz County	Pipeline construction in unincorporated Santa Cruz County	Encroachment Permit	

## Environmental Effects to be Analyzed

The EIR will analyze, at a project-level of detail, the potential environmental effects of constructing, operating, and maintaining the Projects. As indicated above, the Projects include mitigation measures adopted by the Board of Directors to reduce the severity and magnitude of environmental effects (presented in Appendix NOP-2). Analyses conducted as part of the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects EIR may identify



the need for additional or modified mitigation, which could take the form of (1) modifications to update the mitigation measures presented in Appendix NOP-2 to reflect current conditions and site-specific impacts; or (2) new mitigation measures to replace or augment an adopted mitigation measure. Topics to be addressed in the EIR include, but are not limited to, the following:

- Land Use and Agricultural Resources
- Surface Water, Groundwater, and Water Quality
- Biological Resources
- Air Quality and Greenhouse Gases
- Geology and Soils
- Hazards and Hazardous Materials
- Noise
- Transportation and Traffic
- Cultural Resources
- Tribal Cultural Resources
- Energy
- Utilities
- Public Services
- Recreation
- Aesthetic Resources
- Alternatives
- Cumulative Impacts

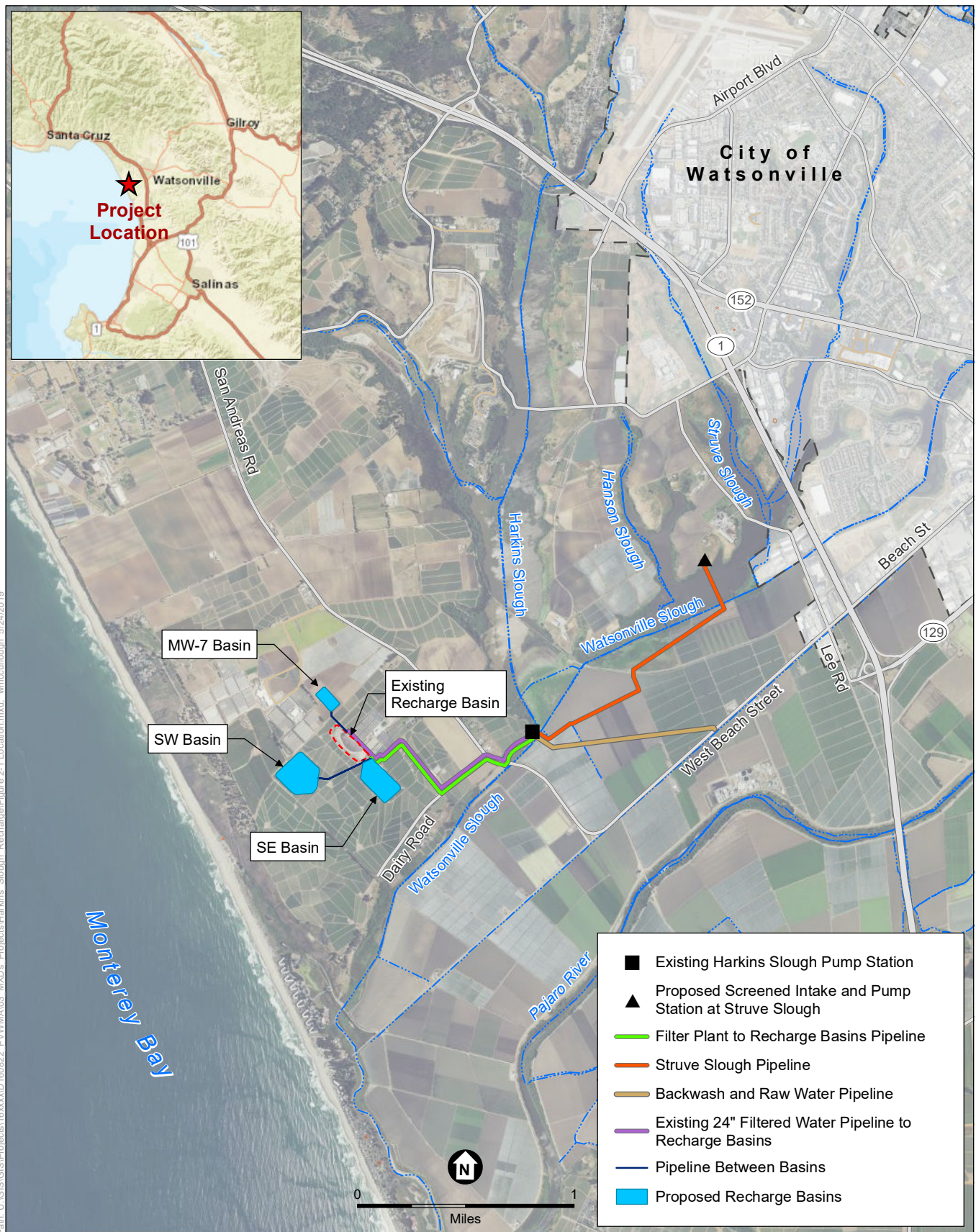
The Projects are not likely to result in potentially significant environmental effects with respect to the following environmental issue areas; as such, these topics will not be addressed in the EIR.

- **Forestry and Mineral Resources** - The proposed pipelines would be installed generally in existing roadways or agricultural fields. The recharge basins would be located in parcels zoned for Commercial Agriculture and Commercial Agriculture-Agricultural Preserve and Farm-land Security, the intake and pump station at Struve Slough would be located in parcels zoned for Commercial Agriculture-Watsonville Utility Prohibition, and the Harkins Slough pup station is zoned for Commercial Agriculture. The entire Projects' area is mapped by the California Geological Survey as MRZ-1 (no significant mineral deposits are present). Therefore, no impact to mineral resources is expected and the EIR will not address this topic. The Project area contains no timber harvesting activities or land specifically designated as forest land or timberland and no impact to forestry resources would occur.
- **Physically divide an established community** – The Projects' area is surrounded by predominantly agricultural uses; implementation of the Projects would alter the use of land at the recharge basins and the facilities at Struve Slough, but would not physically divide an established community. The Projects' pipelines would traverse agricultural lands in unincorporated Santa Cruz County, but the pipelines would be installed underground, and thus would not divide any established communities. Therefore, this criterion is not applicable.
- **Having soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater** – None of the Projects' components include the use of septic tanks or alternative wastewater disposal systems, and therefore, there would be no impact on the support capacity of affected soils. For these reason, this criterion is not applicable to the Projects.
- **Release or handling of hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school** – None of the Projects' sites are within one-quarter mile of an existing or proposed school. Therefore, this criterion is not applicable to the Projects.

- **Safety hazards from public airports** – The nearest public airport, the Watsonville Municipal Airport, is located over 2 miles from Project components. Therefore, this criterion is not applicable to the Projects.
- **Wildfire** – The Projects’ sites are located in urban and agricultural areas and are not located within a high or very high fire hazard severity zone. The Projects’ sites are in areas classified as Local Responsibility Area and are not within Generalized Critical Fire Hazard Areas mapped by Santa Cruz County. Therefore, this criterion and related criteria are not applicable to the Projects.
- **Exposure of people to excess noise due to proximity to an airport land use plan or private airstrip** – The Projects’ sites would not result in the placement of workers in areas where they would be exposed to excessive noise levels associated with airports or airstrips. The nearest airport is the Watsonville Municipal Airport, approximately two miles to the north. The year 2020 noise contours for the Airport Master Plan indicates that the lowest (55 A-weighted decibels) noise contour does not extend into the Project area. Therefore, the Projects would have no impact related to this criterion.
- **Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise during project operations** – Project operations and routine maintenance would not expose people to, or generate, groundborne vibration. Groundborne noise occurs when vibrations transmitted through the ground result in secondary radiation of noise. Groundborne noise is generally associated with underground railway operations and with construction activities such as blasting, neither of which would result from implementation of the Projects. Operation of the Projects would not involve equipment that would produce groundborne vibration. Therefore, the Projects would have no impact related to this criterion.
- **Population and Housing** - Project facilities would not displace substantial numbers of people or existing housing given the location of proposed facilities and existing land uses on affected parcels. The Projects would not increase available water supplies for domestic or municipal purposes (instead, surface water supplies would be substituted for groundwater supplies currently used for irrigation) and, consequently, the Projects would not induce any substantial population growth. The new water supply developed under the Projects would replace use of groundwater in an effort to stop overdraft and seawater intrusion in the groundwater basin. For these reasons, criteria related to population and housing would be less than significant.
- **Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities** – In 2000, the Santa Cruz County Regional Transportation Commission exercised its right on behalf of the local jurisdictions in Santa Cruz County to be exempt from preparation and implementation of a Congestion Management Plan. As a result, none of the roadways in the Project area are subject to Congestion Management Plan-established Level of Service standards. Therefore, this criterion will not be discussed in the EIR. Further, the Projects would not directly or indirectly eliminate alternative transportation corridors or facilities (e.g., bike paths, lanes, bus turnouts, etc.) both because of Projects’ site locations and because of the short-term nature of construction activities where potential effects could occur. In addition, the Projects would not include changes in policies or programs that support alternative transportation. Therefore, the Projects would not conflict with adopted policies, plans, or programs supporting alternative transportation,

- **Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)** – The provisions of CEQA *Guidelines* section 15064.3, subdivision (b) will apply statewide on July 1, 2020. Since no vehicle miles travelled thresholds have been adopted yet, no further analysis is required and no impacts related to CEQA Guidelines section 15064.3, subdivision (b) would occur.
- **Increased hazards due to a geometric design feature or incompatible uses** – The Projects would not include new design features (e.g., new facilities or obstructions within public roadways) or alterations of existing features (e.g., road realignment) that could increase operations-phase transportation hazards. In addition, traffic generated by the Projects would be compatible with the mix of vehicle types (automobiles and trucks) currently using roads in the Project area. Therefore, the Projects would not result in transportation hazards caused by a design feature or incompatible use.
- **Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.** Backwash water from the filters at the Harkins Slough pump station would be diverted through a new backwash and raw water pipeline to the existing gravity sewer within West Beach Street that connects to the Water Resources Center. PV Water would comply with City of Watsonville requirements for discharge of the backwash water. The City of Watsonville's Water Resources Center has capacity for secondary treatment of 12.1 million gallons per day (mgd) and tertiary treatment of 7.7 mgd, which is sufficient capacity to accommodate backwash water derived from operation of the Projects. The Projects do not require relocation, construction, or expansion of stormwater drainage, natural gas, or telecommunications facilities. In addition, the Projects would not induce significant population growth either directly (by constructing housing) or indirectly (for example, by reducing flood risk in currently undeveloped areas into which additional housing could be built). For these reasons, this criterion is not applicable to the Projects. The need for additional electric power facilities will be considered in the EIR.
- **Have insufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years.** During construction, the Projects would intermittently use water for dust control, pressure washing, and cement mixing. Construction would also use relatively small amounts of potable water for some site needs such as drinking water, hand-washing, and other on-site sanitary needs. The small increase in potable water use would be temporary, terminating with the completion of construction. Water supplies are planned such that short-term spikes in potable use can be accommodated during normal, dry, and multiple dry years. For these reasons, this criterion is not applicable to the Projects.
- **Result in a determination by the wastewater treatment provider that would serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments during operation.** During construction of the Projects, new sources of wastewater discharges would include wastewater resulting from sanitary needs of construction workers. The maximum construction work force would be approximately 12 workers per day. Assuming that each worker would generate 2.81 gallons per day of wastewater, the total increase in wastewater volumes would be less than 0.00003 million gallons per day, an increase well within the dry weather capacity of the existing wastewater system. The Project would generate even less wastewater during operations due to minimal number of staff necessary to operate the facilities proposed as part of the Projects. For these reasons, this criterion is not applicable to the Projects.

- **Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.** The Projects do not include recreational facilities and would not require the construction or expansion of recreational facilities because they do not displace any existing facilities. Inclusion of recreational facilities may be revisited in the future and would be separately subject to CEQA if proposed. For these reasons, this criterion is not applicable to the Projects.
- **Growth Inducement** – CEQA requires a discussion of a project’s potential to remove an obstacle to growth (e.g., a major public service expansion) or result in increases in population, and an evaluation of the potential indirect environmental impacts, or secondary effects, of that growth (CEQA Guidelines section 15126.2(d)). The 2014 BMP Update PEIR concluded that “implementation of the BMP Update’s components would not result in construction of residential, commercial, or industrial structures, and thus would not directly foster population or economic growth.” The purpose of the BMP Update components, of which the Projects are a part, is to help balance the groundwater basin, prevent further seawater intrusion, and meet the water supply needs in the service area. The BMP Update components do not provide water supply for municipal or industrial uses that would support growth of residential, commercial, or industrial uses. The water supply from Harkins Slough and Struve Slough under the Projects would not be a new potable water supply source but would be used to offset existing groundwater pumping for agricultural use. The PV Water’s enabling act also includes provisions indicating that no water shall be imported for purposes other than agricultural use. The Projects would not expand PV Water’s service area, or increase water supply to meet planned growth within the service area. Given that the Projects are consistent with the 2014 BMP Update PEIR conclusions, the EIR will not address growth inducement.

