# COLLEGE LAKE INTEGRATED RESOURCES MANAGEMENT PROJECT

## Addendum to the Environmental Impact Report

**Prepared for**
**Pajaro Valley Water Management Agency**

**July 2022**

# COLLEGE LAKE INTEGRATED RESOURCES MANAGEMENT PROJECT

## Addendum to the Certified Environmental Impact Report

Prepared for
Pajaro Valley Water Management Agency

July 2022

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# CHAPTER 1
# Background and Purpose of the Addendum

## 1.1 Background

The 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. 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. In the coastal areas and throughout much of the Pajaro Valley Groundwater Basin, overdraft conditions 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 approximately three 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.

To help achieve its objective 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, PV Water has prepared and periodically updates a basin-wide groundwater management plan, the Basin Management Plan (BMP), which serves, in part, as the basin's Groundwater Sustainability Plan (GSP) Alternative and is the guiding document for its major projects and programs to achieve sustainable groundwater resources. The College Lake Integrated Resources Management Project (Project) was first included in the BMP, and then analyzed as its own project in the College Lake Integrated Resources Management Project Environmental Impact Report (EIR; SCH No. 2017112063) which was published in April 2019. PV Water's Board of Directors certified the EIR on October 16, 2019. The EIR evaluated potential environmental impacts that could occur as a result of implementing the Project, and provided applicable mitigation to reduce the intensity of potential environmental impacts. As part of Project approval, PV Water adopted a Mitigation Monitoring and Reporting Program (MMRP).

Subsequent to adoption of the EIR, the Project has undergone further development. Chapter 2 of this Addendum presents an updated description of the Project. Chapter 3 presents an evaluation of the environmental impacts of the Project as currently developed in comparison to the impacts disclosed in the EIR. Chapter 4 summarizes the findings of the evaluation presented in Chapter 3, and Chapter 5 contains an updated MMRP for the Project as planned for development.

## 1.2 Purpose of This Addendum

California Public Resources Code section 21166 and the CEQA Guidelines (Sections 15162 and 15164) require a lead agency to prepare an addendum to a previously certified EIR if some changes to the project occur or additions to the environmental evaluation are necessary, but none of the following occurs:

1. Substantial changes are proposed in the project which will require major revisions to the EIR due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects;
2. Substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EIR due to involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects; or
3. New information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EIR was adopted, shows any of the following:
    a. The project will have one or more significant effects not discussed in the EIR;
    b. Significant effects previously examined will be substantially more severe than shown;
    c. Mitigation measures or alternatives previously found not to be feasible would in fact be feasible, and would substantially reduce one or more significant effects of the project, but the project proponents decline to adopt the mitigation measure or alternative; or
    d. Mitigation measures or alternatives which are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects on the environment, but the project proponents decline to adopt the mitigation measure or alternative.

This Addendum documents that the Project as modified subsequent to the certified EIR does not trigger any of the conditions described above.

# CHAPTER 2
# Project Description

## 2.1 Summary of Previously Approved Project

The essential function of the College Lake Integrated Resources Management Project (Project) is to store water in and divert water from College Lake for treatment, transmission, and distribution for agricultural irrigation. College Lake is located in unincorporated Santa Cruz County northeast of Watsonville city limits, north of Holohan Road and west of State Route (SR) 152 (refer to **Figure 2-1**). The Project analyzed in the certified Environmental Impact Report (certified EIR)[1] includes a concrete weir structure and intake pump station facility that would divert surface water from College Lake and deliver raw (untreated) water impounded behind the weir to a Water Treatment Plant (WTP) , which would remove sediment, filter and disinfect the water diverted from College Lake; and the College Lake pipeline, an approximately 5.5-mile-long, 24-inch diameter pipeline from the proposed WTP to the Coastal Distribution System (CDS) and the Recycled Water Facility (RWF). These facilities as originally proposed were described starting on page 2-21 of the certified EIR.

**Table 2-1** summarizes key features of the Project described in the certified EIR as well as proposed updates to the Project that are evaluated in this Environmental Impact Report Addendum (EIR Addendum).

## 2.2 Modified Project Components

Following certification of the EIR and approval of the Project, PV Water proceeded with design of the weir structure and intake pump station, WTP, and College Lake pipeline. As a result, PV Water is now proposing the following changes to the approved Project, which are described in detail in following sections. Refer to **Appendix APN** for updated Assessor Parcel Numbers (APNs) associated with the Project components.

- **Weir Structure and Intake Pump Station.** The configuration and dimensions of the weir structure and intake pump station have been refined since approval of the Project.
- **Water Treatment Plant**. The design for the WTP has been refined, resulting in a smaller permanent footprint compared to the approved Project, and addition of a Potable Water Well.
- **College Lake Pipeline**. To reduce disruption to streets within the City of Watsonville, PV Water is evaluating an alternative alignment for the College Lake pipeline that is closer to agricultural fields and generally east of city streets.

1 Pajaro Valley Water Management Agency, *College Lake Integrated Resources Management Project Environmental Impact Report*, State Clearinghouse Number 2017112063, adopted October 2019.


SOURCE: ESA, 2021



**Figure 2-1**
Project Location Map

**TABLE 2-1**
**KEY FEATURES OF COLLEGE LAKE INTEGRATED RESOURCES MANAGEMENT PROJECT**

<table>
<tr><th colspan="2">Key Feature</th><th colspan="3">Summary of EIR Project Components</th><th>Summary of Modified Project Components</th></tr>
<tr><td rowspan="2">Annual Yield</td><td>Average</td><td colspan="3">Approximately 1,800 to 2,300 AFY[a]</td><td>Same as approved Project</td></tr>
<tr><td>Maximum</td><td colspan="3">3,000 AFY</td><td rowspan="3">Same as approved Project</td></tr>
<tr><td colspan="2">Storage Capacity[b]</td><td colspan="3">Approximately 1,800 AF at water surface elevation 62.5 feet NAVD88</td></tr>
<tr><td colspan="2">Water Surface Area[b]</td><td colspan="3">285 acres at water surface elevation of 62.5 feet NAVD88</td></tr>
<tr><td rowspan="3">Components</td><td>Weir Structure, Intake pump station</td><td colspan="3">• Concrete structure equipped with adjustable weir and designed to accommodate fish passage. Weir height adjustable from 60.1 feet NAVD88 (elevation of existing weir) to 62.5 feet NAVD88.<br>• Intake would be screened compliant with NMFS and CDFW screening criteria for anadromous salmonids.<br>• Pump station would be located on western bank adjacent to weir structure</td><td>Same as approved Project but with minor modifications to weir and intake pump station design to, for example, incorporate input from NMFS regarding design of the fishway passage (refer to Figures 2-2 and 2-3).</td></tr>
<tr><td>Water Treatment Plant</td><td colspan="3">• The preferred WTP site is located adjacent to Holohan Road; the optional WTP site is located just west of the weir structure and pump station sites.<br>• Includes sedimentation, filtration, electrical/operations buildings, chemical storage and feed, chlorine contact basin[c], filter influent pump station and effluent pump station. Intermediate ozonation could be added if necessary to meet water quality objectives.</td><td>Same as the preferred WTP with the following proposed changes:<br>• WTP footprint is smaller (approximately 4.3 acres versus approximately 5 acres)<br>• Treatment: includes flocculation/sedimentation and disinfection; chemical storage and feed, solids handling consolidated into solids lagoons. Strainers could be added if necessary to meet water quality objectives. As with the approved EIR, ozonation could be added if necessary to meet water quality objectives, and a chlorine contact tank could be added to supply local users.<br>• WTP construction would include the addition of a potable water well.</td></tr>
<tr><td>Pipelines</td><td colspan="3">• Pipeline from intake pump station to WTP<br>• 5.5 miles from WTP to Coastal Distribution System and Recycled Water Facility (same distance for preferred and optional pipeline alignments)</td><td>Proposed changes to pipeline alignment between the WTP and the Coastal Distribution System and Recycled Water Facility (see Figures 2-5a through 2-5f and Table 2-7); proposed alignment is approximately 6 miles in length; pipeline diameter would be 30 inches.</td></tr>
<tr><td rowspan="7">Operations and Maintenance</td><td colspan="2">Proposed Fish Passage, Bypass of Casserly Creek Flows:[d]</td><td>Adult Steelhead Migration<br>Dec. 15 – Mar. 31</td><td>Smolt Outmigration<br>Apr. 1 – May 31</td><td rowspan="7">Same as approved Project</td></tr>
<tr><td colspan="2">Minimum flow between Corralitos-Salsipuedes Confluence and Pajaro River</td><td>21 cfs</td><td>8 cfs</td></tr>
<tr><td colspan="2">Minimum flow at weir[e] and in Salsipuedes Creek between weir and Corralitos Creek</td><td>1.8 cfs</td><td>1.0 cfs</td></tr>
<tr><td colspan="2">Minimum lake level</td><td>59.5 feet NAVD88</td><td>59.3 feet NAVD88</td></tr>
<tr><td colspan="4">Flood Hazards: Weir height during wet season would be managed so as not to exacerbate upstream or downstream flooding (refer to Section 2.7, Operations and Maintenance)</td></tr>
<tr><td>Water supply diversions</td><td colspan="3">• Dec. 15 – May 31: would occur after minimum lake level and proposed fish passage flows have been achieved, and would be based on demand<br>• May 31 – Dec. 14: would occur based on demand, considering water supply portfolio priorities</td></tr>
<tr><td>Maintenance</td><td colspan="3">• Periodic inspections and maintenance of Project components<br>• Within College Lake Basin<br>- Sediment and debris removal<br>- Vegetation maintenance (disking/tilling, trimming and mowing, removal)<br>- Vector control</td></tr>
</table>

NOTES:

AFY = acre-feet per year
AF = acre-feet
CDFW = California Department of Fish and Wildlife
cfs = cubic feet per second
NAVD88 = North American Vertical Datum of 1988
NMFS = National Marine Fisheries Service
NOAA = National Oceanic and Atmospheric Administration
WTP = water treatment plant

[a] Average water yield for College Lake would vary year to year, depending on hydrologic conditions (e.g., rainfall), weir structure operations, and water demand. The annual yield is consistent with the draft water right permit for the Project.
[b] Information is from cbec, inc. eco engineering (cbec), *College Lake Integrated Resources Management Project, Hydrologic and Hydraulic Modeling Technical Memorandum*, November 2018.
[c] Chlorine contact basins provide disinfection contact time between free chlorine (sodium hypochlorite) and water.
[d] Instream flow requirements based on critical riffle surveys conducted in 2017 and 2018. Each minimum flow requirement would be the number specified in this table or the flow resulting from bypassing the total inflow into College Lake, whichever is less. Minimum flow between the Corralitos Creek-Salsipuedes Creek confluence and Pajaro River is for the combined flow from Corralitos Creek and College Lake. Refinements to fish passage assumptions and modeling may occur during permitting based on agency consultations.
[e] The minimum flows may be refined during design phase of the proposed weir and fish passage structure.

## Weir Structure and Intake Pump Station

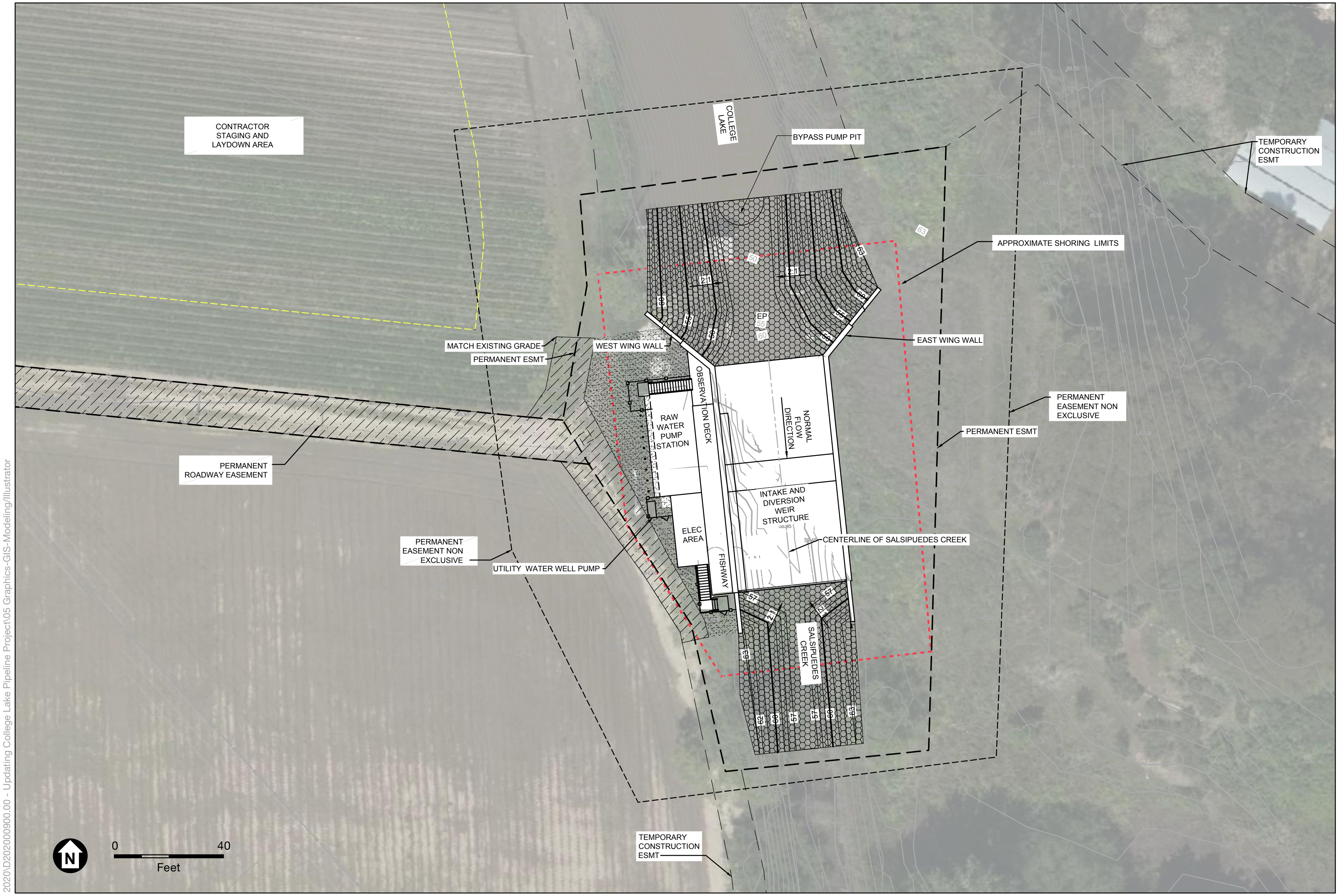
The function of the weir structure and intake pump station would remain the same as that described in the certified EIR. The intake pump station would pump raw (untreated) water from an intake just upstream of the weir to the proposed WTP via a 30-inch diameter intake pipeline. The intake pump station would have a maximum pumping capacity of 30 cubic feet per second (cfs). The proposed weir structure would consist of a reinforced concrete spillway with mechanically adjustable weir, abutment retaining walls on both sides of the structure, and reinforced concrete aprons upstream and downstream of the weir (refer to **Figures 2-2 and 2-3**). The proposed height of the weir (measured from the maximum possible water storage elevation to the downstream toe of the weir) is 5.9 feet. The proposed adjustable weir would be capable of raising the College Lake water level by up to 2.4 feet above the elevation of the existing weir to a water surface elevation of 62.5 feet NAVD88 (the same as described in the certified EIR). The storage capacity of College Lake is approximately 1,150 AF at a water surface elevation of 60.1 feet NAVD88 and approximately 1,800 AF at a water surface elevation of 62.5 feet NAVD88. Modified dimensions for the weir structure and intake pump station are shown in **Table 2-2**.

An approximately 60-foot-long hardscape (e.g., riprap or articulated concrete mat) transition would span the entire 55-foot-wide open channel at the northern and southern ends of the modified weir structure. The hardscape transition would be buried approximately 3 feet and the top of the hardscape transition would be flush with the final grade of the channel bottom. A screened intake would be constructed within the modified weir structure as described in the certified EIR. The Project would include a 30-inch diameter pipeline to convey the diverted surface water from the intake pump station to the WTP (refer to Figures 2-5a through 2-5f for the modified alignment of the pipeline and the location of the weir structure and intake pump station). The modified weir design will not change the water elevation in the certified EIR.

## Water Treatment Plant

The Project would include a WTP to remove sediment and disinfect the diverted surface water. The footprint of the WTP site, shown on **Figure 2-4**, would occupy approximately 4.3 acres on APN 051-101-47. Modified dimensions for the WTP are shown in Table 2-2.

The WTP would contain concrete-lined solids handling basins (lagoons), a ballasted flocculation/sedimentation process, a sodium hypochlorite disinfection system, and a treated water pump station. Solids coming from the ballasted flocculation/sedimentation process at the WTP would be sent to the solids lagoons for settling and drying. As the solids settle out of the water, the decant water from solids handling basins would be recycled to the start of the treatment process. Additional moisture from the solids would be removed via evaporation in the solids lagoons prior to off-haul of the solids to a landfill. As a backup to this process, diluted solids could be bled into the Salsipuedes Sanitary District sewer system, which discharges into the City of Watsonville Wastewater Treatment Facility, at flow rates to be approved by the Salsipuedes Sanitary District and the City of Watsonville to not exceed the existing sewer capacity. However, off-hauling of dried solids is assumed for normal process operations.




SOURCE: Carollo Engineers, 2021; ESA, 2021

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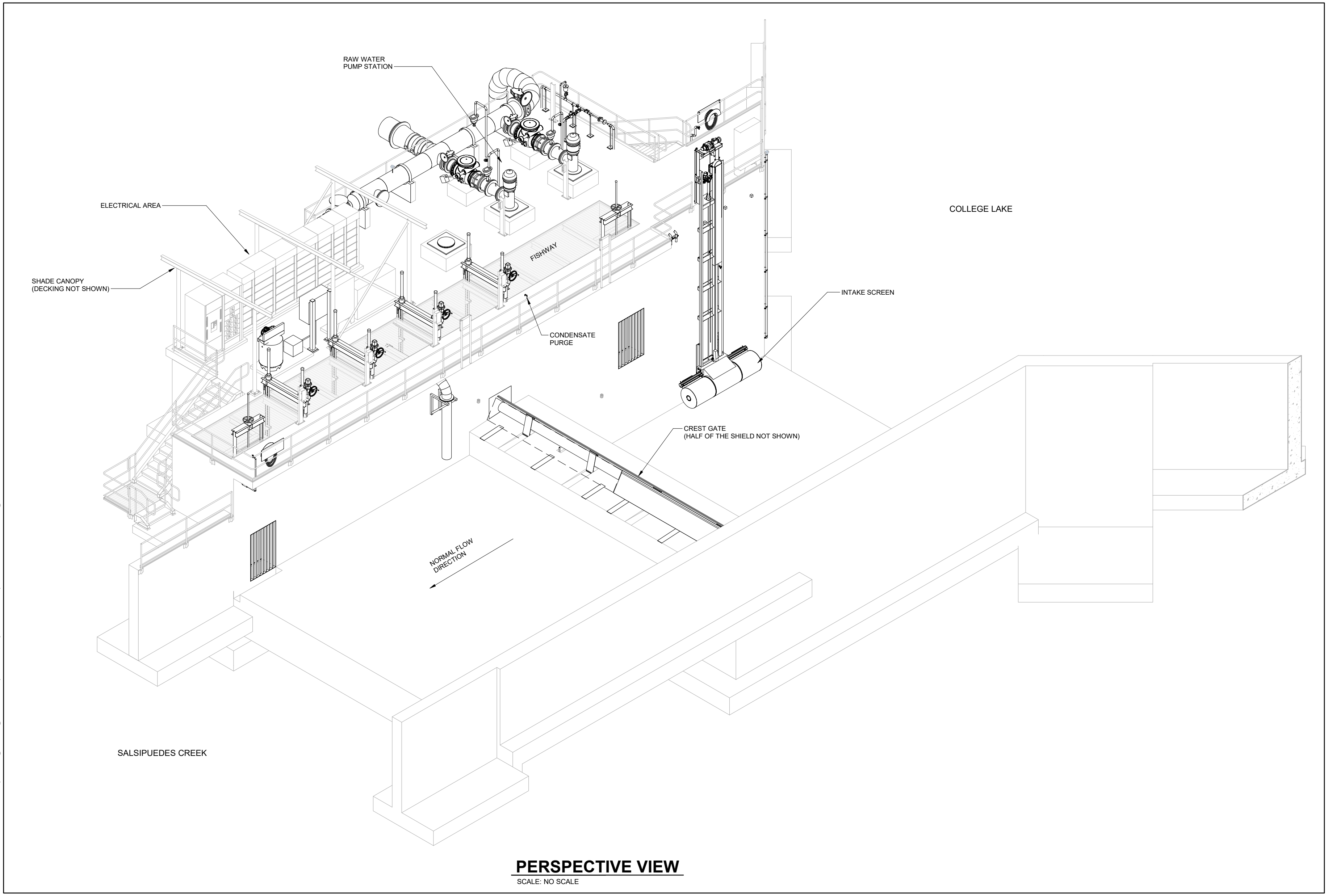
**Figure 2-2**
Modified Weir and Intake Pump Station

ESA




2020\D202000900.00 - Updating College Lake Pipeline Project\05 Graphics-GIS-Modeling/Illustrator

SOURCE: Carollo Engineers, 2021

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**Figure 2-3**
Modified Weir and Intake Pump Station – Perspective View

ESA

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

| Project Component | Approximate Dimensions (length x width; feet) | Maximum Depth of Excavation (feet) | Depth Below Finished Grade (feet)[a] | Depth Below Existing Grade (feet) | Height Above Finished Grade (feet) |
|---|---|---|---|---|---|
| **Diversion Weir and Intake Structure** | | | | | |
| Weir Structure | 122 x 95[b] | 21 | 5 | 3 | 2 to 24[c] |
| Intake Pump Station | 70 x 20 | 26 | 28 | 28 | 16[d] |
| **Water Treatment Plant** | | | | | |
| Ballasted Flocculation/Sedimentation Units (2) | 56 x 56 | 8 | 8 | 4 | 12 |
| Electrical/Treatment Support Building | 45 x 33 | Above grade | 2 | Above grade | 20 |
| Chemical Storage and Feed Facility | 53 x 45 | 2 | 7 | 3 | 13 |
| Chlorine Contact Basin for Local Users | 60 x 25 | 14 | 12 | 9 | 2 |
| Potential Future Ozone Building | 45 x 20 | Above grade | 2 | Above grade | 16 |
| Potential Future Ozone Contactor | 50 x 20 | 14 | 12 | 9 | 2 |
| Potential Future Liquid Oxygen and Evaporator | 40 x 30 | Above grade | 2 | Above grade | 18 |
| Local User Effluent Pump Station | 10 x 15 | 14 | 12 | 9 | 2 |
| Treated Water Pump Station | 33 x 21 | 17 | 19 | 16 | 10[d] |
| Surge Tank | 16 x 12 | 6 | 8 | 5 | 11 |
| Solids Handling Lagoons (includes Decant and Return Pumps) | 345 x 230 | 15 | 17 | 14 | 3 |

NOTES:
a Depths do not include pile foundations.
b Dimensions shown include the wing walls of the weir structure. The structure without the wing walls is approximately 100 feet by 55 feet for the main channel.
c The height of the proposed weir structure is measured from the lowest point in the existing channel which is at approximately 48 feet NAVD88.
d Includes the height of the pumps.

SOURCE: Carollo Engineers, Responses to Requests for Information, 2021


SOURCE: Carollo Engineers, 2021

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**Figure 2-4**
Modified Water Treatment Plant

2020\D202000900.00 - Updating College Lake Pipeline Project\05 Graphics-GIS-Modeling/Illustrator

ESA

Effluent from the ballasted flocculation/sedimentation process would be disinfected using sodium hypochlorite in the College Lake pipeline (described below in Section 2.5.6) and then conveyed to the CDS pipeline (or to local users, following cessation of seawater intrusion along the coast). The WTP would have a capacity up to about 13 million gallons per day. The site plan provides space for potential pretreatment with strainers and/or an ozonation treatment process which could be needed in the future if PV Water deems it appropriate in terms of meeting irrigation water quality goals, and a chlorine contact tank to provide disinfection for local users.

**Table 2-3** identifies the modified chemicals and quantities that would be stored and used at the WTP.

**TABLE 2-3**
**CHEMICAL USE AND STORAGE AT WATER TREATMENT PLANT**

| Chemical | Purpose | Form | Estimated Storage Quantity |
|---|---|---|---|
| Sodium hypochlorite | Disinfection | Liquid, 12.5% solution | 12,000 gallons |
| Coagulant | Coagulation | Liquid | 12,000 gallons |
| Polymer | Flocculant aid | Liquid | 1,000 gallons |
| High Purity Oxygen (if required) | Ozonation if required for removal of toxicity or inorganic compounds | Liquid Oxygen | 2,000 gallons |
| Hydrogen Peroxide (if required) | Advanced oxidation for removal of toxicity | Liquid | 1,600 gallons |
| Diesel Fuel | Standby generator | Liquid | 600 gallons |

SOURCE: Carollo Engineers, Responses to Requests for Information, 2021.

## Potable Water Well

A potable water well would be constructed on an approximately 300 square foot area of packed dirt east of the WTP and north of the existing house (refer to Figure 2-4). The well would extract water for use at the WTP (e.g., emergency showers and eyewash stations, lab sink, pump seal water, polymer dilution), the adjacent home that would become a field office for WTP operations, and to provide up to 1,000 acre-feet per year supplemental water to the CDS, ultimately replacing an equivalent amount of groundwater pumping in the coastal area. Reducing coastal groundwater production and shifting pumping inland is part of the strategy to eliminate seawater intrusion. The well would be approximately 300 to 400 feet deep and resemble existing wells in the area. Two pumps (approximately 7.5-horsepower and 200-horsepower) would extract the water and pipelines between 2- to 16-inches in diameter would convey water to the WTP and residence. Well construction would occur at the start of WTP construction prior to construction of other components and would take up to four days. Equipment would include a rotary drill rig and well installation could require continuous drilling. Permanent exterior security lighting is not proposed at the well site.

## College Lake Pipeline

As noted above, the College Lake pipeline has been moved closer to agricultural fields and generally outside of city streets to avoid disruption within the city of Watsonville. Refer to **Figures 2-5a** through **2-5f** for the modified College Lake pipeline. The modified College Lake pipeline would be an approximately 6-mile-long, 30-inch-diameter pipeline made of high-density polyethylene or Welded Steel Pipe from the WTP to the CDS and the RWF. As shown on Figures 2-5a through 2-5f, the College Lake pipeline route generally follows existing road rights-of-way, Salsipuedes Creek, and traverses agricultural fields. Segment E shown on Figure 2-5e includes a proposed 750-foot pipeline “lateral” that would cross under SR 129 and extend northwest to APN 018-341-25 to connect to an existing well.

# 2.3 Construction

## Construction Schedule, Hours, and Work Force

### Construction Schedule

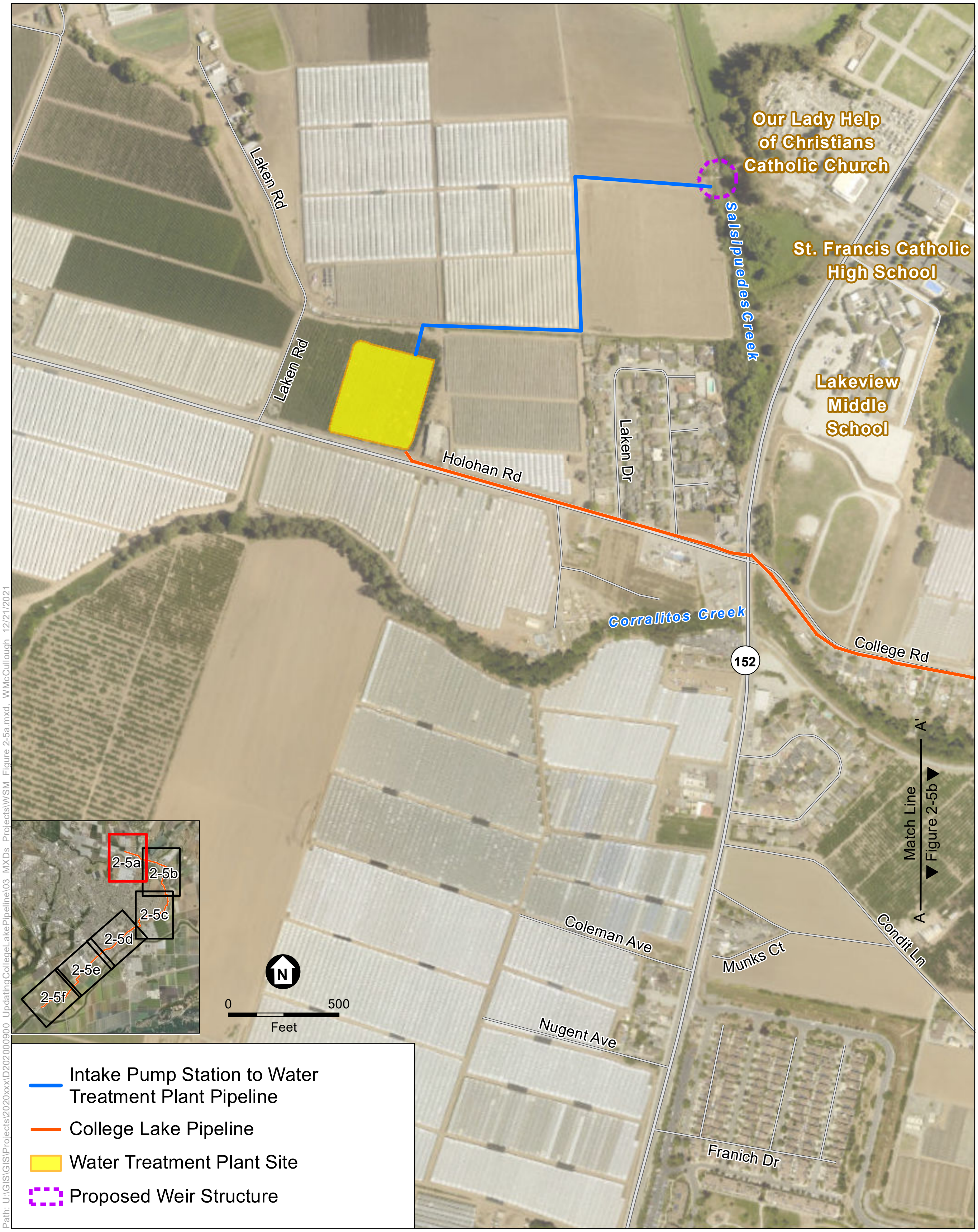
Construction is expected to last about 22 months and would be initiated following completion of environmental documentation pursuant to CEQA, issuance of permits, acquisition of property rights, and completion of design. For purposes of evaluation, it is assumed that construction would begin in 2023 and end in 2024. **Table 2-4** shows the currently anticipated construction schedule and duration of each activity.

### Construction Hours

Standard hours for construction activities generating noise would be 8:00 a.m. to 5:00 p.m., Monday through Saturday. Construction hours do not differ from those previously analyzed in the certified EIR, 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 p.m. to 6 p.m.). Exceptions to standard construction hours would include:

- ***Weir Structure and Intake Pump Station Construction.*** Given seasonal constraints on the construction of these Project components (no work would occur during the wet weather season) and the distance from sensitive receptors, standard construction hours for the proposed weir and intake pump station would be 7:00 a.m. to 7:00 p.m. seven days per week.
- ***Trenchless Pipeline Construction.*** Tunneling requires continuous excavation. Consequently, pipeline construction at the locations circled on Figures 2-5a through 2-5f could occur for up to 24 hours per day and several days in a row.
- ***Potable Water Well Construction.*** Well installation could require continuous drilling, which would occur 24 hours per day for approximately two days at the location shown on Figure 2-4.

The proposed hours of construction do not differ significantly from those discussed in the certified EIR. However, any changes proposed to the location of these activities from those previously analyzed are discussed in greater detail in Chapter 3, *Evaluation of Environmental Impacts*.




SOURCE: Jacobs, 2021; ESA, 2021

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**Figure 2-5a**
Pipeline Alignment

ESA


Path: U:\GIS\GIS\Projects\2020xxx\D202000900_UpdatingCollegeLakePipeline\03_MXDs_Projects\WSM_Figure 2-5b.mxd, WMcCullough 5/20/2022

SOURCE: Jacobs, 2021; ESA, 2021

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ESA

**Figure 2-5b**
Pipeline Alignment


Path: U:\GIS\GIS\Projects\2020xxx\D202000900_UpdatingCollegeLakePipeline\03_MXDs_Projects\WSM_Figure 2-5c.mxd, WMcCullough 12/21/2021

SOURCE: Jacobs, 2021; ESA, 2021

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**Figure 2-5c**
Pipeline Alignment

ESA


SOURCE: Jacobs, 2021; ESA, 2021

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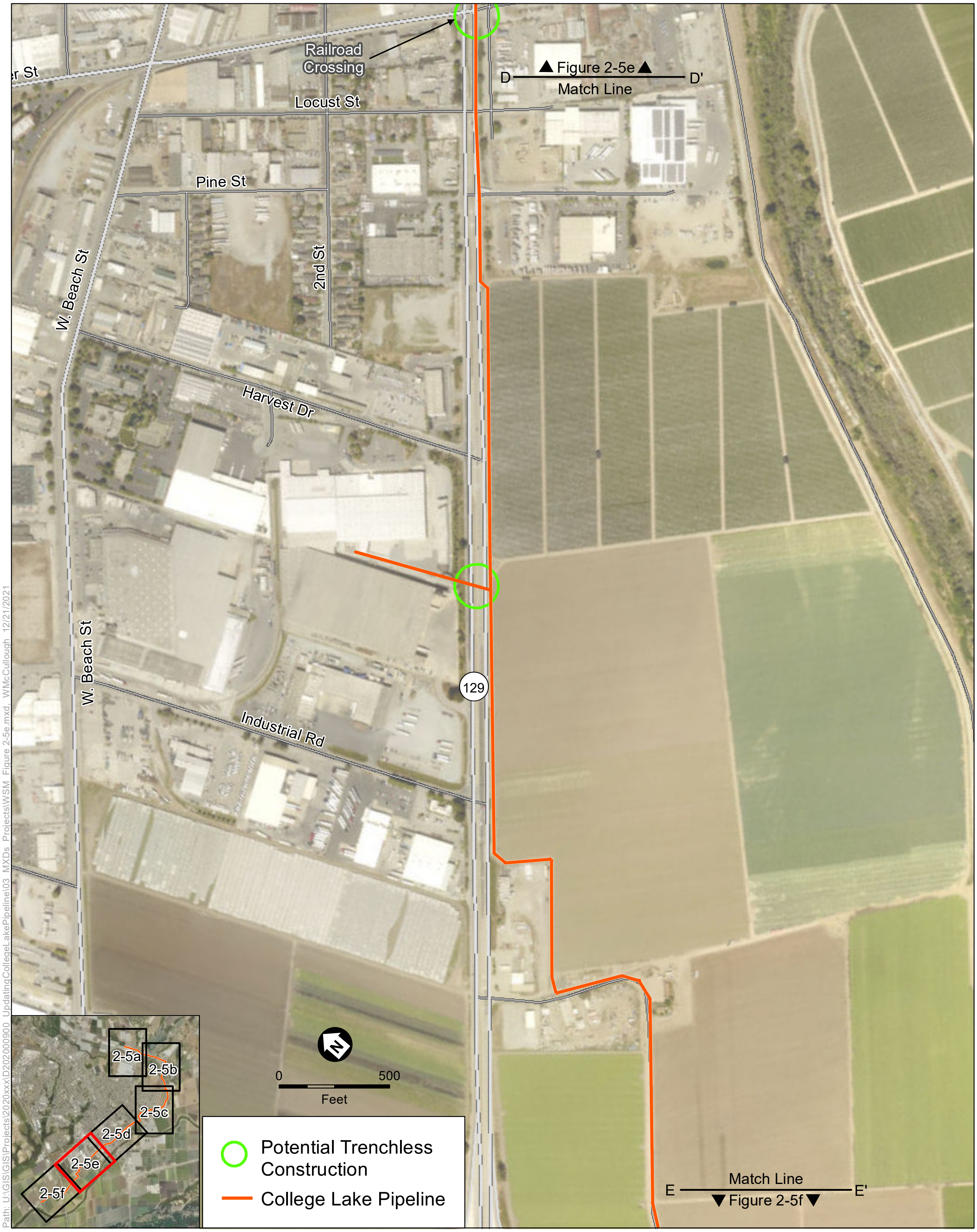
**Figure 2-5d**
Pipeline Alignment

ESA






SOURCE: Jacobs, 2021; ESA, 2021

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**Figure 2-5e**
Pipeline Alignment

ESA


SOURCE: Jacobs, 2021; ESA, 2021

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**Figure 2-5f**
Pipeline Alignment

ESA

**TABLE 2-4**
**APPROXIMATE CONSTRUCTION SCHEDULE**

| Project Component/Construction Phase | Expected Duration | Estimated Schedule |
|---|---|---|
| **College Lake Pipeline** | | |
| Pipeline Construction | 20 months | February 2023 – October 2024 |
| **Water Treatment Plant** | | |
| Mobilization | 1 month | April 2023 |
| Rough Grading | 2 months | May 2023 – June 2023 |
| Pile Driving | 3 months | June 2023 – August 2023 |
| Concrete Work | 12 months | July 2023 – July 2024 |
| Mechanical Equipment installation | 9 months | Oct 2023 – June 2024 |
| Pre-Commissioning | 0.5 month | July 2024 |
| **Weir Structure and Intake Pump Station** | | |
| Mobilization | 2 weeks | May 2023 |
| Clearing and Grubbing | 1 week | June 2023 |
| Demolition of Existing Weir Structure and Pump Station | 2 weeks | June 2023 – July 2023 |
| Installation of Shoring | 3 weeks | June 2023 – July 2023 |
| Dewatering and Excavation | 1 week | June 2023 – July 2023 |
| Install Lightweight Fill Material | 1 week | July 2023 |
| Concrete Work | 5 months[a] | July 2023 – November 2023 |
| Removal of shoring | 2 weeks | November 2023 |
| Mechanical Equipment Installation | 9 months | Nov 2023 – July 2024 |
| Pre-Commissioning | 0.5 month | July 2024 |
| **System Commissioning** | | |
| Intake and Treatment Process Startup and Testing | 1 month | August 2024 |
| Begin Delivery of Treated Water | NA | August 2024 - September 2024 |
| Punchlist | 1 month | September 2024 |
| Contractor Demobilization | 1 month | October 2024 |

NOTES:

[a] The construction site would be winterized and no work would occur within the Salsipuedes Creek channel between November 2023 and May 2024. Construction of upland parts of the intake pump station and mechanical equipment installation could occur during this time as they would be out of the creek channel.

SOURCE: Carollo Engineers and Jacobs, Responses to Requests for Information, 2021.

### Construction Workforce and Equipment

**Table 2-5** identifies the workforce as well as the construction equipment associated with the various Project components. Between 5 to 26 workers would be working at a construction site at any given time.

## 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 weir structure and intake pump station would occur within an approximately 1-acre area surrounding the facilities (refer to Figure 2-2). Construction staging and laydown for the proposed WTP would occur within an approximately 1.5-acre area adjacent to the WTP site (refer to Figure 2-4); a construction disturbance area (e.g., to accommodate heavy equipment movement for site grading) would also occur within the existing apple orchard site boundary. Staging and laydown for pipeline construction would occur primarily within the width of the construction corridor and along the pipeline route. Additional potential staging and laydown areas for pipeline construction could occur at APN 051-741-05 near Lakeview Drive and 017-231-11 near 1st Street and Sakata Lane.

## 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 Project component. Excess excavated material generated during Project construction of each component would be off-hauled to Buena Vista Landfill, to an appropriate recycling facility, or to local land under cultivation. Due to changes in design, excavation soil volumes have increased compared to those in the certified EIR.

## Construction Activities

Construction traffic routing, demolition of the existing weir, and construction of the weir structure and WTP would generally occur as described in EIR Section 2.6, Construction.

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

| Project Component | Approximate Average Daily Work Force | Construction Equipment | |
|---|---|---|---|
| Weir Structure and Intake Pump Station | 18 | • Excavator (2)<br>• Concrete delivery trucks (1)<br>• Back Hoe/Track Hoe (1)<br>• Fork Lifts (2)<br>• Sheet Pile Driver (1) | • Crane (1)<br>• Pumps (4)<br>• Generator Set (1)<br>• Wiring Pulling Machine (1)<br>• Air Compressor (1) |
| Water Treatment Plant | 26 | • Excavator (2)<br>• Concrete delivery trucks (1.9)<br>• Dozers or Scrapers (2)<br>• Skip Loader (1)<br>• Back Hoe/Track Hoe (2)<br>• Fork Lifts (2)<br>• Crane (1)<br>• Pile Driving Equipment (1) | • Scissor Lift (1)<br>• Pumps (8)<br>• Air Compressor (4)<br>• Water Truck (1)<br>• Generator Set (2)<br>• Asphalt/Paver Truck (1)<br>• Wiring Pulling Machine (2)<br>• Rotary Drill Rig (1) |
| College Lake Pipeline and Pipeline from Weir Structure to Water Treatment Plant | 11 | • Excavator (1)<br>• Skip Loader (1)<br>• Back Hoe/Track Hoe (2)<br>• Fork Lifts (1)<br>• Plate Compactor (2)<br>• Pumps (2) | • Air Compressor (1)<br>• Water Truck (1)<br>• Generator Set (1)<br>• Concrete Saw (1)<br>• Asphalt/Paver Truck (1)<br>• Sweepers/ Scrubbers (1) |
| Trenchless Pipeline Installation | 5 | • Mud Pump (1)<br>• Drilling Rig (1)<br>• Excavator (1)<br>• Crane (1) | • Backhoe (2)<br>• Drill Fluid Treatment System (1)<br>• Sheet Pile Driver (1) |

SOURCE: Carollo Engineers and Jacobs, Responses to Requests for Information, 2021.

**TABLE 2-6**
**EXCAVATION SOIL VOLUMES**

| Project Component | Approximate Excavation Soil Volume (cubic yards) | Bulking Factor[a] | Approximate Excavated Soil to be Reused as Fill (cubic yards) | Approximate Excess Spoils to be Hauled Away (cubic yards) |
|---|---|---|---|---|
| Weir Structure and Intake Pump Station | 8,600 | 30% | 0 | 11,180 |
| Water Treatment Plant Site | 28,000 | | 11,000 | 22,100 |
| Pipeline from Weir Structure to Water Treatment Plant | 3,000 | | 2,000 | 1,300 |
| College Lake Pipeline (East of State Route 1) | 60,500[b] | N/A | 38,500 | 22,000 |
| College Lake Pipeline (West of State Route 1) | 6,100[b] | | 3,800 | 2,300 |
| | | | **Total Excess Soils** | **58,880** |

NOTES:
a The bulking factor is the measure of change in volume of a material from when it is excavated to when it is deposited.
b Includes a 10 percent bulking factor.

SOURCE: Carollo Engineers and Jacobs, Responses to Requests for Information, 2021.

## Shoring and Dewatering

The certified EIR indicates that the existing weir would be used as a coffer dam to isolate the weir construction area from drainage from the lake. PV Water instead proposes to demolish the existing weir and install shoring (interlocking sheetpiling) around the entire weir construction area. The shoring would be installed using vibratory piles and would be approximately 10 feet away from the proposed weir structure components (refer to Figure 2-2). The sheet piling could extend up to 45 feet below ground surface and would extend approximately 3 feet above ground surface.

A low spot in the lake at the northern limit of the proposed rip rap would be excavated to a depth sufficient to accommodate a dewatering pump (estimated to be 4 feet). Water collected at this point would be pumped around the construction area. Water collected within the construction area (from groundwater or rainwater) would also be pumped, as described in the certified EIR, and discharged to agricultural lands, storm drains, or other waterways. The discharges would be 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.

## Compensatory Mitigation Plan

Consistent with adopted Mitigation Measure BIO-1c, PV Water has developed and will implement as part of the Project a Compensatory Mitigation Plan (CMP; included as **Appendix CMP**). The CMP describes how PV Water will fulfill mitigation requirements of the Clean Water Act (CWA) Section 404 Permit, the CWA Section 401 Water Quality Certification for the Project (as well as Mitigation Measure BIO-1c), and the Lake and Streambed Alteration Agreement requirement for replacement tree plantings. The CMP provides details for revegetating seasonal wetland and riparian forest understory habitat along Salsipuedes Creek that would be temporarily impacted during the demolition of the existing weir and pump station and construction of the new weir structure, pump station, and associate infrastructure along the creek. The restoration area where red willow stakes would be planted to offset the loss of trees near the weir structure and intake pump station would likely be located within the northeast corner of APN 051-441-11, and direct permanent loss of seasonal wetlands and riparian wetlands would be compensated for by purchase of wetland credits from a mitigation bank in the Pajaro River watershed.

In addition to trees mentioned above, the orchard trees within APN 051-101-47 would be removed for construction of the WTP.

## Pipeline Installation

### *Open Trench Pipeline Installation*

As indicated in EIR Section 2.6.6, the construction method for installation of the pipelines (i.e., the pipeline connecting the intake pump station at the proposed weir structure to the WTP and the College Lake pipeline) would depend on location. Conventional open-trench construction techniques would be used for installation of pipelines in existing roadways and agricultural fields.

As described in the certified EIR at Section 2.6.6, under typical circumstances in urban areas, the width of the disturbance corridor for pipeline construction would be approximately 20 feet. One full lane width and shoulder (or parking lane) closure would be required, with alternating one-way traffic control on two-lane roads. No full road closures are anticipated. For open-trench pipeline construction in agricultural fields, a 20-foot-wide permanent easement with 40-foot-wide temporary construction corridor generally would be used to facilitate construction and movement of equipment, where possible.

Open trench installation would occur as indicated in the certified EIR at Section 2.6.6.1. The minimum depth of cover above the pipeline in agricultural fields is expected to 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 minimum depth of cover above the pipeline in public right of way areas is expected to be 36 inches in Santa Cruz County easements and 42 inches in Caltrans easements, with deeper cover as needed pending utility crossings.

### *Trenchless Pipeline Installation*

Crossings of several surface features (creeks and other drainages, railroads, and state highways) would require trenchless construction; these locations are shown on Figures 2-5a through 2-5f and identified in **Table 2-7**. Trenchless construction would involve the jack and bore method (also referred to as auger boring) described in the certified EIR at Section 2.6.6.2. Groundwater levels in jack and bore excavation areas would be measured prior to construction to help determine the extent of dewatering required. Soil removed from pits would either be stockpiled and reused or loaded directly into dump trucks and hauled away for disposal. If existing soil is not adequate for backfilling, then new material would be imported for backfilling. The minimum depth of cover above the pipe casing would differ at each trenchless location and would be approximately 10 feet in Caltrans roadways, 5.5 feet at the railroad crossing, and 15 feet at Salsipuedes Creek.

**TABLE 2-7**
**COLLEGE LAKE PIPELINE CONSTRUCTION DETAILS**

| Segment[a] | General Location | Location in Public Streets[b] | From | To | Length (ft.) | Construction Method | Estimated Average Production Rate (linear ft./day)[c] |
|---|---|---|---|---|---|---|---|
| A | Unincorporated Santa Cruz County - Located within public right of way | Holohan Road<br>College Road | Proposed WTP | College Road (west of Anderson Drive) | 2,700 | Open Trench | 100 |
| B | Unincorporated Santa Cruz County – Located within agricultural fields and within public right of way | College Road<br>Lakeview Drive | College Road (west of Anderson Drive) | Lakeview Drive (south of 142 Lakeview Drive) | 6,170 | Open Trench | 100-250 |
| C | Unincorporated Santa Cruz County – Located within agricultural fields and within public right of way | Lakeview Drive<br>State Route 129<br>Riverside Road | Lakeview Drive (south of 142 Lakeview Drive) | Riverside Drive (south of 33 Riverside Drive) | 6,600 | Open Trench | 100-250 |
| D | City of Watsonville – Located within public right of way | State Route 129<br>East Riverside Drive | Riverside Drive (south of 33 Riverside Drive) | Railroad Crossing | 5,300 | Open Trench<br>Trenchless at Salsipuedes Creek Crossing, State Route 129 Crossing, Grove Street Crossing, Railroad Crossing | 100 |
| E | City of Watsonville/Unincorporated Santa Cruz County – Located within agricultural fields and public right of way | State Route 129<br>West Riverside Drive<br>Judd Road | Railroad Crossing | Judd Road | 6,830[d] | Open Trench<br>Trenchless at State Route 129 Crossing for the well connection | 100-250 |
| F | Unincorporated Santa Cruz County – Located within agricultural fields and public right of way | Judd Road<br>Lee Road | Judd Road | PV Water CDS/Recycled Water Facility | 4,570 | Open Trench, Trenchless at State Route 1 Crossing | 100-250 |
| Flushing, Pressure Testing, Chlorination | Entire Pipeline | | | | | N/A | N/A |
| Approximate Final Paving | | | | | 11,500 | Paving | 500 |
| | | | | Total | **32,170** | | |

NOTES:
a Please refer to Figures 2-5a through 2-5f for segment locations. Segments A through F identified in Table 2-7 correspond with the figure letter on Figure 2-5 (i.e., Figure 2-5a depicts Segment A, etc.).
b Includes longitudinal encroachments in streets; does not include streets crossing alignment.
c The production rate is subject to variation due to site conditions (access, existing utilities, and traffic control requirements).
d The length of segment E includes the well connection off of the main College Lake pipeline alignment.

SOURCE: Jacobs, Responses to Requests for Information, 2021

## Site Cleanup and Restoration

Project construction activities would result in up to approximately 20.3 acres of ground disturbance (refer to **Table 2-8**, below). After construction, undeveloped areas and agricultural fields used 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 (square feet) | Approximate Area (acres) |
|---|---|---|
| Weir Structure and Intake Pump Station | 87,000 | 2.0 |
| Water Treatment Plant | 370,000 | 8.5 |
| Connection from Weir Structure to Water Treatment Plant | 25,000 | 0.6 |
| College Lake Pipeline | 400,000 | 9.2 |
| **Total Disturbance Area**[a] | **882,000** | **20.3** |

NOTES:
[a] Totals may not add due to rounding.

SOURCE: Carollo Engineers, Responses to Requests for Information, 2021.

# 2.4 Operations and Maintenance

Operations and maintenance activities under the modified Project would be the same as those described in the certified EIR at Section 2.7, Operations and Maintenance. The certified EIR incorrectly indicates that the water treatment process would generate approximately 200,000 pounds of solids annually. Approximately 600,000 pounds of solids would be generated from the water treatment process annually. However, the certified EIR correctly indicated that 52 truck trips per year would be required to off-haul solids from the WTP. Routine maintenance activities within College Lake would generate an estimated 11,500 cubic yards of debris and approximately 1,300 truck trips per year. As indicated in the certified EIR, operations sediment and debris would be hauled to the Buena Vista Landfill for recycling or disposal.

While the entire orchard within APN 051-101-47 would be removed during construction of the WTP as described above, the areas west of the WTP would remain agricultural land once the Project is operational. Landscaping would be planted along Holohan Road in front of the WTP.

## Adaptive Management Plan

Consistent with adopted Mitigation Measures BIO-2i and HYD-2, PV Water has developed and will implement as part of the Project the *College Lake Integrated Resources Management Project Adaptive Management Plan 2022* (AMP; refer to **Appendix AMP**). Following initial engagement with regulatory agencies, the AMP was developed in conjunction with a series of meetings of the Ad Hoc Adaptive Management Plan Committee (Committee) formed by PV Water to solicit stakeholder input through a transparent and inclusive process. During these meetings, which occurred in 2021, key AMP content was discussed, and Committee members provided input and made recommendations. The Committee was supported by PV Water staff and consultants, including technical experts in fisheries, terrestrial wildlife, botany and wetlands, and hydrology. The AMP was adopted by the PV Water Board of Directors on January 20, 2022 and includes ten primary objectives: fish passage, water storage, flooding, farming, vegetation, waterfowl, water quality, invasive animal species, cultural resources, and research.

For each objective, the AMP provides metrics, action thresholds, and potential management actions. For the fish passage and invasive animal species objectives, PV Water developed the following plans as part of the AMP that would be implemented as part of the Project to detail how metrics will be monitored.

- ***Steelhead Monitoring Plan:*** The South-Central California Coast steelhead monitoring plan for the Project was developed in coordination with NMFS and CDFW. Implementation of the plan would include the following monitoring activities: (1) juvenile steelhead population surveys and passive integrated transponder (PIT) tagging in the Casserly Creek watershed; (2) operation of PIT-tag detection arrays at the College Lake weir structure; (3) steelhead outmigrant trapping at the weir; (4) fish passage efficiency evaluations at and downstream of the weir in Salsipuedes Creek. The proposed Steelhead Monitoring Plan is included as Appendix C in Appendix AMP.

- ***Invasive Species Management Plan:*** The Invasive Species Management Plan for the Project was also developed in coordination with NMFS and CDFW. Implementation of the management plan will include draining of the lake as well as direct removal of invasive species through application of standard methods such as seining, dip-netting, and electrofishing. The proposed Invasive Species Management Plan is included as Appendix D in Appendix AMP.

## 2.5 Required Actions and Approvals

PV Water would continue to conduct the necessary studies and consultations to obtain the permits and approvals shown in the certified EIR at Table 2-10.

## 2.6 Status of Reclamation District 2049

The Local Agency Formation Commission of Santa Cruz County (LAFCO) is a state agency that oversees the governance of cities and special districts and how those local agencies provide public services to their residents. LAFCO hosted a workshop in June 2022 to consider the dissolution of Reclamation District (RD) 2049, which currently operates the existing weir and associated pump station as described in certified EIR Section 2.1.4. The District Counsel has suggested that a written agreement be made between RD 2049 and PV Water prior to the dissolution of the reclamation district. The agreement would make the transfer of RD 2049's assets contingent upon and concurrent with PV Water's purchase of easements and/or fee titles to the properties in the College Lake bottom necessary for the College Lake Project to use the lake basin for water storage. This matter does not materially affect the scope or contents of this Addendum.

# CHAPTER 3
# Evaluation of Environmental Impacts

The evaluations made in the certified Environmental Impact Report (EIR) were revisited to determine whether any changes to the analyses were warranted based on refinements to the College Lake Integrated Resources Management Project (Project). This chapter describes any changes that have occurred in the existing environmental conditions within and near the Project area as well as environmental impacts associated with the modified Project. The analysis includes consideration of the mitigation measures adopted for the Project as part of the Mitigation Monitoring and Reporting Program (MMRP). Chapter 5, *Mitigation Monitoring and Reporting Program,* contains the mitigation measures from the adopted MMRP that apply to the Project.

The topics listed below were sufficiently addressed in the EIR and required no additional analysis because either the nature, scale, and timing of the Project has not changed in ways relevant to the topic or there has not been a substantial change in the circumstances involving the topic on the Project site, nor in the local environment surrounding the site.

- **Geology and Soils.** The College Lake pipeline would remain in the same geologic unit as the previous alignment (flood plain deposits, Qfl), with a small portion on College Road and Lakeview Road crossing throughWatsonville terrace deposits (Qtw; refer to EIR Figure 3.6-2). Additionally, the weir and intake pump station, water treatment plant (WTP), and northern portion of the College Lake pipeline would remain in the Zayante-Vergeles Fault Zone (refer to EIR Figure 3.6-1). Consistent with Mitigation Measures GS-1 and GS-3, Project components have been further designed based on recommendations from a geotechnical report prepared by Fugro.[1] Consistent with Mitigation Measure GS-2, the contractor will be required to prepare and implement erosion control plans and otherwise comply with permit conditions and approvals from resource agencies. For these reasons, the Project changes are not expected to result in any new significant impacts or substantially more adverse impacts related to geology and soils than those discussed in the certified EIR.

- **Transportation and Traffic.** Because the location of the components and amount of construction and operational truck trips have not changed, transportation impacts related to the weir structure, intake pump station, and WTP would remain the same as those described in the certified EIR at Section 3.9. While the alignment of the College Lake pipeline has changed and would be within different roads than previously analyzed, no full road closures are anticipated and construction activities would be the same as described in the certified EIR. Additionally, the pipeline would pass fewer schools and would be installed in fewer streets than the previous alignment. Pipeline construction would be temporary in nature due to the pipeline being constructed at a rate of 100 to 250 feet per day. With implementation of adopted Mitigation Measures TRA-1a and TRA-1b, which will require compliance with local

[1] Fugro, Geotechnical Investigation Report, PV Water, College Lake Integrated Resources Mangement Project Water Treatment Plant and Intake Facilities.

road encroachment permit conditions, preparation of a Traffic Control Plan, identification of roadways that require special construction techniques, development of a circulation and detour plan, and consultation with local transit service providers, potential impacts would be mitigated to less-than-significant levels. Therefore, Project changes are not expected to result in any new significant impacts or substantially more adverse impacts related to transportation and traffic. Refer to Section 3.4, Hazards and Hazardous Materials for a discussion related to emergency access.

- **Tribal Cultural Resources.** No tribal cultural resources as defined in Public Resources Code Section 21074 were identified to be present within the Project area. Therefore, Project changes are not expected to result in any new significant impacts or substantially more adverse impacts related to tribal cultural resources.

- **Energy, Utilities, Public Services, and Recreation.** The nature of the Project with respect to population growth and impairment of achieving service performance objectives, wastewater collection and treatment, water use, and solid waste disposal has not changed. Additionally, projected energy use associated with the Project has not changed. A portion of the College Lake pipeline would cross the levee trail along Salsipuedes Creek, but would be installed via trenchless pipeline construction, and is therefore not expected to impact use of the trails. For these reasons, the Project changes are not expected to result in any new significant impacts or substantially more adverse impacts related to energy, utilities, public services, and recreation than those previously analyzed in the certified EIR.

- **Aesthetic Resources.** Even with design changes, the visual character of the weir structure, intake pump station, and WTP would remain the same as described in the certified EIR. While the entire apple orchard would be removed from the WTP site, the western portion of the site would still be used for row crops once construction is complete. Additionally, the footprint of the structure would be smaller than previously analyzed, and landscaping and natural design elements will be implemented consistent with adopted Mitigation Measures AES-1a and AES-1b to reduce visual impacts. There would be no changes in visual impacts at College Lake, and design changes at the weir structure and intake pump station would be minimal enough to not be noticed from distant views of the site due to existing vegetation, site topography, existing agricultural practices, and screening provided by the Orchard Park residential development. While the alignment of the College Lake pipeline has shifted, construction activities would be the same as described in the certified EIR, progressing at about 100 feet per day in urban areas and 250 feet per day through farm fields (refer to Figures 2-5a through 2-5f for the location of the pipeline). The equipment used would still be similar to or smaller in scale than equipment used regularly in the Project area, and the pipeline would not be visible once constructed. For these reasons, Project changes are not expected to result in any new significant impacts or substantially more adverse impacts related to aesthetics than those analyzed in the certified EIR.

- **Surface Water, Groundwater, and Water Quality.** Because changes in the Project do not substantially change construction in or near surface water or proposed operations of College Lake, the changes would not create a new significant impact or substantially increase the severity of an impact related to surface water, groundwater, or water quality disclosed in the certified EIR. As described in Section 2.2, one proposed modification to the Project is construction and operation of a potable water well at the WTP site. The well would extract water for use at the WTP and a field office, and provide up to 1,000 acre-feet per year of supplemental water to the Coastal Distribution System (CDS). Operation of the proposed potable water well would result in a net positive effect on the groundwater basin by shifting pumping approximately 6 miles inland. As described in certified EIR Section 2.1 and 2.3, seawater intrusion has caused chloride contamination of groundwater wells up to two and a half miles inland. Monitoring of chloride concentrations in the intruded areas has shown that implementation of Basin Management Plan projects, including PV Water's existing supplemental wells, has decreased the rate of progression of seawater intrusion (refer to certified EIR Figure 2-6). Operation of the potable water well would ultimately replace an equivalent amount of groundwater pumping in the intruded area, helping eliminate seawater intrusion. Construction and operation of the proposed potable water well would therefore not substantially decrease groundwater supplies (or interfere substantially with groundwater recharge) such that the Project may impede sustainable groundwater management of the basin. All of the mitigation measures adopted by PV Water for surface water, groundwater, and water quality impacts will be implemented as outlined in the adopted MMRP.

- **Cumulative Projects.** ESA reviewed City of Watsonville, County of Santa Cruz, and Caltrans websites regarding additional projects that may be implemented in the vicinity of the Project sites which could contribute to cumulative impacts. The City of Watsonville's Bridge Street Reconstruction Project was not identified in EIR Table 3.1-1 and may be constructed at the same time as the Project. The project includes reconstruction of the Bridge Street roadway between Blackburn Street and Beck Street, including the two intersections, and replacement of select pedestrian faciltities in the area.[2] The southern portion of the project would be adjacent to the trenchless crossings at Salsipuedes Creek and State Route (SR) 129 (refer to Figure 2-5d). PV Water or its designee would coordinate with the City of Watsonville to avoid constructing the two trenchless crossings of the College Lake pipeline at the same time that the Bridge Street Reconstruction Project is taking place to avoid cumulative impacts related to air quality, traffic, noise, and aesthetics. By doing so, there would be no additional cumulative impacts beyond those described in the certified EIR.

Changes and additions to the certified EIR discussion of the remaining topics are included below, pursuant to CEQA Guidelines Section 15164. The following discussion describes the environmental impacts of the Project as compared to the impacts of the approved Project as addressed in the EIR certified in October 2019. These additions do not reflect involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects; for these reasons, a subsequent EIR was not prepared.

2 Personal correspondence between M. Fontes (City of Watonsville) and K. Hein (Jacobs) regarding City of Watsonville projects. June 23, 2022.

# 3.1 Land Use and Agricultural Resources

| *Issues (and Supporting Information Sources):* | *Potentially Significant Effects Not Identified in Prior EIR* | *Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR* | *No New or More Severe Significant Effects* |
|---|---|---|---|
| **CHECKLIST 3.1, LAND USE AND AGRICULTURAL RESOURCES — Would the Project:** | | | |
| a) 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? | ☐ | ☐ | ☒ |
| b) Conflict with existing zoning for agricultural use, or a Williamson Act contract? | ☐ | ☐ | ☒ |
| c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))? | ☐ | ☐ | ☒ |
| d) Result in the loss of forest land or conversion of forest land to non-forest use? | ☐ | ☐ | ☒ |
| e) 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? | ☐ | ☐ | ☒ |
| f) Physically divide an established community? | ☐ | ☐ | ☒ |
| g) 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? | ☐ | ☐ | ☒ |

## Setting

The setting related to land use and agricultural resources remains generally the same as that described in the certified EIR at Section 3.2.1 and summarized here. College Lake and the proposed locations for the weir structure, intake pump station, and WTP sites would still be located in unincorporated Santa Cruz County; the College Lake pipeline would extend through areas of unincorporated Santa Cruz County and portions of the City of Watsonville (refer to Figure 2-1 in Chapter 2, *Project Description*). Refer to **Table 3.1-1** and **Figure 3.1-1** for land uses within and adjacent to the College Lake pipeline alignment. Agriculture is the predominant land use in the Project area outside of the City of Watsonville. 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 residences 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. Rural residential development is also present in inland foothill areas. Commercial uses, schools, and parks are also concentrated in the City of Watsonville.