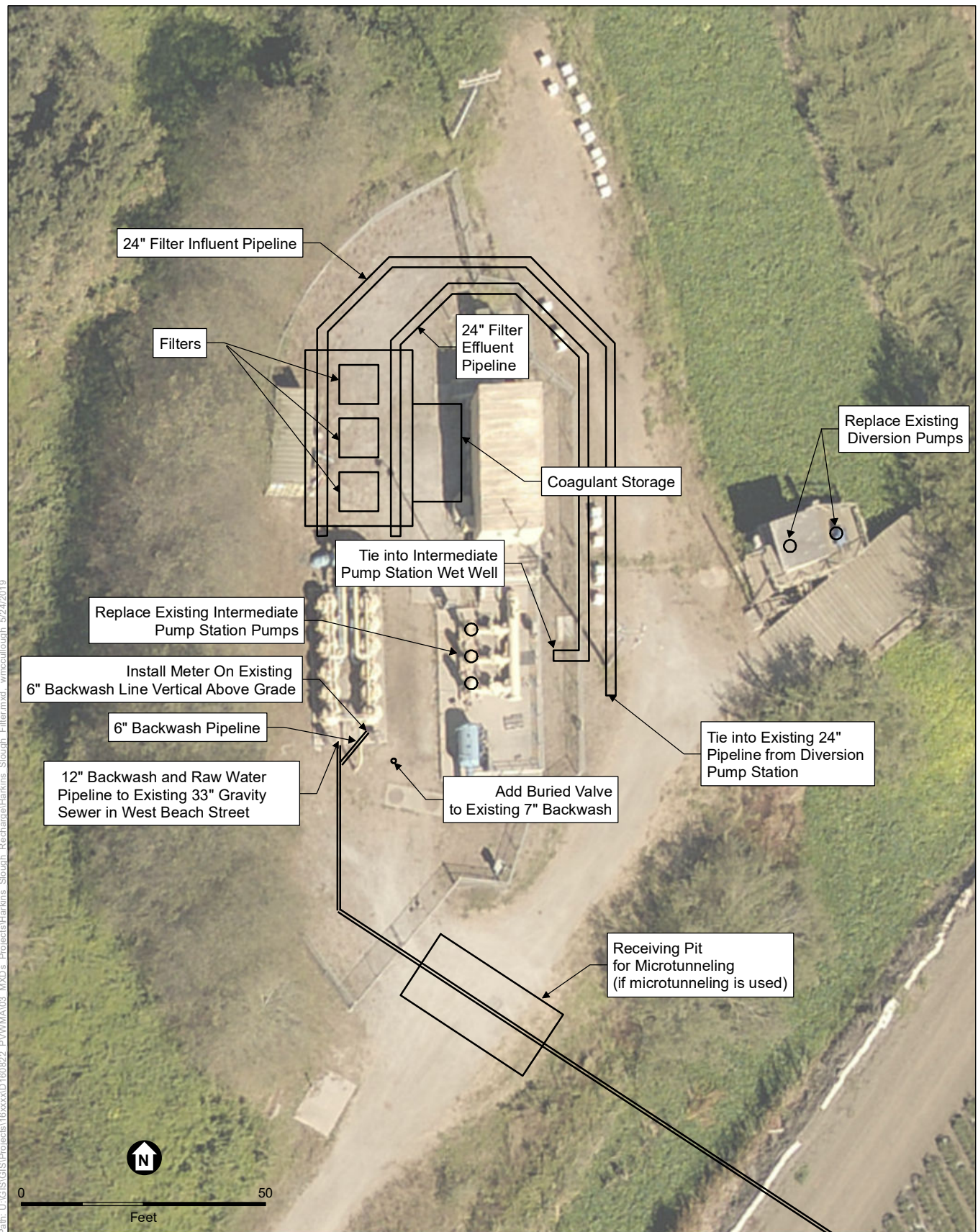


SOURCE: Carollo Engineers, 2019;  
ESRI World Imagery, 7/23/2016; ESA

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 1**  
Project Location Map



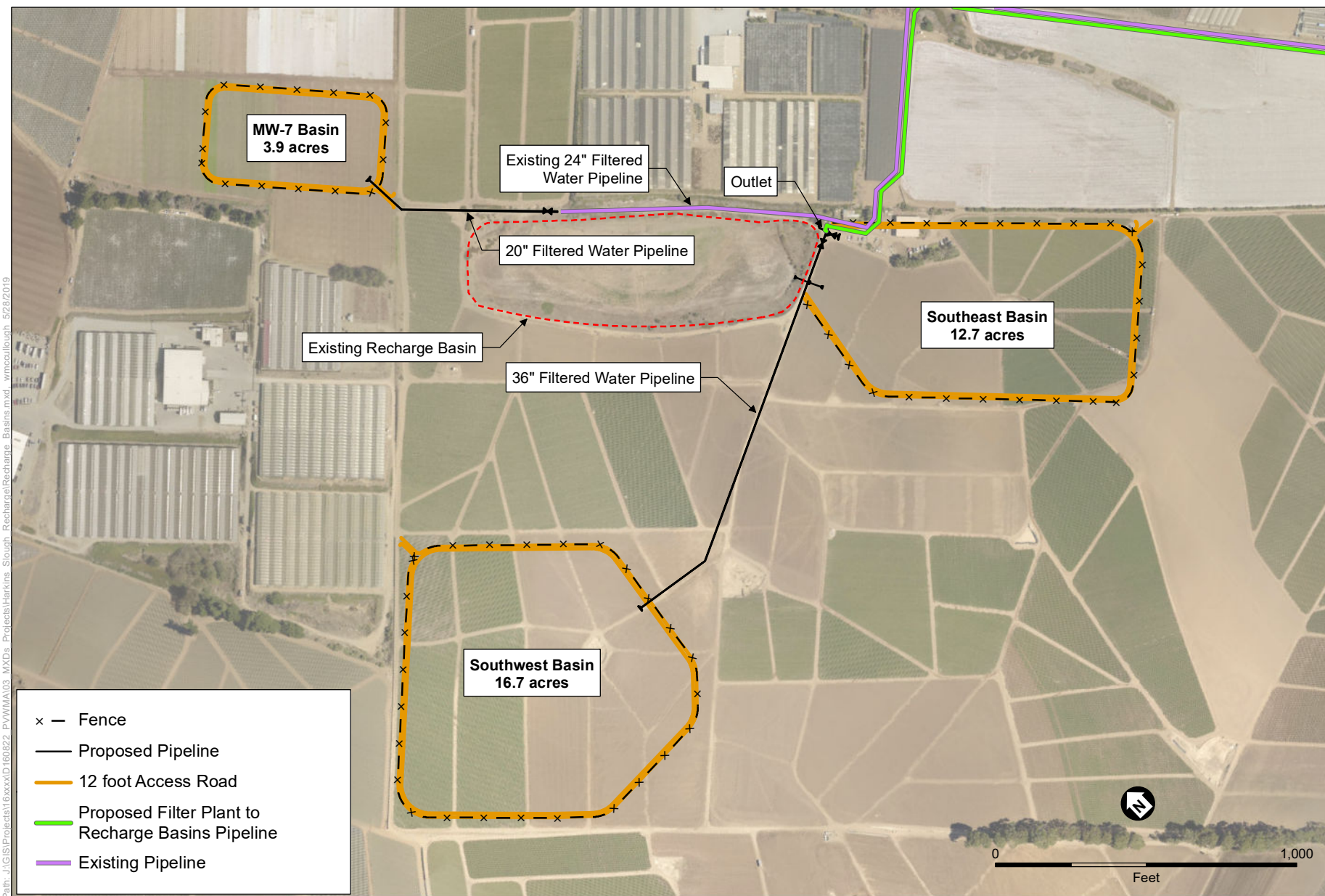


SOURCE: Carollo Engineers, 2019

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 2**  
Harkins Slough Pump Station Site Plan





SOURCE: Carollo Engineers, 2019

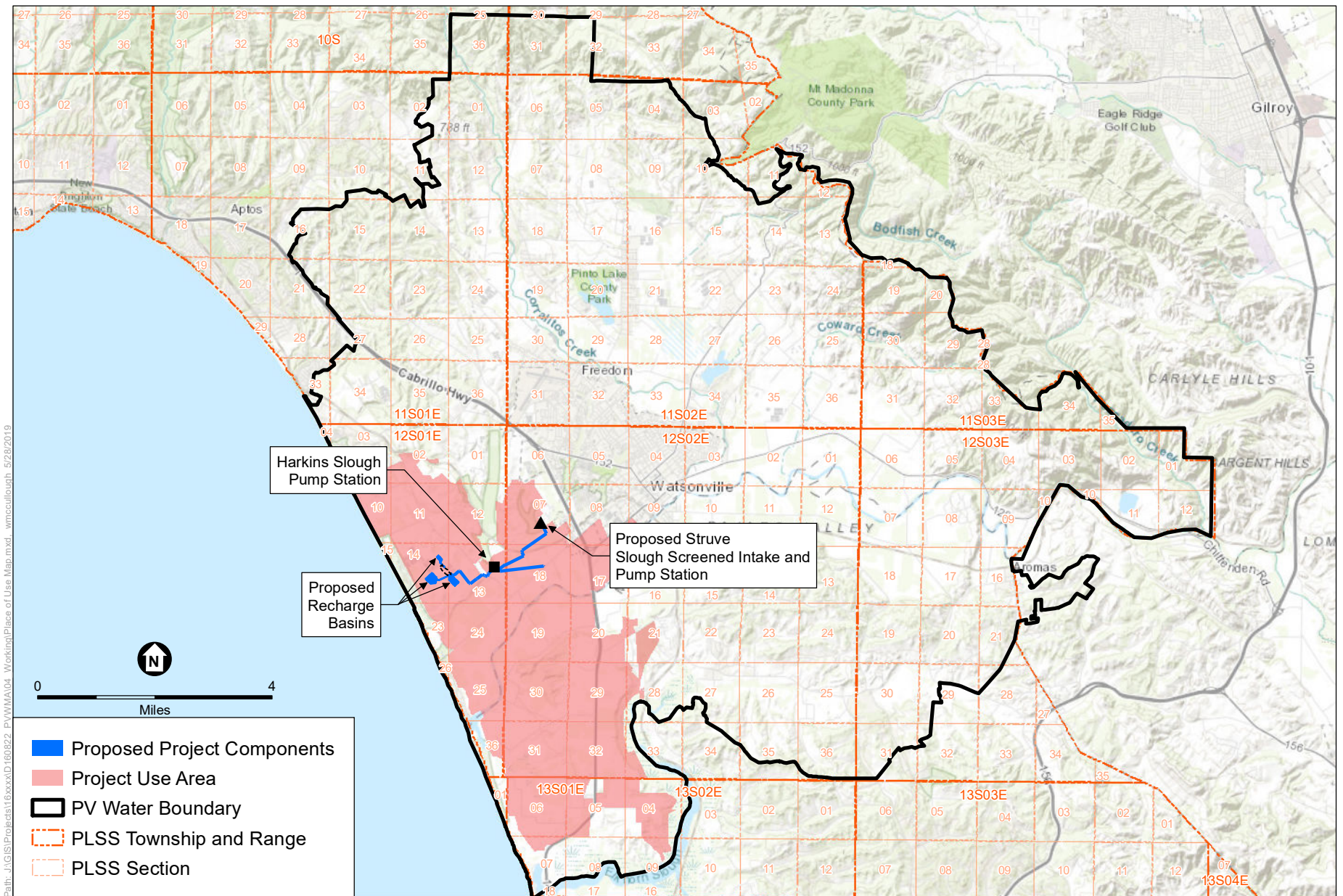
**Note:**

1. Recovery wells would be located within 500 feet of each proposed recharge basin.
2. Not shown: connection from recovery wells to existing Coastal Distribution System pipelines.
3. A portion of the existing 24-inch filtered water pipeline located within the boundary of the proposed Southeast recharge basin would be relocated as needed.

Harkins and Watsonville/Struve Slough Projects

**Figure 3**  
Recharge Basins





SOURCE: Carollo Engineers, 2017; ESA, 2019

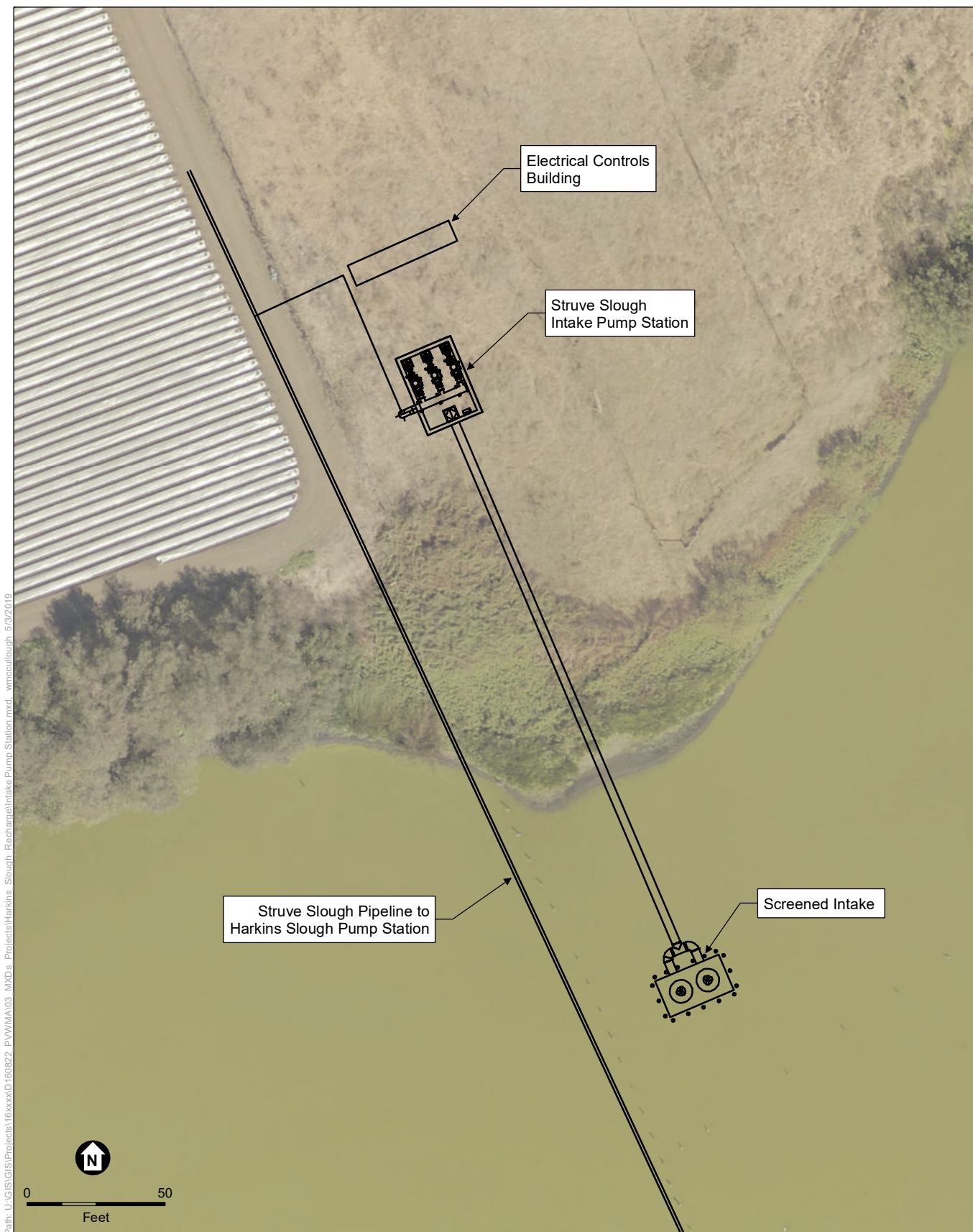
Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 4**  
Place of Use