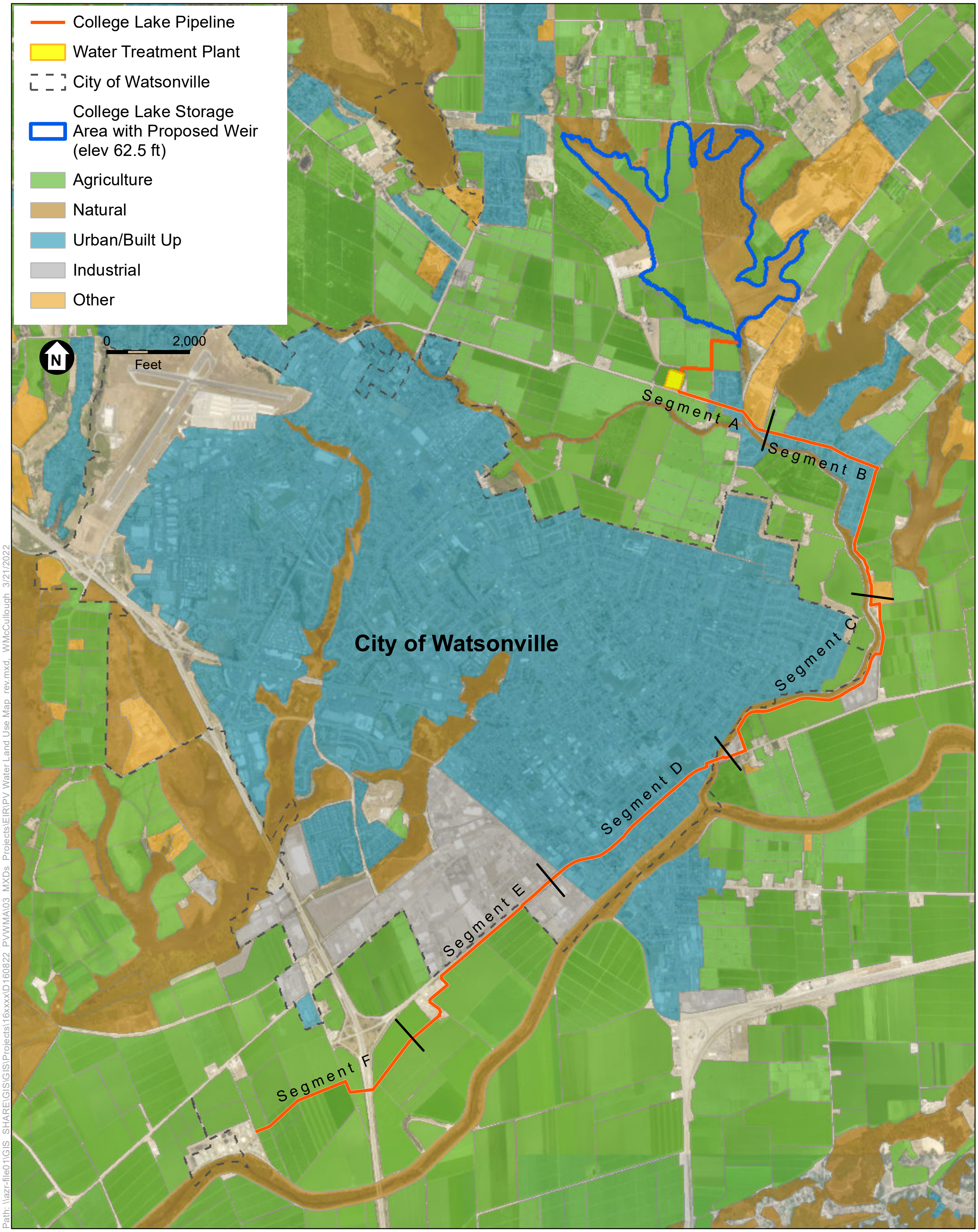
**TABLE 3.1-1**
**LAND USES WITHIN AND ADJACENT TO THE COLLEGE LAKE PIPELINE ALIGNMENT**

| Segment[a] | General Location of Alignment | From | To | Length (feet) | Land Uses | |
|---|---|---|---|---|---|---|
| | | | | | Within Alignment | Adjacent to Alignment |
| A | Unincorporated Santa Cruz County | Proposed WTP | College Road (west of Anderson Drive) | 2,700 | Agriculture, Urban/built up, Public streets | Agriculture, Urban/built up |
| B | Unincorporated Santa Cruz County | College Road (west of Anderson Drive) | Lakeview Drive (south of 142 Lakeview Drive) | 6,170 | Agriculture, Public streets | Agriculture, Urban/built up, Other |
| C | Unincorporated Santa Cruz County | Lakeview Drive (south of 142 Lakeview Drive) | Riverside Drive (south of 33 Riverside Drive) | 6,600 | Agriculture, Industrial, Public streets | Agriculture, Industrial, Natural |
| D | City of Watsonville | Riverside Drive (south of 33 Riverside Drive) | Railroad Crossing | 5,300 | Industrial, Natural (Salsipuedes Creek crossing), Urban/built up, Public streets | Industrial, Natural, Urban/built up, Public streets |
| E | City of Watsonville/Unincorporated Santa Cruz County | Railroad Crossing | Judd Road | 6,830[d] | Agriculture, Other, Public streets | Agriculture, Urban/built up, Other |
| F | Unincorporated Santa Cruz County | Judd Road | PV Water CDS/Recycled Water Facility | 4,570 | Agriculture, Crosses Public street (State Route 1) | Agriculture |

NOTES:

[a] Please refer to Figure 3.1-1 and Figures 2-5a through 2-5f for segment locations.

SOURCE: California Department of Conservation, GIS data, 2018.




Path: \\azr-file01\GIS_SHARE\GIS\GIS\Projects\16xxxx\D160822_PVWMA\03_MXDs_Projects\EIR\PV Water Land Use Map_rev.mxd, WMcCullough 3/21/2022

SOURCE: Pajaro Valley Water Management Agency, 2017; G. Kittleson, 2017; ESA, 2022

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**Figure 3.1-1**
Land Use in the Project Area

ESA

## Findings of Previously Certified EIR

The certified EIR determined that Project impacts related to land use and agricultural resources would be less than significant or significant and unavoidable with mitigation. Chapter 5, *Mitigation Monitoring and Reporting Program*, reproduces adopted mitigation measures applicable to land use and agricultural resources impacts from the Project.

## Discussion

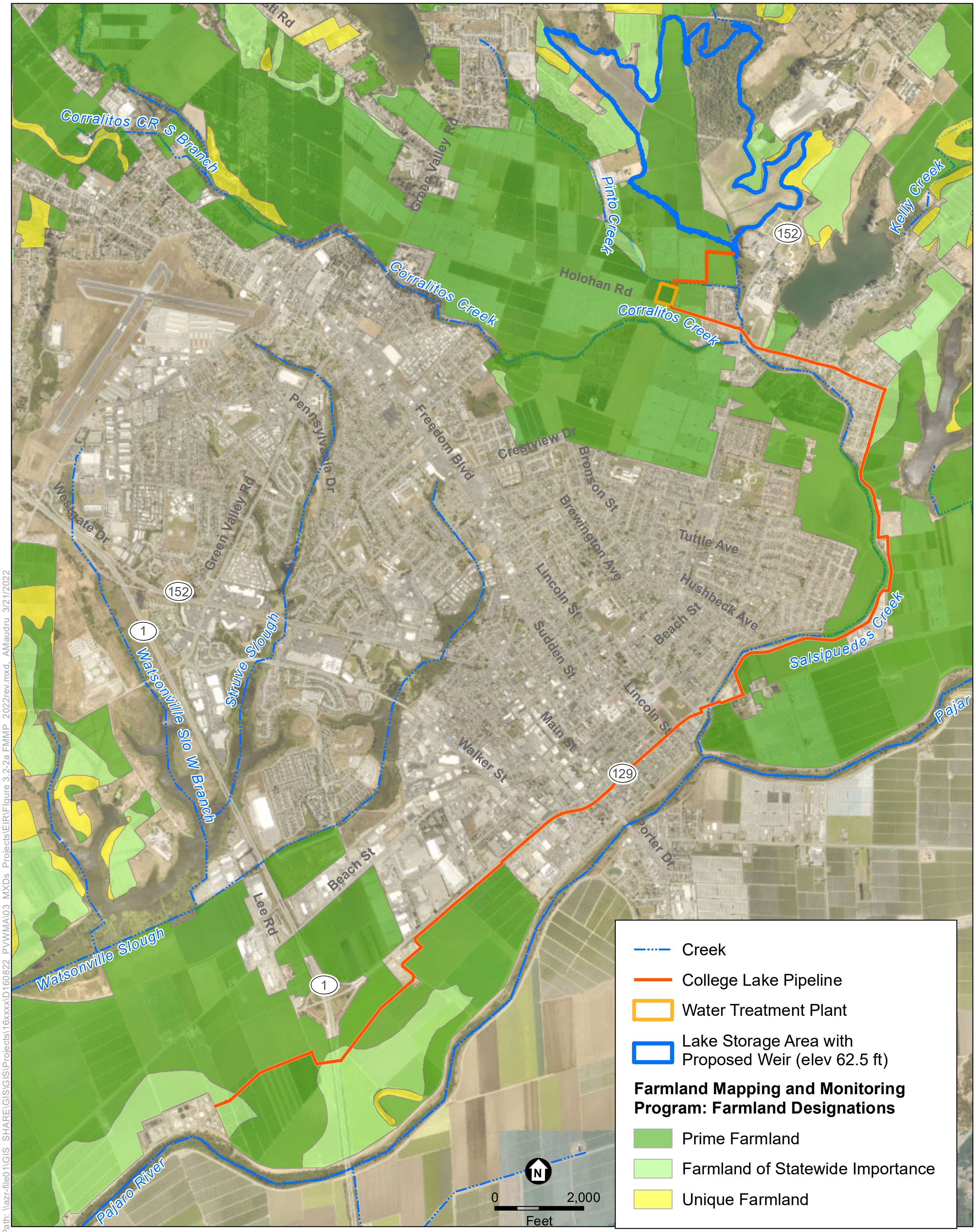
Below is a discussion of the modified Project as compared to the Land Use and Agricultural Resources issues summarized in Checklist 3.1 above and as analyzed in the certified EIR. The following issues were not analyzed for reasons described in the certified EIR at Section 3.2.3.1: Conflict with existing zoning for agricultural use (b); conflict with existing zoning for forest land, loss of forest land, or conversion of forest land to non-forest use (c, d, and e with respect to forest land); and physically divide an established community (f). Changes in the Project would not conflict with the reasoning on Draft EIR page 3.2-14; therefore, these criteria remain inapplicable to the Project.

### Issues a & e) 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; or involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use

Refer to **Figure 3.1-2** for updated Important Farmland mapping at and in the vicinity of the Project sites.

#### *College Lake Water Storage Area*

As shown on Figure 3.1-2, the southeastern portion of College Lake is no longer designated as Prime Farmland (APNs 051-441-11, 051-441-04, and 051-441-27). While there are no proposed changes to operations within the College Lake water storage area, because of the Department of Conservation's change in Important Farmland designation of approximately 78 acres from Prime Farmland to Other Land, loss of Important Farmland to water management activities (described under EIR Impact LU-1) would be less than estimated in the certified EIR. Mitigation Measures LU-1a and LU-1b will still be implemented to help reduce the magnitude of this impact on land that remains designated as Important Farmland.




SOURCE: California Department of Conservation, 2022; ESA, 2022

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**Figure 3.1-2**
Important Farmland

### *Weir Structure and Intake Pump Station*

The weir structure and intake pump station would permanently remove approximately 0.3 acres of Important Farmland. Modifications to the weir structure's design are solely responsible for this change (approximately 0.1 acre more than discussed in the certified EIR), resulting in permanent conversion of Important Farmland to another use. As discussed in Chapter 2, *Project Description*, construction staging and laydown for the weir structure and intake pump station would occur within an approximately 1-acre area surrounding the facilities (approximately 0.4 acres more than discussed in the certified EIR). While construction staging activities would result in temporary impacts/disruption to agricultural uses, staging areas would not permanently convert Important Farmland to non-agricultural uses. As discussed in the certified EIR at Impact LU-1, other general construction activities (e.g., trucks traveling on farm roads, noise, and dust) could disrupt farming practices on neighboring properties, but impacts would be temporary and would not constitute a significant impact on Important Farmland because they would not result in the conversion of Important Farmland.

Construction of the 30-inch diameter pipeline to convey the diverted surface water from the intake pump station to the WTP (refer to Figures 2-5a) would disrupt Important Farmland as described in the certified EIR at Impact LU-1. Mitigation Measure LU-1c will be implemented to prevent a long-term adverse effect on Important Farmland resulting from pipeline construction.

### *Water Treatment Plant*

Construction of the WTP would result in the direct conversion of approximately 4.3 acres of Important Farmland, (approximately 0.7 acres less than discussed in the certified EIR). As discussed in the certified EIR at Impact LU-1, the WTP footprint is situated in approximately nine acres of apple orchard, all of which would be impacted due to construction of the WTP, staging, and/or infrastructure being damaged during construction. Construction staging and laydown for the proposed WTP would occur within an approximately 1.5-acre area adjacent to the WTP site (refer to Figure 2-4); construction disturbance (e.g., to accommodate heavy equipment movement for site grading) would also occur within the existing apple orchard site boundary. While the entire orchard west of the WTP would be removed during construction, the land would remain agricultural land that could accommodate berries or other crops after construction is complete, so less Important Farmland would be permanently converted under the modified project than would occur as discussed in the certified EIR.

### *College Lake Pipeline*

As shown on Figure 3.1-2, segments of the College Lake pipeline alignment pass through Important Farmland. While there would be temporary disruption of farming operations during construction 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 College Lake pipeline.

Temporary disruption of agricultural use may occur during construction of the College Lake pipeline as described on Draft EIR page 3.2-23. To reduce potential long-term impacts on the productivity of Important Farmland, Mitigation Measure LU-1c will be implemented to ensure that top soil is replaced following construction. With implementation of Mitigation Measure LU-

1c, the Project would not result in any new or more significant impacts than those identified in the certified EIR, and the impact related to the College Lake pipeline would be less than significant with mitigation.

### *Summary*

As indicated in the certified EIR at Impact LU-1, although implementation of the Project would result in the permanent conversion of Important Farmland through direct and indirect changes in the environment, 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, which are otherwise threatened by long term conversion to nonagricultural use due to seawater intrusion. While modifications to the Project design reduced the potential conversion of Important Farmland to other uses and the implementation of adopted Mitigation Measures LU-1a, LU-1b, and LU-1c would further reduce these impacts, the loss of Important Farmland remains ***significant and unavoidable*** for the reasons described above and on Draft EIR pages 3.2-23 and 3.2-24.

### Issues b & g) 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

Impacts related to the parcel within College Lake that is enrolled in a Williamson Act Contract would remain the same as described in the certified EIR at Impact LU-1, no impact. No other Williamson Act Contracts are within the Project area. Similar to the College Lake pipeline that was analyzed in the certified EIR, the portion of the College Lake pipeline alignment that is west of State Route (SR) 1 would be within the Coastal Zone. As indicated in the certified EIR, PV Water would need to obtain a coastal development permit. Installation of the proposed College Lake pipeline would not preclude farming, and would help preserve agricultural lands in the Coastal Zone over the long term by reducing pumping and groundwater overdraft which has led to seawater intrusion in the Pajaro Valley. Implementation of the Project 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. The Project would not result in any new or more significant impacts than those identified in the certified EIR, and the impact would be ***less than significant***.

## Conclusion

With the reduced footprint of the modified WTP and implementation of the mitigation measures noted above from the certified EIR, the Project would not result in new or more significant impacts related to land use and agricultural resources. Overall, loss of Important Farmland may be reduced from what was estimated in the certified EIR.

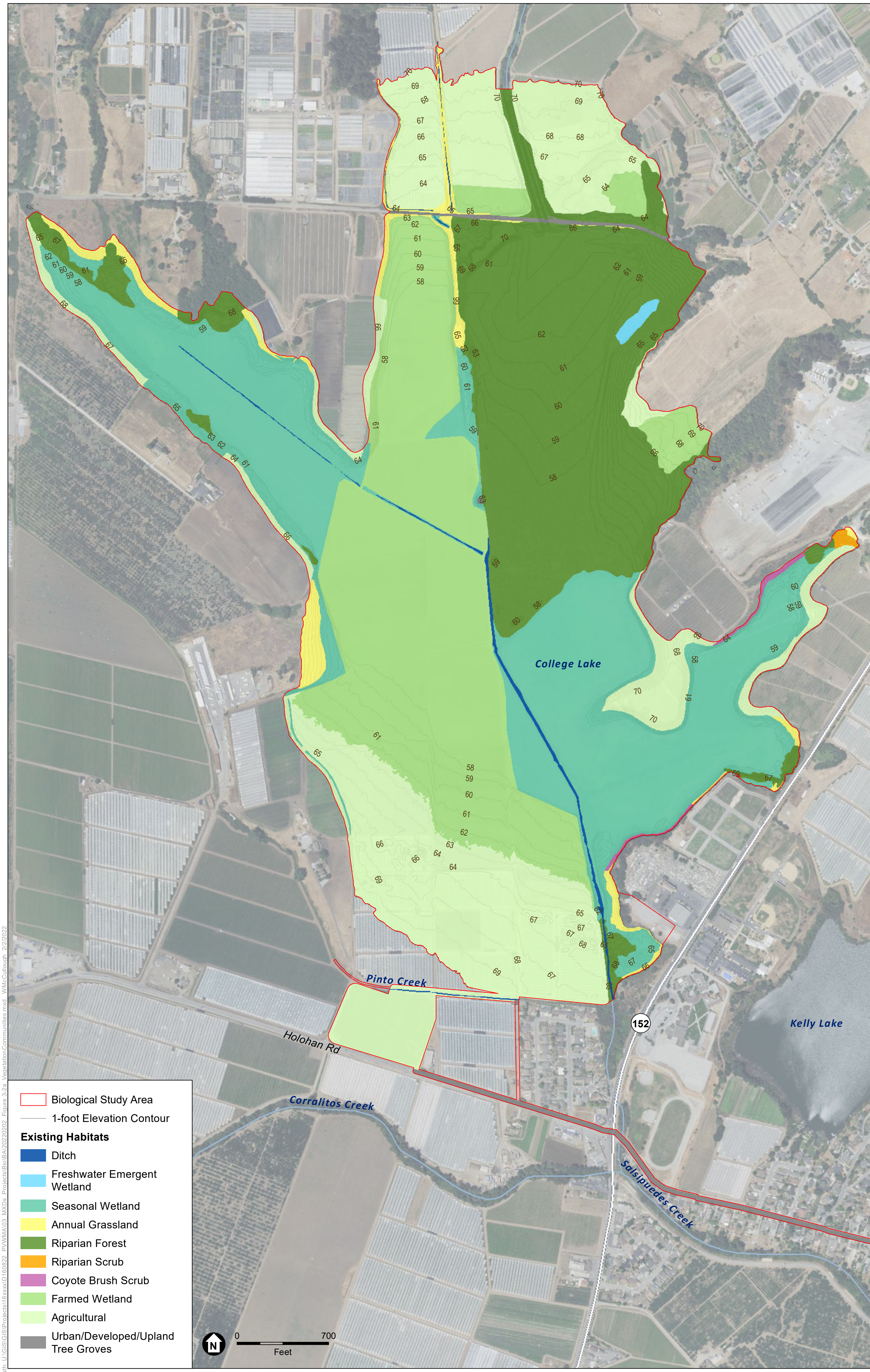
# 3.2 Biological Resources

| *Issues (and Supporting Information Sources):* | *Potentially Significant Effects Not Identified in Prior EIR* | *Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR* | *No New or More Severe Significant Effects* |
|---|---|---|---|
| **CHECKLIST 3.2, BIOLOGICAL RESOURCES — Would the Project:** | | | |
| a) 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? | ☐ | ☐ | ☒ |
| b) 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? | ☐ | ☐ | ☒ |
| c) 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? | ☐ | ☐ | ☒ |
| d) 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? | ☐ | ☐ | ☒ |
| e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance? | ☐ | ☐ | ☒ |
| f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan? | ☐ | ☐ | ☒ |

## Setting

The certified EIR and this addendum analyze biological impacts to the “biological study area”, which includes an area larger than the Project area (i.e., footprint) within which potential effects on biological resources were studied for this evaluation. The study area includes the Project area as well as aquatic habitat within Pinto Creek Ditch and within Salsipuedes Creek 500 feet upstream and downstream of the pipeline crossing at Bridge Street and SR 129.

The location of College Lake, the weir structure, intake pump station, and WTP has not changed since publication of the certified EIR. While the College Lake pipeline has changed, it would still extend through areas of unincorporated Santa Cruz County and the City of Watsonville (refer to Figure 2-1 in Chapter 2, *Project Description*).The setting related to biological resources includes the same vegetation communities and associated wildlife habitats described in the certified EIR at Section 3.4.1. Habitat types present include Riparian Scrub, Riparian Forest, Freshwater Emergent Wetland, Coyote Brush Scrub, Seasonal Wetland, Agriculture, Farmed Wetlands, Annual Grassland, Urban/Developed and Upland Tree Groves, Perennial Stream, and Ditch (refer to **Figures 3.2-1a** through **3.2-1c**). With regard to lake elevations, the setting remains the same as in the certified EIR, and the modified weir design would not result in a different operational lake elevation than that described in the certified EIR. The slight changes to the design and size of the weir structure and intake pump station will adversely affect the same vegetation communities as described in the certified EIR, although the magnitude of potential impacts has increased as described under the discussion of impacts to riparian habitat, and protected wetland and waters, below.




SOURCE: USDA, 2016; ESA, 2022

College Lake Integrated Resources Management Project - Addendum

**Figure 3.2-1a**
Existing Habitats

ESA


SOURCE: USDA, 2016; ESA, 2022

College Lake Integrated Resources Management Project - Addendum

**Figure 3.2-1b**
Existing Habitats

ESA


SOURCE: USDA, 2016; ESA, 2022

College Lake Integrated Resources Management Project - Addendum

**Figure 3.2-1c**
Existing Habitats

ESA

Although the College Lake pipeline alignment has changed, it continues to be primarily located in Agricultural and Urban/Developed/Upland Tree Grove. While the pipeline alignment described in the certified EIR crosses Perennial Stream and Riparian Forest in Corralitos Creek, the new pipeline alignment no longer crosses Corralitos Creek but crosses these same habitat types in Salsipuedes Creek. The old College Lake pipeline alignment parallels a ditch west of the SR 1/SR 129 intersection for approximately 0.4 miles, the modified alignment does not. Sensitive natural communities, environmentally sensitive habitat areas, critical habitat, and essential fish habitat in the modified Project footprint are consistent with those identified in the EIR.

## Findings of Previously Certified EIR

The certified EIR determined that Project impacts related to biological resources would be less than significant and less than significant with mitigation. Chapter 5, *Mitigation Monitoring and Reporting Program*, reproduces adopted mitigation measures applicable to biological resources impacts from the Project.

## Discussion

Below is a discussion of the modified Project as compared to the Biological Resources issues summarized in Checklist 3.2 above and as analyzed in the certified EIR. The certified EIR indicated that the following issues were not analyzed for reasons described on page 3.4-39: Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan (f). Changes in the Project would not conflict with the reasoning in the Draft EIR beginning on page 3.4-39; therefore, this issue remains inapplicable to the modified Project.

### Issue a) 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?

#### *College Lake Water Storage Area*

No construction activities would occur within College Lake; therefore, potential construction impacts to special-status species are the same as in the certified EIR. No changes to lake elevations or monthly average discharges from College Lake into Salsipuedes Creek are anticipated under the modified Project that would result in changes to vegetation communities and associated wildlife habitat that differ from those analyzed under the EIR. Revised adopted Mitigation Measures BIO-2j, BIO-2k, and BIO-2i will still be implemented. Therefore, potential operational impacts to special-status species in College Lake remain the same as those discussed in the certified EIR, ***less than significant with mitigation***.

#### *Weir Structure*

The overall footprint of the modified weir structure will be larger than was analyzed in the certified EIR, but the adjacent intake pump station will remain the same. Both structures will be placed in the same location, constructed in the same manner, function the same, and impact the same vegetation and aquatic communities and associated wildlife habitats as described in the certified EIR. In addition, there is no change to proposed maintenance (e.g., vegetation management) within College Lake and around the weir. The Project analyzed in the certified EIR concluded that implementation of the adopted 2014 BMP Update PEIR Mitigation Measures BIO-1b, 2a through 2l, 2n, HWQ-1, and implementation of Mitigation Measures BR-1a (Fish Relocations), BR-1b (Frac-out Contingency Plan), BR-1c (Avoid and Minimize Impacts on Special-status Bat Species), BR-1d (Avoidance and Minimization Measures for San Francisco Dusky-Footed Woodrat), and BR-2 (Invasive Fish Species Control Plan) would reduce construction and operational impacts from the weir and intake pump replacement to individual special-status fish, California red-legged frog (CRF), western pond turtle (WPT), nesting birds, special-status roosting bats, and dusky-footed woodrat to less-than-significant levels. Although the overall footprint of the modified weir will be larger than the Project analyzed in the certified EIR, the increase in size is minimal and the mitigation measures in the EIR would reduce potential impacts to special-status species to a less-than-significant level. Therefore, potential construction and operational impacts to special-status species at the modified weir structure and the adjacent intake pump station would remain the same as in the certified EIR, ***less than significant with mitigation.***

### *Water Treatment Plant*

The WTP is located on the same parcel of agricultural land, but occupies a smaller footprint (4.3 acres), relative to the WTP analyzed in the certified EIR (between 6.5 and 6.9 acres); therefore, with implementation of adopted Mitigation Measure BIO-2i, potential construction and operational impacts to special-status species would be the same or less than those discussed in the certified EIR, and would be ***less than significant with mitigation***.

### *College Lake Pipeline*

Although the alignment of the College Lake pipeline has changed, the majority of the alignment remains in developed or agricultural areas. While the location of the open trench crossing at Pinto Creek has shifted slightly west compared to the one analyzed in the certified EIR, the vegetation communities, construction methods, size of construction and impact area is the same as that described in the certified EIR. The currently proposed jack and bore trenchless pipeline crossing at Salsipuedes Creek is functionally equivalent in terms of vegetation communities that support special-status species compared to the horizontal direction drilling crossing that was proposed under Corralitos Creek in the certified EIR. In addition, the mitigation measures presented above, under *Weir Structure*, would reduce potential construction impacts to special-status species to a less-than-significant level. Therefore, potential construction impacts to special-status species along the College Lake pipeline are the same as in the certified EIR, ***less than significant with mitigation***. No operational impacts are anticipated.

## Issues b and c) Have a substantial adverse effect on riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW and USFWS or 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

As described in the certified EIR, the open water perennial channel of Salsipuedes Creek and associated riparian forest and seasonal wetland are considered sensitive natural communities and the open water, riparian forest, seasonal wetland, and farmed wetland are considered potentially jurisdictional as regulated by the USACE, CDFW, and RWQCB. Unlike the College Lake alignment analyzed in the certified EIR, no portion of the modified Project is considered an Environmentally Sensitive Habitat Area (ESHA) under the California Coastal Act.

### *College Lake Water Storage Area*

No construction activities would occur within College Lake; therefore, potential construction impacts to riparian habitat, sensitive natural communities, and state or federally protected wetlands and waters are the same as in the certified EIR. No changes to lake elevations or monthly average discharges downstream of the weir are anticipated relative to the Project analyzed in the certified EIR; therefore, potential operational impacts to riparian habitat, sensitive natural communities, and state or federally protected wetlands and waters are the same as in the certified EIR.

### *Weir Structure and Intake Pump Station*

Methods for removal of the existing weir structure and intake pump station are equivalent to those analyzed in the Draft EIR. The footprint of the modified weir structure and intake pump station is larger than the footprint analyzed in the certified EIR, and installation of the proposed adjustable weir would result in 0.138 acre of increased open water channel aquatic CRF habitat (due to conversion of riparian and seasonal wetlands to open water). Installation of the modified adjustable weir would also result in the permanent loss of 0.058 acre of riparian and seasonal wetland CRF dispersal habitat by replacement with the modified weir structure's footprint.

As stated in the certified EIR at Impact BR-2, compliance with adopted Mitigation Measures BIO-1b and HWQ-1, implementation of revised Adopted 2014 BMP Update PEIR Mitigation Measures BIO-1c, BIO-1d, and BIO-1e, and implementation of Mitigation Measure BR-1 will effectively reduce and mitigate impacts on sensitive natural communities, including potentially jurisdictional wetland and water, to a less-than-significant level. In particular, BIO-1c and BIO-1d require revegetation and restoration of temporary impacts to riparian vegetation and wetlands, and mitigation for permanent impacts to riparian vegetation and wetlands. Therefore, potential impacts to these sensitive biological resources would remain the same as in the certified EIR, ***less than significant with mitigation***.

### *Water Treatment Plant*

The WTP will be constructed at the same location as was analyzed in the EIR. The parcel has no riparian habitat, sensitive natural communities, and state or federally protected wetlands and waters; therefore, potential impacts to these sensitive biological resources are the same as in the certified EIR.

### *College Lake Pipeline*

While the location of the open trench crossing at Pinto Creek has shifted slightly west, the construction methods and size of construction and impact area is the same as that described in the certified EIR. The jack and bore crossing at Salsipuedes Creek is functionally equivalent in terms of riparian habitat, sensitive natural communities, and state or federally protected wetlands and waters to the horizontal directional drilling Corralitos Creek crossing analyzed in the certified EIR. Therefore, with implementation of adopted Mitigation BR-1b which requires preparation of a Frac-out Contingency Plan, potential impacts to these sensitive biological resources would be the same as in the certified EIR, ***less than significant with mitigation***.

## Issue d) 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

College Lake and Salsipuedes Creek provide habitat for migratory bird species and habitat corridors for resident species, such as steelhead, CRF, WPT, and a variety of bird species.

### *College Lake Water Storage Area*

No construction activities would occur within College Lake and no changes to lake elevations or monthly discharges below the weir are anticipated relative to the Project analyzed in the certified EIR. Therefore, potential impacts to the movement of migratory wildlife species or established wildlife corridors are the same as in the EIR, and would be ***less than significant***.

### *Weir Structure*

Although the footprint of the modified weir structure and the adjacent unmodified intake pump station is slightly larger than that analyzed in the certified EIR, impacts associated with construction activities in or near Salsipuedes Creek would remain temporary, relatively small, and short term. Construction of the modified weir structure and the adjacent intake pump station is expected to occur over approximately 15.5 months. Adjacent vegetated riparian floodplain would remain intact and would provide wildlife passage around the new facilities. Average monthly discharges from College Lake into Salsipuedes Creek would remain the same as those analyzed in the certified EIR. For these reasons, potential impacts to the movement of migratory wildlife species or established wildlife corridors are the same as in the certified EIR, and would be ***less than significant***.