**Notes:**

1. The proposed place of use includes parcels served by the existing Coastal Distribution System (CDS) and parcels that may be served by an expanded CDS.
2. PLSS = Public Land Survey System





SOURCE: Carollo Engineers, 2019

Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

**Figure 5**  
Struve Slough Screened Intake and Pump Station

## **APPENDIX NOP-1**

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### Assessor Parcel Numbers Associated with the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

This appendix lists the Assessor Parcel Numbers of privately owned properties that are wholly or partially within the footprint of proposed Project facilities (e.g., intake and pump station, recharge basins, pipelines).

**TABLE NOP 1-1**  
**PARCELS POTENTIALLY AFFECTED BY THE WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS**

<b>SCREENED INTAKE AND PUMP STATION AT STRUVE SLOUGH</b>			
052-081-38			
<b>PIPELINES</b>			
052-081-37	052-191-08	052-191-53	052-191-54
052-191-55	052-191-57	052-191-58	052-211-12
052-211-14	052-211-15	052-211-26	052-211-28
052-221-09	052-221-23	052-221-24	052-221-25
052-551-01	052-551-03	052-551-04	052-551-05
<b>HARKINS SLOUGH PUMP STATION</b>			
052-211-29			
<b>RECHARGE BASINS, RECOVERY WELLS, AND ASSOCIATED PIPELINES</b>			
046-151-24	046-151-37	052-181-17	052-181-18
052-181-19	052-181-20	052-191-57	052-311-01
052-311-05	052-311-06	052-311-08	052-541-02

## **APPENDIX NOP-2**

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### **2014 BMP Update PEIR Mitigation Measures**

The Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects) were analyzed at a program-level in the 2014 Basin Management Plan Update Program Environmental Impact Report (2014 BMP Update PEIR) as two of seven components under the BMP. The 2014 BMP Update PEIR identified programmatic mitigation measures. Under Resolution No. 2014-05, the Board of Directors adopted the BMP Update Mitigation Monitoring and Reporting Program (MMRP) that identifies programmatic mitigation measures applicable to the BMP Update components, including the Projects. Table NOP 2-1 presents mitigation measures that apply to the Projects as adopted by the Board of Directors. Refer to Chapter 3 of the 2014 BMP Update PEIR for proposed revisions to some of these mitigation measures.

**TABLE NOP 2-1  
MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<b>AIR QUALITY AND GREENHOUSE GASES</b>		
<p><b>AQ-1:</b> The construction contractor shall implement a dust program that includes the following elements:</p> <ul style="list-style-type: none"> <li>• Water all active construction sites at least twice daily</li> <li>• Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard</li> <li>• Pave, apply water three times daily, or apply (non- toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites</li> <li>• Sweep daily (with water sweepers) all paved access roads, paved parking areas and paved staging areas at construction sites</li> <li>• Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.</li> <li>• Hydroseed or apply (non-toxic) soil binders to inactive construction areas. However, do not apply these measures in operating agricultural fields under cultivation unless requested by the grower</li> <li>• Enclose, cover, water twice daily or apply (non- toxic) soil binders to exposed stockpiles (dirt, sand, etc.).</li> <li>• Limit traffic on unpaved roads to 15 mph</li> <li>• Install sandbags or other erosion control measures to prevent silt runoff to public roadways</li> <li>• Replant vegetation in disturbed areas as quickly as possible</li> </ul> <p>The contractor or builder shall designate a person or persons to monitor the fugitive dust emissions and enhance the implementation of the measures as necessary to minimize dust complaints. The name and telephone number of such persons shall be provided to the APCD Compliance Division prior to the start of any grading, earthwork or demolition.</p>	X	X
<b>BIOLOGICAL RESOURCES</b>		
<p><b>BIO-1a:</b> Wetlands and riparian habitat will be avoided by project construction activities. All facilities and construction activities will be maintained outside the jurisdictional area defined by riparian or emergent wetland vegetation and applicable setbacks and buffers where feasible. Within the Coastal Zone, project improvements will be located 100 feet from coastal review wetlands. Within the City of Watsonville, development will be located 100 feet from riparian areas. Within the unincorporated areas of the County, yet outside the Coastal Zone, a setback of 30 feet and 50 feet will be established adjacent to intermittent and perennial streams, respectively. If complete avoidance of wetlands and riparian areas is infeasible and/or development occurs within a regulated buffer/setback area, impacts would be minimized through implementation of Mitigation Measures BIO-1b, BIO- 1c BIO-1d, and BIO-1e.</p>	X	X
<p><b>BIO-1b:</b> Standard measures to maintain water quality and to control erosion and sedimentation will be implemented. These measures include:</p> <ul style="list-style-type: none"> <li>• Restrict trenching across all waterways to low-flow periods.</li> <li>• Exclude water from around the section of trench that is within the actively flowing channels. This will further reduce the potential for sediment or other pollutants to enter the waterways and impact downstream resources. The diversion will consist of water pillows, rock, sandbags, or other structural methods deemed most effective by the project engineer.</li> <li>• Place sediment curtains downstream of the construction zone to prevent sediment disturbed during trenching activities from being transported and deposited outside of the construction zone.</li> <li>• Locate spoil sites so they do not drain directly into the waterways. If a spoil site drains into a channel, catch basins will be constructed to intercept sediment before it reaches the channels. Spoil sites will be graded to reduce the potential for erosion.</li> </ul>	X	X

**TABLE NOP 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<ul style="list-style-type: none"> <li>• Prepare and implement a spill prevention plan for potentially hazardous materials. The plan will include the proper handling and storage of all potentially hazardous materials, as well as the proper procedures for cleaning up and reporting of any spills. If necessary, containment berms will be constructed to prevent spilled materials from reaching the creek channels.</li> <li>• Store equipment and materials away from the waterways, outside existing levees or at least 50 feet from waterways, but within the pipeline right-of-way. No equipment or materials will be deposited within 100 feet of wetlands.</li> <li>• Provide proper and timely maintenance for vehicles and equipment used during construction to reduce the potential for mechanical breakdowns leading to a spill of materials into or around the creeks. Maintenance and fueling will be conducted in an area that meets the criteria set forth in the spill prevention plan (i.e., away from the creeks).</li> <li>• Prior to construction, install temporary construction fencing at the perimeter of the construction zone to prevent inadvertent equipment access or construction staging within adjacent riparian forest and/or coastal marsh habitats. This fencing will be signed in the field as "SENSITIVE HABITAT AREA — NO CONSTRUCTION ACCESS". Monitor construction activities to verify compliance with the perimeter fencing and limits of construction access and staging and implement remedial action if non-compliance is noted.</li> </ul> <p>Restrict limbing of riparian forest trees; if trees are limbed for construction access, document the impact and provide compensation as per Mitigation Measure BIO-1c.</p>		
<p><b>BIO-1c:</b> Where impacts to mixed riparian or willow riparian forest occurs, revegetation measures will be developed as part of a revegetation plan approved by CDFW, RWQCB, and if applicable, USACE and/or California Coastal Commission, pursuant to regulatory agency permitting. The revegetation plan will include specific plans for the revegetation of impacted riparian forest, and for restoration of nearby creek riparian habitat, as appropriate. Upon approval by Santa Cruz County and other applicable agencies, the PVWMA may choose to coordinate with the Natural Resources Conservation Service (NRCS) and the Santa Cruz County Resource Conservation District (RCD) to develop and implement the required riparian revegetation, including providing funds to the RCD for their implementation of the revegetation. Revegetation measures will include the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met. Revegetation will include a 3:1 replacement ratio the acreage of riparian habitat lost and for all trees lost as result of the project to account for the reduced habitat values of smaller trees compared with mature vegetation. Success criteria for replanting will be less than 20 percent mortality of individual species yearly for 5 years. Replanting will be conducted each year that plantings exceed 20% mortality, such that 80% plant survival is maintained each year of the 5-year monitoring period. Cover provided by invasive, non-native plant species shall not exceed 5% during each year of the 5-year monitoring period.</p>	X	X
<p><b>BIO-1d:</b> Where impacts to coastal freshwater marsh occurs, revegetation measures will be developed as part of a revegetation plan approved by CDFW, RWQCB, USACE, and/or California Coastal Commission, pursuant to regulatory agency permitting. Upon approval by Santa Cruz County and other applicable agencies, the PVWMA may choose to coordinate with the Natural Resources Conservation Service (NRCS) and the Santa Cruz County Resource Conservation District (RCD) to develop and implement the required wetland revegetation, including providing funds to the RCD for their implementation of the revegetation. The revegetation plan will include specific plans for the revegetation of impacted coastal marsh, and for restoration of nearby wetland habitat, as appropriate. Revegetation measures will include the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met. Revegetation will include a 3:1 replacement ratio (or an equivalent habitat replacement strategy as agreed upon by PVWMA and regulatory agencies) for impacted wetlands. If natural recovery is a viable strategy, then a wetland plant cover exceeding 50% should be attained after two growing seasons. Mitigation may occur via restoration, creation, or preservation of wetlands. Mitigation will occur at a site acceptable to permitting agencies and pursuant to Project permit requirements. If the compensatory mitigation includes restoration, enhancement, or creation of wetlands, a qualified biologist will monitor the designated wetland mitigation area for a minimum of five years to ascertain if the wetland mitigation is successful. Annual reports will be submitted to permitting agencies by December 31 of each monitoring year, describing the results of the monitoring and any remedial actions needed to achieve a minimum 3:1 habitat replacement ratio or equivalent for permanent impacts to wetlands and other waters.</p>	X	X

**TABLE NOP 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<b>BIO-1e:</b> Where construction and/or facilities are placed within a riparian or wetland development setback area, indirect impacts to adjacent riparian and wetland vegetation will be minimized. Where feasible, buffer plantings of native trees and shrubs will be installed between the facility and the adjacent wetland or riparian resource to provide a vegetated buffer. A buffer planting plan will be prepared as part of a revegetation plan approved by CDFW, RWQCB, USACE, and/or California Coastal Commission, pursuant to regulatory agency permitting. The buffer planting plan will include specific revegetation measures, including the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met.	X	X
<b>BIO-2:</b> During the development of BMP Update components, PVWMA will implement conservation measures during construction activities to avoid and minimize incidental take and significant impacts on individuals, populations, or habitat of special-status wildlife species to the maximum extent practicable. The following general measures will be incorporated into the planning and construction of BMP Update components, as appropriate, to ensure that the effects of the BMP Update are avoided, minimized, and mitigated.  Suggested species-specific measures for CA red-legged frog, WPT, and steelhead are included, as well, although BMP Update components that proposed to divert surface waters beyond existing entitlements would require future additional project-level CEQA analyses of specific diversion and operation plans to support water rights application and environmental permits. It is assumed that project-level biological studies and analysis for these BMP Update components will be required to support those future permits and biological opinions.	X	X
<b>BIO-2a:</b> During project activities, all trash that may attract predators will be properly contained, removed from the work site, and disposed of regularly. Following construction, all trash and construction debris will be removed from work areas.	X	X
<b>BIO-2b:</b> All refueling, maintenance, and staging of equipment and vehicles will occur at least 65 feet from any riparian habitat or water body. The Agency will ensure contamination of habitat does not occur during such operations. Prior to the onset of work, the Agency will ensure that the contractor has prepared a plan to allow a prompt and effective response to any accidental spills. All workers will be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur.	X	X
<b>BIO-2c:</b> The spread or introduction of invasive exotic plant species will be avoided to the extent practicable. When practicable, invasive exotic plants in the project areas will be removed.	X	X
<b>BIO-2d:</b> Prior to any on-site work in areas where special-status species may occur, a qualified biologist will conduct a tailgate training session in which all construction personnel will receive training regarding measures (below) that are to be implemented to avoid environmental impacts. This training will include a presentation of the potential for sensitive species to occur at the site and measures to protect habitat including aquatic habitat and avoid impacts to the species. All personnel working on the site will receive this training, and will sign a sign-in sheet showing they received the training.	X	X
<b>BIO-2e:</b> Prior to the commencement of work, the limits of the work area (including haul routes, access ramps, storage areas and material stockpiles) will be clearly marked with orange construction fencing to prevent workers from impacting habitat outside the work area. No work will occur outside the designated marked work areas.	X	X
<b>BIO-2f:</b> Each morning before work begins on any components in or within 100 feet of a suitable habitat area (defined as: riparian habitat, USACE jurisdictional wetlands or "other waters" of the U.S., or sensitive habitats identified in subsequent USFWS Biological Opinions and CDFW 1600 Lake and Streambed Alteration Agreements), a qualified monitor will survey the work site and habitat immediately surrounding the active work site for conditions that could impact special-status species, and will remain on-site whenever work is occurring that may adversely impact special-status species and their habitats. No work will be allowed to begin each morning until the monitor has inspected the work site.	X	X

**TABLE NOP 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<b>BIO-2g:</b> A USFWS-approved biologist or biological monitor will permanently remove from within the project area(s), any individuals of exotic species, such as bullfrogs, crayfish, and centrarchid fishes to the extent practicable.	X	X
<b>BIO-2h:</b> Upon locating individuals of special-status species that are dead or injured as a direct result of activities conducted by PVWMA, initial notification will be made to the USFWS's Division of Law Enforcement at (916) 978-4861 (Sacramento) within three working days of its finding. The USFWS Field Office within whose area of responsibility the specimen is recovered will also be notified. Written notification will be made within five calendar days and include the date, time, and location of the carcass, a photograph, cause of death, if known, and any other pertinent information.	X	X
<p><b>BIO-2i:</b> Nesting Bird Surveys. Prior to any project construction activities, the project proponent will take the following steps to avoid direct losses of nests, eggs, and nestlings and indirect impacts to avian breeding success:</p> <ul style="list-style-type: none"> <li>• If construction activities occur only during the non- breeding season, between August 31 and February 1, no surveys will be required.</li> </ul> <p>During the breeding bird season (February 1 through August 31), a qualified biologist will survey construction areas in the vicinity of the project site for nesting raptors and passerine birds not more than 14 days prior to any ground-disturbing activity or vegetation removal. Surveys will include all potential habitats within 500 feet (for raptors) of activities and all on-site vegetation including bare ground within 250 feet of activities (for all other species). If results are positive for nesting birds, avoidance procedures will be adopted, if necessary, on a case-by-case basis. These may include implementation of buffer areas (minimum 50-foot buffer for passerines and 250-foot minimum buffer for raptors) or seasonal avoidance.</p>	X	X
<p><b>BIO-2j (CRT):</b> The following measures for avoidance and minimization of adverse impacts to California Red- Legged Frog (<i>Rana draytonii</i>) (CRF) during construction of the BMP Update components are those typically employed for construction activities that may result in short-term impacts to individuals and their habitat. The focus of these measures is on scheduling activities at certain times of year, keeping the disturbance footprint to a minimum, and monitoring. Consultation with the USFWS will be conducted and a Biological Opinion developed for each BMP Update component that requires a USACE Section 404 Wetland Permit. Ongoing and future CRF studies in the project area may result in site-specific conditions that would be integrated into the future project-level BMP Update component designs, permitting and operations.</p> <p><b>CRF-1.</b> The Agency will annually submit the name(s) and credentials of biologists who would conduct activities specified in the following measures. No project activities will begin until the Agency receives approval from the Service that the biologist(s) is qualified to conduct the work.</p> <p><b>CRF-2.</b> A USFWS-approved biologist will survey the work site 48 hours prior to the onset of activities. If CRF, tadpoles, or eggs are found, the approved biologist will determine the closest appropriate relocation site. The approved biologist will be allowed sufficient time to move them from the work site before work activities begin. Only USFWS-approved biologists will participate in activities associated with the capture, handling, and moving of CRF.</p> <p><b>CRF-3.</b> Before any activities begin on a project, a USFWS-approved biologist will conduct a training session for all construction personnel. At a minimum, the training will include a description of the CRF and its habitat, the importance of the CRF and its habitat, general measures that are being implemented to conserve the CRF as they relate to the project, and the boundaries within which the project may be accomplished. Brochures, books and briefings may be used in the training session, provided that a qualified person is on hand to answer any questions.</p> <p><b>CRF-4.</b> A USFWS-approved biologist will be present at the work site until such time as all removal of CRF, instruction of workers, and disturbance of habitat have been completed. After this time, the biologist will designate a person to monitor on-site compliance with all minimization measures and any</p>	X	X



**TABLE NOP 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<p>future staff training. The USFWS-approved biologist will ensure that this individual receives training outlined in measure WPT-2 and in the identification of CRF. The monitor and the USFWS-approved biologist will have the authority to stop work if CRF are in harm's way.</p> <p><b>CRF-5.</b> The number of access routes, number and size of staging areas, and the total area of the activity will be limited to the minimum necessary to achieve the project goal. Routes and boundaries will be clearly demarcated, and these areas will be outside of riparian and wetland areas to the extent practicable.</p> <p><b>CRF-6.</b> Work activities will be completed between April 1 and November 1 to the extent practicable. Should the Agency demonstrate a need to conduct activities outside this period, the Agency may conduct such activities after obtaining the Service's approval.</p> <p><b>CRF-7.</b> If a work site is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than five millimeters (mm) to prevent CRF from entering the pump system. Water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow will be removed in a manner that would allow flow to resume with the least disturbance to the substrate.</p> <p><b>CRF-8.</b> The Declining Amphibian Populations Task Force's Fieldwork Code of Practice will be followed to minimize the possible spread of chytrid fungus or other amphibian pathogens and parasites.</p> <p><b>CRF-9:</b> Implement Mitigation Measure 3.10-1 through 3.10-4 in Section 3.10, Hydrology and Water Quality: Surface Water Systems.</p>		
<p><b>BIO-2k (WPT):</b> The following measures for avoidance and minimization of adverse impacts to western pond turtle (<i>Actinemys marmorata</i>) (WPT) during construction of the BMP Update project elements are those typically employed for construction activities that may result in short-term impacts to individuals and their habitat. The focus of these measures is on keeping the disturbance footprint to a minimum and aggressive monitoring of WPTs before vegetation removal and during the construction and revegetation phase.</p> <p><b>WPT-1.</b> The Agency will annually submit the name(s) and credentials of biologists who would conduct activities specified in the following measures. No project activities will begin until proponents have received approval from CDFW that the biologist(s) is qualified to conduct the work.</p> <p><b>WPT-2.</b> A CDFW-approved biologist will survey the work site 48 hours prior to the onset of activities. If WPT adults, juveniles or eggs are found, the approved biologist will determine the closest appropriate relocation site. The approved biologist will be allowed sufficient time to move them from the work site before work activities begin. Only CDFW-approved biologists will participate in activities associated with the capture, handling, and moving of WPT.</p> <p><b>WPT-3.</b> Before any activities begin on a project, a CDFW-approved biologist will conduct a training session for all construction personnel. At a minimum, the training will include a description of the WPT and its habitat, the importance of the WPT and its habitat, general measures that are being implemented to conserve the WPT as they relate to the project, and the boundaries within which the project may be accomplished. Brochures, books and briefings may be used in the training session, provided that a qualified person is on hand to answer any questions.</p> <p><b>WPT-4.</b> A CDFW-approved biologist will be present at the work site until such time as all removal of WPT, instruction of workers, and disturbance of habitat have been completed.</p>	X	X

**TABLE NOP 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<p><b>WPT-5.</b> The number of access routes, number and size of staging areas, and the total area of the activity will be limited to the project plans. Routes and boundaries will be clearly demarcated.</p> <p>Where impacts occur in these staging areas and access routes, restoration will occur as identified in the general BMP Update components above.</p>		
<p><b>BIO-3a:</b> Occurrences of special status plant species shall be avoided by project construction activities to the extent feasible. All facilities and construction activities will be maintained outside habitats supporting special status plant species where feasible. Prior to construction, a qualified biologist will conduct a survey of the project area to ascertain the presence or absence of special status plant species. If no species are encountered, no mitigation is required. If a special status species is found within a BMP Update component project area, a setback of 50 feet will be established between the occurrence and the BMP Update construction activities. Prior to construction, PVWMA will install temporary construction fencing at the 50-foot setback line to prevent inadvertent equipment access or construction staging within the special status plant habitat. This fencing will be signed in the field as "SENSITIVE HABITAT AREA - NO CONSTRUCTION ACCESS". A qualified biologist will inspect the temporary construction barrier fence and monitor the contractor's compliance with this avoidance measure. If complete avoidance of special status plant species is infeasible, impacts would be minimized through implementation of Mitigation Measure BIO-3b.</p>	X	X
<p><b>BIO-3b:</b> Prior to clearing and grubbing in areas where impacts to special status plant species cannot be avoided, PVWMA will consult with applicable resource agencies (i.e., CDFW and/or USFWS) prior to implementing salvage and revegetation actions. A qualified biologist will collect any available above- ground seed pods/seed heads for their use in future revegetation efforts. During construction, the upper 6 inches of topsoil from areas supporting the plant species will be stripped from the construction area and stored for later use. The topsoil will be used in future revegetation efforts which may be on-site (if feasible) or at an off-site location approved by permitting agencies (i.e., USFWS, CDFW). At the designated revegetation area, all stockpiled topsoil will be placed on site and finish graded to blend with surrounding topography. Under direction of a qualified biologist, the areas will be revegetated with locally native herbaceous plant species compatible with natural regeneration of the special status plant species. The qualified biologist will hand broadcast any seeds collected from the special status plant species into the appropriate habitat areas. The revegetation will achieve a minimum of 2:1 plant replacement (i.e., re- establish two plants for every plant impacted). The qualified biologist will monitor the revegetation areas for two years after construction to ascertain if the special status plant species re-established within the revegetation area. Annual reports will be submitted to permitting agencies by December 31 of each monitoring year, describing the results of the revegetation measures, for a period of 5 years.</p>	X	X
<b>CULTURAL RESOURCES</b>		
<p><b>CR-1a:</b> Final pipeline and facility plans shall locate facilities and pipeline alignments away from identified and recorded archaeological sites in each component area based on a site reconnaissance and archaeological investigation conducted by a qualified archaeologist at the time site-specific construction plans are developed. The archaeologist shall identify the areal extent of potential recorded sites, assess potential significance to identified resources, recommend adjustment to siting of improvements, facilities and/or pipeline alignments, if necessary, and provide other recommendations to avoid impacts to identified significant resources. If a significant or potentially significant archaeological or historic resource is identified pursuant to the definitions in the State CEQA Guidelines as identified above, the consulting archaeologist shall develop an appropriate mitigation plan for the cultural resource. Possible mitigation measures for important cultural resources may include monitoring by a qualified archaeologist during construction at identified sensitive sites, documentation and recordation of the resource, recovery and relocation, or stabilization of the resource.</p>	X	X

**TABLE NOP 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<b>CR-1b:</b> The cultural resource boundaries of potentially significant sites shall be marked as exclusion zones both on ground and on construction maps prior to the commencement of construction activities on component sites. Construction supervisory personnel shall be notified of the existence of cultural resources in each component area and will be required to keep personnel and equipment away from these cultural resources sites. During construction and operational phases, personnel and equipment will be restricted to each surveyed corridor for each component.	X	X
<b>CR-1c:</b> Should any as yet undiscovered cultural resources be uncovered at any component site, such as structural features, or unusual amounts of bone or shell, artifacts, human remains, or architectural remains be encountered during any development activities, work will be suspended and PVWMA staff will be contacted. A qualified professional archaeologist shall be retained and will perform any necessary investigations to determine the significance of the find. PVWMA will then implement any mitigation deemed necessary for the recordation and/or protection of the cultural resources. In addition, pursuant to Sections 5097.97 and 5097.98 of the State Public Resources Code and Section 7050.5 of the State Health and Safety Code, in the event of the discovery of human remains, all work must be halted and the County Coroner shall be immediately notified. If the remains are determined to be Native American, guidelines of the Native American Heritage Commission shall be adhered to in the treatment and disposition of the remains.	X	X
<b>ENERGY, UTILITIES, AND SERVICES</b>		
<p><b>ES-1:</b> A study to identify utilities along proposed alignments will be conducted by PVWMA during pre- design states of projects. The following mitigation measures are required for segments identified in final design as having potential conflicts with significant utilities:</p> <ul style="list-style-type: none"> <li>a. Utility excavation and encroachment permits would be required from the appropriate agencies, including the Public Works Departments of Santa Cruz County, City of Watsonville, Caltrans, and Union Pacific Railroad. These permits include measures to minimize utility disruption. PVWMA and its contractors shall comply with permit conditions. Permit requirements shall be included in construction contract specifications.</li> <li>b. Utility locations would be verified through field survey (potholing) and use of an underground locating service.</li> <li>c. A detailed engineering and construction plan shall be prepared as part of the design plans and specifications. This plan shall include procedures for the excavation, support, and fill of areas around utility cables and pipes. All affected utility services would be notified of PVWMA's construction plans and schedule. Arrangements would be made with these entities regarding protection, relocation, or temporary disconnection of services.</li> <li>d. In areas where the pipeline would parallel wastewater mains, engineering and construction plans shall include trench wall support measures to guard against trench wall failure, and possible resulting loss of structural support for the wastewater main.</li> </ul> <p>Residents and businesses in the project area shall be notified in writing by the contractor of planned utility service disruption two to four days in advance, in conformance with state and County standards.</p>	X	X
<b>ES-2:</b> PVWMA shall include in its construction specifications a requirement for the contractor to provide plans for recovering, reusing, and recycling construction, demolition, and excavation wastes and providing for composting of plant material, where feasible.	X	X
<b>GEOLOGY AND SOILS</b>		