### *Water Treatment Plant*

The WTP is not within any wildlife migration or movement corridors.

### *College Lake Pipeline*

The jack and bore crossing at Salsipuedes Creek is functionally equivalent as a migration or movement corridor for fish and wildlife to the horizontal directional drilling crossing at Corralitos Creek analyzed in the certified EIR. Therefore, potential impacts to wildlife migration and movement corridors are the same as in the certified EIR, and would be ***less than significant***.

## Issue e) Conflict with local policies or ordinances protecting biological resources

Local policies and ordinances relevant to the Project include Santa Cruz County Code, Chapter 16.30 Riparian Corridor and Wetland Protection and the Santa Cruz County General Plan/Local Coastal Plan Policy. Chapter 16.34 of the Santa Cruz County Code restricts actions that would cause adverse effects to significant trees within the Coastal Zone.

### *College Lake Water Storage Area*

No construction activities would occur within College Lake and no changes to lake elevations are anticipated relative to the Project analyzed in the certified EIR; therefore, potential conflicts with local policies or ordinances protecting biological resources are the same as in the certified EIR.

### *Weir Structure*

The certified EIR at Impact BR-8 identified a potential conflict with the Santa Cruz County General Plan/Local Coastal Plan Policy 5.6.1, which provides minimum streamflow requirements to maintain anadromous fish runs. Modifications to the Project do not reduce average monthly discharges from College Lake to Salsipuedes Creek relative what was analyzed in the certified EIR. Trees proposed for removal are outside of the Coastal Zone. Implementation of revised adopted Mitigation Measures BIO-1b, 1c, and 1d, and adopted Mitigation Measure BIO-1e, will reduce impacts on sensitive habitats and riparian corridors, and potential conflict with local policies and codes to less than significant, and potential conflicts with local policies or ordinances related to changes in streamflow that result from operation of the modified weir and tree removal necessary to construct the modified weir and the unmodified intake pump station. For these reasons the modified project, as mitigated, would be the same as described in the certified EIR.

### *Water Treatment Plant*

No conflicts with local policies related to construction or operation of the WTP were analyzed under the certified EIR and none are anticipated under the modified Project; therefore, potential conflicts with local policies or ordinances related to the WTP are the same as described in the certified EIR.

### *College Lake Pipeline*

No conflicts with local policies related to construction or operation of the College Lake pipeline were analyzed in the certified EIR; therefore, potential conflicts with local policies or ordinances related to the pipeline alignment are the same as described in the certified EIR.

## Conclusion

In summary, potential impacts to special-status species, riparian habitat, sensitive natural communities, state or federally protected wetlands, the movement of wildlife/wildlife corridors, and local policies and ordinances protecting biological resources under the Project are the same as those analyzed in the certified EIR.

# 3.3 Air Quality and Greenhouse Gases

| *Issues (and Supporting Information Sources):* | *Potentially Significant Effects Not Identified in Prior EIR* | *Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR* | *No New or More Severe Significant Effects* |
|---|---|---|---|
| **CHECKLIST 3.3, AIR QUALITY AND GREENHOUSE GASES — Would the Project:** | | | |
| a) 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? | ☐ | ☐ | ☒ |
| b) Expose sensitive receptors to substantial pollutant concentrations? | ☐ | ☐ | ☒ |
| c) Conflict with or obstruct implementation of the applicable air quality plan? | ☐ | ☐ | ☒ |
| d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people? | ☐ | ☐ | ☒ |
| e) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment? | ☐ | ☐ | ☒ |
| f) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases? | ☐ | ☐ | ☒ |

## Setting

The setting related to air quality and greenhouse gases (GHGs) would generally remain the same as that described in certified EIR at Section 3.5.1 for College Lake and the proposed locations for the modified weir structure, the adjacent unmodified intake pump station, and the modified WTP sites. While the College Lake pipeline would still extend through areas of unincorporated Santa Cruz County and the City of Watsonville (refer to Figure 2-1 in Chapter 2, *Project Description*), the setting for College Lake pipeline has slightly changed, and is discussed below.

The air quality setting relevant to the Project, including applicable regulations and air quality conditions, has not appreciably changed since the certification of the EIR. The Monterey Bay Air Resources Board (MBARD) maintains regional authority for air quality management in the Project area. Attainment designations for criteria air pollutants with respect to the federal and California ambient air quality standards remain unchanged (CARB, 2022). There have been no updates to the Air Quality Management Plan (AQMP) since certification of the EIR. The 2012 – 2015 update to the AQMP (MBARD, 2017) continues to be the applicable air quality management plan to help the Monterey Bay region achieve ambient air quality standards.

There have been no updates to the *CEQA Air Quality Guidelines* or the *Guidelines for Implementing the California Environmental Quality Act*, the two guidelines adopted by MBARD. *CEQA Air Quality Guidelines* provide guidance for lead agencies that prepare project-specific CEQA documentation for projects within the air district and *Guidelines for Implementing the California Environmental Quality Act* for MBARD's implementation of CEQA as a lead agency. Similar to the certified EIR, 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 Project.

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 NOx and ROG, 82 pounds per day of $PM_{10}$, 55 pounds per day of $PM_{2.5}$, and 550 pounds per day of CO. Consistent with the EIR, this analysis uses the BAAQMD's operational threshold of 1,100 metric tons $CO_2e$ per year as a rough gauge to determine if the Project would be consistent with the post-2020 goals of Executive Orders B-30-15 and S-3-05. Estimated construction emissions are amortized over a period equal to the estimated life of the Project (in this case 50 years) and added to operational emissions, and then compared to the operational significance threshold.

### Sensitive Receptors

Sensitive receptors in the vicinity of the weir structure, the adjacent unmodified intake pump station and the WTP site as identified and discussed in the certified EIR, have not changed and remain applicable to the modified Project. No new residential buildings, schools, colleges or universities, daycare facilities, hospitals, or senior-care facilities have been constructed closer to these Project components than the sensitive receptors identified in the certified EIR. The nearest receptors are the Our Lady Help of Christians church, located approximately 340 feet east of the modified weir structure boundary and a residential community located approximately 710 feet southwest of the proposed unmodified intake pump station boundary. The closest receptor to the WTP is a residence located 40 feet southeast of the WTP site boundary, which is not currently occupied, would not be occupied during construction, and would be used as a PV Water field office during operation. The modified College Lake pipeline, at approximately 6 miles long, would be slightly longer than previously analyzed in the certified EIR. However, the alignment has been moved closer to agricultural fields to avoid exposure to sensitive receptors within the City of Watsonville. While there are sensitive receptors along the modified alignment (single- and multi-family residences and Watsonville High School), fewer receptors would be exposed to the Project's air quality impacts. The nearest sensitive receptors to pipeline construction would still be as close as 25 feet away.

## Findings of Previously Certified EIR

The certified EIR determined that all Project impacts related to air quality and greenhouse gases would be less than significant.

## Discussion

Below is a discussion of the modified Project as compared to the Air Quality and Greenhouse Gases (GHG) issues summarized in Checklist 3.3 above and as analyzed in the certified EIR.

## Issues a and c) 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; conflict with or obstruct implementation of the applicable air quality plan

As discussed in the certified EIR, the Project 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 AQMP. There is no appreciable difference realted to population growth between the modified Project and the Project analyzed in the certified EIR. Operation of the emergency standby generator at the WTP would be subject to MBARD's permitting requirements thus ensuring consistency with the MBARD's Rules and Regulations. Therefore, if the Project 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 AQMP.

### Construction

The most recent version of CalEEMod (version 2020.4.0) was used to analyze and estimate emissions for the modified Project. Construction emissions were estimated based on modified construction data provided by PV Water's engineering consultants, including modified construction schedule and equipment data. Haul truck and worker vehicle trip numbers and trip lengths used are the same as those assumed in the certified EIR.

Construction emissions associated with the modified Project are presented in **Table 3.3-1**. The table shows maximum daily emissions by construction year and compares them to the MBARD significance thresholds for construction.

**TABLE 3.3-1**
**PROJECT CONSTRUCTION EMISSIONS**

| Construction Year | Estimated Maximum Daily Construction Emissions[a,b] (pounds/day) | | | |
|---|---|---|---|---|
| | ROG | NOx | $PM_{10}$ | $PM_{2.5}$ |
| Year 1 (2022) | 5.1 | 44.7 | 2.5 | 2.0 |
| Year 2 (2023) | 15.6 | 131.7 | 7.4 | 5.9 |
| Year 3 (2024) | 14.8 | 120.6 | 6.8 | 5.3 |
| MBARD Significance Threshold | 137 | 137 | 82 | 55 |
| Exceeds Threshold? | No | No | No | No |

NOTES:
a. Estimated maximum daily emissions shown are for summer conditions and do not represent emissions throughout the year.
b. Emissions associated with the operation of the drill rig for construction of the potable water well would not add to the maximum daily emissions as well construction would precede other construction activities at the WTP site.

SOURCE: Appendix AIR.

As shown in Table 3.3-1, the maximum daily construction emissions of ROG, NOx, $PM_{10}$ and $PM_{2.5}$ would not exceed the MBARD significance thresholds for construction. Mitigation Measure AQ-1 from the 2014 BMP Update PEIR and EIR will be implemented as part of the Project to reduce fugitive dust emissions from construction activities by approximately 35 percent. Given that the Project would result in emissions less than the quantitative thresholds of significance during construction, the Project would be considered to be accounted for in regional air quality planning and would be considered to be consistent with the goals of the AQMP. This impact would be the same as that described in the certified EIR, ***less than significant***.

### Operation

Operational emissions presented in **Table 3.3-2** would result primarily from onroad trips generated by the Project and would include trips associated with worker commute, chemical deliveries, and transport of solids from the WTP and debris from College Lake to the Buena Vista landfill. The estimates presented in Table 3.3-2 are based on updated emission factors from EMFAC2021, available since adoption of the EIR. As shown in Table 3.3-2, Project operational emissions would be well below MBARD's operational thresholds. Given that the Project would result in emissions less than the quantitative thresholds of significance during operation, the Project would be considered to be accounted for in regional air quality planning and would be considered to be consistent with the goals of the AQMP. This impact would be the same as that described in the certified EIR, ***less than significant***.

**TABLE 3.3-2**
**PROJECT OPERATIONAL EMISSIONS**

| Source | Estimated Maximum Daily Operational Emissions[a] (pounds/day) | | | |
|---|---|---|---|---|
| | ROG | NOx | $PM_{10}$ | $PM_{2.5}$ |
| Onroad Vehicle Emissions | <0.1 | 4.7 | 0.3 | 0.1 |
| Backup Generator Testing | 0.5 | 10.0 | 0.3 | 0.3 |
| Total | 0.6 | 14.7 | 0.6 | 0.4 |
| MBARD Significance Threshold | 137 | 137 | 82 | 55 |
| Exceeds Threshold? | No | No | No | No |

NOTES:
a. Estimated maximum daily emissions shown occur when the Project is in operation depending on demand and water availability and do not represent emissions throughout the year.

SOURCE: Appendix AIR.

## Issue b) Expose sensitive receptors to substantial pollutant concentrations

Impacts from exposure to toxic air contaminants from the modified Project's construction activities would be similar to those discussed in the certified EIR. Construction activities associated with the modified Project would take place over an approximately 22-month period, although the level of activity would vary both temporally and spatially (refer to Table 2-4 for the approximate construction schedule). Construction activities associated with the modified weir structure and the adjacent unmodified intake pump station are expected to take place over a 15-month period, excluding pre-commissioning. Construction of the modified WTP is expected to last approximately 16 months and the construction of the modified College Lake pipeline is expected to last approximately 20 months.

Table 3.3-1 shows estimated maximum daily emissions of $PM_{10}$ (used as a surrogate for diesel particulate matter [DPM]) from the simultaneous construction of all Project components would be less than 7 pounds per day. This level of emissions would occur over a period of 14 months during the construction period, but the emissions would be distributed spatially and the same set of receptors would not be exposed to emissions from construction of all project components. In addition, pipeline construction would advance at the rate of between 100 to 250 linear feet per day, so the same set of receptors would not be continually exposed to diesel exhaust from pipeline construction equipment for an extended period. Given the relatively short duration of exposure compared to the 30-year exposure used in health risk assessments, and given that any sensitive receptors in the vicinity of these project components would be exposed to a fraction of the emissions estimates presented in Table 3.3-1, health risks from exposure to short-term DPM emissions associated with construction of Project components would be negligible, and this impact would remain the same as discussed in the certified EIR, ***less than significant***.

Impacts from exposure to operational toxic air contaminants would be the same as that discussed in the EIR, less than significant. As the modified College Lake pipeline would result in construction and operational criteria air pollutant emissions less than the MBARD thresholds, health impacts from exposure to ozone and its precursors would also be ***less than significant***.

## Issue d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people

Changes in design at the weir structure, the WTP site, and revisions to the College Lake pipeline alignment would not result in a change in Project-related odors. Additionally, Project operations would remain the same as those described in the certified EIR. Therefore, construction and operational odor impacts associated with the Project would be similar to those discussed in the certified EIR, ***less than significant***.

## Issue e) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment

### Construction

GHG emissions from the modified Project's construction activities (fuel combustion in construction equipment, worker vehicles and trucks used to transport equipment, materials and debris) are shown in **Table 3.3-3**. As discussed in the certified EIR, the 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; therefore, project emissions are compared to the Bay Area Air Quality Management District (BAAQMD) GHG significance threshold of 1,100 metric tons $CO_2e$ per year to evaluate whether the modified Project's emissions could have a significant impact on the environment. Consistent with the San Luis Obispo Air Pollution Control District's guidance used in the certified EIR, construction emissions from the Project are amortized over the life of the Project and considered with the operational emissions discussed below for comparison with the threshold.

Total GHG emissions from the modified Project's construction would be less than the 1,100 MT $CO_2$e per year threshold. Therefore, the modified Project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment, and this impact would remain the same as the certified EIR, ***less than significant***.

**TABLE 3.3-3**
**GHG EMISSIONS FROM PROJECT CONSTRUCTION**

| Construction Year | GHG emissions as MT $CO_2$e |
|---|---|
| Year 1 (2022) | 348 |
| Year 2 (2023) | 3,676 |
| Year 3 (2024) | 2,540 |
| Total | 6,564 |
| Assumed Project Life (years) | 50 |
| Amortized Annual Construction Emissions | 131.3 |

SOURCE: Appendix AIR.

### Operation

**Table 3.3-4** presents GHG emissions generated from the Project's operational activities. The estimates presented in Table 3.3-4 are based on updated emission factors and models available since the adoption of the EIR. These estimates also include an incremental increase associated with truck trips transporting solids from the WTP, which was included in the certified EIR's Project Description, but was inadvertently omitted from the certified EIR's operational GHG emissions analysis. The sum of the Project's operational GHG emissions and the amortized construction emissions is compared to the BAAQMD's 1,100 MT of $CO_2$e per year threshold in Table 3.3-4.

Total GHG emissions from Project operations would be less than the 1,100 MT $CO_2$e per year threshold. Therefore, the Project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment, and this impact would remain the same as the certified EIR, ***less than significant***.

**TABLE 3.3-4**
**PROJECT GHG EMISSIONS**

| Source | GHG emissions as MT $CO_2e$ |
|---|---|
| Standby Generator – Testing and Maintenance | 35.6 |
| On-road Trips[b] | 55.5 |
| Electricity Generation (Indirect) | 428.3 |
| Amortized Annual Construction Emissions | 131.3 |
| Total | 650.6 |
| Significance Threshold | 1,100 |
| Significant? | No |

NOTES:

a. Assumes operation of the emergency standby generator for a maximum of 50 hours per year for testing and maintenance per MBARD Rule 1010.
b. Includes worker commute trips and truck trips for chemical deliveries and hauling of solids and debris from the WTP, as well as and maintenance activities at College Lake. Assumes an operational period of 6 months per year.
c. GHG emission factors for electricity generation in California from U.S. EPA's eGRID Summary Tables 2020, Table 1. Available at https://www.epa.gov/egrid/summary-data.

SOURCE: Appendix AIR.

## Issue f) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases

### Executive Order B-30-15 Emissions Reduction Goal

As detailed in the certified EIR, the goal of reducing GHG emissions to 40 percent below 1990 levels by 2030 consistent with Executive Order B-30-15 is roughly equivalent to reducing emissions by 42 percent below 2020 levels. Therefore, the significance threshold of 1,100 MT $CO_2e$ per year recommended by the BAAQMD to evaluate consistency with AB 32's goal to reduce 2020 emissions to 1990 levels can also be used to evaluate the modified Project's consistency with the goal of EO B-30-15 to reduce 2030 emissions to 40 percent below 1990 levels. As discussed above, the modified Project would generate GHG emissions less than 1,100 MT $CO_2e$ per year. Therefore, the modified Project would not conflict with the Executive Order B-30-15 Emissions Reduction Goal, and the associated impact would the same as the certified EIR, ***less than significant***.

# Conclusion

Based on the analysis presented above, the modified Project would not result in new or more significant impacts related to air quality and greenhouse gases than those described in the certified EIR.

# 3.4 Hazards and Hazardous Materials

| *Issues (and Supporting Information Sources):* | *Potentially Significant Effects Not Identified in Prior EIR* | *Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR* | *No New or More Severe Significant Effects* |
|---|---|---|---|
| **CHECKLIST 3.4, HAZARDS AND HAZARDOUS MATERIALS — Would the Project:** | | | |
| a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials? | ☐ | ☐ | ☒ |
| b) Create a significant hazard to the public or the environmental through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment? | ☐ | ☐ | ☒ |
| c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school? | ☐ | ☐ | ☒ |
| d) 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? | ☐ | ☐ | ☒ |
| e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area? | ☐ | ☐ | ☒ |
| f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan? | ☐ | ☐ | ☒ |
| g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires? | ☐ | ☐ | ☒ |
| h) Be located in or near state responsibility areas or lands classified as very high fire hazard severity zone. | ☐ | ☐ | ☒ |

# Setting

## Hazardous Materials at Nearby Sites

A Cortese list[3] database search for hazardous materials sites within one-quarter mile of the modified Project was performed to update the setting. Within one-quarter mile of the modified Project components, including the College Lake pipeline, there are 25 sites listed in these databases; many are closed leaking underground storage tank (LUST) sites or other closed cleanup sites. Six of these sites are currently active, not fully closed, or closed with land use restrictions, and are summarized in **Table 3.4-1** and discussed in greater detail below. Previous uses that released contaminants include vehicle service centers, dry cleaning, a manufactured gas plant, and pesticide and fertilizer manufacturing.

[3] 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.

**TABLE 3.4-1
CORTESE LIST SITES WITHIN ONE-QUARTER MILE OF PROJECT COMPONENTS**

| Business Name | Street Address | Latitude, Longitude | Case Type | Status | Status Date | Potential Hazardous Materials on Site |
|---|---|---|---|---|---|---|
| **State Water Resources Control Board GeoTracker** | | | | | | |
| Crop Production Services, Inc. – Watsonville | 5 Lakeview Road, Watsonville | 36.550325, -121.435606 | Cleanup Program Site | Open - Verification Monitoring | 1/3/1997 | Nitrate |
| PG&E Service Station (same site as Watsonville Service Center) | 11 Walker Street | 36.541129, -121.452041 | Cleanup Program Site | Open – Remediation | 3/22/2006 | Arsenic, Diesel, Gasoline, PAHS, Waste (Oil/ Motor/ Hydraulic/ Lubricating) |
| **Department of Toxic Substances EnviroStor** | | | | | | |
| Southwest Truck Service | 50 Pine Street, Watsonville | 36.542085, -121.454266 | Evaluation | Refer: Other Agency | 4/27/1989 | None specified but potentially automotive related products |
| California Spray & Chemical | 135 Walker Street, Watsonville | 36.905178, -121.758834 | Voluntary Cleanup | Certified / Operation & Maintenance | 6/20/2002 | Manufacturing - Pesticides |
| PG&E, Watsonville #2 Manufactured Gas Plant | North Corner of Walker and Front Streets, Watsonville | 36.541412, -121.451876 | Voluntary Cleanup | Certified / Operation & Maintenance | 6/25/2015 | Arsenic, PAHS, TPH-Motor oil, TPH-Diesel |
| PG&E, Watsonville Service Center | 11 Walker Street, Watsonville | 36.541129, -121.452041 | Voluntary Cleanup | Certified / Operation & Maintenance | 6/30/2011 | Arsenic, PAHS, TPH-Motor oil, TPH-Diesel, TPH-Gas |

NOTES:

MTBA= Methyl tert-butyl ether; PAHS = Polynuclear Aromatic Hydrocarbons; PG&E = Pacific Gas and Electric; TBA = tertiary butyl alcohol; TPH = Total Petroleum Hydrocarbons

SOURCE: Department of Toxic Substances Control, EnviroStor reports for: Southwest Truck Service (44420003), California Spray & Chemical (44280006), PG&E Watsonville #2 MGP (44490008), and PG&E Watsonville SVC CTR (44490011). Available online at http://www.envirostor.dtsc.ca.gov/public/. Accessed on March 21, 2022; State Water Resources Control Board GeoTracker reports for: Crop Production Services, Inc. – Watsonville (SL203231261) and PG&E Service Station (SL0608793505). Available online at http://geotracker.waterboards.ca.gov. Accessed on March 21, 2022.

In addition to the open sites described below, the College Lake pipeline would cross through three Geotracker Sites with a status of "Completed – Case Closed". While the actual Cortese List sites have changed from those analyzed in the EIR, there are a similar number of open sites near Project components, and the types of sites are consistent with those previously reviewed.

### *Crop Production Services, Inc.*

This site has operated as a retail fertilizer and pesticide facility since 1972 and will continue similar operations for the foreseeable future. Groundwater at the site has been monitored and sampled since 1990, and nitrate is the chemical of concern. The College Lake pipeline alignment is within one-quarter mile and depending on the area of contamination, may intersect the northern portion of the site.

### *PG&E Service Station/Watsonville Service Center*

In April 1904, the Big Creek Power Company purchased this site and began construction of a steam electric plant. The steam electric plant was located across Walker Street from a manufactured gas plant (PG&E Watsonville #2 site, Calsites #44490008, described below). Underground pipes were used to transfer steam from the electric plant for use at the gas plant. In turn, oil was transferred from the gas plant for use at the electric plant. In 1927, the electric plant ceased its operations. It is unknown when the plant was dismantled. Records indicate that the site was owned by Coast Counties Gas and Electric Company in 1940 which later donated a portion of the site along the Pajaro River to the City of Watsonville for a flood control project. A levee was constructed to prevent frequent flooding of the river banks in the area. Coast Counties Gas and Electric Company and PG&E merged in 1954. The site has been used by PG&E as a service center for the last 30 years. The College Lake pipeline alignment is within one-quarter mile, but does not intersect this site.

### *Southwest Truck Service*[4]

Southwest Truck Service started its business in around 1961. The site used to contain two underground fuel tanks, which were removed in 1990 under the direction of Watsonville City Fire Department. In May 2005, County of Santa Cruz Health Services Agency issued a letter to Southwest Truck Service stating that based on soil sampling conducted in 1990, no further assessment was needed. During a site visit by the Department of Toxic Substances Control (DTSC)'s personnel on May 8, 2008, a spill around the Safetv-Kleen tank area inside the maintenance building was observed and was noted as an area where potential release of chemical to the environment could occur. However, Southwest Truck Service does not maintain or service trucks on site, therefore the potential for a release is minimal. The maintenance yard is used for occasional truck maintenance activities, and all regular maintenance activities are conducted offsite by outside vendor. The College Lake pipeline alignment is within one-quarter mile, but does not intersect this site.

4 California Department of Toxic Substances Control, Site Screen Assessment, Cooperative Agreement Number: V99925205-3, Southwest Truck Service. May 12, 2008.

### *California Spray & Chemical*

The certified EIR included California Spray and Chemical Company, formed in 1907 to produce lead arsenate insecticide spray. Manufacturing of the lead arsenate was discontinued at the site in 1929. The site is currently the location of a truck tire repair operation and a road construction and paving supply company. Potential contaminants of concern are arsenic and lead. Land uses, including activities that will disturb the soil, are restricted at the site. A Soil Management Plan and a Health and Safety Plan must be approved by DTSC prior to excavation of contaminated soils, and the owner must provide DTSC with written notice at least fourteen days prior to any building, filling, grading, mining, or excavating below the ground surface. The College Lake pipeline alignment is within one-quarter mile, but does not intersect this site.

### *PG&E, Watsonville #2 Manufactured Gas Plant*

A manufactured gas plant (MGP) was constructed at the PG&E Watsonville #2 site in 1905, and began processing oil to manufacture gas for heat and fuel between 1905 and 1908. The MGP was shut down in 1931, and lay dormant for several years until PG&E installed a gas regulating station in the late 1950's, after its merger with Coast Counties Gas and Electric in 1954. The site is located across Walker Street from the PG&E Watsonville Service Center site (described above), which is still in operation. All MGP buildings and plant structures were demolished. The site is currently used by PG&E as a general construction yard for storage of construction materials. The College Lake pipeline alignment is within one-quarter mile, but does not intersect this site.

## Airports and Emergency Response Plans

Information regarding the Watsonville Municipal Airport and Santa Cruz Operational Area Emergency Management Plan remain the same as that described in the certified EIR.

## Wildfire Hazards

The Project area is within a Local Responsibility Area managed by either the City of Watsonville or Santa Cruz County. While a majority of the modified Project components are within land zoned as “Local Responsibility Area Unzoned” (that is, fire hazard is not considered “very high,” “high,” or “moderate”), an approximately 900-foot portion of the College Lake pipeline on College Road crosses through an area zoned as “Local Responsibility Area High”[5] Managed by Santa Cruz County. None of the modified Project sites are within Generalized Critical Fire Hazard Areas mapped by Santa Cruz County.[6]

## Schools

The following schools are within one-quarter mile of modified Project components: Lakeview Middle School, Watsonville High School, Linscott Charter, and Ceiba College Preparatory Academy. All

[5] California Department of Forestry and Fire Protection, Draft Fire Hazard Severity Zones in LRA, Santa Cruz County, October 3, 2007.

[6] County of Santa Cruz, Generalized Critical Fire Hazard Areas, November 2009.

of these schools were also within one-quarter mile of Project components analyzed in the certified EIR.

## Findings of Previously Certified EIR

The certified EIR determined that all project impacts related to hazards and hazardous materials would be less than significant or less than significant with mitigation. Chapter 5, *Mitigation Monitoring and Reporting Program*, reproduces adopted mitigation measures applicable to transportation impacts from this Project.

## Discussion

Below is a discussion of the modified Project as compared to the Hazards and Hazardous Materials issues summarized in Checklist 3.4 above and as analyzed in the certified EIR. The following issues are not analyzed further in this section for reasons described in the certified EIR at Section 3.7.3, Impacts and Mitigation Measures: safety hazards from public airports (e); exposure to wildland fires (g); and be located in or near state responsibility areas classified as very high fire hazard severity zone (h). As discussed above, while a segment of the College Lake pipeline on College Road would go through an approximately 900-foot portion of land with a potentially high fire hazard, the area around it has a moderate risk, and no surrounding areas are considered very high fire hazard risk. Pipeline construction would be temporary, moving at a pace of between 100 and 250 feet per day, and would not exacerbate fire risk. Additionally, impacts related to checklist items a), b), and c) would not change with implementation of the modified Project, and are therefore not further discussed below.

### Issue d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5

As indicated above, none of the modified Project sites are included on a list of hazardous materials sites compiled by one or more government regulatory agency. However, the College Lake pipeline would be installed within roadways, and would pass through seven Geotracker Sites with a status of "Completed – Case Closed". The College Lake pipeline alignment is also adjacent to the open sites listed in Table 3.4-1 and described above.

As indicated in the certified EIR, in accordance with adopted Mitigation Measure HM-1, PV Water will perform soil testing on agricultural sites proposed for development (including pipeline sites). While adopted Mitigation Measure HM-2 would apply to the entire proposed pipeline alignment, because the soil testing required as part of adopted Mitigation Measure HM-1 would apply to agricultural lands along the pipeline route, PV Water will perform a Phase I Environmental Site Assessment for all other portions of the College Lake pipeline alignment to determine the potential for encountering hazardous materials-contaminated soils to be excavated and identify appropriate recommendations. Revised adopted Mitigation Measure HM-2 was presented in the certified EIR to clarify this. Given the past land uses and the potential to encounter currently unknown contamination, should hazardous materials contaminated soils be identified by either the soil testing (Mitigation Measure HM-1) or the Phase I Environmental Site Assessment

(Mitigation Measure HM-2), Project construction could result in a hazard to the public or the environment, a potentially significant impact. Implementation of a Health and Safety Plan (Mitigation Measure HAZ-1a) and a Soil Management Plan (Mitigation Measure HAZ-1b) will reduce this impact to a less-than-significant level by implementing appropriate health and safety measures for worker safety, soil handling, and disposal of contaminated soils. Results from soil testing and the Environmental Site Assessment would inform the contents of the Health and Safety Plan and Soil Management Plan. Additionally, adopted Mitigation Measure AQ-1 will be implemented to minimize impacts from fugitive dust emissions (refer to Section 3.5, Air Quality and Greenhouse Gases for the full text of Mitigation Measure AQ-1). Implementation of adopted Mitigation Measures HM-1, HM-2, and AQ-1, and Mitigation Measures HAZ-1a and HAZ-1b from the EIR will reduce impacts associated with encountering potentially contaminated soil or groundwater to less-than-significant levels by controlling contact with and release of these materials into the environment. Methods of control include soil testing (for areas where soil testing has not already occurred), stopping work should these materials be encountered, and use of a qualified contractor to dispose of contaminated materials in accordance with regulatory requirements. With implementation of these mitigation measures, this impact would be ***less than significant with mitigation***.

Operational impacts related would remain the same as those described in the certified EIR.

## Issue f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan

While the roads that the modified College Lake pipeline would impact differ from those analyzed in the certified EIR, the impact would generally remain the same. As described under EIR Impact HAZ-5, Project construction would not conflict with the County of Santa Cruz Emergency Management Plan, because the plan does not designate emergency response or evacuation routes, and the Project would not otherwise impair implementation of this plan. However, the modified 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.

Because construction of the modified weir structure, the unmodified intake pump station, and the modified WTP would not occur within public roadways, it would not directly result in inadequate emergency access. As described in Chapter 2, *Project Description*, no full road closures are anticipated under the modified Project. However, one full lane width and shoulder (or parking lane) closure would be required, with alternating one-way traffic control on two-lane roads, which could impede emergency response traffic. Implementation of adopted Mitigation Measure TRA-1b (Construction Traffic Control/Traffic Management Plan) will 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. As a result, implementation of Mitigation Measure TRA-1b will 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 related to the modified Project would remain the same as those described in the certified EIR.

## Conclusion

With implementation of the mitigation measures noted above from the certified EIR, the modified Project would not result in new or more significant impacts related to hazards or hazardous materials.

# 3.5 Noise and Vibration

| Issues (and Supporting Information Sources): | Potentially Significant Effects Not Identified in Prior EIR | Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR | No New or More Severe Significant Effects |
|---|---|---|---|
| **CHECKLIST 3.5, NOISE AND VIBRATION — Would the Project result in:** | | | |
| a) Generation of 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? | ☐ | ☐ | ☒ |
| b) Generation of excessive groundborne vibration or groundborne noise levels? | ☐ | ☐ | ☒ |
| c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels? | ☐ | ☐ | ☒ |

## Setting

The setting related to noise and vibration would generally remain the same as that described in the certified EIR at Section 3.8.1 for College Lake pipeline and the proposed locations for the modified weir structure, the adjacent unmodified intake pump station, and modified WTP sites. While the College Lake pipeline would still extend through areas of unincorporated Santa Cruz County and the City of Watsonville (refer to Figure 2-1 in Chapter 2, *Project Description*), the setting for College Lake pipeline has slightly changed, and is discussed below. The regulatory setting and noise standards in the General Plans and noise ordinances of Santa Cruz County and the City of Watsonville described in the certified EIR remain unchanged and applicable to the modified Project.