**TABLE NOP 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<b>GS-1:</b> Future construction of proposed BMP Update facilities shall be designed in accordance with design recommendations of geotechnical reports and in compliance with applicable policies and appropriate engineering investigation practices necessary to reduce the potential detrimental effects of ground shaking and liquefaction. Construction shall be in accordance with applicable City and County ordinances and policies regarding mitigation of seismic and geologic hazards, and appropriate geotechnical studies shall be conducted.	X	X
<b>GS-2:</b> Construction of future BMP Update facilities shall include preparation and implementation of erosion control plans to minimize erosion and inadvertent transport of sediments into water bodies during installation of facilities. Measures shall include, but not be limited to: limiting the area of ground disturbance and vegetation removal at any one time during construction; conducting work prior to the rainy season if possible and protecting disturbed areas during the rainy season; installing bales or other appropriate barriers adjacent to water bodies to prevent transport of sediments into sloughs and water courses; immediately revegetating disturbed areas; and other Best Management Practices during construction to protect water quality. All grading and construction shall conform to requirements of the Santa Cruz County Grading Ordinance. To the extent possible, grading activities in non-cropped areas shall be limited to the period between April 15 and October 31.	X	X
<b>GS-3:</b> All diversion and pipeline facilities shall be designed and engineered in accordance with recommendations of a geotechnical report and appropriate engineering designs to reduce the potential detrimental effects of expansive soils, corrosivity, and/or other identified soils constraints. A licensed geotechnical engineer shall prepare recommendations applicable to foundation design, earthwork, and site preparation prior to or during the project design phase. Recommendations will address mitigation of site- specific, adverse soil and bedrock conditions that could hinder development. Project engineers shall implement the recommendations. Geotechnical design and design criteria will comply with applicable codes and requirements of the California Building Code with California additions (CCR Title 24), applicable City and County construction and grading ordinances.	X	X
<b>HAZARDS AND HAZARDOUS MATERIALS</b>		
<b>HM-1:</b> Prior to initiation of earthwork activities, PVWMA shall perform soil testing on agricultural sites proposed for development and analytically test for pesticide residuals and pesticide-related metals arsenic, lead, and mercury. If contamination is identified in the soil samples above applicable levels, PVWMA shall prepare a Site Management Plan (SMP) to establish protocols/guidelines for the contractor including: identification of appropriate health and safety measures while working in contaminated areas; soil reuse; handling, and disposal of any contaminated soils; and agency notification requirements. The SMP shall be subject to the review and approval of the appropriate regulatory agency.	X	X
<b>SURFACE WATER, GROUNDWATER, AND WATER QUALITY</b>		
<b>HWQ-1:</b> PVWMA shall require contractors to apply for all applicable NPDES permits, including dewatering permits, develop a SWPPP for construction of proposed facilities, and comply with conditions of the permit(s), as required by the CCRWQCB. The objectives of the SWPPP are to identify pollutant sources that may affect the quality of stormwater discharge and to implement BMPs to reduce pollutants in stormwater discharges. The SWPPP for this proposed action would include the implementation, at a minimum, of the following elements: <ul style="list-style-type: none"> <li>• Source identification</li> <li>• Preparation of a site map</li> </ul>	X	X

**TABLE NOP 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<ul style="list-style-type: none"> <li>• Description of construction materials, practices, and equipment storage and maintenance</li> <li>• List of pollutants likely to contact stormwater</li> <li>• Estimate of the construction site area and percent impervious area</li> <li>• Erosion and sedimentation control practices, including soils stabilization, revegetation, and runoff control to limit increases in sediment in stormwater runoff, such as detention basins, straw bales, silt fences, check dams, geofabrics, drainage swales, and sandbag dikes</li> <li>• Proposed construction dewatering plans</li> <li>• Provisions to eliminate or reduce discharge of materials to stormwater</li> <li>• Description of waste management practices</li> </ul> <p>Maintenance and training practices</p>		
<p><b>HWQ-2:</b> Rapid, imposed water-level fluctuations shall be avoided within the sloughs, Salsipuedes Creek, and the Pajaro River to minimize erosion and failure of exposed (or unvegetated), susceptible banks. This can be accomplished by operating the pumps at an appropriate flow rate, in conjunction with commencing operation of the pumps only when suitable water levels or flow rates are measured in the water body. Criteria for minimizing fluctuations and/or protecting banks from related erosion will need to be developed, as some banks presently are stable and others are not. Control is important, as the mobilized sediment also impairs in-slough habitat values, and potentially exacerbates bacterial levels in the slough system. It may be that water-level fluctuations may be controlled as well to minimize other impacts, such as desiccation of amphibian eggs or waterlogging of agricultural soils adjacent to the sloughs.</p>	X	
<p><b>HWQ-4:</b> Facilities shall be designated to comply with FEMA and County of Santa Cruz requirements to floodproof the facilities and shall not exacerbate upstream or downstream flood hazards on other properties. The FEMA process will require identification of the FEMA floodway zone and may require no increase water elevations for a one percent chance annual flood. The FEMA process will require identification of the FEMA zone type and may require no increase water elevations for a one percent chance annual flood. To meet the specific FEMA requirements for the component, substantial modifications to the facility design and additional mitigation may be required.</p>	X	X
<b>TRANSPORTATION AND TRAFFIC</b>		
<p><b>TR-1:</b> Conduct a preconstruction survey of road conditions on key access routes to the project sites (e.g., San Andreas Road). The pavement conditions of local streets judged to be in good condition for use by heavy truck traffic shall be monitored. Roads damaged by construction shall be repaired to a structural condition equal to, or better than, that which existed prior to construction activity.</p>	X	X

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## Central Coast Regional Water Quality Control Board

June 25, 2019

Mr. Brian Lockwood  
General Manager / Hydrogeologist  
Pajaro Valley Water Management Agency  
[lockwood@pvwater.org](mailto:lockwood@pvwater.org)  
[eir@pvwater.org](mailto:eir@pvwater.org)

Dear Mr. Lockwood:

**CENTRAL COAST REGIONAL WATER QUALITY CONTROL BOARD COMMENTS  
REGARDING THE NOTICE OF PREPARATION OF THE ENVIRONMENTAL IMPACT  
REPORT FOR THE WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE  
AND RECOVERY PROJECT**

The Central Coast Water Board appreciates the opportunity to comment on the Watsonville Slough managed aquifer recharge and recovery project.

We reiterate our support for the projects developed and implemented by the Pajaro Valley Water Management Agency (PVWMA) to manage groundwater resources in a sustainable manner, to control overdraft, prevent seawater intrusion, and to create a reliable and long-term water supply.

We understand the three proposed recharge basins will be solely operated as storage and percolation (recharge) facilities to increase the capacity of the aquifer directly underneath and to recover, via pumping, the percolated water for irrigation water use.

However, we take this opportunity to ask a few questions for clarification of a few aspects of the project:

- 1) Poor water quality has been described as one of the reasons for limiting water diversions from Harkins Slough to the existing recharge basin.
  - a) Please identify which water quality parameters have caused this reduction in water diversion.
  - b) Which water quality parameters will be considered in the new proposed recharge basins?

DR. JEAN-PIERRE WOLFF, CHAIR | JOHN M. ROBERTSON, EXECUTIVE OFFICER

- 2) What is the source of water that will be diverted into recharge basins SE and SW?  
We are specifically inquiring about the source of the raw untreated water.
- 3) Is the source of water into recharge basin MW-7 only the Struve Slough?
- 4) Is irrigation return flow, or irrigation runoff, tile drain water, or other water drained from agricultural operations going to be used as a source of water used for any of the recharge basins?
- 5) Please confirm that the proposed recharge basins will no longer be used for farming activities.
- 6) Is there any information about the effects that the polyaluminum chloride coagulant could have on the chemistry of the soil underneath the recharge basins? Could this coagulant affect soil redox potential, pH, or other properties in such a manner that causes the release of attached (bounded) minerals or other potential groundwater contaminants?

We appreciate this opportunity to comment. If you have any questions, please contact Monica Barricarte at (805) 549-3881 or [Monica.barricarte@waterboards.ca.gov](mailto:Monica.barricarte@waterboards.ca.gov) or Harvey Packard at (805) 542-4639 or [Harvey.packard@waterboards.ca.gov](mailto:Harvey.packard@waterboards.ca.gov)

Sincerely,

*for* John M. Robertson  
Executive Officer

cc:  
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Assistant Executive Officer  
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State of California – Natural Resources Agency  
DEPARTMENT OF FISH AND WILDLIFE  
Bay Delta Region  
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Fairfield, CA 94534  
(707) 428-2002  
[www.wildlife.ca.gov](http://www.wildlife.ca.gov)

GAVIN NEWSOM, Governor  
CHARLTON H. BONHAM, Director



June 20, 2019

Mr. Brian Lockwood  
Pajaro Valley Water Management Agency  
36 Brennan Street  
Watsonville, CA 95076  
[eir@pvwater.org](mailto:eir@pvwater.org)

Subject: Watsonville Slough System Managed Aquifer Recharge and Recovery Projects,  
Notice of Preparation of a Draft Environmental Impact Report, SCH #2019059130,  
Santa Cruz County

Dear Mr. Lockwood:

The California Department of Fish and Wildlife (CDFW) reviewed the Notice of Preparation (NOP) of a draft Environmental Impact Report (EIR) prepared by the Pajaro Valley Water Management Agency (PV Water) for the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Project) located in the County of Santa Cruz. CDFW is submitting comments on the NOP regarding potential impacts to biological resources associated with the proposed Project.

CDFW is a Trustee Agency with responsibility under the California Environmental Quality Act (CEQA) §15386 for commenting on projects that could impact fish, plant and wildlife resources. CDFW is also considered a Responsible Agency if a project would require discretionary approval, such as the California Endangered Species Act (CESA) Permit, the Native Plant Protection Act, the Lake and Streambed Alteration Agreement (LSAA) and other provisions of the Fish and Game Code that afford protection to the State's fish and wildlife trust resources. Pursuant to our jurisdiction, CDFW has the following concerns, comments, and recommendations regarding the Project.

## PROJECT DESCRIPTION

The proposed Project would provide supplemental water supply outlined in PV Water's Basin Management Plan. The supplemental supply is to relieve groundwater usage and meet Sustainable Groundwater Management Act requirements. The Project is separated into the Harkins Slough Project and the Struve Slough Project.

The proposed Harkins Slough Project would include upgrades to the Harkins Slough pump station, installation of a backwater and raw water pipeline from the filter plant at the Harkins Slough pump station to an existing gravity sewer in West Beach Street, and construction of two new recharge basins and associated recovery wells and pipelines.

The proposed Struve Slough Project would include a new screened intake, new pump station, a new pipeline to connect the new pump station to the Harkins Slough pump station, a new

pipeline to connect the Harkins Slough pump station to recharge basins, and a new recharge basin and associated recovery wells and pipelines.

The CEQA Guidelines (§§15124 and 15378) require that the draft EIR incorporate a full Project description, including reasonably foreseeable future phases of the Project, and require that it contain sufficient information to evaluate and review the Project's environmental impact. Please include a complete description of the following Project components in the Project description:

- Operation of the Struve Slough diversion, including operation during wet years, dry years, and drought conditions;
- Operation of ground water recharge basins;
- Protective bypass flows to maintain native fish and wildlife resources in good condition while the instream diversion is in use and/or restrictions of diversion of water at the Point of Diversion (POD) that could effectively dewater downstream reaches during times that sensitive species would normally be present;
- The maximum amount of water that will be diverted from Struve Slough per year;
- Additional water that will be diverted from Harkins Slough;
- Service area and proposed recipients the additional water source would serve; and
- Basis for establishing a new water diversion and ground water recharge basins (e.g., water right, LSAA).

## ENVIRONMENTAL SETTING

The special-status species that are known to occur, or have the potential to occur in or near the Project site, include:

- California red-legged frog (*Rana draytonii*), a federally threatened species listed under the Endangered Species Act (ESA) and a state species of special concern;
- Monterey gilia (*Gilia tenuiflora* ssp. *arenaria*), a federally endangered species listed under ESA and a state threatened species listed under CESA;
- Northern California legless lizard (*Anniella pulchra*), a state species of special concern;
- Santa Cruz tarplant (*Holocarpha macradenia*), a federally threatened species listed under ESA and a state endangered species listed under CESA;
- Tricolored blackbird (*Agelaius tricolor*), a state threatened species listed under CESA;
- Western pond turtle (*Emys marmorata*), a state species of special concern; and
- Nesting/migratory birds

## COMMENTS

*Comment 1: Installation of new instream water diversion direct and cumulative impacts*

CDFW recommends exploring and discussing alternatives to adding a new water intake along Struve Slough in the draft EIR, such as implementation of water conservation measures and alternative water sources. Installation of an instream diversion may have direct and cumulative



adverse impacts on fish and wildlife resources of Struve Slough. The proposed Project could impact instream and downstream resources (e.g., California red-legged frog), by further reducing instream flow and water availability necessary to maintain riparian habitat and native fish in good condition. Please discuss these effects in the analysis, and include mitigation to address significant impacts.

*Comment 2: Species baseline*

CDFW recommends that the CEQA document prepared for the Project provide baseline habitat assessments for special-status plant, fish and wildlife species located and potentially located within the Project area and surrounding lands, including all rare, threatened, or endangered species (CEQA Guidelines, §15380).