### Sensitive Receptors

The location of sensitive receptors in the vicinity of the modified weir structure, the unmodified intake pump station, and the modified WTP site, as identified and discussed in the certified EIR, have not changed and remain applicable to the modified Project. No new noise-sensitive land uses have been constructed closer to the modified Project components than the sensitive receptors identified in the certified EIR. The nearest receptors are the Our Lady Help of Christians church, located approximately 340 feet east of the proposed modified weir structure boundary and a residential community located approximately 710 feet southwest of the proposed unmodified intake pump station boundary. The closest receptor to the modified WTP is a residence located 40 feet southeast of the modified WTP site boundary. The modified College Lake pipeline, at approximately 6 miles long, would be slightly longer than what was previously analyzed in the certified EIR; however, the alignment has been moved closer to agricultural fields to avoid exposure to sensitive receptors within the City of Watsonville. While there are sensitive receptors along the modified alignment (single- and multi-family residences and Watsonville High School), fewer receptors would be exposed to noise from pipeline construction. The nearest sensitive receptors to pipeline construction would still be the same as evaluated in the certified EIR and remains as close as 25 feet.

# Findings of Previously Certified EIR

The certified EIR determined that Project impacts related to noise and vibration would be no impact, less than significant, less than significant with mitigation, or significant and unavoidable with mitigation. Chapter 5, *Mitigation Monitoring and Reporting Program*, reproduces adopted mitigation measures applicable to noise and vibration impacts from this Project.

# Discussion

Below is a discussion of the modified Project as compared to the Noise and Vibration issues summarized in Checklist 3.5 above and as analyzed in the certified EIR. The certified EIR indicated that the following issue was not analyzed for reasons described on page 3.8-12: Exposure of people to excess noise due to proximity to an airport land use plan or private airstrip (c). Changes in the Project would not conflict with the reasoning on certified EIR page 3.8-12; therefore, this issue remains inapplicable to the modified Project.

## Issue a) Generation of 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, or applicable standards of other agencies

### *Construction*

Noise impacts associated with construction activities would remain the same as concluded in the certified EIR, significant and unavoidable, for the reasons described under EIR Impact NOI-1. Though the modified pipeline alignment would avoid sensitive areas through the City of Watsonville, 24-hour drilling required for trenchless construction would be in conflict with the City of Watsonville's noise ordinance and would therefore result in a ***significant and unavoidable*** impact even with mitigation, as described below.

#### Weir Structure and Intake Pump Station

Construction activities associated with the modified weir structure and the adjacent unmodified intake pump station would occur within unincorporated Santa Cruz County. There are no changes to the location of the modified weir structure and the adjacent unmodified intake pump station, the sensitive receptors in the vicinity, and the equipment proposed to be used for construction. Additionally, Mitigation Measure NOI-1a would be implemented. Therefore, noise impacts to Our Lady Help of Christians church, the nearest sensitive receptor to the proposed weir structure and intake pump station would be the same as discussed in the certified EIR, ***less than significant with mitigation***.

### Water Treatment Plant

Construction activities associated with the modified WTP would occur within unincorporated Santa Cruz County. There are no changes to the location of the WTP (preferred WTP site in the certified EIR) and the equipment proposed to be used for construction. The nearest residence previously analyzed in the certified EIR was located approximately 40 feet southeast of the WTP boundary; however, when the modified Project is implemented, this residence, recently acquired by PV Water, would not be occupied. The closest sensitive receptor would now be the residence approximately 220 feet west of the WTP boundary. This residence would be exposed to $L_{max}$ and $L_{eq}$ construction noise levels of 72.9 dBA and 69 dBA, respectively, which would be less than the County of Santa Cruz's daytime noise standard of 75 dBA $L_{eq}$, and the impact would therefore be reduced to ***less than significant***. Mitigation Measure NOI-1a would no longer need to be implemeneted at the WTP,

A drill rig would be required to be operated, potentially 24 hours per day for approximately two days in a row for the construction of a potable water well at the WTP site. Construction of the well would take place prior to commencement of other construction activities at the WTP site. One single family residence approximately 620 feet west of the where the potable water well would be constructed may be occupied during construction. At this distance, noise from the continuous operation of a drill rig would attenuate to 57.7 dBA $L_{eq}$, which would be less than both the County's daytime and nighttime construction exterior noise standards or 75 dBA, $L_{eq}$ and 60 dBA, $L_{eq}$, respectively. Therefore, noise impacts from well construction activities would be ***less than significant***.

### College Lake Pipeline – Open Trench Pipe Installation

Open trench pipeline construction along the modified alignment is not proposed to occur outside of the allowed hours specified in the City of Watsonville noise ordinance, and therefore would not conflict with the City of Watsonville noise ordinance. Open trench pipeline construction would occur within the daytime hours identified in the Santa Cruz County noise ordinance. Similar to the alignment analyzed in the certified EIR, the modified College Lake pipeline would result in open trench construction taking place as close as 25 feet from the nearest noise sensitive receptors. As shown in the certified EIR at Table 3.8-6, at this distance, noise from pipeline construction using open trench installation would exceed the County of Santa Cruz daytime noise standard of 75 dBA, $L_{eq}$. Even with implementation of Mitigation Measure NOI-1a, this impact would remain the same as discussed in the certified EIR, ***significant and unavoidable***.

### College Lake Pipeline – Trenchless Pipeline Installation

Trenchless pipeline installation (likely jack and bore) and sheet pile driving would be required at five locations along the modified alignment: Salsipuedes Creek, SR 129, railroad crossing, SR 129 (for well connection pipeline), and SR 1 (refer to Figures 2-5a through 2-5f). Trenchless pipeline construction generally requires continuous excavation. Consequently, pipeline construction at these five locations could occur for up to 24 hours per day and (for longer tunneling) several days in a row. Since the vibratory pile driver would be used during the construction of the boring pits, vibratory pile driving and trenchless pipeline construction would not occur at the same time.

The SR 1 crossing would be located within Santa Cruz County. However, as there are no sensitive receptors within 1,000 feet of this crossing, the impact would be less than significant. The other four crossings (Salsipuedes Creek, SR 129, railroad, and SR 129 well connection pipeline) would be located fully or partly within the City of Watsonville. Therefore, 24-hour construction associated with trenchless construction would be in conflict with the allowed construction hours in the City of Watsonville noise ordinance and would result in a significant impact. Implementation of Mitigation Measure NOI-1b will require PV Water to provide temporary hotel accommodations for all residents who would like it within 200 feet of where nighttime drilling activities would occur, which is the approximate noise contour distance to the Santa Cruz County nighttime standard of 60 dBA $L_{eq}$. Although the boring sites associated with these crossings are not within the County of Santa Cruz, the County's nighttime noise standard is used to determine which sensitive receptors should be offered hotel accommodations. Single-family residences are located approximately 150 feet from the SR 129 crossing. There are no residences located within 200 feet of the Salsipuedes Creek, Railroad, and SR 129 well connection pipeline crossings. Therefore, Mitigation Measure NOI-1b will apply only to the receptors within 200 feet of the SR 129 crossing. Nevertheless, since trenchless pipeline construction activities would occur outside of the allowed construction hours specified in the City of Watsonville noise ordinance, this impact would remain the same as that discussed in the certified EIR, ***significant and unavoidable with mitigation***.

### *Operation*

Operation of the modified College Lake pipeline would not result in a source of noise. The primary noise sources associated with modified Project operation would be the same as those described in the EIR, and include pumps and air compressors at the modified weir structure, at the adjacent unmodified intake pump station, and at the modified WTP. There would be no changes to operational activities and equipment associated with these Project components. The modified weir structure, unmodified intake pump station, and modified WTP would be located entirely within unincorporated Santa Cruz County and would be subject to noise standards in the County's General Plan, which limits noise from stationary sources to 50 dBA $L_{eq}$ during the daytime hours and 45 dBA $L_{eq}$ during the nighttime hours. As shown in certified EIR Table 3.8-7, none of the sensitive receptors near the modified weir structure, unmodified intake pump station, or modified WTP would be exposed to noise levels that exceed these standards from the operation of pumps and air compressors. Therefore, the operational impact of the Project related to exposure of persons to, or generation of, noise levels in excess of the local general plan standards would remain as that described in the certified EIR, ***less than significant***.

## Issue b) Generate excessive groundborne vibration during Project construction

### *Weir Structure, Intake Pump Station and WTP*

The location of the modified weir structure, unmodified intake pump station, and modified WTP, the nearest noise sensitive receptors in their vicinity, and equipment proposed to be used for the construction of these components remain the same as that discussed in the certified EIR. As shown in the certified EIR at Table 3.8-8, none of the onsite construction equipment proposed to be used for construction of these Project components would expose nearby residential structures to vibration levels that would exceed the applied human annoyance or building damage thresholds. Drilling associated with construction of the potable water well would generate vibration levels of 0.089 in/sec PPV at 25 feet which is already less than the thresholds for building damage and human annoyance; hence, the nearest receptor at 900 feet from the well would not experience any vibration impacts. Therefore, vibration impacts from construction of these Project components would remain the same as discussed in the certified EIR, ***less than significant***.

### *College Lake Pipeline – Open Trench Installation*

Similar to the alignment analyzed in the certified EIR, sensitive receptors would be located as close as 25 feet from the modified alignment of the College Lake pipeline where open trench installation is proposed. However, there are no historic resources along the modified pipeline alignment as it would avoid the historic or potentially historic buildings in the City of Watsonville. Impacts associated with human annoyance and building damage to residential or modern structures would therefore be the same as discussed in the certified EIR, ***less than significant***. The modified pipeline alignment ensures there would be no impacts to historic buildings.

### *College Lake Pipeline – Trenchless Installation*

Trenchless construction along the modified College Lake pipeline would require the use of a vibratory pile driver to install sheet piles at the pit areas. Residences along the modified alignment would be located farther away than from the alignment analyzed in the certified EIR with the nearest residences approximately 110 feet from the trenchless installation site at SR 129 crossing near Blackburn Street. There are no residences close enough to the other trenchless installation sites to result in vibration levels that exceed the human annoyance and modern building damage thresholds during vibratory pile driving or horizontal directional drilling. Further, there are no historic resources identified in the vicinity of any of the trenchless installation sites. Therefore, vibration impacts associated with human annoyance and building damage to residential or modern structures from trenchless construction along the modified College Lake pipeline alignment would be the same as discussed in the certified EIR, ***less than significant***. There would be no impacts to historic resources; therefore, Mitigation Measure NOI-2 would not be requiredand the impact to historic resources would be less than that described in the certified EIR.

## Conclusion

Based on the analysis presented above, with implementation of mitigation measures, the modified Project would not result in new or more significant impacts related to noise and vibration than those described in the certified EIR.

# 3.6 Cultural Resources

| *Issues (and Supporting Information Sources):* | *Potentially Significant Effects Not Identified in Prior EIR* | *Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR* | *No New or More Severe Significant Effects* |
|---|---|---|---|
| **CHECKLIST 3.6, CULTURAL RESOURCES — Would the Project:** | | | |
| a) Cause a substantial adverse change in the significance of a historical resource pursuant to in Section 15064.5? | ☐ | ☐ | ☒ |
| b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5? | ☐ | ☐ | ☒ |
| c) Disturb any human remains, including those interred outside of formal cemeteries? | ☐ | ☐ | ☒ |

## Setting

The setting related to cultural resources for College Lake and the proposed locations for the modified weir structure, the unmodified intake pump station, and the modified WTP sites would remain the same as described in the certified EIR at Section 3.10.1. While the modified College Lake pipeline alignment would still extend through areas of unincorporated Santa Cruz County and the City of Watsonville (refer to Figure 2-1 in Chapter 2, *Project Description*), the setting for the modified College Lake pipeline related to cultural resources has changed from that described in the certified EIR, Section 3.10.1, and is described below.

### Identification of Historical and Archaeological Resources

#### *Previously Recorded Archaeological and Historical Architectural Resources*

ESA reviewed the previous California Historical Resources Information System (CHRIS) Northwest Information Center (NWIC) cultural resources records results, which were conducted as part of the previous cultural resources assessment report for the unmodified Project.[7] No archaeological resources have been previously recorded within the modified College Lake pipeline alignment. One built environment resource (P-44-000395 – Watsonville Historic District) overlaps the modified College Lake pipeline alignment. The Watsonville Historic District encompasses the City of Watsonville boundary. The district has not been evaluated for listing in the National Register or California Register, nor have contributors and non-contributors been identified.

A review of the online Built Environment Resources Directory for Santa Cruz County did not indicate that any other built environment resources have been documented within the modified College Lake pipeline alignment.

7 Ehringer, C., C. Lockwood, M. Loder, F. Clark, *College Lake Integrated Resources Management Project, City of Watsonville and Unincorporated Santa Cruz County, California: Cultural Resources Assessment Report.* Prepared by Environmental Science Associates, March 2020.

### *Cultural Resources Survey*

A cultural resources survey of the modified College Lake pipeline alignment was conducted on November 16, 2021. Additional parcels along SR 129, just west of the intersection with Lakeview Road were surveyed on March 14, 2022, when additional land access was provided. Approximately 55 percent of the modified College Lake pipeline alignment was subject to a systematic pedestrian survey. Approximately 15 percent was subject to an opportunistic survey. The remaining 30 percent could not be surveyed since the modified pipeline alignment was completely within paved roadways lacking ground surface visibility or was not accessible (no landowner permission to access). Ground visibility ranged from 0 to 75 percent within areas subject to pedestrian survey. No previously unrecorded cultural resources (built environment or archaeological) were identified as a result of the survey.

### *Historic Maps and Aerial Photographs*

Historic maps, aerial photographs, and Sanborn maps were examined to provide historical information about past land uses in the vicinity of the modified Project and to contribute to an assessment of the modified College Lake pipeline's archaeological sensitivity. Review of the topographic maps and aerials indicate that a portion of the modified College Lake pipeline alignment passes through the City of Watsonville, which has been in existence since the mid-1800s. The remainder of the modified College Lake pipeline alignment appears to have been largely rural and agricultural.

Review of Sanborn maps indicate that the portion of the modified College Lake pipeline alignment located in the City of Watsonville along present-day SR 129 (Riverside Drive) between Union Street and Rodriguez Street was occupied by various ethnic groups from the late 1800s to the 1960s. In particular, the area appears to have housed Chinese and Japanese enclaves. The maps depict Chinese gambling halls, washing houses, and restaurants, and Japanese lodgings, grocers, pool rooms, clubs, general merchants, an opera house, school, and laundry.

## Sacred Lands File Search

The California Native American Heritage Commission (NAHC) maintains a confidential Sacred Lands File (SLF) which contains sites of traditional, cultural, or religious value to the Native American community. The NAHC was contacted on December 14, 2021 to request a search of the SLF. The NAHC responded to the request in a letter dated February 28, 2022 indicating that the results were positive. The letter did not provide details on the resources identified within the modified College Lake pipeline alignment, but recommended that the Costanoan Ohlone Rumsen-Mutsen Tribe be contacted for additional information.

### Geoarchaeological Review

A desktop geoarchaeological review was conducted as part of the previous cultural resources assessment report[8] in order to assess the potential to encounter subsurface prehistoric archaeological resources during ground disturbance. The geoarchaeological study was based on a review of previously recorded archaeological sites obtained through records searches at the CHRIS-NWIC, a literature review, and a review of geologic maps, soils maps, and historical aerial photos and maps. An addendum to the cultural resources survey report updated the analysis to cover the modified College Lake pipeline alignment.[9]

The updated geoarchaeological review indicates that portions of the modified pipeline alignment (mapped as *Qof*) are considered to have a high sensitivity for prehistoric archaeological resources and that these resources could be shallowly or deeply buried, while other portions (mapped as *Qyf*) are considered to have a moderate to low sensitivity for prehistoric archaeological resources. Other portions (mapped as *Qwf*), which are adjacent to, but not within the modified pipeline alignment, have a high sensitivity for shallow prehistoric archaeological resources and low sensitivity for deep cultural resources. As indicated on **Figure 3.6-1**, areas with high sensitivity for shallow and deep cultural resources are shaded purple; and areas with moderate to low sensitivity are shaded orange. Areas adjacent, but not within, that show high sensitivity (shallow cultural resources)/low sensitivity (deep cultural resources) are shaded green.

## Findings of Previously Certified EIR

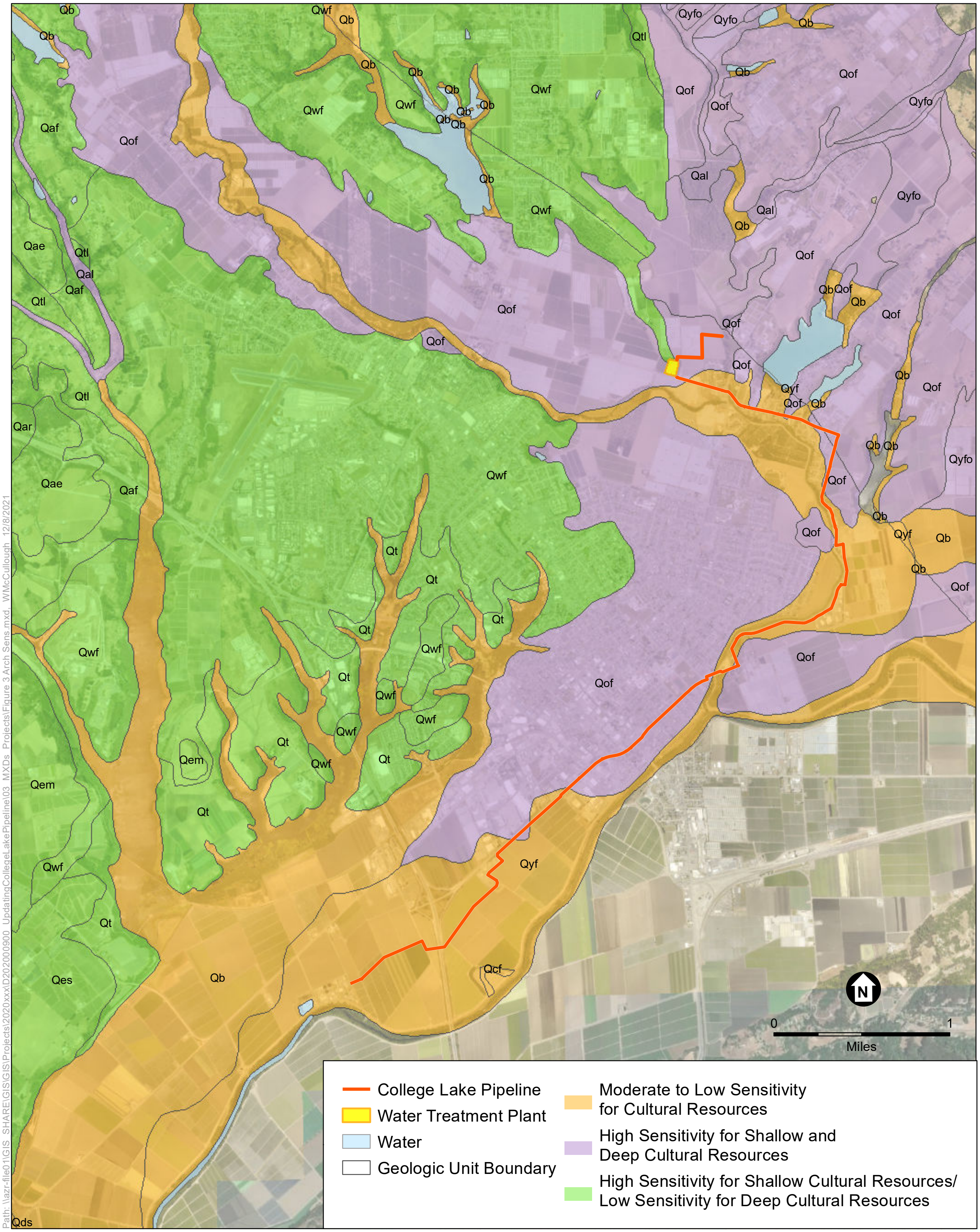
The certified EIR determined that all project impacts related to cultural resources would be less than significant with mitigation. Chapter 5, *Mitigation Monitoring and Reporting Program*, reproduces adopted mitigation measures applicable to cultural resources impacts from the Project.

## Discussion

Cultural Resources issues analyzed for the modified Project are summarized in Checklist 3.6 above. Impacts to cultural resources related to construction and operation of the modified weir structure, the adjacent and unmodified intake pump station, and the modified WTP (all criteria) would generally remain the same as those described in the certified EIR. Impacts related to the modified College Lake pipeline alignment are discussed below.

8 Ehringer, C., C. Lockwood, M. Loder, F. Clark, *College Lake Integrated Resources Management Project, City of Watsonville and Unincorporated Santa Cruz County, California: Cultural Resources Assessment Report.* Prepared by Environmental Science Associates, March 2020.

9 Ehringer, C., A. Sims, F. Clark, *College Lake Integrated Resources Management Project: Cultural Resources Assessment Report Addendum.* Prepared by Environmental Science Associates, March 2022.




SOURCE: USGS, 1997; ESA, 2017

College Lake Integrated Resources Management Project - Addendum

**Figure 3.6-1**
Archaeological Sensitivity

ESA

## Issue a) Cause a substantial adverse change in the significance of a historical resource pursuant to CEQA *Guidelines* Section 15064.5

The following discussion focuses on architectural resources. Archaeological resources, including archaeological resources that are potentially historical resources according to CEQA *Guidelines* Section 15064.5, are addressed below at Issue b.

No historical resources would be directly impacted by the modified College Lake pipeline alignment. While portions of the modified College Lake pipeline traverse the Watsonville Historic District, which is considered to be a historical resource by PV Waterpursuant to CEQA *Guidelines* Section 15064.5(a)(4). However, pipeline construction would be limited to existing paved road rights-of-ways in these areas, and would not directly result in a substantial adverse change to historical resources. As such, no mitigation measures are required and the impact would be ***less than significant***.

## Issue b*)* 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

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).

No known archaeological resources were identified during the records search or pedestrian survey. The geoarchaeological review described above indicates that portions of the modified College Lake pipeline alignment are generally considered to have a high sensitivity (refer to Figure 3.6-1) for shallow or deeply buried prehistoric archaeological resources, while other portions are considered to have a moderate to low sensitivity for prehistoric archaeological resources. The areas with the highest potential to encounter historic-period archaeological resources includes the area in Watsonville along present-day SR 129 (Riverside Drive) between Union Street and Rodriguez Street, which appears to have housed Chinese and Japanese enclaves.

As no archaeological resources are known to exist within the modified College Lake pipeline alignment, no impacts are expected to occur. However, the modified Project has the potential to result in a substantial adverse change in the significance of unknown archaeological resources from ground disturbance. With implementation of adopted Mitigation Measures CUL-1a through CUL-1i, which require retention of a qualified archaeologist, pre-construction surveys, development of a cultural resources monitoring and mitigation program, construction worker cultural resources sensitivity training, archaeological and Native American monitoring, treatment of inadvertent discoveries, and long-term monitoring of CA-SCR-44/H and CA-SCR-150, impacts to archaeological resources would be reduced to ***less than significant with mitigation***. Mitigation Measure CUL-1c has been revised as indicated in Chapter 5, *Mitigaiton Monitoring and Reporting Program*, to reflect modifications to the College Lake pipeline.

### *c)* Disturb any human remains, including those interred outside of formal cemeteries

No archaeological sites with Native American burials have been previously recorded within the modified College Lake pipeline alignment. However, pursuant to the cultural resources assessment report[10] for the modified Project, there are known archaeological sites with Native American burials, as well as formal cemeteries, in the vicinity of the modified Project. Additionally, the SLF conducted for the modified pipeline alignment indicated that the results were positive. Given the prehistoric occupation of the area and the high sensitivity for buried prehistoric resources, there is a potential for modified Project-related ground disturbance to disturb human remains, including those outside of formal cemeteries. With implementation of adopted 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, impacts to human remains would be ***less than significant with mitigation***.

## Conclusion

Based on the analysis presented above, the modified College Lake pipeline alignment would not result in new or more significant environmental impacts related to historical resources, unique archaeological resources, and human remains than those described in the certified EIR. Similarly, no new information of substantial importance related to cultural resources has been identified in relation to the modified Project.

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[10] Ehringer, C., C. Lockwood, M. Loder, F. Clark, *College Lake Integrated Resources Management Project, City of Watsonville and Unincorporated Santa Cruz County, California: Cultural Resources Assessment Report.* Prepared by Environmental Science Associates, March 2020.

# CHAPTER 4
# Conclusion

The modifications to the College Lake Integrated Resources Management Project (modified Project) would not result in new or more severe significant impacts than those attributable to the Project described in the Environmental Impact Report certified in October 2019 (certified EIR).

The analyses and discussion in Chapter 3 of this Environmental Impact Report Addendum (EIR Addendum) do not indicate substantial changes in the Project which require major revisions to the certified EIR due to involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects. There have been no substantial changes in circumstances under which the Project is undertaken that would result in new significant environmental impacts or substantially more severe impacts, and no new information of substantial importance has become available that would indicate the potential for new significant impacts or substantially more severe impacts than were discussed in the EIR. Therefore, no further evaluation is required, and no Subsequent EIR or Supplement to an EIR is needed pursuant to Public Resources Code section 21166 and CEQA Guidelines sections 15162 and 15163.

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# CHAPTER 5

# Mitigation Monitoring and Reporting Program – College Lake Integrated Resources Management Project

Section 21081.6 of the California Environmental Quality Act (CEQA) requires a Lead Agency to adopt a Mitigation Monitoring and Reporting Program (MMRP) whenever it approves a project for which mitigation measures have been required to mitigate or avoid significant effects on the environment. The MMRP presented in Table 5-1 reproduces mitigation measures that were adopted by PV Water's Board of Directors on October 16, 2019. The purpose of the MMRP is to ensure compliance with the mitigation measures during implementation of the modified College Lake Integrated Resources Management Project.

Several mitigation measures have been revised to reflect changes in the Project design. Added text is shown as underline and deleted text is shown as ~~strikethrough~~.

**TABLE 5-1**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Land Use and Agricultural Resources** | | | | |
| **LU-1a: Promote Farming**<br>To reduce the amount of Farmland of Statewide Importance and Unique Farmland converted to other uses and in coordination with affected landowners, PV Water shall adopt practices to promote farming within the areas depicted with red hatching on Figure 3.2-4 of the College Lake Integrated Resources Management Project EIR. Such practices may include, but are not limited to, the following:<br>• Maintain, improve and potentially expand tile drain systems.<br>• If controlling land by easement, establish terms that require land owners to cultivate crops or otherwise productively use the land for agricultural purposes at least once every five years, hydrologic conditions permitting.<br>• If acquiring land outright, enter into lease arrangements for the land to be cultivated or otherwise productively used for agricultural purposes at least once every five years, hydrologic conditions permitting. | CL | 4. Post construction | PV Water | |
| **LU-1b: Compensate for Conversion of Important Farmland**<br>*Track Conversion of Important Farmland.* PV Water shall review California Department of Conservation's Farmland Mapping and Monitoring Program farmland designations for College Lake annually beginning with the first year of construction and continuing for five years of Project operation. PV Water shall identify Prime Farmland, Farmland of Statewide Importance, and Unique Farmland referred to herein as Important Farmland that is within the College Lake basin below elevation 63 feet NAVD88 that converts due to water management operations.<br>*Establish Memorandum of Understand 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 Project. 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 Project; 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 Project.<br>*Contribute to Agricultural Easement Fund.* PV Water shall initially designate funds to secure easements for up to 6 acres of Prime Farmland to offset impacts associated with the water treatment plant. In addition, for Prime Farmland, Farmland of Statewide Importance, or Unique Farmland within the lake basin that the Department of Conservation converts to non-agricultural designations after the Project has operated for a period of one year, PV Water shall designate for the Agricultural Easement Fund an amount to cover the costs associated with acquisition of agricultural easements of equivalent Farmland Mapping and Monitoring Program designation value.<br>*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. | CL<br>WTP | 2. Pre-Construction<br>3. Construction<br>4. Post Construction | PV Water<br>Santa Cruz Land Trust (Potential) | |

**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Land Use and Agricultural Resources (cont.)** | | | | |
| **LU-1c: Replacement of Topsoil**<br>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:<br>• Strip 18 inches of topsoil from the area excavated unless otherwise stipulated by the landowner. The topsoil shall be stored separately from subsoil and other construction materials.<br>• 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.<br>• Stockpile topsoil on the same property from which it was stripped and return topsoil to same property from which it was stripped. | W<br>WTP<br>CLP | 3. Construction<br>4. Post Construction | Contractor to implement; PV Water to monitor | |
| **Surface Water, Groundwater, and Water Quality** | | | | |
| ****HWQ-1:** 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:<br>• Source identification<br>• Preparation of a site map<br>• Description of construction materials, practices, and equipment storage and maintenance<br>• List of pollutants likely to contact stormwater<br>• Estimate of the construction site area and percent impervious area<br>• 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<br>• Proposed construction dewatering plans<br>• Provisions to eliminate or reduce discharge of materials to stormwater<br>• Description of waste management practices<br>• Maintenance and training practices | W<br>WTP<br>CLP | 2. Pre-Construction<br>3. Construction | Contractor to implement; PV Water to monitor | |

NOTES: CL = College Lake; W = Weir Structure; WTP = Water Treatment Plant; CLP = College Lake Pipeline

**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Surface Water, Groundwater, and Water Quality (cont.)** | | | | |
| ****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. | W | 1. Design | PV Water | X |
| ****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:<br>1. Improving irrigation efficiency<br>2. Modifying irrigation and agricultural operations<br>3. Lowering the pump in the irrigation well<br>4. Lowering and changing the pump in the irrigation well<br>5. Adding storage capacity for irrigation supply<br>6. Replacing the irrigation well<br>7. Replacing the irrigation water source.<br>To determine if well production loss can be attributed to one of the project components, the PVWMA will allow well owners to enroll in a monitoring and mitigation program (MMP). PVMWA 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, PVWMA 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 PVWMA 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 PVWMA staff or their designee, for review and concurrence. | CL<br>W | 4. Post Construction | PV Water | |

NOTES: CL = College Lake; W = Weir Structure; WTP = Water Treatment Plant; CLP = College Lake Pipeline

**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Surface Water, Groundwater, and Water Quality (cont.)** | | | | |
| ****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. | W<br>WTP | 1. Design | PV Water | X |
| **HYD-1: Implement Dewatering Best Management Practices for In-Water Construction**<br>For in-water construction during pipeline installation activities, 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 Salsipuedes and Pinto Creeks meet water quality objectives. This work shall be timed to take place as flows are receding and only after 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.<br>1. All work performed in-water shall be completed in a manner that meets the water quality objectives to ensure the protection of beneficial uses as specified in the 2017 Basin Plan.<br>2. All dewatering and diversion methods shall be installed such that natural flow is maintained upstream and downstream of the Project area.<br>3. 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.<br>4. Screened pumps shall be used in accordance with CDFW'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.<br>5. Cofferdams shall remain in place and functional throughout the in-stream construction.<br>6. Disturbance of protected riparian vegetation shall be limited or avoided entirely. | W<br>WTP<br>CLP | 2. Pre-Construction<br>3. Construction | Contractor to implement, PV Water to monitor | |
| **HYD-2a: Water Quality Adaptive Management for College Lake**<br>To learn about potential impacts of the Project on College Lake water quality and the quality of downstream water bodies, PV Water shall monitor College Lake water for indications of Cyanobacteria blooms. When the proposed weir crest is elevated to 62.5 feet NAVD88, PV Water shall monitor College Lake water temperature within the water column to establish whether a thermocline develops. PV Water shall use results of this monitoring to support the development of the Adaptive Management Plan (refer to Section 2.7) that establishes management actions to minimize the conditions that can contribute to algal blooms, including cyanobacteria blooms, such that this impact is mitigated. | CL | 4. Post Construction | PV Water | |