Habitat assessments and species profiles should include information from multiple sources: aerial imagery, historical and recent survey data, field reconnaissance, scientific literature and reports, and findings from “positive occurrence” databases such as California Natural Diversity Database (CNDDB). Based on the data and information from the habitat assessment, the CEQA document can then adequately assess which special-status species are likely to occur in the Project vicinity.

*Comment 3: Special-status species surveys*

CDFW recommends that the time leading up to Project implementation, special-status species surveys be conducted for species that have the potential to occur or will be impacted by the Project implementation. CDFW recommends, if available, using established species survey protocols. Survey and monitoring protocols and guidelines are available at:  
<https://www.wildlife.ca.gov/Conservation/Survey-Protocol>.

Botanical surveys for special-status plant species, including those listed by the California Native Plant Society (<http://www.cnps.org/cnps/rareplants/inventory/>), must be conducted during the blooming period for all sensitive plant species potentially occurring within the Project area and require the identification of reference populations. Please refer to CDFW protocols for surveying and evaluating impacts to rare plants available at:  
<https://www.wildlife.ca.gov/Conservation/Plants>.

*Comment 4: Direct and indirect impact analysis*

The CEQA Guidelines (§15126.2) necessitate that the draft EIR discuss all direct and indirect impacts (temporary and permanent) that may occur with implementation of the Project. This includes evaluating and describing impacts such as:

- Loss or modification of breeding, nesting, dispersal and foraging habitat, including vegetation removal, alternation of soils and hydrology, and removal of habitat structural features (e.g. snags, roosts, overhanging banks);
- Direct and cumulative impacts to species (e.g., California red-legged frog) and biological resources (e.g., riparian habitat);
- The cumulative impact of the installation of an additional water intake among other water diversions within the watershed; and

- Permanent and temporary habitat disturbances associated with ground disturbance, noise, lighting, reflection, air pollution, traffic or human presence.

The CEQA document also should identify reasonably foreseeable future projects in the Project vicinity, disclose any cumulative impacts associated with these projects, determine the significance of each cumulative impact, and assess the significance of the Project's contribution to the impact (CEQA Guidelines, §15355). Although a project's impacts may be insignificant individually, its contributions to a cumulative impact may be considerable; a contribution to a significant cumulative impact – e.g., reduction of available habitat for a listed species – should be considered cumulatively considerable without mitigation to minimize or avoid the impact.

#### *Comment 5 Notification of Lake or Streambed Alteration*

PV Water is responsible for complying with all applicable local, state, and federal laws, including Fish and Game Code section 1602. Fish and Game Code section 1602 requires a person, or any other entity, to notify (CDFW) before beginning certain activities, and if necessary, obtaining an LSAA from CDFW. These activities include substantially diverting or obstructing the natural flow of a river, stream, or lake, or substantially changing or using any material from the bed, channel, or bank of a river, stream, or lake. Any person who engages in an activity subject to Fish and Game Code section 1602 without first notifying CDFW is in violation of section 1602.

In CDFW's view, based on the Project description in the NOP, notification under Fish and Game Code section 1602 is required for your Project. For information on notifying CDFW, please go to <https://www.wildlife.ca.gov/conservation/lsa>.

## **REGULATORY REQUIREMENTS**

### *California Endangered Species Act*

Please be advised that a CESA Permit must be obtained if the Project has the potential to result in "take" of plants or animals listed under CESA, either during construction or over the life of the Project. Issuance of a CESA Permit is subject to CEQA documentation; the CEQA document must specify impacts, mitigation measures, and a mitigation monitoring and reporting program. If the Project will impact CESA listed species, early consultation is encouraged, as significant modification to the Project and mitigation measures may be required in order to obtain a CESA Permit.

CEQA requires a Mandatory Finding of Significance if a project is likely to substantially impact threatened or endangered species (CEQA §§ 21001(c), 21083, and CEQA Guidelines §§ 15380, 15064, 15065). Impacts must be avoided or mitigated to less-than-significant levels unless the CEQA Lead Agency makes and supports Findings of Overriding Consideration (FOC). The CEQA Lead Agency's FOC does not eliminate the Project proponent's obligation to comply with Fish and Game Code section 2080.

### *Lake and Streambed Alteration Agreement*

CDFW will require an LSAA, pursuant to Fish and Game Code section 1600 et. seq. for Project-related activities within any 1600-jurisdictional waters within the proposed Project area. Notification is required for any activity that will substantially divert or obstruct the natural flow;



Mr. Brian Lockwood  
Pajaro Valley Water Management Agency  
June 20, 2019  
Page 5 of 5


change or use material from the bed, channel, or bank including associated riparian or wetland resources; or deposit or dispose of material where it may pass into a river, lake or stream. Work within ephemeral streams, washes, watercourses with a subsurface flow, and floodplains are subject to notification requirements. CDFW, as a Responsible Agency under CEQA, will consider the CEQA document for the Project. CDFW may not execute the final LSAA until it has complied with CEQA (Public Resources Code section 21000 et seq.) as the responsible agency.

## FILING FEES

CDFW anticipates that the Project will have an impact on fish and/or wildlife, and assessment of filing fees is necessary (Fish and Game Code section 711.4; Public Resources Code section 21089). Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW.

If you have any questions, please contact Ms. Monica Oey, Environmental Scientist, at (707) 428-2088 or [monica.oey@wildlife.ca.gov](mailto:monica.oey@wildlife.ca.gov); or Ms. Randi Adair, Senior Environmental Scientist (Supervisory), at (707) 576-2786.

Sincerely,

 #585 FOR GREGG  
ERICKSON  
Gregg Erickson  
Regional Manager  
Bay Delta Region

cc: State Clearinghouse

Chad Mitcham  
U.S. Fish and Wildlife Service  
[chad\\_mitcham@fws.gov](mailto:chad_mitcham@fws.gov)

Jacob Martin  
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Ryan Moroney  
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Kim Sanders  
Central Coast Regional Water Quality Control Board  
[Kim.Sanders@waterboards.ca.gov](mailto:Kim.Sanders@waterboards.ca.gov)

NATIVE AMERICAN HERITAGE COMMISSION  
Cultural and Environmental Department

1550 Harbor Blvd., Suite 100  
West Sacramento, CA 95691 Phone (916) 373-3710  
Email: [nahc@nahc.ca.gov](mailto:nahc@nahc.ca.gov)  
Website: <http://www.nahc.ca.gov>  
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RECEIVED  
JUN 10 2019  
PVWMA

June 7, 2019

Brian Lockwood  
Pajaro Valley Water Management Agency  
36 Brennan Street  
Watsonville, CA 95076

RE: SCH# 2019059130 Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Harksins Slough Facilities Upgrades Project and Struve Slough Project), Santa Cruz County

Dear Mr. Lockwood:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §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, § 5064 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 within the area of potential 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, a notice of negative declaration, or a 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 §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 §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 §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 §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 §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 non-federally 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 §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §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 §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](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](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 §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 §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](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 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, §15064.5(f) (CEQA Guidelines §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 §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §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 or need additional information, please contact me at my email

address: [Gayle.Totton@nahc.ca.gov](mailto:Gayle.Totton@nahc.ca.gov).

Sincerely,



for

Gayle Totton  
Associate Governmental Program Analyst

cc: State Clearinghouse



## Watsonville Wetlands Watch

P.O. Box 1239 • Freedom, CA 95019

[www.watsonvillewetlandswatch.org](http://www.watsonvillewetlandswatch.org)

"Dedicated to preserving, restoring and fostering the appreciations of the wetlands of the Pajaro Valley"

July 1, 2019

Pajaro Valley Water Management Agency  
ATTN: Brian Lockwood, General Manager  
36 Brennan Street  
Watsonville, CA 95076

RE: Environmental Impact Report Scoping Documents for the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

Dear Mr. Lockwood:

The Watsonville Wetlands Watch appreciates that the Pajaro Valley Water Management Agency recently held a public meeting to discuss the initiation of the Environmental Impact Analysis for the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects. We would like to provide the following input into this process at this time.

As one of the State's largest freshwater coastal wetland resources, the Watsonville Sloughs provide critically important environmental services and are habitat to a large suite of resident and migratory birds and special status plant and animal species. We have long supported and valued the Pajaro Valley Water Management Agencies careful and thoughtful use of this resource to augment critical water supplies.

Within the considerations of impacts to your proposed project we feel it would be beneficial to assess the following:

1. Site specific impacts of the proposed projects associated with project construction and operation to wildlife species, including listed special status species such as the California red-legged frog.
2. The project's impact on the hydrology of the slough system throughout the year and the corresponding impact on wildlife habitat, including breeding and summer use by California red-legged frogs, fall shorebird migration and use of mudflats, spring and summer waterfowl use, and potential impacts to other wetland, marsh, and riparian bird species.

We are very appreciative of all of the work that PV Water has undertaken to maintain the hydrologic modeling currently being conducted within the Slough System and your work to advance the regional

understanding of hydrology and related information to support best management and planning for these wetland resources. Should you find it helpful, we would like to offer our support during the projects development with technical review and any other considerations that would be supportive of this project and the effort to plan a project most compatible with best management of the slough system.

Thank you for the opportunity to review and comment on the proposed project. If you have any questions, or need further clarification on items discussed above, please contact me.

Sincerely,



Jonathan Pilch

Executive Director

Watsonville Wetlands Watch



## **APPENDIX PD-1**

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### Assessor Parcel Numbers Associated with the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects

This appendix lists the Assessor Parcel Numbers of privately owned properties that are wholly or partially within the footprint of proposed Project facilities (e.g., intake and pump station, recharge basins, pipelines).

**TABLE PD 1-1**  
**PARCELS POTENTIALLY AFFECTED BY THE WATSONVILLE SLOUGH SYSTEM MANAGED AQUIFER RECHARGE AND RECOVERY PROJECTS**

<b>SCREENED INTAKE AND PUMP STATION AT STRUVE SLOUGH</b>			
052-081-38			
<b>PIPELINES</b>			
052-081-37	052-191-08	052-191-53	052-191-54
052-191-55	052-191-57	052-191-58	052-211-12
052-211-14	052-211-15	052-211-26	052-211-28
052-221-09	052-221-23	052-221-24	052-221-25
052-551-01	052-551-03	052-551-04	052-551-05
<b>HARKINS SLOUGH PUMP STATION</b>			
052-211-29			
<b>RECHARGE BASINS, RECOVERY WELLS, AND ASSOCIATED PIPELINES</b>			
046-151-24	046-151-37	052-181-17	052-181-18
052-181-19	052-181-20	052-191-57	052-311-01
052-311-05	052-311-06	052-311-08	052-541-02

## **APPENDIX PD-2**

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### 2014 BMP Update PEIR Mitigation Measures

The Watsonville Slough System Managed Aquifer Recharge and Recovery Projects (Projects) were analyzed at a program-level in the 2014 Basin Management Plan Update Program Environmental Impact Report (2014 BMP Update PEIR) as two of seven components under the BMP. The 2014 BMP Update PEIR identified programmatic mitigation measures. Under Resolution No. 2014-05, the Board of Directors adopted the BMP Update Mitigation Monitoring and Reporting Program (MMRP) that identifies programmatic mitigation measures applicable to the BMP Update components, including the Projects. Table PD 2-1 presents mitigation measures that apply to the Projects as adopted by the Board of Directors. Refer to Chapter 3 of the Watsonville Slough System Managed Aquifer Recharge and Recovery Projects Draft EIR for proposed revisions to some of these mitigation measures.

**TABLE PD 2-1  
MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<b>AIR QUALITY AND GREENHOUSE GASES</b>		
<p><b>AQ-1:</b> The construction contractor shall implement a dust program that includes the following elements:</p> <ul style="list-style-type: none"> <li>• Water all active construction sites at least twice daily</li> <li>• Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard</li> <li>• Pave, apply water three times daily, or apply (non- toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites</li> <li>• Sweep daily (with water sweepers) all paved access roads, paved parking areas and paved staging areas at construction sites</li> <li>• Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.</li> <li>• Hydroseed or apply (non-toxic) soil binders to inactive construction areas. However, do not apply these measures in operating agricultural fields under cultivation unless requested by the grower</li> <li>• Enclose, cover, water twice daily or apply (non- toxic) soil binders to exposed stockpiles (dirt, sand, etc.).</li> <li>• Limit traffic on unpaved roads to 15 mph</li> <li>• Install sandbags or other erosion control measures to prevent silt runoff to public roadways</li> <li>• Replant vegetation in disturbed areas as quickly as possible</li> </ul> <p>The contractor or builder shall designate a person or persons to monitor the fugitive dust emissions and enhance the implementation of the measures as necessary to minimize dust complaints. The name and telephone number of such persons shall be provided to the APCD Compliance Division prior to the start of any grading, earthwork or demolition.</p>	X	X
<b>BIOLOGICAL RESOURCES</b>		
<p><b>BIO-1a:</b> Wetlands and riparian habitat will be avoided by project construction activities. All facilities and construction activities will be maintained outside the jurisdictional area defined by riparian or emergent wetland vegetation and applicable setbacks and buffers where feasible. Within the Coastal Zone, project improvements will be located 100 feet from coastal review wetlands. Within the City of Watsonville, development will be located 100 feet from riparian areas. Within the unincorporated areas of the County, yet outside the Coastal Zone, a setback of 30 feet and 50 feet will be established adjacent to intermittent and perennial streams, respectively. If complete avoidance of wetlands and riparian areas is infeasible and/or development occurs within a regulated buffer/setback area, impacts would be minimized through implementation of Mitigation Measures BIO-1b, BIO- 1c BIO-1d, and BIO-1e.</p>	X	X
<p><b>BIO-1b:</b> Standard measures to maintain water quality and to control erosion and sedimentation will be implemented. These measures include:</p> <ul style="list-style-type: none"> <li>• Restrict trenching across all waterways to low-flow periods.</li> <li>• Exclude water from around the section of trench that is within the actively flowing channels. This will further reduce the potential for sediment or other pollutants to enter the waterways and impact downstream resources. The diversion will consist of water pillows, rock, sandbags, or other structural methods deemed most effective by the project engineer.</li> <li>• Place sediment curtains downstream of the construction zone to prevent sediment disturbed during trenching activities from being transported and deposited outside of the construction zone.</li> <li>• Locate spoil sites so they do not drain directly into the waterways. If a spoil site drains into a channel, catch basins will be constructed to intercept sediment before it reaches the channels. Spoil sites will be graded to reduce the potential for erosion.</li> </ul>	X	X



**TABLE PD 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<ul style="list-style-type: none"> <li>• Prepare and implement a spill prevention plan for potentially hazardous materials. The plan will include the proper handling and storage of all potentially hazardous materials, as well as the proper procedures for cleaning up and reporting of any spills. If necessary, containment berms will be constructed to prevent spilled materials from reaching the creek channels.</li> <li>• Store equipment and materials away from the waterways, outside existing levees or at least 50 feet from waterways, but within the pipeline right-of-way. No equipment or materials will be deposited within 100 feet of wetlands.</li> <li>• Provide proper and timely maintenance for vehicles and equipment used during construction to reduce the potential for mechanical breakdowns leading to a spill of materials into or around the creeks. Maintenance and fueling will be conducted in an area that meets the criteria set forth in the spill prevention plan (i.e., away from the creeks).</li> <li>• Prior to construction, install temporary construction fencing at the perimeter of the construction zone to prevent inadvertent equipment access or construction staging within adjacent riparian forest and/or coastal marsh habitats. This fencing will be signed in the field as "SENSITIVE HABITAT AREA — NO CONSTRUCTION ACCESS". Monitor construction activities to verify compliance with the perimeter fencing and limits of construction access and staging and implement remedial action if non-compliance is noted.</li> </ul> <p>Restrict limbing of riparian forest trees; if trees are limbed for construction access, document the impact and provide compensation as per Mitigation Measure BIO-1c.</p>		
<p><b>BIO-1c:</b> Where impacts to mixed riparian or willow riparian forest occurs, revegetation measures will be developed as part of a revegetation plan approved by CDFW, RWQCB, and if applicable, USACE and/or California Coastal Commission, pursuant to regulatory agency permitting. The revegetation plan will include specific plans for the revegetation of impacted riparian forest, and for restoration of nearby creek riparian habitat, as appropriate. Upon approval by Santa Cruz County and other applicable agencies, the PVWMA may choose to coordinate with the Natural Resources Conservation Service (NRCS) and the Santa Cruz County Resource Conservation District (RCD) to develop and implement the required riparian revegetation, including providing funds to the RCD for their implementation of the revegetation. Revegetation measures will include the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met. Revegetation will include a 3:1 replacement ratio the acreage of riparian habitat lost and for all trees lost as result of the project to account for the reduced habitat values of smaller trees compared with mature vegetation. Success criteria for replanting will be less than 20 percent mortality of individual species yearly for 5 years. Replanting will be conducted each year that plantings exceed 20% mortality, such that 80% plant survival is maintained each year of the 5-year monitoring period. Cover provided by invasive, non-native plant species shall not exceed 5% during each year of the 5-year monitoring period.</p>	X	X
<p><b>BIO-1d:</b> Where impacts to coastal freshwater marsh occurs, revegetation measures will be developed as part of a revegetation plan approved by CDFW, RWQCB, USACE, and/or California Coastal Commission, pursuant to regulatory agency permitting. Upon approval by Santa Cruz County and other applicable agencies, the PVWMA may choose to coordinate with the Natural Resources Conservation Service (NRCS) and the Santa Cruz County Resource Conservation District (RCD) to develop and implement the required wetland revegetation, including providing funds to the RCD for their implementation of the revegetation. The revegetation plan will include specific plans for the revegetation of impacted coastal marsh, and for restoration of nearby wetland habitat, as appropriate. Revegetation measures will include the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met. Revegetation will include a 3:1 replacement ratio (or an equivalent habitat replacement strategy as agreed upon by PVWMA and regulatory agencies) for impacted wetlands. If natural recovery is a viable strategy, then a wetland plant cover exceeding 50% should be attained after two growing seasons. Mitigation may occur via restoration, creation, or preservation of wetlands. Mitigation will occur at a site acceptable to permitting agencies and pursuant to Project permit requirements. If the compensatory mitigation includes restoration, enhancement, or creation of wetlands, a qualified biologist will monitor the designated wetland mitigation area for a minimum of five years to ascertain if the wetland mitigation is successful. Annual reports will be submitted to permitting agencies by December 31 of each monitoring year, describing the results of the monitoring and any remedial actions needed to achieve a minimum 3:1 habitat replacement ratio or equivalent for permanent impacts to wetlands and other waters.</p>	X	X

**TABLE PD 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<b>BIO-1e:</b> Where construction and/or facilities are placed within a riparian or wetland development setback area, indirect impacts to adjacent riparian and wetland vegetation will be minimized. Where feasible, buffer plantings of native trees and shrubs will be installed between the facility and the adjacent wetland or riparian resource to provide a vegetated buffer. A buffer planting plan will be prepared as part of a revegetation plan approved by CDFW, RWQCB, USACE, and/or California Coastal Commission, pursuant to regulatory agency permitting. The buffer planting plan will include specific revegetation measures, including the use of locally obtained plant materials, detailed descriptions of installation methods, after-installation care, weed control measures, success criteria, and corrective measures if the success criteria are not met.	X	X
<b>BIO-2:</b> During the development of BMP Update components, PVWMA will implement conservation measures during construction activities to avoid and minimize incidental take and significant impacts on individuals, populations, or habitat of special-status wildlife species to the maximum extent practicable. The following general measures will be incorporated into the planning and construction of BMP Update components, as appropriate, to ensure that the effects of the BMP Update are avoided, minimized, and mitigated.  Suggested species-specific measures for CA red-legged frog, WPT, and steelhead are included, as well, although BMP Update components that proposed to divert surface waters beyond existing entitlements would require future additional project-level CEQA analyses of specific diversion and operation plans to support water rights application and environmental permits. It is assumed that project-level biological studies and analysis for these BMP Update components will be required to support those future permits and biological opinions.	X	X
<b>BIO-2a:</b> During project activities, all trash that may attract predators will be properly contained, removed from the work site, and disposed of regularly. Following construction, all trash and construction debris will be removed from work areas.	X	X
<b>BIO-2b:</b> All refueling, maintenance, and staging of equipment and vehicles will occur at least 65 feet from any riparian habitat or water body. The Agency will ensure contamination of habitat does not occur during such operations. Prior to the onset of work, the Agency will ensure that the contractor has prepared a plan to allow a prompt and effective response to any accidental spills. All workers will be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur.	X	X
<b>BIO-2c:</b> The spread or introduction of invasive exotic plant species will be avoided to the extent practicable. When practicable, invasive exotic plants in the project areas will be removed.	X	X
<b>BIO-2d:</b> Prior to any on-site work in areas where special-status species may occur, a qualified biologist will conduct a tailgate training session in which all construction personnel will receive training regarding measures (below) that are to be implemented to avoid environmental impacts. This training will include a presentation of the potential for sensitive species to occur at the site and measures to protect habitat including aquatic habitat and avoid impacts to the species. All personnel working on the site will receive this training, and will sign a sign-in sheet showing they received the training.	X	X
<b>BIO-2e:</b> Prior to the commencement of work, the limits of the work area (including haul routes, access ramps, storage areas and material stockpiles) will be clearly marked with orange construction fencing to prevent workers from impacting habitat outside the work area. No work will occur outside the designated marked work areas.	X	X
<b>BIO-2f:</b> Each morning before work begins on any components in or within 100 feet of a suitable habitat area (defined as: riparian habitat, USACE jurisdictional wetlands or "other waters" of the U.S., or sensitive habitats identified in subsequent USFWS Biological Opinions and CDFW 1600 Lake and Streambed Alteration Agreements), a qualified monitor will survey the work site and habitat immediately surrounding the active work site for conditions that could impact special-status species, and will remain on-site whenever work is occurring that may adversely impact special-status species and their habitats. No work will be allowed to begin each morning until the monitor has inspected the work site.	X	X

**TABLE PD 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<b>BIO-2g:</b> A USFWS-approved biologist or biological monitor will permanently remove from within the project area(s), any individuals of exotic species, such as bullfrogs, crayfish, and centrarchid fishes to the extent practicable.	X	X
<b>BIO-2h:</b> Upon locating individuals of special-status species that are dead or injured as a direct result of activities conducted by PVWMA, initial notification will be made to the USFWS's Division of Law Enforcement at (916) 978-4861 (Sacramento) within three working days of its finding. The USFWS Field Office within whose area of responsibility the specimen is recovered will also be notified. Written notification will be made within five calendar days and include the date, time, and location of the carcass, a photograph, cause of death, if known, and any other pertinent information.	X	X
<p><b>BIO-2i:</b> Nesting Bird Surveys. Prior to any project construction activities, the project proponent will take the following steps to avoid direct losses of nests, eggs, and nestlings and indirect impacts to avian breeding success:</p> <ul style="list-style-type: none"> <li>• If construction activities occur only during the non- breeding season, between August 31 and February 1, no surveys will be required.</li> </ul> <p>During the breeding bird season (February 1 through August 31), a qualified biologist will survey construction areas in the vicinity of the project site for nesting raptors and passerine birds not more than 14 days prior to any ground-disturbing activity or vegetation removal. Surveys will include all potential habitats within 500 feet (for raptors) of activities and all on-site vegetation including bare ground within 250 feet of activities (for all other species). If results are positive for nesting birds, avoidance procedures will be adopted, if necessary, on a case-by-case basis. These may include implementation of buffer areas (minimum 50-foot buffer for passerines and 250-foot minimum buffer for raptors) or seasonal avoidance.</p>	X	X
<p><b>BIO-2j (CRT):</b> The following measures for avoidance and minimization of adverse impacts to California Red- Legged Frog (<i>Rana draytonii</i>) (CRF) during construction of the BMP Update components are those typically employed for construction activities that may result in short-term impacts to individuals and their habitat. The focus of these measures is on scheduling activities at certain times of year, keeping the disturbance footprint to a minimum, and monitoring. Consultation with the USFWS will be conducted and a Biological Opinion developed for each BMP Update component that requires a USACE Section 404 Wetland Permit. Ongoing and future CRF studies in the project area may result in site-specific conditions that would be integrated into the future project-level BMP Update component designs, permitting and operations.</p> <p><b>CRF-1.</b> The Agency will annually submit the name(s) and credentials of biologists who would conduct activities specified in the following measures. No project activities will begin until the Agency receives approval from the Service that the biologist(s) is qualified to conduct the work.</p> <p><b>CRF-2.</b> A USFWS-approved biologist will survey the work site 48 hours prior to the onset of activities. If CRF, tadpoles, or eggs are found, the approved biologist will determine the closest appropriate relocation site. The approved biologist will be allowed sufficient time to move them from the work site before work activities begin. Only USFWS-approved biologists will participate in activities associated with the capture, handling, and moving of CRF.</p> <p><b>CRF-3.</b> Before any activities begin on a project, a USFWS-approved biologist will conduct a training session for all construction personnel. At a minimum, the training will include a description of the CRF and its habitat, the importance of the CRF and its habitat, general measures that are being implemented to conserve the CRF as they relate to the project, and the boundaries within which the project may be accomplished. Brochures, books and briefings may be used in the training session, provided that a qualified person is on hand to answer any questions.</p> <p><b>CRF-4.</b> A USFWS-approved biologist will be present at the work site until such time as all removal of CRF, instruction of workers, and disturbance of habitat have been completed. After this time, the biologist will designate a person to monitor on-site compliance with all minimization measures and any</p>	X	X