NOTES: CL = College Lake; W = Weir Structure; WTP = Water Treatment Plant; CLP = College Lake Pipeline

**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Surface Water, Groundwater, and Water Quality (cont.)** | | | | |
| **HYD-2b: Scour Analysis for Pinto Creek Crossing**<br><br>To reduce Project impacts on erosion and sedimentation, PV Water shall evaluate the potential for scour and channel bank erosion due to the Pinto Creek pipeline crossing. The analysis shall recommend a design depth for the pipeline crossing that avoids scour, estimated using standard engineering methods. PV Water shall implement the pipeline depth that avoids scour in final project design. | CLP | 1. Design<br>2. Pre-Construction | PV Water | |
| **HYD-3: Avoid Flooding at Pajaro Dunes During Pumped Flow**<br><br>PV Water shall not pump flow exceeding fish passage requirements into Salsipuedes Creek until receiving approval from the Santa Cruz County Flood Control District indicating that pumped flow can occur without lagoon breaching, based on current water surface elevation conditions in Pajaro Lagoon. Existing hypsometric curves will be used to develop a lookup table to relate capacity of College Lake and Pajaro Lagoon that will assess whether pumped flows would require lagoon breaching. PV Water pumped flows shall not result in lagoon water surface elevations exceeding the threshold elevation identified based on the lookup table. The College Lake operations plan will discuss scenarios where lake draining activities may supersede lagoon flooding and breaching activities. | CL | 4. Post construction | PV Water | |
| **Biological Resources** | | | | |
| ****BIO-1a:** 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. | W<br>CLP | 1. Design<br>2. Pre-Construction<br>3. Construction<br>4. Post Construction | PV Water | |
| ****BIO-1b:** Standard measures to maintain water quality and to control erosion and sedimentation will be implemented. These measures include:<br>• Restrict trenching across all waterways to low-flow periods.<br>• 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.<br>• 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.<br>• 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. | W<br>CLP | 2. Pre-Construction<br>3. Construction<br>4. Post Construction | Contractor to implement, PV Water to monitor | |

NOTES: CL = College Lake; W = Weir Structure; WTP = Water Treatment Plant; CLP = College Lake Pipeline

**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Biological Resources (cont.)** | | | | |
| • 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.<br>• 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.<br>• 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).<br>• 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.<br>• 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. | | | | |
| ****BIO-2:** 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.<br>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. | W<br>WTP<br>CLP | Varies (se Mitigation Measures BIO-2a through 2p) | PV Water | |
| ****BIO-2a:** 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. | W<br>WTP<br>CLP | 1. Design<br>3. Construction | Contractor to implement, PV Water to monitor | |
| ****BIO-2b:** 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. | W<br>WTP<br>CLP | 1. Design<br>3. Construction | Contractor to implement, PV Water to monitor | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Biological Resources (cont.)** | | | | |
| ****BIO-2c:** 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. | W<br>WTP<br>CLP | 1. Design<br>3. Construction | Contractor to implement, PV Water to monitor | |
| ****BIO-2d:** 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. | W<br>WTP<br>CLP | 3. Construction | PV Water and qualified biologist | |
| ****BIO-2e:** 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. | W<br>WTP<br>CLP | 2. Pre-Construction | Contractor to implement, PV Water to monitor | |
| ****BIO-2f:** 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. | W<br>CLP | 3. Construction | PV Water and qualified biologist | |
| ****BIO-2g:** 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. | W<br>WTP<br>CLP | 2. Pre-Construction<br>3. Construction | PV Water and qualified biologist | |
| ****BIO-2h:** 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. | W<br>WTP<br>CLP | 2. Pre-Construction<br>3. Construction | PV Water and qualified biologist | |
| ****BIO-2i.1:** Develop Adaptive Management Plan for College Lake Waterfowl Management and Multi- Species Mitigation. To mitigate impacts to existing waterfowl or waterfowl habitat at College Lake, an Adaptive Management Plan for waterfowl management and multi-species mitigation will be developed with the consultation of the state and federal resource agencies and College Lake stakeholders. The Adaptive Management Plan for waterfowl management and multi-species mitigation at College Lake will develop multi-year baseline waterfowl population and habitat use data for future project design, environmental permitting and CEQA impact analysis of project-level alternatives. To the extent practical, it will integrate the results of ongoing College Lake hydrology and hydraulic analyses, as well as future consultations with state and federal agencies on fish flows and fish bypass criteria. | CL | 1. Design<br>2. Pre-Construction<br>3. Construction<br>4. Post Construction | PV Water | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Biological Resources (cont.)** | | | | |
| The Management Plan will be specific to the level of impact and mitigations under site-specific and project implementation conditions. However, the following standards will apply as defined during project-level design, regulatory review and CEQA analysis: The Management Plan should include terms and conditions from applicable permits and agreements as appropriate and define provisions for monitoring assignments, scheduling, and responsibility. The Management Plan should also include habitat replacement and revegetation, protection during ground-disturbing activities, performance standards, maintenance criteria, and monitoring requirements for temporary and permanent impacts consistent with mitigation in this EIR and regulatory requirements during project- specific review. The Management Plan will be in conformance with the biology mitigation measures from this EIR, and will also include terms and conditions consistent regulatory requirements as applicable from the USFWS, USACE, SWRCB, and CDFW permits during project design and permitting as applicable. The Management Plan will be prepared for project level project implementation as determined needed through future CEQA review and consultation with agencies as required under CESA and ESA. | | | | |
| ****BIO-2l (FISH):** The following measures are required to reduce impacts to special status fisheries, including steelhead and resident rainbow trout, to a less-than- significant level:<br>FISH-1. A NOAA Fisheries-approved, qualified fisheries biologist would be onsite to provide preconstruction training on steelhead life-history to construction crews and to provide daily monitoring during construction activities.<br>FISH-2. If the preliminary construction concept proposes the use of temporary coffer dams for isolating the work areas at the upstream and downstream extent of the project, installation and removal of the temporary coffer dams would be monitored by the qualified fisheries biologist.<br>FISH-3. Following initial construction of the coffer dam bypass system, isolated standing water would be pumped from the work area to adjacent vegetated terraces, settling tanks or back into the river, if turbidity is not elevated more than 10% of background turbidity levels.<br>FISH-4. If a work site is to be temporarily de-watered by pumping, intakes will be completely screened with wire mesh not larger than 0.2 inch to prevent steelhead or other native fish 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.<br>FISH-5. The installation and removal of the coffer dam structures would be controlled to minimize turbidity in the water.<br>FISH-6. The use of best management practices would be implemented to reduce the probability of sediment and/or contaminated material from entering the creek. | W | 1. Design<br>2. Pre-Construction<br>3. Construction<br>4. Post Construction | PV Water and qualified biologist | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Biological Resources (cont.)** | | | | |
| ****BIO-2m:** No water shall be diverted from College Lake from the time the lake begins filling in late fall/early winter through the end of the smolt outmigration period (approximately May 31 or June 15) unless sufficient bypass flows are provided at the dam for unimpeded adult upstream migration through March 31, and sufficient bypass flows are provided at the dam for unimpeded smolt outmigration through May 31. The precise bypass flow levels required to achieve unimpeded migrations are not known at this time. After May 31 or June 15, the entire storage of College Lake could potentially be diverted. College Lake would likely be too warm to allow summer rearing by steelhead, especially in the presence of warm water predatory fishes. | W | 1. Design<br>4. Post Construction | PV Water | |
| ****BIO-2n:** Protection of Steelhead Migratory Habitat – HWQ-Impacts to steelhead migration passage shall be minimized by carrying out construction in College Lake/Casserly Creek/Salsipuedes Creek after June 1 and prior to November 1, during which time adults and smolts do not migrate through the area. | W | 1. Design<br>3. Construction | Contractor to implement, PV Water to monitor | |
| ****BIO-2o:** Protection of Steelhead Migratory Habitat - The proposed College Lake with Inland Pipeline to Coastal Distribution System component shall be operated such that it complies with all minimum required bypass flow requirements during the steelhead migration period, including those developed through a new bypass flow study to be conducted by a qualified fisheries biologist in consultation with the relevant regulatory agencies. | W | 4. Post Construction | PV Water and qualified biologist | |
| ****BIO-2p:** The PVWMA shall install and operate surface-water streamflow gaging stations on Casserly Creek upstream and on Salsipuedes Creek downstream of the proposed College Lake diversion structure to monitor available diversion inflows and to provide and document future Biological Opinion-required fish bypass flows. | W | 1. Design<br>2. Pre-Construction<br>3. Construction<br>4. Post Construction | PV Water | |
| ****BIO-3a:** 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. | W<br>WTP<br>CLP | 1. Design<br>2. Pre-Construction<br>3. Construction | PV Water and qualified biologist | |
| ****BIO-3b:** 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 | W<br>WTP<br>CLP | 2. Pre-Construction<br>3. Construction<br>4. Post Construction | PV Water and qualified biologist | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Biological Resources (cont.)** | | | | |
| 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. | | | | |
| **BR-1a: Fish Relocations**<br><br>Prior to, or concurrent with, draining of College Lake and/or dewatering of the construction site, special-status and other native fish species shall be captured and relocated by a qualified fisheries biologist. The following measures shall be taken to minimize harm and mortality to steelhead and other native fish resulting from fish relocation and dewatering activities:<br><br>1. Fish relocation shall be performed by a qualified fisheries biologist, with all necessary state and federal authorizations. Captured fish shall be moved to the nearest appropriate site outside of the work area. A record of relocation activities shall be maintained and include the date of capture and relocation, the method of capture, the location of the relocation site in relation to the Project site, and the number and species of fish captured and relocated;<br>2. Electrofishing shall be conducted by properly trained personnel following NOAA Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act, June 2000.<br>3. Prior to capturing fish, the most appropriate release location(s) shall be determined.<br>4. The most efficient method for capturing fish shall be determined by the biologist. Complex stream habitat generally requires the use of electrofishing equipment, whereas in outlet pools, fish may be concentrated by pumping-down the pool and then seining or dip-netting fish.<br>5. Handling of salmonids shall be minimized. However, when handling is necessary, hands or nets shall be wetted prior to touching fish.<br>6. Captured fish shall be held in cool, shaded, aerated water in a container with a lid. Aeration shall be provided with a battery-powered external bubbler. Fish shall be protected from jostling and noise, and shall not be removed from this container until time of release.<br>7. Air and water temperatures shall be measured periodically. A thermometer shall be placed in holding containers and, if necessary, periodically conduct partial water changes to maintain a stable water temperature. If water temperature reaches or exceeds 18 degrees Celsius, fish shall be released and rescue operations ceased, if feasible.<br>8. Overcrowding in containers shall be avoided by having at least two containers and segregating young-of-year fish from larger age-classes to avoid predation. If fish are abundant, the capturing of fish and amphibians shall cease periodically and shall be released at the predetermined locations.<br>9. Species and year-class of fish shall be visually estimated at time of release. The number of fish captured shall be counted and recorded. Anesthetization or measuring fish shall be avoided unless requested by appropriate resource agencies (NMFS, CDFW). | CL<br>W | 2. Pre-Construction<br>3. Construction | PV Water and qualified biologist | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Biological Resources (cont.)** | | | | |
| 10. Fish relocation activities are typically restricted to the period of June 15 through November 1. However, draining of College Lake may have to commence prior to June 1 to ensure the lake is fully drained prior to the start of construction. If lake draining commences prior to June 1 (as it regularly does under existing conditions), fish relocations would be timed accordingly. Given that steelhead present at the time of draining are likely to be smolts attempting to reach the ocean, pre-June 1 relocations concurrent with lake draining would ensure suitable downstream passage conditions and timing for relocated smolts. | | | | |
| **BR-1b: Frac-out Contingency Plan**<br>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, RWQCB, USACE, USFWS, and NMFS) 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: | CLP | 1. Design<br>3. Construction | Contractor to implement, PV Water to monitor | |
| 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;<br>2. Methods for preventing frac-out including maintaining pressure in the borehole to avoid exceeding the strength of the overlying soil.<br>3. Methods for detecting an accidental release of bentonite slurry that include: (a) monitoring by a minimum of one biological 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.<br>4. Protocols that the contractor would follow if there is a loss of circulation or other indicator of a release of slurry.<br>5. Cleanup and disposal procedures and equipment the contractor would use if a frac-out occurs.<br>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.<br>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. | | | | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Biological Resources (cont.)** | | | | |
| **BIO-1c (Revised)**<br><br>Where construction impacts on mixed riparian or willow riparian forest occur, revegetation and restoration 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 applicable agencies, PV Water may choose to coordinate with the Natural Resources Conservation Service 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 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 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. | W<br>CLP | 1. Design<br>2. Pre-Construction<br>3. Construction<br>4. Post Construction | PV Water | |
| **BIO-1d (Revised)**<br><br>Where construction impacts on open water (creeks, streams, jurisdictional ditches), seasonal wetlands, or coastal freshwater marsh occurs, revegetation and restoration measures will be developed as part of a revegetation plan approved by CDFW, RWQCB, USACE, California Coastal Commission, and/or Santa Cruz County, pursuant to regulatory agency permitting. Upon approval by applicable agencies, PV Water may choose to coordinate with the Natural Resources Conservation Service and the Santa Cruz County 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 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 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. | W<br>CLP | 1. Design<br>2. Pre-Construction<br>3. Construction<br>4. Post Construction | PV Water | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Biological Resources (cont.)** | | | | |
| **BR-1c: Avoid and Minimize Impacts on Special-status Bat Species**<br>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.<br>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:<br>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).<br>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.<br>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.<br>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.<br>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.<br>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.<br>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). | W<br>WTP<br>CLP | 2. Pre-Construction<br>3. Construction | PV Water and qualified biologist | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Biological Resources (cont.)** | | | | |
| 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.<br>a. Trimming or removal of trees with active (non-maternity or hibernation) or potentially active roost sites shall follow a two-step removal process:<br>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).<br>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).<br>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.<br>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.<br>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. | | | | |
| **BR-1d: Avoidance and Minimization Measures for San Francisco Dusky-Footed Woodrat**<br>1. A qualified wildlife biologist shall conduct preconstruction surveys for San Francisco dusky-footed woodrat in the Salsipuedes Creek riparian corridor within the existing and proposed weir structure and intake pump station work area. The surveys shall be conducted within 14 days prior to the start of construction in suitable habitat and shall identify any woodrat nests located within 50 feet of anticipated construction disturbance areas.<br>2. If woodrat nests are found during the preconstruction surveys, the wildlife biologist shall conduct additional surveys throughout the duration of construction activities at the Project site to identify any newly constructed woodrat nests.<br>3. If nests are observed outside of the construction area, the qualified biologist shall demarcate a minimum 50-foot buffer area with orange construction fencing and require that all construction activities and disturbance remain outside of the fencing. | W | 2. Pre-Construction<br>3. Construction | PV Water and qualified biologist | |

NOTES: CL = College Lake; W = Weir Structure; WTP = Water Treatment Plant; CLP = College Lake Pipeline

**TABLE 5-1 (CONTINUED)
MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Biological Resources (cont.)** | | | | |
| 4. Active woodrat nests located within the anticipated construction disturbance areas shall be relocated. Nests shall be relocated outside of the peak breeding season as feasible to minimize disturbance to young woodrats. Woodrat breeding season is December to September with peak breeding in mid-spring. Relocation of woodrats and/or their nests shall be conducted by the qualified wildlife biologist as follows:<br>a. Clear understory vegetation from around the nest using hand tools.<br>b. After all vegetative cover has been cleared around the nest, the biologist shall gently disturb the nest to encourage the woodrat(s) to abandon the nest and seek cover in adjacent habitat.<br>c. Once the woodrats have left the nest, the biologist shall carefully relocate the nest sticks within 50 feet of the original nest location and map the location of the original nest location and relocated nest location on an aerial image of the Project site. The location of the relocated nest will offer a mix of sun and shade and be no closer than 20 feet from an existing SFDW nest. Relocation areas will be as close as possible to the original locations in similar habitat and contain biologically-suitable habitat features (e.g., stands of poison oak, coast live oaks, and dense native brush). If multiple nests are relocated, the stick piles shall be placed at least 20 feet from one another.<br>d. The qualified biologist supervising woodrat nest relocation shall ensure potential health hazards to the biologists moving nests are addressed to minimize the risk of contracting diseases associated with woodrats and woodrat nests. These include hantavirus, Lyme disease, and plague. The biologists that relocate nests shall take the following precautionary safety measures:<br>i. Wear a Cal/OSHA-certified facial respirator to reduce inhalation of potential disease causing organisms.<br>ii. Wear a white Tyvec protective suit to provide a barrier for ticks and fleas and facilitate their detection and removal and use gloves.<br>e. If young woodrats are encountered during dismantling of the nest, nest material shall be replaced and a 50-foot no-disturbance buffer shall be established around the active nest. The buffer shall remain in place until the young woodrats have matured enough to disperse on their own accord and the nest is no longer active. Nesting substrate shall then be collected and relocated to suitable habitat outside of the Project area | | | | |
| **BIO-1e (Revised)**<br>With the exception of open trench pipeline construction that is separated from riparian or wetland habitat by an existing levee, ~~W~~where construction and/or facilities are placed within a riparian or wetland development setback area (as defined in the Santa Cruz County Municipal Code), indirect impacts on 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. | W<br>CLP | 1. Design<br>2. Pre-Construction<br>3. Construction | PV Water | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Biological Resources (cont.)** | | | | |
| **BIO-2i: Nesting Bird Surveys (Revised)**<br>Prior to any project construction or maintenance activities, the project proponent will take the following steps to avoid direct losses of nests, eggs, and nestlings and indirect impacts on avian breeding success:<br>• If construction or maintenance activities occur only during the non-breeding season, between August 31 and February 1, no surveys will be required.<br>• During the breeding bird season (February 1 through August 31), a qualified biologist will survey construction or maintenance 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.<br>• Surveys will include all potential habitats within 500 feet (for raptors) of activities and all onsite vegetation including bare ground within 250 feet of activities (for all other species).<br>• 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 | W<br>WTP<br>CLP | 2. Pre-Construction<br>3. Construction | PV Water and qualified biologist | |
| **BIO-2j: CRF (Revised)**<br>The following measures for avoidance and minimization of adverse impacts on California Red-Legged Frog (*Rana draytonii*) (CRF) during construction and maintenance of the Project are those typically employed for construction activities that may result in short-term impacts on 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.<br>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 component designs, permitting and operations. CRF-1 through CRF-9 would apply only to Project locations identified as CRF habitat.<br>CRF-1. PV Water will annually submit the name(s) and credentials of biologists who would conduct activities specified in the following measures. No project activities would begin until the Agency receives approval from the Service that the biologist(s) is qualified to conduct the work.<br>CRF-2. A USFWS-approved biologist will survey the construction or maintenance 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.<br>CRF-3. Before any construction or maintenance 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 | W<br>CLP | 1. Design<br>2. Pre-Construction<br>3. Construction<br>4. Post Construction | PV Water and qualified biologist | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Biological Resources (cont.)** | | | | |
| 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.<br><br>CRF-4. A USFWS-approved biologist will be present at the construction or maintenance 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 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.<br><br>CRF-5. 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.<br><br>CRF-6. Construction and maintenance 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 USFWS approval.<br><br>CRF-7. If a construction or maintenance site is to be temporarily dewatered by pumping, and would take place within or adjacent to suitable CRF habitat, intakes will be completely screened with wire mesh not larger than five millimeters to prevent CRF from entering the pump system where applicable. Water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction or maintenance activities, any barriers to flow will be removed in a manner that would allow flow to resume with the least disturbance to the substrate.<br><br>CRF-8. 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.<br><br>CRF-9: Implement Mitigation Measure HWQ-1 through HWQ-4 in Section 3.3, Surface Water, Groundwater, and Water Quality. | | | | |
| **BIO-2k: WPT (Revised)**<br><br>The following measures for avoidance and minimization of adverse impacts on western pond turtle (*Actinemys marmorata*) (WPT) during construction and maintenance of the Project are those typically employed for construction activities that may result in short-term impacts on 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.<br><br>WPT-1. PV Water 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.<br><br>WPT-2. A CDFW-approved biologist will survey the work site 48 hours prior to the onset of construction or maintenance activities. If WPT adults or juveniles are found, the approved biologist will determine the closest | W<br>CLP | 1. Design<br>2. Pre-Construction<br>3. Construction<br>4. Post Construction | PV Water and qualified biologist | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Biological Resources (cont.)** | | | | |
| 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. If WPT eggs or nests are found, no work will be conducted within a 50-foot radius of the nest. Work can resume within the 50-foot radius once the eggs hatch and the juveniles have left the area.<br><br>WPT-3. Before any construction or maintenance 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.<br><br>WPT-4. A CDFW-approved biologist will be present at the construction or maintenance site until such time as all removal of WPT, instruction of workers, and disturbance of habitat have been completed.<br><br>WPT-5. 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. Where impacts occur in these staging areas and access routes, restoration will occur as identified in the general <u>best management practices</u> measures above | | | | |
| **BR-2: Invasive Fish Species Control Plan**<br><br>PV Water shall develop an Invasive Fish Species Control Plan. PV Water would submit the plan to the appropriate resource agencies (CDFW, USFWS, and NMFS) for approval within one year of Project implementation. The Fish Species Control Plan shall be implemented at College Lake within two years of Project implementation. The Fish Species Control Plan shall include, at a minimum:<br>1. Measures describing PV Water's methods of draining College Lake to the greatest extent feasible;<br>2. Measures describing PV Water's methods, equipment, and timing of invasive species eradication efforts to be conducted in association with lake drawdown efforts;<br>3. Measures describing the frequency at which invasive species control efforts are to be implemented. | CL | 4. Post Construction | PV Water | |
| **Air Quality and Greenhouse Gases** | | | | |
| ****AQ-1:** The construction contractor shall implement a dust program that includes the following elements:<br>• Water all active construction sites at least twice daily<br>• Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard<br>• 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<br>• Sweep daily (with water sweepers) all paved access roads, paved parking areas and paved staging areas at construction sites | W<br>WTP<br>CLP | 1. Design<br>3. Construction | Contractor to implement, PV Water to monitor | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Air Quality and Greenhouse Gases (cont.)** | | | | |
| • Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.<br>• 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<br>• Enclose, cover, water twice daily or apply (non- toxic) soil binders to exposed stockpiles (dirt, sand, etc.).<br>• Limit traffic on unpaved roads to 15 mph<br>• Install sandbags or other erosion control measures to prevent silt runoff to public roadways<br>• Replant vegetation in disturbed areas as quickly as possible<br>• 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. | | | | |
| **Geology and Soils** | | | | |
| **GS-1 (Revised)**<br>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 regarding mitigation of seismic and geologic hazards, and appropriate geotechnical studies shall be conducted. | W<br>WTP<br>CLP | 1. Design | PV Water and qualified engineer | |
| **GS-2 (Revised)**<br>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. | W<br>WTP<br>CLP | 1. Design<br>3. Construction | Contractor to implement, PV Water to monitor | |
| **GS-3 (Revised)**<br>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 (CCR Title 24). | W<br>WTP<br>CLP | 1. Design | PV Water and qualified geotechnical engineer | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Geology and Soils (cont.)** | | | | |
| **GEO-1: Inadvertent Discovery of Paleontological Resources**<br>If construction or other Project personnel discover any potential fossils during construction, work at the discovery location shall cease in a 50-foot radius of the discovery until a qualified paleontologist meeting the Society of Vertebrate Paleontology standards has assessed the discovery and made recommendations as to the appropriate treatment. If the find is deemed significant, it shall be salvaged following the standards of the Society of Vertebrate Paleontology and curated with a certified repository. Following a discovery, the qualified paleontologist shall also provide PV Water with recommendations regarding future paleontological monitoring, if deemed warranted. | W<br>WTP<br>CLP | 1. Design<br>3. Construction | Contractor to implement, PV Water to monitor | |
| **Hazards and Hazardous Materials** | | | | |
| ****HM-1:** Prior to initiation of earthwork activities, PVWMA or its designee 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 or its designee 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. | W<br>WTP<br>CLP | 1. Design<br>2. Pre-Construction | PV Water | |
| **HM-2 (Revised)**<br>Prior to initiation of earthwork activities on properties along the College Lake pipeline alignment not sampled as part of adopted Mitigation Measure HM-1, PV Water shall perform a Phase I Environmental Site Assessment for the alignment to determine the potential for encountering hazardous materials contamination in soils to be excavated and identify appropriate recommendations. Appropriate health and safety measures shall be identified as needed for worker safety, soil handling, and disposal of contaminated soils. | CLP | 1. Design<br>2. Pre-Construction<br>3. Construction | PV Water | |
| **HAZ-1a: Health and Safety Plan (HASP)**<br>Using information from the soil testing performed as part of adopted Mitigation Measure HM-1 and from the Phase I Environmental Site Assessment performed as part of adopted Mitigation Measure HM-2, PV Water shall require the construction contractor(s) to prepare and implement a site-specific HASP in accordance with 29 CFR 1910.120 to protect construction workers and the public during all excavation and grading activities. The HASP shall include, but is not limited to, the following elements:<br>1. Designation of a trained, experienced site safety and health supervisor who has the responsibility and authority to develop and implement the site HASP;<br>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;<br>3. Specified personal protective equipment and decontamination procedures, if needed;<br>4. Emergency procedures, including route to the nearest hospital; and<br>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. | W<br>WTP<br>CLP | 1. Design<br>3. Construction | Contractor to implement, PV Water to monitor | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Hazards and Hazardous Materials (cont.)** | | | | |
| These procedures shall be in accordance with hazardous waste operations regulations and specifically include, but are not limited to, the following: immediately stopping work in the vicinity of unknown discovered or suspected hazardous materials release and notifying the Santa Cruz County CUPA (415-473-7085). | | | | |
| **HAZ-1b: Soil Management Plan (SMP)**<br><br>Using information from the soil testing performed as part of adopted Mitigation Measure HM-1 and from the Phase I Environmental Site Assessment performed as part of adopted Mitigation Measure HM-2, PV Water or its contractor shall develop and implement an SMP that includes a materials disposal plan specifying how the construction contractor shall remove, handle, transport, and dispose of all excavated material in a safe, appropriate, and lawful manner. The plan shall identify protocols for training workers to recognize potential soil contamination (such as soil staining, noxious odors, debris or buried storage containers), soil testing and disposal by a qualified contractor in the event that contamination is identified, and identification of approved disposal sites (e.g., approved landfill or reuse site). Contract specifications shall mandate approval of the SMP by PV Water as well as full compliance with all applicable local, state, and federal regulations related to the identification, transportation, and disposal of hazardous materials. | W<br>WTP<br>CLP | 1. Design<br>3. Construction | Contractor to implement, PV Water to monitor | |
| **Noise and Vibration** | | | | |
| **NOI-1a: Construction Noise Reduction Plan**<br><br>PV Water shall develop and implement a Construction Noise Reduction Plan prior to initiating construction at the weir structure and intake pump station, ~~the preferred WTP site,~~ College Lake pipeline (trench construction) and trenchless construction activities near SR <u>129 and Blackburn Street</u> ~~152 and Walker Street~~. 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:<br><br>• 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.<br>• All construction equipment shall have intake and exhaust mufflers recommended by the manufacturers thereof.<br>• The use of impact and vibratory pile drivers is limited to the daytime and evening hours permissible under the County of Santa Cruz noise ordinance. All impact pile driving activities shall be restricted to the hours of 8:00 a.m. to 10:00 p.m.<br>• 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. | W<br>~~WTP~~<br>CLP | 1. Design<br>3. Construction | Contractor to implement, PV Water to monitor | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Noise and Vibration (cont.)** | | | | |
| • Impact tools (e.g., jack hammers, pavement breakers) used during construction activities shall be hydraulically or electrically powered to avoid noise associated with compressed air exhaust from pneumatically powered tools to the extent feasible. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used.<br>• 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. This measure does not apply to pipeline construction | | | | |
| **NOI-1b: Off-site Accommodations for Substantially Affected Nighttime Receptors**<br>PV Water shall offer to provide temporary hotel accommodations for all residences within 200 feet of where trenchless construction activities would occur~~ at the SR 152 and Walker Street crossings~~. 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 the number of beds). | CLP | 3. Construction | PV Water | |
| ~~**NOI-2: Vibration Monitoring Plan**~~<br>~~Prior to construction, PV Water shall require the pipeline construction contractor to develop a Vibration Monitoring Plan in coordination with a structural engineer, geotechnical engineer, and construction contractor if trenchless construction methods are used at the following intersections: East Lake Avenue/Palm Avenue/Hushbeck Avenue, East Beach Street/Lincoln Street, and 2nd Street/Walker Street. The Vibration Monitoring Plan shall include the following elements:~~<br>~~• To mitigate vibration, the Vibration Monitoring Plan shall include measures such that surrounding buildings will be exposed to less than 0.25 in/sec PPV for historic or potentially historic buildings to prevent building damage. Measures may include restricting the use of vibratory pile driving and drill rigs from operating within 13 and 19 feet from historic structures, respectively.~~<br>~~• With permission of applicable property owners, conduct a pre-construction survey of buildings and other sensitive structures within the area of potential effects due to vibration-generating activities. Respond to any claims by inspecting the affected property promptly, but in no case more than five working days after the claim was filed. Any new cracks or other changes in structure will be compared to preconstruction conditions and a determination made as to whether the Project could have caused such damage. In the event that the Project is demonstrated to have caused any damage, such damage will be repaired to the pre-existing conditions.~~ | ~~CLP~~ | ~~1. Design~~<br>~~3. Construction~~ | ~~Contractor to implement, PV Water to monitor~~ | |
| **Transportation and Traffic** | | | | |
| ****TR-1:** Conduct a preconstruction survey of road conditions on key access routes to the project sites (e.g., Holohan Road ~~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. | W<br>WTP<br>CLP | 1. Design<br>2. Pre-Construction<br>3. Construction<br>4. Post Construction | Contractor to implement, PV Water to monitor | |

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**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

<table>
<tr><th>Mitigation Measure</th><th>Project Component</th><th>Mitigation Schedule</th><th>Monitoring, Reporting Responsibility</th><th>Verification of Compliance by PV Water</th></tr>
<tr><td colspan="5">Transportation and Traffic (cont.)</td></tr>
<tr><td>TRA-1a: Encroachment Permits<br>PV Water shall require the construction contractor to obtain any necessary road encroachment permits from the appropriate local jurisdiction (i.e., City of Watsonville, Santa Cruz County) prior to constructing each Project component and shall comply with the conditions of approval attached to all Project permits and approvals.</td><td>CLP</td><td>2. Pre-Construction<br>3. Construction</td><td>Contractor to implement, PV Water to monitor</td><td></td></tr>
<tr><td>TRA-1b: Construction Traffic Control/Traffic Management Plan<br>PV Water shall require the construction contractor to prepare a Construction Traffic Control/Traffic Management Plan and submit it to the appropriate local jurisdiction (i.e., City of Watsonville, 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:<br>• Identify hours of construction for each Project component.<br>• 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.<br>• 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.<br>• Control and monitor construction vehicle movements by enforcing current standard construction specifications as defined by the appropriate local jurisdiction (i.e., City of Watsonville, Santa Cruz County) through periodic onsite inspections by the construction contractor.<br>• Install traffic control devices where traffic conditions warrant, as specified in the applicable jurisdiction's standards (e.g., the California Manual of Uniform Traffic Controls for Construction and Maintenance Work Zones).<br>• 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.<br>• Consult with the Santa Cruz Metro at least one month prior to construction to coordinate bus stop relocations (as necessary) and to reduce potential interruption of transit service.<br>• 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.<br>• Store all equipment and materials in designated contractor staging areas.</td><td>W<br>WTP<br>CLP</td><td>2. Pre-Construction<br>3. Construction</td><td>Contractor to implement, PV Water to monitor</td><td></td></tr>
</table>

NOTES: CL = College Lake; W = Weir Structure; WTP = Water Treatment Plant; CLP = College Lake Pipeline

**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Transportation and Traffic (cont.)** | | | | |
| • Encourage construction crews to park at staging areas to limit lane closures in the public rights-of-way.<br>• 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.<br>• 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.<br>Include a plan and implementation process to coordinate all construction activities with the Pajaro Valley Unified School District at least two months in advance. The Pajaro Valley Unified School District shall be notified of the timing, location, and duration of construction activities. PV Water shall coordinate with the Pajaro Valley Unified School District to identify peak circulation periods at schools along the College Lake pipeline alignment (i.e., the arrival and departure of students), and require their contractor to avoid construction and lane closures during those periods, if feasible. The construction contractor for each Project component shall be required to ensure that construction of the Project component does not inhibit vehicle, bicycle, pedestrian, and/or school bus service through inclusion of such provisions in the construction contract. The assignment of temporary crossing guards at designated intersections may be needed to enhance pedestrian safety during Project construction.<br>• 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. | | | | |
| **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. | CL<br>W<br>WTP<br>CLP | 1. Design | PV Water and qualified archaeologist | |

NOTES: CL = College Lake; W = Weir Structure; WTP = Water Treatment Plant; CLP = College Lake Pipeline

**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Cultural Resources (cont.)** | | | | |
| ****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. | See Measure CUL-1e | See Measure CUL-1e | See Measure CUL-1e | Superseded by Measure CUL-1e |
| **** 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 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. | See Measure CUL-1h | See Measure CUL-1h | See Measure CUL-1h | Superseded by Measure CUL-1h |
| **CUL-1a: Retention of a Qualified Archaeologist**<br><br>Prior to start of any 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. | W<br>WTP<br>CLP | 2. Pre-Construction<br>3. Construction | PV Water and qualified archaeologist | |
| **CUL-1b: Pre-Construction Phase I Cultural Resources Survey**<br><br>Prior to the start of any ground-disturbing activity, the qualified archaeologist shall conduct a pre-construction Phase I Cultural Resources Survey of all areas that have not been previously surveyed within the last five years. The survey shall document resources potentially qualifying as historical resources or unique archaeological 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 historic architectural resources are encountered that could potentially be impacted by the Project, 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 at least 90 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. | W<br>WTP<br>CLP | 2. Pre-Construction | PV Water and qualified archaeologist | |

NOTES: CL = College Lake; W = Weir Structure; WTP = Water Treatment Plant; CLP = College Lake Pipeline

**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Cultural Resources (cont.)** | | | | |
| In the event resources potentially qualifying as historical resources or unique archaeological resources under CEQA are identified during the survey, avoidance and preservation in place shall be the preferred manner of mitigating impacts to the 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. If avoidance of archaeological resources is determined by PV Water to be infeasible in light of factors such as the nature of the find, Project design, costs, and other considerations, then the portion of the resource within the Area of Direct Impact shall be subject to presence/absence testing and if potentially significant deposits are identified, the resource shall be evaluated for significance under all four National Register/California Register Criteria (A/1-D/4). If a resource is found to be significant (i.e., meets the definition for historical resource in CEQA *Guidelines* Section 15064.5(a) or unique archaeological resource in Public Resources Code Section 21083.2(g)), the qualified archaeologist shall develop an Archaeological Data Recovery and Treatment Plan for the resource. When assessing significance and developing treatment for resources that are Native American in origin, the qualified archaeologist and PV Water shall consult with the appropriate Native American representatives. | | | | |
| **CUL-1c: Development of a Cultural Resources Monitoring and Mitigation Program**<br><br>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:<br><br>• *Provisions for Archaeological Monitoring.* The CRMMP shall outline the archaeological monitor(s) responsibilities and requirements (refer to Mitigation Measure CUL-1f). The qualified archaeologist, in consultation with PV Water, shall have the ability to modify monitoring frequencies (i.e., either increase, decrease, or discontinue entirely) at all locations described below, based on soil observations (if it is determined that the likelihood of encountering intact significant resources is low due to disturbances or soil types, monitoring may be decreased or cease entirely) or discoveries (discovery of archaeological resources may warrant increased frequency of monitoring).<br>– Full-time archaeological monitoring shall be required during all ground disturbance in the following locations:<br>▪ Areas shaded purple ~~and green~~ on Figure 3.6-1 ~~Figure 3.10-1~~ of the College Lake Integrated Resources Management Project Addendum ~~EIR~~ that are within agricultural fields (i.e., not within paved roadway rights-of-ways).<br>▪ The area along State Route 129 (Riverside Drive) between Union Street and Rodriguez Street within the City of Watsonville.<br>~~▪ The area along Maple Street/2nd Street between Main Street and Union Street within the City of Watsonville.~~<br>~~▪ Within 100 feet of Environmentally Sensitive Areas established through implementation of Mitigation Measure CUL-1e.~~ | W<br>WTP<br>CLP | 1. Design<br>2. Pre-Construction<br>3. Construction | PV Water and qualified archaeologist | |

NOTES: CL = College Lake; W = Weir Structure; WTP = Water Treatment Plant; CLP = College Lake Pipeline

**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Cultural Resources (cont.)** | | | | |
| – Part-time archaeological monitoring consisting of one 8-hour day per week shall be conducted during ground disturbance in the following locations (as noted above, the frequency of monitoring may be modified if conditions warrant):<br>▪ Areas shaded purple on Figure 3.6-1 ~~Figure 3.10-1~~ of the College Lake Integrated Resources Management Project Addendum ~~EIR~~ that are within paved roadway right-of-ways (i.e., not within agricultural fields), with the exception of areas along State Route 129 (Riverside Drive) between Union Street and Rodriguez Street ~~Maple Street/2nd Street between Main Street and Union Street~~, which require~~s~~ full-time monitoring as outlined above.<br>▪ Areas shaded orange on Figure 3.6-1 ~~Figure 3.10-1~~ of the College Lake Integrated Resources Management Project Addendum ~~EIR~~ that are within agricultural fields (i.e., not within paved roadway right-of-ways).<br>– Part-time archaeological monitoring consisting of one 4-hour day per week shall be conducted during ground disturbance in the following locations (as noted above, the frequency of monitoring may be modified if conditions warrant):<br>▪ Areas shaded orange on Figure 3.6-1 ~~Figure 3.10-1~~ of the College Lake Integrated Resources Management Project Addendum ~~EIR~~ that are within paved roadway right-of-ways (i.e., not within agricultural fields).<br>• *Procedures upon ~~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, and shall address procedures for when an archaeological monitor is present, and when one is not present. The CRMMP shall state avoidance or preservation in place is the preferred manner of mitigating impacts to historical resources and unique archaeological 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-1h.<br>If, based on the recommendation of the qualified archaeologist, it is determined that a discovered archaeological resource constitutes a historical resource or a unique archaeological resource pursuant to CEQA and data recovery through excavation is the only feasible mitigation available, an 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. PV Water, or its designee, shall consult with appropriate Native American representatives in determining treatment of resources that are Native American in origin to ensure cultural values ascribed to the resource, beyond those that are scientifically important, are considered.<br>• *Procedures upon ~~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). | | | | |

NOTES: CL = College Lake; W = Weir Structure; WTP = Water Treatment Plant; CLP = College Lake Pipeline

**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Cultural Resources (cont.)** | | | | |
| • *Reporting Requirements.* The CRMMP shall outline provisions for weekly, monthly, 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. Monthly progress reports summarizing monitoring efforts shall be prepared and submitted to PV Water for the duration 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).<br>• *Curation Requirements.* Disposition of Native American archaeological materials shall be determined through consultation between Native American representatives, 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).<br>Any 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.<br>• *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 full-time Native American monitoring of ground disturbance in the purple and green shaded areas shown on <u>Figure 3.6-1</u> ~~Figure 3.10-1~~ of the College Lake Integrated Resources Management Project <u>Addendum</u> ~~EIR~~ within agricultural fields (i.e., not within paved roadway right-of-ways), as well as during any subsurface investigation and data recovery for discovered resources that are Native American in origin (refer to Mitigation Measures CUL-1g). | | | | |
| **CUL-1d: Construction Worker Cultural Resources Sensitivity Training Program**<br>A worker cultural resources sensitivity training program shall be implemented for the Project. 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 Project (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 area and given a tutorial providing information on how to identify the types of resources that may be | W<br>WTP<br>CLP | 2. Pre-Construction | PV Water and qualified archaeologist | |

NOTES: CL = College Lake; W = Weir Structure; WTP = Water Treatment Plant; CLP = College Lake Pipeline

**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Cultural Resources (cont.)** | | | | |
| 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. | | | | |
| **CUL-1e: Designation of Environmentally Sensitive Areas**<br><br>Prior to the start of ground disturbance, the portion of the boundary of CA-SCR-44/H nearest Project-related activities shall be marked as an Environmentally Sensitive Area. This area shall not be marked as an archaeological resource, but shall be designated as an “exclusion zone” on Project plans and protective fencing in order to discourage unauthorized disturbance or collection of artifacts. The qualified archaeologist, or his/her designee, shall periodically inspect this area for the duration of Project activities in the vicinity to ensure that protective fencing remains intact and no incursions into the exclusion zone have occurred. Upon completion of all Project-related activities in the vicinity, all protective fencing and signage shall be removed. | W | 2. Pre-Construction<br>3. Construction | PV Water and qualified archaeologist | |
| **CUL-1f: Archaeological Monitoring**<br><br>Project-related ground disturbance shall be subject to archaeological monitoring as outlined in Mitigation Measure CUL-1c. 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, based on the recommendations of the qualified archaeologist in coordination with PV Water, and the Native American representatives in the event the resource is Native American in origin, and in accordance with the protocols and procedures outlined in the CRMMP (refer to Mitigation Measure CUL-1c). The qualified archaeologist shall have the authority to modify monitoring frequencies based on soil observations and/or discoveries. | W<br>WTP<br>CLP | 2. Pre-Construction<br>3. Construction | PV Water and qualified archaeologist | |
| **CUL-1g: Native American Monitoring**<br><br>Prior to the start of any ground-disturbing activity, PV Water shall retain a qualified Native American monitor to provide monitoring services as outlined in Mitigation Measure CUL-1c. The Native American monitor shall be from a Tribe that is culturally and geographically affiliated with the Project area (according to the California Native American Heritage Commission contact list for this project). If resources of Native American origin are discovered, the Native American monitor shall provide monitoring services in accordance with protocols and procedures outlined in the CRMMP (refer to Mitigation Measure CUL-1c). | W<br>WTP<br>CLP | 2. Pre-Construction<br>3. Construction | PV Water | |
| **CUL-1h: Inadvertent Discovery of Archaeological Resources**<br><br>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-1c). 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-1c). When assessing significance and developing treatment for resources that are Native American in origin, the qualified archaeologist and PV Water shall consult with the | W<br>WTP<br>CLP | 3. Construction | PV Water and qualified archaeologist | |

NOTES: CL = College Lake; W = Weir Structure; WTP = Water Treatment Plant; CLP = College Lake Pipeline

**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Cultural Resources (cont.)** | | | | |
| appropriate Native American representatives. The qualified archaeologist shall also determine if work may proceed in other parts of the Project area while treatment for cultural resources is being carried out, and whether additional archaeological and/or Native American monitoring is warranted. | | | | |
| **CUL-1i: Long-Term Monitoring of CA-SCR-44/H and CA-SCR-150**<br><br>PV Water shall retain a qualified archaeologist to conduct quarterly inspections of the portions of CA-SCR-44/H and CA-SCR-150 that overlap with the proposed lake storage area to ensure that lake water levels are not resulting in site erosion. If erosion or other indirect impacts are noted, PV Water shall work with the qualified archaeologist to develop a plan to protect the site(s) from further damage, or a plan to conduct data recovery of the affected portion(s) if protective measures are determined by PV Water to be infeasible. Quarterly inspections shall be conducted for two years, after which time they shall be reduced to semi-annual inspections for an additional three years. If after five years no erosion or other indirect impacts are noted, the long-term monitoring program shall be discontinued. After each inspection, the qualified archaeologist shall prepare a memorandum documenting the results of the inspection with photographs. Memoranda shall be submitted to PV Water within 30 days of the completion of each inspection. | CL | 4. Post Construction | PV Water and qualified archaeologist | |
| **CUL-2: Inadvertent Discovery of Human Remains**<br><br>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. | W<br>WTP<br>CLP | 3. Construction | PV Water and qualified archaeologist | |
| **Energy, Utilities, and Services** | | | | |
| ****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:<br><br>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 Santa Cruz County Regional Transportation Commission ~~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.<br><br>b. Utility locations would be verified through field survey (potholing) and use of an underground locating service. | CLP | 1. Design<br>2. Pre-Construction<br>3. Construction | PV Water, contractor to comply with encroachment permits | |

NOTES: CL = College Lake; W = Weir Structure; WTP = Water Treatment Plant; CLP = College Lake Pipeline

**TABLE 5-1 (CONTINUED)**
**MITIGATION MONITORING AND REPORTING PROGRAM**

| Mitigation Measure | Project Component | Mitigation Schedule | Monitoring, Reporting Responsibility | Verification of Compliance by PV Water |
|---|---|---|---|---|
| **Energy, Utilities, and Services (cont.)** | | | | |
| 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.<br>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.<br>e. 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. | | | | |
| ****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. | W<br>WTP<br>CLP | 1. Design<br>2. Pre-Construction<br>3. Construction | Contractor to implement, PV Water to monitor | |
| **Aesthetic Resources** | | | | |
| **AES-1a: Aboveground Facility Treatment**<br>PV Water shall paint or otherwise treat aboveground facilities using low-glare paint that blends with predominant color(s) of the surrounding terrain, unless colors otherwise specified by regulatory agencies. Concrete structures need not be painted. | W<br>WTP | 1. Design<br>3. Construction | Contractor to implement, PV Water to monitor | |
| **AES-1b: Landscaping**<br>~~For the preferred WTP site, PV Water shall shift the site plan northward in order to preserve orchard trees along Holohan Road and several orchard trees northeast of 116 Holohan Road, to the extent feasible and in accordance with PV Water security requirements. Where preservation of orchard trees along Holohan Road is not feasible (e.g., due to the access road and the College Lake pipeline),~~ PV Water shall use landscaping to reduce textural contrasts and enhance visual integration of the WTP with its surroundings <u>along Holohan Road, to the extent feasible and in accordance with PV Water security requirements</u>. Landscaping shall include shrubs and other vegetation typical of the surrounding area.<br>~~For the optional WTP site, PV Water shall use landscaping to reduce textural contrasts and enhance visual integration of the WTP with its surroundings when viewed from SR 152. Landscaping shall include shrubs and other vegetation typical of the surrounding area.~~ | WTP | 1. Design<br>3. Construction | Contractor to implement, PV Water to monitor | |
| **AES-2: Construction Lighting**<br>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. | W<br>WTP<br>CLP | 1. Design<br>3. Construction | Contractor to implement, PV Water to monitor | |

NOTES:
* x = Verification of monitoring and reporting has been completed by PV Water
** Mitigation measure adopted in the 2014 BMP Update PEIR and not revised in the College Lake EIR.

NOTES: CL = College Lake; W = Weir Structure; WTP = Water Treatment Plant; CLP = College Lake Pipeline

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# APPENDIX AIR

## Air Quality Supporting Information

This appendix includes supporting information that was used for the analyses in Addendum Section 3.3, Air Quality and Greenhouse Gases.

## Updated College Lake Project Data

| CalEEMod defaults used | From Jacobs | From Carollo | | 2/7/2022 |
|---|---|---|---|---|
| Cells highlihted in green show changes from the EIR analysis. | | | | |

### Revised Construction Schedule

| Construction Phase | Start Date | End Date | Days/Week | Total Days |
|---|---|---|---|---|
| Weir & Pump Station | 5/1/2023 | 7/31/2024 | 5 | 328 |
| Treatment Plant | 4/1/2023 | 7/31/2024 | 5 | 348 |
| College Lake to CDS Pipeline | 10/1/2022 | 6/30/2024 | 5 | 455 |
| Trenchless Pipeline Installation | 10/1/2022 | 6/30/2024 | 5 | 150 |
| Total workdays accounting for overlapping construction | | | | 478 |

### Construction Equipment

**Weir & Pump Station**

| Project Construction Equipment | Equivalent Equipment in CalEEMod | Number of Equipment | Workdays used in Phase | Hours per Workday | Average horsepower (hp) from CalEEMod | |
|---|---|---|---|---|---|---|
| Excavator | Excavators | 2 | 328 | 6 | 158 | |
| Back Hoe/Track Hoe | Tractors/Loaders/Backhoes | 1 | 328 | 4 | 97 | concrete delivery truck (1) included in onroad |
| Fork Lifts | Forklifts | 2 | 328 | 3 | 100 | |
| Pile driving equipment | Other Construction Equipment | 1 | 25 | 8 | 172 | sheet pile driving equipment |
| Crane | Cranes | 1 | 328 | 3 | 231 | |
| Pumps | Pumps | 4 | 328 | 6 | 172 | |
| Air Compressors | Air Compressors | 1 | 328 | 1 | 172 | |
| Generator Sets | Generator Sets | 1 | 328 | 6 | 172 | |
| Wiring Pulling Machine | Other Construction Equipment | 1 | 328 | 4 | 172 | |

**Treatment Plant**

| Project Construction Equipment | Equivalent Equipment in CalEEMod | Number of Equipment | Workdays used in Phase | Hours per Workday | Average horsepower (hp) from CalEEMod | |
|---|---|---|---|---|---|---|
| Excavator | Excavators | 2 | 348 | 6 | 158 | |
| Dozers/Scrapers | Scrapers | 2 | 45 | 6 | 367 | |
| Skip Loader | Skid Steer Loaders | 1 | 348 | 6 | 65 | concrete delivery trucks (2) included in onroad |
| Back Hoe/Track Hoe | Tractors/Loaders/Backhoes | 2 | 348 | 4 | 97 | |
| Fork Lifts | Forklifts | 2 | 348 | 4 | 100 | |
| Crane | Cranes | 1 | 348 | 4 | 231 | |
| Pile driving equipment | Other Construction Equipment | 1 | 60 | 8 | 172 | |
| Scissor Lift | Forklifts | 1 | 348 | 4 | 100 | |
| Wiring Pulling Machine | Other Construction Equipment | 2 | 348 | 4 | 172 | |
| Pumps | Pumps | 8 | 348 | 6 | 172 | |
| Air Compressors | Air Compressors | 4 | 348 | 1 | 172 | |
| Water Truck | Off-Highway Trucks | 1 | 348 | 4 | 402 | |
| Generator Sets | Generator Sets | 2 | 348 | 6 | 172 | |
| Asphalt/Paver Truck | Off-Highway Trucks | 1 | 348 | 8 | 402 | |

**College Lake to CDS Pipeline**

| Project Construction Equipment | Equivalent Equipment in CalEEMod | Number of Equipment | Workdays used | Hours per Workday | Average horsepower (hp) |
|---|---|---|---|---|---|

| Project Construction Equipment | CalEEMod | Number of Equipment | in Phase | Hours per Workday | from CalEEMod | |
|---|---|---|---|---|---|---|
| Excavator | Excavators | 1 | 455 | 6 | 158 | |
| Plate Compactor | Plate Compactors | 2 | 455 | 4 | 8 | |
| Skip Loader | Skid Steer Loaders | 1 | 455 | 6 | 65 | |
| Sweepers/Scrubbers | Sweepers/Scrubbers | 1 | 455 | 1 | 63 | |
| Back Hoe/Track Hoe | Tractors/Loaders/Backhoes | 2 | 455 | 4 | 97 | |
| Fork Lifts | Forklifts | 1 | 455 | 2 | 100 | |
| Pumps | Pumps | 2 | 455 | 6 | 172 | |
| Air Compressors | Air Compressors | 1 | 455 | 1 | 172 | |
| Water Truck | Off-Highway Trucks | 1 | 455 | 2 | 402 | |
| Concrete saw | Concrete/Industrial saws | 1 | 455 | 2 | 402 | Using data from Jacobs and not Carollo who also provided data for this |
| Generator Sets | Generator Sets | 1 | 455 | 6 | 172 | |
| Asphalt/Paver Truck | Off-Highway Trucks | 1 | 455 | 8 | 402 | |

## Trenchless Pipeline Installation

| Project Construction Equipment | Equivalent Equipment in CalEEMod | Number of Equipment | Workdays used in Phase | Hours per Workday | Average horsepower (hp) from CalEEMod | |
|---|---|---|---|---|---|---|
| Mud Pump | Pumps | 1 | 80 | 8 | 172 | |
| Drilling Rig | Bore/Drill Rigs | 2 | 80 | 8 | 172 | |
| Excavator | Excavators | 1 | 150 | 6 | 158 | |
| Crane | Cranes | 1 | 150 | 8 | 231 | |
| Backhoe | Tractors/Loaders/Backhoes | 2 | 150 | 6 | 97 | |
| Drill Fluid Treatment System | Other Construction Equipment | 1 | 150 | 8 | 172 | |
| Sheet Pile Driver | Other Construction Equipment | 1 | 16 | 8 | 172 | vibratory pile driver |

**Construction Vehicle Trips**

| Weir & Pump Station | | | | |
|---|---|---|---|---|
| | two-way trips/day | one-way trips/day | days | Total one-way trips |
| Worker trips | 18 | 36 | 210 | 7560 |
| Excavation trips | 35 | 71 | 15 | 1061 |
| Fill trips | 16 | 31 | 15 | 467 |
| Material delivery trips | 3 | 6 | 210 | 1260 |
| **Treatment Plant** | | | | |
| | two-way trips/day | one-way trips/day | days | Total one-way trips |
| Worker trips | 26 | 52 | 360 | 18720 |
| Excavation trips | 5 | 10 | 20 | 200 |
| Fill trips | 54 | 108 | 40 | 4320 |
| Material delivery trips | 7 | 14 | 360 | 5040 |
| **College Lake to CDS Pipeline** | | | | |
| | two-way trips/day | one-way trips/day | days | Total one-way trips |
| Worker trips | 11 | 22 | 200 | 4400 |
| Excavation trips | 6 | 12 | 100 | 1200 |
| Fill trips | 5 | 10 | 100 | 1000 |
| Material/pipe delivery trips | 2 | 4 | 200 | 800 |

| Phase | trips/day Worker | trips/day Vendor | trips/phase Hauling |
|---|---|---|---|
| Weir & Pump Station | 36 | 6 | 1528 |
| Treatment Plant | 52 | 14 | 4520 |
| College Lake to CDS Pipeline | 22 | 4 | 2200 |
| Trenchless Pipeline Installation | 22 | 4 | 0 |

| Operational Trips | No. of trips |
|---|---|
| Employee trips | 4 trips/day |
| Solids Hauling Trips | 30 trips/year |
| Chemical deliveries | |
| Sodium Hypochlorite | 4 trips/month |
| Coagulant | 2 trips/month |

Assuming one trip of each chemical delivery and one hauling trip happens on a max day

| employee trips per day | truck trips per day |
|---|---|

| | | | |
|---|---|---|---|
| LOX | 2 trips/month | 8 | 12 |
| Peroxide | 2 trips/month | | |
| Total Chemical deliveries | 10 trips/month | | |

**Dewatered Solids Hauling Assumptions:**

| | |
|---|---|
| 20 | cubic yards per truck load |
| 10 | tons per truck load |
| 120 | lbs/cf Cake solids density |
| 1.62 | tons/cy |
| 486 | cy of solids per year |
| 300 | tons/year of solids |
| 30 | truck loads based on weight |
| 24.3 | truck loads based on volume |

## Construction Emissions

### Criteria Air Pollutants

**Maximum Daily emissions based on Summer Construction Emissions - Criteria Air Pollutants**

| Year | Maximum Daily Emissions during Summer (pounds/day) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | ROG | NOx | Exhaust $PM_{10}$ | Fugitive $PM_{10}$ | Total $PM_{10}$ | Exhaust $PM_{2.5}$ | Fugitive $PM_{2.5}$ | Total $PM_{2.5}$ | CO |
| 2022 | 5.1 | 44.7 | 2.0 | 0.5 | 2.5 | 1.9 | 0.1 | 2.0 | 59.3 |
| 2023 | 15.6 | 131.7 | 5.7 | 1.7 | 7.4 | 5.5 | 0.4 | 5.9 | 187.0 |
| 2024 | 14.8 | 120.6 | 5.1 | 1.7 | 6.8 | 4.9 | 0.4 | 5.3 | 186.4 |
| MBARD Thresholds | 137 | 137 | | | 82 | | | 55 | 550 |

### Greenhouse Gases

| | |
|---|---|
| 2022 | 347.7 |
| 2023 | 3676.3 |
| 2024 | 2539.9 |
| Total | 6563.9 |
| Life of Project | 50 |
| Amortized Emissions ($MTCO_2e$/year) | 131.3 |

# OPERATIONAL EMISSIONS

## CAP Emissions Summary

| Source | Maximum Daily Emissions (lb/day) | | | | |
|---|---|---|---|---|---|
| | ROG | NOx | CO | $PM_{10}$ | $PM_{2.5}$ |
| Onroad Trips | 0.07 | 4.73 | 0.78 | 0.30 | 0.14 |
| Backup Generator | 0.52 | 9.97 | 5.68 | 0.31 | 0.31 |
| **Total** | **0.6** | **14.7** | **6.5** | **0.6** | **0.4** |
| MBARD Daily Threshold | 137 | 137 | 550 | 82 | 55 |

### Maximum Daily CAP Emissions from On-road Trips during Operation

1 pound = 453.592 g

| Source | Vehicle type | Trips/day (round trips) | One way trips/day | One Way Trip length (miles) | Truck Trip miles per day | EMFAC2021 Emission Factors (gms/mile) | | | | | Daily Emissions (lbs/day) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ROG | NOx | CO | $PM_{10}$ | $PM_{2.5}$ | ROG | NOx | CO | $PM_{10}$ | $PM_{2.5}$ |
| Chemical Delivery trips | HHDT | 5 | 10 | 25 | 250 | 0.0268 | 2.2783 | 0.1084 | 0.1442 | 0.0655 | 0.01 | 1.26 | 0.06 | 0.08 | 0.04 |
| Debris removal | HHDT | 33 | 66 | 10 | 660 | 0.0268 | 2.2783 | 0.1084 | 0.1442 | 0.0655 | 0.04 | 3.32 | 0.16 | 0.21 | 0.10 |
| Solids Hauling Trips | HHDT | 1 | 2 | 10 | 20 | 0.0268 | 2.2783 | 0.1084 | 0.1442 | 0.0655 | 0.00 | 0.10 | 0.00 | 0.01 | 0.00 |
| Employee trips | LDT | 4 | 8 | 12.5 | 100 | 0.0615 | 0.2803 | 2.5191 | 0.0209 | 0.0082 | 0.01 | 0.06 | 0.56 | 0.00 | 0.00 |
| **Total Project Maximum Daily (lbs/day)** | | | | | | | | | | | 0.07 | 4.73 | 0.78 | 0.30 | 0.14 |

## GHG Emissions Summary

| Source | GHG Emissions ($MTCO_2e$/year) |
|---|---|
| Backup Generator | 35.6 |
| Truck trips | 55.5 |
| Electricity | 428.3 |
| Annualized Construction | 131.3 |
| TOTAL | 650.6 |

### Indirect GHG Emissions from Electricity Generation

| Source | Consumption | eGRID GHG Emission Factors (lb/MW-hr)[1] | | | GHG Emissions (MT/year) | | | |
|---|---|---|---|---|---|---|---|---|
| | MW-hr/year | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$ |
| Electricity Consumption | 1662 | 513.455 | 0.032 | 0.004 | 426.7 | 0.03 | 0.00 | 428.3 |

### Annual GHG Emissions from On-road Trips during Operation

1MT = 1000000 g

| Trips | Trips/month (round trips) | Trips/year[2] (round trips) | One way trips/year | One Way Trip length (miles) | Truck Trip miles per year | EMFAC2021 Emission Factors (g/mile) | | | Total Emissions (MT/year) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$ |
| Chemical Delivery trips | 10 | 60 | 120 | 25 | 3000 | 1652.1075 | 0.0012 | 0.2603 | 4.96 | 0.000004 | 0.000781 | 5.19 |
| Debris Removal | 217 | 1300 | 2600 | 10 | 26000 | 1652.1075 | 0.0012 | 0.2603 | 42.95 | 0.000032 | 0.006768 | 44.97 |
| Solids Hauling Trips | 5 | 30 | 60 | 10 | 600 | 1652.1075 | 0.0012 | 0.2603 | 0.99 | 0.000001 | 0.000156 | 1.04 |
| Employee trips | 80 | 480 | 960 | 12.5 | 12000 | 351.5330 | 0.0132 | 0.0178 | 4.22 | 0.000159 | 0.000214 | 4.29 |
| **Total GHG emissions from operational truck trips (tons/year)** | | | | | | | | | 53.12 | 0.00020 | 0.00792 | 55.49 |

NOTES:

1. GHG emissions factors for electricity generation in California from USEPA eGRID Summary Tables 2020, Table 1. Available at https://www.epa.gov/egrid/summary-data

2. Using an operational period of 6 months per year

## Emergency Generator Emissions

**Conversion Factors**

| | | |
|---|---|---|
| HP/kW | 1.3410 | |
| lb/g | 0.0022 | |
| lb/ton | 2,000 | |
| Metric ton/ton | 0.90719 | |
| $PM_{10}$ Fraction of Total PM | 0.960 | Table A - Updated CEIDARS Table with PM2.5 Fractions, INTERNAL COMBUSTION - DISTILLATE AND DIESEL-ELECTRIC GENERATION |
| $PM_{2.5}$ Fraction of Total PM | 0.937 | Table A - Updated CEIDARS Table with PM2.5 Fractions, INTERNAL COMBUSTION - DISTILLATE AND DIESEL-ELECTRIC GENERATION |
| $CO_2$ kg/gal | 10.21 | Climate Registry, Table 13.1: https://www.theclimateregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf |
| $CH_4$ g/gal | 0.58 | Climate Registry, Table 13.7: https://www.theclimateregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf |
| $N_2O$ g/gal | 0.26 | Climate Registry, Table 13.7: https://www.theclimateregistry.org/wp-content/uploads/2014/11/2016-Climate-Registry-Default-Emission-Factors.pdf |
| GWP $CH_4$ | 25 | IPCC AR4, https://ww2.arb.ca.gov/ghg-gwps |
| GWP $N_2O$ | 298 | IPCC AR4, https://ww2.arb.ca.gov/ghg-gwps |
| $CO_2e$ g/gal | 10,302 | |
| $CO_2$ g/gal | 10,210 | |
| $CO_2/CO_2e$ | 0.9911 | |

| | | | |
|---|---|---|---|
| Generator Rating: | 999 | kW | *(Source: Project Description)* |
| | 1,340 | HP | *(based on conservative engineering assumptions; conversion from kW to hp)* |
| Load Factor: | 0.74 | | *(based on CalEEMod Generator Set Load Factor)* |
| Engine Emissions Tier: | | | *(compliance with CARB diesel regulations)* |
| Operating Hours per Unit: | 50 | hours/year | |
| | 1.00 | hours/day - maximum | |
| | 0.14 | hours/day - average | |

| Units | Criteria Pollutants [1, 2] | | | | | Greenhouse Gases [3] | |
|---|---|---|---|---|---|---|---|
| | VOC | $NO_X$ | CO | $PM_{10}$ | $PM_{2.5}$ | $CO_2$ | $CO_2e$ |
| g/kW-hr | — | — | 3.50 | — | — | — | — |
| g/HP-hr | 0.24 | 4.56 | 2.60 | 0.1440 | 0.1406 | 526.17 | 530.91 |
| lbs/hr | 0.52 | 9.97 | 5.68 | 0.31 | 0.31 | 1554.40 | 1,568.40 |
| **lbs/day(maximum daily)** | **0.52** | **9.97** | **5.68** | **0.31** | **0.31** | 1554.40 | 1568.40 |
| lbs/day (average daily) | 0.07 | 1.37 | 0.78 | 0.04 | 0.04 | 212.93 | 214.85 |
| lbs/yr | 26.23 | 498.43 | 284.19 | 15.74 | 15.36 | 77,720.00 | 78,420.17 |
| tons/yr | 0.01 | 0.25 | 0.14 | 0.008 | 0.008 | 38.86 | 39.21 |
| **metric tons/yr** | — | — | — | — | — | **35.25** | **35.57** |

Notes:

1. Emission factors for VOC and NOX: ARB 2011 Final Regulation Order for the ATCM for stationary engines, Table 1, Model year 2008+: https://www.arb.ca.gov/regact/2010/atcm2010/finalregorder.pdf; Policy: CARB Emission Factors for CI Diesel Engines – Percent HC in Relation to NMHC + NOx: http://www.baaqmd.gov/~/media/Files/Engineering/policy_and_procedures/Engines/EmissionFactorsforDieselEngines.ashx
2. Emission factors for CO, $PM_{10}$, and $PM_{2.5}$: ARB 2011 Final Regulation Order for the ATCM for stationary engines, Table 1, Model year 2008+: https://www.arb.ca.gov/regact/2010/atcm2010/finalregorder.pdf
3 Emission factor for $CO_2$: U.S. Environmental Protection Agency, AP-42 Compilation of Air Pollutant Emission Factors, Fifth Edition, Section 3.4, Table 3.4-1.
Emissions of GHGs assume 99.11% of the $CO_2e$ emissions occur as $CO_2$, based on Climate Registry emission factors as referenced above.