**TABLE PD 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<p>future staff training. The USFWS-approved biologist will ensure that this individual receives training outlined in measure WPT-2 and in the identification of CRF. The monitor and the USFWS-approved biologist will have the authority to stop work if CRF are in harm's way.</p> <p><b>CRF-5.</b> The number of access routes, number and size of staging areas, and the total area of the activity will be limited to the minimum necessary to achieve the project goal. Routes and boundaries will be clearly demarcated, and these areas will be outside of riparian and wetland areas to the extent practicable.</p> <p><b>CRF-6.</b> Work activities will be completed between April 1 and November 1 to the extent practicable. Should the Agency demonstrate a need to conduct activities outside this period, the Agency may conduct such activities after obtaining the Service's approval.</p> <p><b>CRF-7.</b> If a work site is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than five millimeters (mm) to prevent CRF from entering the pump system. Water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow will be removed in a manner that would allow flow to resume with the least disturbance to the substrate.</p> <p><b>CRF-8.</b> The Declining Amphibian Populations Task Force's Fieldwork Code of Practice will be followed to minimize the possible spread of chytrid fungus or other amphibian pathogens and parasites.</p> <p><b>CRF-9:</b> Implement Mitigation Measure 3.10-1 through 3.10-4 in Section 3.10, Hydrology and Water Quality: Surface Water Systems.</p>		
<p><b>BIO-2k (WPT):</b> The following measures for avoidance and minimization of adverse impacts to western pond turtle (<i>Actinemys marmorata</i>) (WPT) during construction of the BMP Update project elements are those typically employed for construction activities that may result in short-term impacts to individuals and their habitat. The focus of these measures is on keeping the disturbance footprint to a minimum and aggressive monitoring of WPTs before vegetation removal and during the construction and revegetation phase.</p> <p><b>WPT-1.</b> The Agency will annually submit the name(s) and credentials of biologists who would conduct activities specified in the following measures. No project activities will begin until proponents have received approval from CDFW that the biologist(s) is qualified to conduct the work.</p> <p><b>WPT-2.</b> A CDFW-approved biologist will survey the work site 48 hours prior to the onset of activities. If WPT adults, juveniles or eggs are found, the approved biologist will determine the closest appropriate relocation site. The approved biologist will be allowed sufficient time to move them from the work site before work activities begin. Only CDFW-approved biologists will participate in activities associated with the capture, handling, and moving of WPT.</p> <p><b>WPT-3.</b> Before any activities begin on a project, a CDFW-approved biologist will conduct a training session for all construction personnel. At a minimum, the training will include a description of the WPT and its habitat, the importance of the WPT and its habitat, general measures that are being implemented to conserve the WPT as they relate to the project, and the boundaries within which the project may be accomplished. Brochures, books and briefings may be used in the training session, provided that a qualified person is on hand to answer any questions.</p> <p><b>WPT-4.</b> A CDFW-approved biologist will be present at the work site until such time as all removal of WPT, instruction of workers, and disturbance of habitat have been completed.</p>	X	X

**TABLE PD 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<p><b>WPT-5.</b> The number of access routes, number and size of staging areas, and the total area of the activity will be limited to the project plans. Routes and boundaries will be clearly demarcated.</p> <p>Where impacts occur in these staging areas and access routes, restoration will occur as identified in the general BMP Update components above.</p>		
<p><b>BIO-3a:</b> Occurrences of special status plant species shall be avoided by project construction activities to the extent feasible. All facilities and construction activities will be maintained outside habitats supporting special status plant species where feasible. Prior to construction, a qualified biologist will conduct a survey of the project area to ascertain the presence or absence of special status plant species. If no species are encountered, no mitigation is required. If a special status species is found within a BMP Update component project area, a setback of 50 feet will be established between the occurrence and the BMP Update construction activities. Prior to construction, PVWMA will install temporary construction fencing at the 50-foot setback line to prevent inadvertent equipment access or construction staging within the special status plant habitat. This fencing will be signed in the field as "SENSITIVE HABITAT AREA - NO CONSTRUCTION ACCESS". A qualified biologist will inspect the temporary construction barrier fence and monitor the contractor's compliance with this avoidance measure. If complete avoidance of special status plant species is infeasible, impacts would be minimized through implementation of Mitigation Measure BIO-3b.</p>	X	X
<p><b>BIO-3b:</b> Prior to clearing and grubbing in areas where impacts to special status plant species cannot be avoided, PVWMA will consult with applicable resource agencies (i.e., CDFW and/or USFWS) prior to implementing salvage and revegetation actions. A qualified biologist will collect any available above- ground seed pods/seed heads for their use in future revegetation efforts. During construction, the upper 6 inches of topsoil from areas supporting the plant species will be stripped from the construction area and stored for later use. The topsoil will be used in future revegetation efforts which may be on-site (if feasible) or at an off-site location approved by permitting agencies (i.e., USFWS, CDFW). At the designated revegetation area, all stockpiled topsoil will be placed on site and finish graded to blend with surrounding topography. Under direction of a qualified biologist, the areas will be revegetated with locally native herbaceous plant species compatible with natural regeneration of the special status plant species. The qualified biologist will hand broadcast any seeds collected from the special status plant species into the appropriate habitat areas. The revegetation will achieve a minimum of 2:1 plant replacement (i.e., re- establish two plants for every plant impacted). The qualified biologist will monitor the revegetation areas for two years after construction to ascertain if the special status plant species re-established within the revegetation area. Annual reports will be submitted to permitting agencies by December 31 of each monitoring year, describing the results of the revegetation measures, for a period of 5 years.</p>	X	X
<b>CULTURAL RESOURCES</b>		
<p><b>CR-1a:</b> Final pipeline and facility plans shall locate facilities and pipeline alignments away from identified and recorded archaeological sites in each component area based on a site reconnaissance and archaeological investigation conducted by a qualified archaeologist at the time site-specific construction plans are developed. The archaeologist shall identify the areal extent of potential recorded sites, assess potential significance to identified resources, recommend adjustment to siting of improvements, facilities and/or pipeline alignments, if necessary, and provide other recommendations to avoid impacts to identified significant resources. If a significant or potentially significant archaeological or historic resource is identified pursuant to the definitions in the State CEQA Guidelines as identified above, the consulting archaeologist shall develop an appropriate mitigation plan for the cultural resource. Possible mitigation measures for important cultural resources may include monitoring by a qualified archaeologist during construction at identified sensitive sites, documentation and recordation of the resource, recovery and relocation, or stabilization of the resource.</p>	X	X

**TABLE PD 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<b>CR-1b:</b> The cultural resource boundaries of potentially significant sites shall be marked as exclusion zones both on ground and on construction maps prior to the commencement of construction activities on component sites. Construction supervisory personnel shall be notified of the existence of cultural resources in each component area and will be required to keep personnel and equipment away from these cultural resources sites. During construction and operational phases, personnel and equipment will be restricted to each surveyed corridor for each component.	X	X
<b>CR-1c:</b> Should any as yet undiscovered cultural resources be uncovered at any component site, such as structural features, or unusual amounts of bone or shell, artifacts, human remains, or architectural remains be encountered during any development activities, work will be suspended and PVWMA staff will be contacted. A qualified professional archaeologist shall be retained and will perform any necessary investigations to determine the significance of the find. PVWMA will then implement any mitigation deemed necessary for the recordation and/or protection of the cultural resources. In addition, pursuant to Sections 5097.97 and 5097.98 of the State Public Resources Code and Section 7050.5 of the State Health and Safety Code, in the event of the discovery of human remains, all work must be halted and the County Coroner shall be immediately notified. If the remains are determined to be Native American, guidelines of the Native American Heritage Commission shall be adhered to in the treatment and disposition of the remains.	X	X
<b>ENERGY, UTILITIES, AND SERVICES</b>		
<p><b>ES-1:</b> A study to identify utilities along proposed alignments will be conducted by PVWMA during pre- design states of projects. The following mitigation measures are required for segments identified in final design as having potential conflicts with significant utilities:</p> <ul style="list-style-type: none"> <li>a. Utility excavation and encroachment permits would be required from the appropriate agencies, including the Public Works Departments of Santa Cruz County, City of Watsonville, Caltrans, and Union Pacific Railroad. These permits include measures to minimize utility disruption. PVWMA and its contractors shall comply with permit conditions. Permit requirements shall be included in construction contract specifications.</li> <li>b. Utility locations would be verified through field survey (potholing) and use of an underground locating service.</li> <li>c. A detailed engineering and construction plan shall be prepared as part of the design plans and specifications. This plan shall include procedures for the excavation, support, and fill of areas around utility cables and pipes. All affected utility services would be notified of PVWMA's construction plans and schedule. Arrangements would be made with these entities regarding protection, relocation, or temporary disconnection of services.</li> <li>d. In areas where the pipeline would parallel wastewater mains, engineering and construction plans shall include trench wall support measures to guard against trench wall failure, and possible resulting loss of structural support for the wastewater main.</li> </ul> <p>Residents and businesses in the project area shall be notified in writing by the contractor of planned utility service disruption two to four days in advance, in conformance with state and County standards.</p>	X	X
<b>ES-2:</b> PVWMA shall include in its construction specifications a requirement for the contractor to provide plans for recovering, reusing, and recycling construction, demolition, and excavation wastes and providing for composting of plant material, where feasible.	X	X
<b>GEOLOGY AND SOILS</b>		

**TABLE PD 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<b>GS-1:</b> Future construction of proposed BMP Update facilities shall be designed in accordance with design recommendations of geotechnical reports and in compliance with applicable policies and appropriate engineering investigation practices necessary to reduce the potential detrimental effects of ground shaking and liquefaction. Construction shall be in accordance with applicable City and County ordinances and policies regarding mitigation of seismic and geologic hazards, and appropriate geotechnical studies shall be conducted.	X	X
<b>GS-2:</b> Construction of future BMP Update facilities shall include preparation and implementation of erosion control plans to minimize erosion and inadvertent transport of sediments into water bodies during installation of facilities. Measures shall include, but not be limited to: limiting the area of ground disturbance and vegetation removal at any one time during construction; conducting work prior to the rainy season if possible and protecting disturbed areas during the rainy season; installing bales or other appropriate barriers adjacent to water bodies to prevent transport of sediments into sloughs and water courses; immediately revegetating disturbed areas; and other Best Management Practices during construction to protect water quality. All grading and construction shall conform to requirements of the Santa Cruz County Grading Ordinance. To the extent possible, grading activities in non-cropped areas shall be limited to the period between April 15 and October 31.	X	X
<b>GS-3:</b> All diversion and pipeline facilities shall be designed and engineered in accordance with recommendations of a geotechnical report and appropriate engineering designs to reduce the potential detrimental effects of expansive soils, corrosivity, and/or other identified soils constraints. A licensed geotechnical engineer shall prepare recommendations applicable to foundation design, earthwork, and site preparation prior to or during the project design phase. Recommendations will address mitigation of site- specific, adverse soil and bedrock conditions that could hinder development. Project engineers shall implement the recommendations. Geotechnical design and design criteria will comply with applicable codes and requirements of the California Building Code with California additions (CCR Title 24), applicable City and County construction and grading ordinances.	X	X
<b>HAZARDS AND HAZARDOUS MATERIALS</b>		
<b>HM-1:</b> Prior to initiation of earthwork activities, PVWMA shall perform soil testing on agricultural sites proposed for development and analytically test for pesticide residuals and pesticide-related metals arsenic, lead, and mercury. If contamination is identified in the soil samples above applicable levels, PVWMA shall prepare a Site Management Plan (SMP) to establish protocols/guidelines for the contractor including: identification of appropriate health and safety measures while working in contaminated areas; soil reuse; handling, and disposal of any contaminated soils; and agency notification requirements. The SMP shall be subject to the review and approval of the appropriate regulatory agency.	X	X
<b>SURFACE WATER, GROUNDWATER, AND WATER QUALITY</b>		
<b>HWQ-1:</b> PVWMA shall require contractors to apply for all applicable NPDES permits, including dewatering permits, develop a SWPPP for construction of proposed facilities, and comply with conditions of the permit(s), as required by the CCRWQCB. The objectives of the SWPPP are to identify pollutant sources that may affect the quality of stormwater discharge and to implement BMPs to reduce pollutants in stormwater discharges. The SWPPP for this proposed action would include the implementation, at a minimum, of the following elements: <ul style="list-style-type: none"> <li>• Source identification</li> <li>• Preparation of a site map</li> </ul>	X	X

**TABLE PD 2-1 (Continued)**  
**MITIGATION MEASURES ADOPTED FOR THE 2014 BMP UPDATE PEIR**

Mitigation Measure	Harkins Slough	Struve Slough (Watsonville Slough in the 2014 BMP Update PEIR)
<ul style="list-style-type: none"> <li>Description of construction materials, practices, and equipment storage and maintenance</li> <li>List of pollutants likely to contact stormwater</li> <li>Estimate of the construction site area and percent impervious area</li> <li>Erosion and sedimentation control practices, including soils stabilization, revegetation, and runoff control to limit increases in sediment in stormwater runoff, such as detention basins, straw bales, silt fences, check dams, geofabrics, drainage swales, and sandbag dikes</li> <li>Proposed construction dewatering plans</li> <li>Provisions to eliminate or reduce discharge of materials to stormwater</li> <li>Description of waste management practices</li> </ul> <p>Maintenance and training practices</p>		
<p><b>HWQ-2:</b> Rapid, imposed water-level fluctuations shall be avoided within the sloughs, Salsipuedes Creek, and the Pajaro River to minimize erosion and failure of exposed (or unvegetated), susceptible banks. This can be accomplished by operating the pumps at an appropriate flow rate, in conjunction with commencing operation of the pumps only when suitable water levels or flow rates are measured in the water body. Criteria for minimizing fluctuations and/or protecting banks from related erosion will need to be developed, as some banks presently are stable and others are not. Control is important, as the mobilized sediment also impairs in-slough habitat values, and potentially exacerbates bacterial levels in the slough system. It may be that water-level fluctuations may be controlled as well to minimize other impacts, such as desiccation of amphibian eggs or waterlogging of agricultural soils adjacent to the sloughs.</p>	X	
<p><b>HWQ-4:</b> Facilities shall be designated to comply with FEMA and County of Santa Cruz requirements to floodproof the facilities and shall not exacerbate upstream or downstream flood hazards on other properties. The FEMA process will require identification of the FEMA floodway zone and may require no increase water elevations for a one percent chance annual flood. The FEMA process will require identification of the FEMA zone type and may require no increase water elevations for a one percent chance annual flood. To meet the specific FEMA requirements for the component, substantial modifications to the facility design and additional mitigation may be required.</p>	X	X
<b>TRANSPORTATION AND TRAFFIC</b>		
<p><b>TR-1:</b> Conduct a preconstruction survey of road conditions on key access routes to the project sites (e.g., San Andreas Road). The pavement conditions of local streets judged to be in good condition for use by heavy truck traffic shall be monitored. Roads damaged by construction shall be repaired to a structural condition equal to, or better than, that which existed prior to construction activity.</p>	X	X