Updating College Lake - - Santa Cruz County, Summer

**EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied**

# Updating College Lake -

**Santa Cruz County, Summer**

## 1.0 Project Characteristics

### 1.1 Land Usage

| Land Uses | Size | Metric | Lot Acreage | Floor Surface Area | Population |
|---|---|---|---|---|---|
| General Light Industry | 1.00 | 1000sqft | 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** | 2025 |
| **Utility Company** | Pacific Gas and Electric Company | | | | |
| **CO2 Intensity (lb/MWhr)** | 203.98 | **CH4 Intensity (lb/MWhr)** | 0.033 | **N2O Intensity (lb/MWhr)** | 0.004 |

### 1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Unit sizes assumed

Construction Phase - Project data

Off-road Equipment - Phase not used

Off-road Equipment - Phase not used

Off-road Equipment - Phase not used

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 -

Off-road Equipment - Project data

Grading - .

Off-road Equipment - Project data

Trips and VMT - Project data

Vehicle Trips - Operational emissions not estimated in this run

| Table Name | Column Name | Default Value | New Value |
|---|---|---|---|
| tblConstructionPhase | NumDays | 5.00 | 0.00 |
| tblConstructionPhase | NumDays | 100.00 | 328.00 |
| tblConstructionPhase | NumDays | 10.00 | 0.00 |
| tblConstructionPhase | NumDays | 2.00 | 0.00 |
| tblConstructionPhase | NumDays | 5.00 | 0.00 |
| tblConstructionPhase | NumDays | 1.00 | 0.00 |
| tblConstructionPhase | NumDays | 100.00 | 348.00 |
| tblConstructionPhase | NumDays | 1.00 | 455.00 |
| tblConstructionPhase | PhaseEndDate | 3/22/2023 | 3/15/2023 |
| tblConstructionPhase | PhaseEndDate | 3/8/2023 | 7/31/2024 |
| tblConstructionPhase | PhaseEndDate | 10/14/2022 | 9/30/2022 |
| tblConstructionPhase | PhaseEndDate | 10/19/2022 | 10/17/2022 |
| tblConstructionPhase | PhaseEndDate | 3/15/2023 | 3/8/2023 |
| tblConstructionPhase | PhaseEndDate | 10/17/2022 | 10/14/2022 |
| tblConstructionPhase | PhaseStartDate | 10/20/2022 | 5/1/2023 |
| tblLandUse | LotAcreage | 0.02 | 1.00 |
| tblOffRoadEquipment | HorsePower | 89.00 | 100.00 |
| tblOffRoadEquipment | HorsePower | 89.00 | 100.00 |
| tblOffRoadEquipment | HorsePower | 64.00 | 63.00 |
| tblOffRoadEquipment | HorsePower | 89.00 | 100.00 |
| tblOffRoadEquipment | HorsePower | 84.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 78.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 81.00 | 402.00 |
| tblOffRoadEquipment | HorsePower | 84.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 84.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 221.00 | 172.00 |

| | | | |
|---|---|---|---|
| tblOffRoadEquipment | HorsePower | 89.00 | 100.00 |
| tblOffRoadEquipment | HorsePower | 84.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 78.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 84.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 84.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 78.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 84.00 | 172.00 |
| tblOffRoadEquipment | LoadFactor | 0.46 | 0.46 |
| tblOffRoadEquipment | LoadFactor | 0.37 | 0.37 |
| tblOffRoadEquipment | LoadFactor | 0.20 | 0.20 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.37 | 0.37 |
| tblOffRoadEquipment | LoadFactor | 0.50 | 0.50 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.29 | 0.29 |
| tblOffRoadEquipment | LoadFactor | 0.42 | 0.42 |
| tblOffRoadEquipment | LoadFactor | 0.42 | 0.42 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.48 | 0.48 |
| tblOffRoadEquipment | LoadFactor | 0.37 | 0.37 |
| tblOffRoadEquipment | LoadFactor | 0.42 | 0.42 |
| tblOffRoadEquipment | LoadFactor | 0.20 | 0.20 |
| tblOffRoadEquipment | LoadFactor | 0.42 | 0.42 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.42 | 0.42 |
| tblOffRoadEquipment | LoadFactor | 0.42 | 0.42 |
| tblOffRoadEquipment | OffRoadEquipmentType | | Plate Compactors |
| tblOffRoadEquipment | OffRoadEquipmentType | | Sweepers/Scrubbers |
| tblOffRoadEquipment | OffRoadEquipmentType | | Tractors/Loaders/Backhoes |

| | | | |
|---|---|---|---|
| tblOffRoadEquipment | OffRoadEquipmentType | | Forklifts |
| tblOffRoadEquipment | OffRoadEquipmentType | | Pumps |
| tblOffRoadEquipment | OffRoadEquipmentType | | Air Compressors |
| tblOffRoadEquipment | OffRoadEquipmentType | | Off-Highway Trucks |
| tblOffRoadEquipment | OffRoadEquipmentType | | Concrete/Industrial Saws |
| tblOffRoadEquipment | OffRoadEquipmentType | | Generator Sets |
| tblOffRoadEquipment | OffRoadEquipmentType | | Off-Highway Trucks |
| tblOffRoadEquipment | OffRoadEquipmentType | | Excavators |
| tblOffRoadEquipment | OffRoadEquipmentType | | Skid Steer Loaders |
| tblOffRoadEquipment | OffRoadEquipmentType | | Pumps |
| tblOffRoadEquipment | OffRoadEquipmentType | | Bore/Drill Rigs |
| tblOffRoadEquipment | OffRoadEquipmentType | | Excavators |
| tblOffRoadEquipment | OffRoadEquipmentType | | Cranes |
| tblOffRoadEquipment | OffRoadEquipmentType | | Other Construction Equipment |
| tblOffRoadEquipment | OffRoadEquipmentType | | Other Construction Equipment |
| tblOffRoadEquipment | OffRoadEquipmentType | | Excavators |
| tblOffRoadEquipment | OffRoadEquipmentType | | Scrapers |
| tblOffRoadEquipment | OffRoadEquipmentType | | Skid Steer Loaders |
| tblOffRoadEquipment | OffRoadEquipmentType | | Other Construction Equipment |
| tblOffRoadEquipment | OffRoadEquipmentType | | Forklifts |
| tblOffRoadEquipment | OffRoadEquipmentType | | Other Construction Equipment |
| tblOffRoadEquipment | OffRoadEquipmentType | | Pumps |
| tblOffRoadEquipment | OffRoadEquipmentType | | Air Compressors |
| tblOffRoadEquipment | OffRoadEquipmentType | | Off-Highway Trucks |
| tblOffRoadEquipment | OffRoadEquipmentType | | Generator Sets |
| tblOffRoadEquipment | OffRoadEquipmentType | | Off-Highway Trucks |
| tblOffRoadEquipment | OffRoadEquipmentType | | Excavators |
| tblOffRoadEquipment | OffRoadEquipmentType | | Other Construction Equipment |
| tblOffRoadEquipment | OffRoadEquipmentType | | Pumps |
| tblOffRoadEquipment | OffRoadEquipmentType | | Air Compressors |
| tblOffRoadEquipment | OffRoadEquipmentType | | Generator Sets |
| tblOffRoadEquipment | OffRoadEquipmentType | | Other Construction Equipment |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 1.00 | 0.00 |

| | | | |
|---|---|---|---|
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 4.00 | 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 | 2.00 | 1.00 |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 2.00 | 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 | 2.00 | 1.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 4.00 | 3.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 3.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 1.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 4.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 4.00 |

| | | | |
|---|---|---|---|
| tblOffRoadEquipment | UsageHours | 8.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 4.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 6.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 4.00 |
| tblTripsAndVMT | HaulingTripNumber | 0.00 | 1,528.00 |
| tblTripsAndVMT | HaulingTripNumber | 0.00 | 4,520.00 |
| tblTripsAndVMT | HaulingTripNumber | 0.00 | 2,200.00 |
| tblTripsAndVMT | VendorTripNumber | 0.00 | 6.00 |
| tblTripsAndVMT | VendorTripNumber | 0.00 | 14.00 |
| tblTripsAndVMT | VendorTripNumber | 0.00 | 4.00 |
| tblTripsAndVMT | VendorTripNumber | 0.00 | 4.00 |
| tblTripsAndVMT | WorkerTripNumber | 0.00 | 36.00 |
| tblTripsAndVMT | WorkerTripNumber | 0.00 | 52.00 |
| tblTripsAndVMT | WorkerTripNumber | 38.00 | 22.00 |
| tblTripsAndVMT | WorkerTripNumber | 23.00 | 22.00 |

## 2.0 Emissions Summary

### 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 | | | | | |
| 2022 | 5.0613 | 44.7496 | 59.2727 | 0.1214 | 0.4993 | 1.9963 | 2.4956 | 0.1343 | 1.8885 | 2.0228 | 0 | 11,720.45 | 11,720.45 | 2.2984 | 0.099 | 11,807.40 |
| 2023 | 15.5933 | 131.6761 | 186.9562 | 0.3961 | 1.6635 | 5.7031 | 7.3666 | 0.4486 | 5.4501 | 5.8987 | 0 | 38,215.53 | 38,215.53 | 5.8571 | 0.3942 | 38,479.42 |
| 2024 | 14.8005 | 120.6487 | 186.355 | 0.3954 | 1.6635 | 5.1147 | 6.7783 | 0.4487 | 4.8822 | 5.3309 | 0 | 38,145.01 | 38,145.01 | 5.8121 | 0.3847 | 38,404.96 |
| **Maximum** | **15.5933** | **131.6761** | **186.9562** | **0.3961** | **1.6635** | **5.7031** | **7.3666** | **0.4487** | **5.4501** | **5.8987** | **0** | **38,215.53** | **38,215.53** | **5.8571** | **0.3942** | **38,479.42** |

**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 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2022 | 5.0613 | 44.7496 | 59.2727 | 0.1214 | 0.4993 | 1.9963 | 2.4956 | 0.1343 | 1.8885 | 2.0228 | 0 | 11,720.45 | 11,720.45 | 2.2984 | 0.099 | 11,807.40 |
| 2023 | 15.5933 | 131.6761 | 186.9562 | 0.3961 | 1.6635 | 5.7031 | 7.3666 | 0.4486 | 5.4501 | 5.8987 | 0 | 38,215.53 | 38,215.53 | 5.8571 | 0.3942 | 38,479.42 |
| 2024 | 14.8005 | 120.6487 | 186.355 | 0.3954 | 1.6635 | 5.1147 | 6.7783 | 0.4487 | 4.8822 | 5.3309 | 0 | 38,145.01 | 38,145.01 | 5.8121 | 0.3847 | 38,404.96 |
| **Maximum** | **15.5933** | **131.6761** | **186.9562** | **0.3961** | **1.6635** | **5.7031** | **7.3666** | **0.4487** | **5.4501** | **5.8987** | **0** | **38,215.53** | **38,215.53** | **5.8571** | **0.3942** | **38,479.42** |

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio-CO2 | Total CO2 | CH4 | N20 | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Percent Reduction** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

## 2.2 Overall Operational

**Operational emissions not estimated in this run**

## 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 | 10/1/2022 | 9/30/2022 | 5 | 0 | |
| 2 | College Lake to CDS Pipeline | Trenching | 10/1/2022 | 6/30/2024 | 5 | 455 | |
| 3 | Trenchless Pipeline Installation | Site Preparation | 10/1/2022 | 6/30/2024 | 5 | 455 | |
| 4 | Site Preparation | Site Preparation | 10/15/2022 | 10/14/2022 | 5 | 0 | |
| 5 | Grading | Grading | 10/18/2022 | 10/17/2022 | 5 | 0 | |
| 6 | Paving | Paving | 3/9/2023 | 3/8/2023 | 5 | 0 | |
| 7 | Architectural Coating | Architectural Coating | 3/16/2023 | 3/15/2023 | 5 | 0 | |
| 8 | Treatment Plant | Building Construction | 4/1/2023 | 7/31/2024 | 5 | 348 | |
| 9 | Weir & Pump Station | Building Construction | 5/1/2023 | 7/31/2024 | 5 | 328 | |

**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: 1,500; Non-Residential Outdoor: 500; Striped Parking Area: 0 (Architectural Coating –**

**OffRoad Equipment**

| Phase Name | Offroad Equipment Type | Amount | Usage Hours | Horse Power | Load Factor |
|---|---|---|---|---|---|
| Architectural Coating | Air Compressors | 0 | 0.00 | 78 | 0.48 |
| Paving | Cement and Mortar Mixers | 0 | 0.00 | 9 | 0.56 |
| Demolition | Concrete/Industrial Saws | 0 | 0.00 | 81 | 0.73 |
| Weir & Pump Station | Cranes | 1 | 3.00 | 231 | 0.29 |
| Weir & Pump Station | Forklifts | 2 | 3.00 | 100 | 0.20 |
| Grading | Graders | 0 | 0.00 | 187 | 0.41 |
| Site Preparation | Graders | 0 | 0.00 | 187 | 0.41 |
| Paving | Pavers | 0 | 0.00 | 130 | 0.42 |
| Paving | Rollers | 0 | 0.00 | 80 | 0.38 |
| Demolition | Rubber Tired Dozers | 0 | 0.00 | 247 | 0.40 |
| Grading | Rubber Tired Dozers | 0 | 0.00 | 247 | 0.40 |
| Weir & Pump Station | Tractors/Loaders/Backhoes | 1 | 4.00 | 97 | 0.37 |
| Demolition | Tractors/Loaders/Backhoes | 0 | 0.00 | 97 | 0.37 |
| Grading | Tractors/Loaders/Backhoes | 0 | 0.00 | 97 | 0.37 |
| Paving | Tractors/Loaders/Backhoes | 0 | 0.00 | 97 | 0.37 |
| Site Preparation | Tractors/Loaders/Backhoes | 0 | 0.00 | 97 | 0.37 |
| Treatment Plant | Cranes | 1 | 4.00 | 231 | 0.29 |
| Treatment Plant | Forklifts | 2 | 4.00 | 100 | 0.20 |
| Trenchless Pipeline Installation | Graders | 0 | 0.00 | 187 | 0.41 |
| Treatment Plant | Tractors/Loaders/Backhoes | 2 | 4.00 | 97 | 0.37 |
| Trenchless Pipeline Installation | Tractors/Loaders/Backhoes | 2 | 6.00 | 97 | 0.37 |
| College Lake to CDS Pipeline | Plate Compactors | 2 | 4.00 | 8 | 0.43 |
| College Lake to CDS Pipeline | Sweepers/Scrubbers | 1 | 1.00 | 63 | 0.46 |
| College Lake to CDS Pipeline | Tractors/Loaders/Backhoes | 2 | 4.00 | 97 | 0.37 |
| College Lake to CDS Pipeline | Forklifts | 1 | 2.00 | 100 | 0.20 |
| College Lake to CDS Pipeline | Pumps | 2 | 6.00 | 172 | 0.74 |
| College Lake to CDS Pipeline | Air Compressors | 1 | 1.00 | 172 | 0.48 |
| College Lake to CDS Pipeline | Off-Highway Trucks | 1 | 2.00 | 402 | 0.38 |
| College Lake to CDS Pipeline | Concrete/Industrial Saws | 1 | 2.00 | 402 | 0.73 |

| | | | | | |
|---|---|---|---|---|---|
| College Lake to CDS Pipeline | Generator Sets | 1 | 6.00 | 172 | 0.74 |
| College Lake to CDS Pipeline | Off-Highway Trucks | 1 | 8.00 | 402 | 0.38 |
| College Lake to CDS Pipeline | Excavators | 1 | 6.00 | 158 | 0.38 |
| College Lake to CDS Pipeline | Skid Steer Loaders | 1 | 6.00 | 65 | 0.37 |
| Trenchless Pipeline Installation | Pumps | 1 | 8.00 | 172 | 0.74 |
| Trenchless Pipeline Installation | Bore/Drill Rigs | 2 | 8.00 | 172 | 0.50 |
| Trenchless Pipeline Installation | Excavators | 1 | 6.00 | 158 | 0.38 |
| Trenchless Pipeline Installation | Cranes | 1 | 8.00 | 231 | 0.29 |
| Trenchless Pipeline Installation | Other Construction Equipment | 1 | 8.00 | 172 | 0.42 |
| Trenchless Pipeline Installation | Other Construction Equipment | 1 | 8.00 | 172 | 0.42 |
| Treatment Plant | Excavators | 2 | 6.00 | 158 | 0.38 |
| Treatment Plant | Scrapers | 2 | 6.00 | 367 | 0.48 |
| Treatment Plant | Skid Steer Loaders | 1 | 6.00 | 65 | 0.37 |
| Treatment Plant | Other Construction Equipment | 1 | 8.00 | 172 | 0.42 |
| Treatment Plant | Forklifts | 1 | 4.00 | 100 | 0.20 |
| Treatment Plant | Other Construction Equipment | 2 | 4.00 | 172 | 0.42 |
| Treatment Plant | Pumps | 8 | 6.00 | 172 | 0.74 |
| Treatment Plant | Air Compressors | 4 | 1.00 | 172 | 0.48 |
| Treatment Plant | Off-Highway Trucks | 1 | 4.00 | 402 | 0.38 |
| Treatment Plant | Generator Sets | 2 | 6.00 | 172 | 0.74 |
| Treatment Plant | Off-Highway Trucks | 1 | 8.00 | 402 | 0.38 |
| Weir & Pump Station | Excavators | 2 | 6.00 | 158 | 0.38 |
| Weir & Pump Station | Other Construction Equipment | 1 | 8.00 | 172 | 0.42 |
| Weir & Pump Station | Pumps | 4 | 6.00 | 172 | 0.74 |
| Weir & Pump Station | Air Compressors | 1 | 1.00 | 172 | 0.48 |
| Weir & Pump Station | Generator Sets | 1 | 6.00 | 172 | 0.74 |
| Weir & Pump Station | Other Construction Equipment | 1 | 4.00 | 172 | 0.42 |

**Trips and VMT**

| Phase Name | Offroad Equipment Count | Worker Trip Number | Vendor Trip Number | Hauling Trip Number | Worker Trip Length | Vendor Trip Length | Hauling Trip Length | Worker Vehicle Class | Vendor Vehicle Class | Hauling Vehicle Class |
|---|---|---|---|---|---|---|---|---|---|---|
| Demolition | 0 | 0.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Site Preparation | 0 | 0.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Grading | 0 | 0.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Weir & Pump Station | 14 | 36.00 | 6.00 | 1,528.00 | 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 |
| Architectural Coating | 0 | 0.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Treatment Plant | 30 | 52.00 | 14.00 | 4,520.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| College Lake to CDS Pipeline | 15 | 22.00 | 4.00 | 2,200.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Trenchless Pipeline Installation | 9 | 22.00 | 4.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |

### 3.1 Mitigation Measures Construction

### 3.2 Demolition - 2022

**Phase not used**

### 3.3 College Lake to CDS Pipeline - 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 | 2.3822 | 19.2136 | 26.2128 | 0.0578 | | 0.8488 | 0.8488 | | 0.8170 | 0.8170 | | 5,513.4316 | 5,513.4316 | 0.9234 | | 5,536.5177 |
| **Total** | **2.3822** | **19.2136** | **26.2128** | **0.0578** | | **0.8488** | **0.8488** | | **0.8170** | **0.8170** | | **5,513.4316** | **5,513.4316** | **0.9234** | | **5,536.5177** |

**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 | 0.0235 | 1.1732 | 0.1713 | 3.4400e-003 | 0.0839 | 9.2100e-003 | 0.0931 | 0.0229 | 8.8100e-003 | 0.0318 | | 374.2527 | 374.2527 | 0.0105 | 0.0593 | 392.1798 |
| Vendor | 9.8200e-003 | 0.2940 | 0.0674 | 9.0000e-004 | 0.0270 | 2.8500e-003 | 0.0298 | 7.7600e-003 | 2.7300e-003 | 0.0105 | | 96.9748 | 96.9748 | 1.9500e-003 | 0.0146 | 101.3748 |
| Worker | 0.0809 | 0.0577 | 0.7196 | 1.6700e-003 | 0.1807 | 1.2400e-003 | 0.1820 | 0.0479 | 1.1400e-003 | 0.0491 | | 170.1138 | 170.1138 | 6.1600e-003 | 5.2400e-003 | 171.8296 |
| **Total** | **0.1142** | **1.5249** | **0.9582** | **6.0100e-003** | **0.2916** | **0.0133** | **0.3049** | **0.0786** | **0.0127** | **0.0913** | | **641.3413** | **641.3413** | **0.0187** | **0.0791** | **665.3841** |

## 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 | 2.3822 | 19.2136 | 26.2128 | 0.0578 | | 0.8488 | 0.8488 | | 0.8170 | 0.8170 | 0.0000 | 5,513.4316 | 5,513.4316 | 0.9234 | | 5,536.5177 |
| **Total** | **2.3822** | **19.2136** | **26.2128** | **0.0578** | | **0.8488** | **0.8488** | | **0.8170** | **0.8170** | **0.0000** | **5,513.4316** | **5,513.4316** | **0.9234** | | **5,536.5177** |

## 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 | 0.0235 | 1.1732 | 0.1713 | 3.4400e-003 | 0.0839 | 9.2100e-003 | 0.0931 | 0.0229 | 8.8100e-003 | 0.0318 | | 374.2527 | 374.2527 | 0.0105 | 0.0593 | 392.1798 |
| Vendor | 9.8200e-003 | 0.2940 | 0.0674 | 9.0000e-004 | 0.0270 | 2.8500e-003 | 0.0298 | 7.7600e-003 | 2.7300e-003 | 0.0105 | | 96.9748 | 96.9748 | 1.9500e-003 | 0.0146 | 101.3748 |
| Worker | 0.0809 | 0.0577 | 0.7196 | 1.6700e-003 | 0.1807 | 1.2400e-003 | 0.1820 | 0.0479 | 1.1400e-003 | 0.0491 | | 170.1138 | 170.1138 | 6.1600e-003 | 5.2400e-003 | 171.8296 |
| **Total** | **0.1142** | **1.5249** | **0.9582** | **6.0100e-003** | **0.2916** | **0.0133** | **0.3049** | **0.0786** | **0.0127** | **0.0913** | | **641.3413** | **641.3413** | **0.0187** | **0.0791** | **665.3841** |

# 3.3 College Lake to CDS 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 | 2.2406 | 17.2222 | 26.1253 | 0.0578 | | 0.7446 | 0.7446 | | 0.7169 | 0.7169 | | 5,515.0415 | 5,515.0415 | 0.9186 | | 5,538.0052 |
| **Total** | **2.2406** | **17.2222** | **26.1253** | **0.0578** | | **0.7446** | **0.7446** | | **0.7169** | **0.7169** | | **5,515.0415** | **5,515.0415** | **0.9186** | | **5,538.0052** |

## 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 | 0.0151 | 1.0202 | 0.1557 | 3.3200e-003 | 0.0839 | 6.9000e-003 | 0.0908 | 0.0229 | 6.6000e-003 | 0.0296 | | 361.8719 | 361.8719 | 0.0103 | 0.0573 | 379.2112 |
| Vendor | 5.8200e-003 | 0.2495 | 0.0570 | 8.7000e-004 | 0.0270 | 1.4300e-003 | 0.0284 | 7.7600e-003 | 1.3700e-003 | 9.1300e-003 | | 93.7752 | 93.7752 | 1.7700e-003 | 0.0141 | 98.0216 |
| Worker | 0.0753 | 0.0510 | 0.6591 | 1.6200e-003 | 0.1807 | 1.1700e-003 | 0.1819 | 0.0479 | 1.0800e-003 | 0.0490 | | 166.0131 | 166.0131 | 5.5400e-003 | 4.8200e-003 | 167.5890 |
| **Total** | **0.0962** | **1.3207** | **0.8718** | **5.8100e-003** | **0.2916** | **9.5000e-003** | **0.3011** | **0.0786** | **9.0500e-003** | **0.0877** | | **621.6602** | **621.6602** | **0.0176** | **0.0762** | **644.8217** |

**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 | 2.2406 | 17.2222 | 26.1253 | 0.0578 | | 0.7446 | 0.7446 | | 0.7169 | 0.7169 | 0.0000 | 5,515.0414 | 5,515.0414 | 0.9186 | | 5,538.0052 |
| **Total** | **2.2406** | **17.2222** | **26.1253** | **0.0578** | | **0.7446** | **0.7446** | | **0.7169** | **0.7169** | **0.0000** | **5,515.0414** | **5,515.0414** | **0.9186** | | **5,538.0052** |

**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 | 0.0151 | 1.0202 | 0.1557 | 3.3200e-003 | 0.0839 | 6.9000e-003 | 0.0908 | 0.0229 | 6.6000e-003 | 0.0296 | | 361.8719 | 361.8719 | 0.0103 | 0.0573 | 379.2112 |
| Vendor | 5.8200e-003 | 0.2495 | 0.0570 | 8.7000e-004 | 0.0270 | 1.4300e-003 | 0.0284 | 7.7600e-003 | 1.3700e-003 | 9.1300e-003 | | 93.7752 | 93.7752 | 1.7700e-003 | 0.0141 | 98.0216 |
| Worker | 0.0753 | 0.0510 | 0.6591 | 1.6200e-003 | 0.1807 | 1.1700e-003 | 0.1819 | 0.0479 | 1.0800e-003 | 0.0490 | | 166.0131 | 166.0131 | 5.5400e-003 | 4.8200e-003 | 167.5890 |
| **Total** | **0.0962** | **1.3207** | **0.8718** | **5.8100e-003** | **0.2916** | **9.5000e-003** | **0.3011** | **0.0786** | **9.0500e-003** | **0.0877** | | **621.6602** | **621.6602** | **0.0176** | **0.0762** | **644.8217** |

## 3.3 College Lake to CDS 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 | 2.1388 | 15.7438 | 26.0956 | 0.0578 | | 0.6620 | 0.6620 | | 0.6368 | 0.6368 | | 5,515.9921 | 5,515.9921 | 0.9118 | | 5,538.7861 |

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | **2.1388** | **15.7438** | **26.0956** | **0.0578** | | **0.6620** | **0.6620** | | **0.6368** | **0.6368** | | **5,515.9921** | **5,515.9921** | **0.9118** | | **5,538.7861** |

## 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 | 0.0146 | 0.9733 | 0.1566 | 3.2500e-003 | 0.0839 | 6.6700e-003 | 0.0906 | 0.0230 | 6.3800e-003 | 0.0293 | | 354.3371 | 354.3371 | 0.0103 | 0.0561 | 371.3222 |
| Vendor | 5.5400e-003 | 0.2416 | 0.0553 | 8.6000e-004 | 0.0270 | 1.3900e-003 | 0.0284 | 7.7600e-003 | 1.3300e-003 | 9.0900e-003 | | 92.1493 | 92.1493 | 1.7600e-003 | 0.0139 | 96.3211 |
| Worker | 0.0704 | 0.0453 | 0.6081 | 1.5700e-003 | 0.1807 | 1.1000e-003 | 0.1818 | 0.0479 | 1.0200e-003 | 0.0490 | | 162.1512 | 162.1512 | 4.9900e-003 | 4.4600e-003 | 163.6054 |
| **Total** | **0.0905** | **1.2601** | **0.8201** | **5.6800e-003** | **0.2916** | **9.1600e-003** | **0.3008** | **0.0787** | **8.7300e-003** | **0.0874** | | **608.6376** | **608.6376** | **0.0170** | **0.0744** | **631.2487** |

## 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 | 2.1388 | 15.7438 | 26.0956 | 0.0578 | | 0.6620 | 0.6620 | | 0.6368 | 0.6368 | 0.0000 | 5,515.9921 | 5,515.9921 | 0.9118 | | 5,538.7861 |
| **Total** | **2.1388** | **15.7438** | **26.0956** | **0.0578** | | **0.6620** | **0.6620** | | **0.6368** | **0.6368** | **0.0000** | **5,515.9921** | **5,515.9921** | **0.9118** | | **5,538.7861** |

## 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 | 0.0146 | 0.9733 | 0.1566 | 3.2500e-003 | 0.0839 | 6.6700e-003 | 0.0906 | 0.0230 | 6.3800e-003 | 0.0293 | | 354.3371 | 354.3371 | 0.0103 | 0.0561 | 371.3222 |
| Vendor | 5.5400e-003 | 0.2416 | 0.0553 | 8.6000e-004 | 0.0270 | 1.3900e-003 | 0.0284 | 7.7600e-003 | 1.3300e-003 | 9.0900e-003 | | 92.1493 | 92.1493 | 1.7600e-003 | 0.0139 | 96.3211 |
| Worker | 0.0704 | 0.0453 | 0.6081 | 1.5700e-003 | 0.1807 | 1.1000e-003 | 0.1818 | 0.0479 | 1.0200e-003 | 0.0490 | | 162.1512 | 162.1512 | 4.9900e-003 | 4.4600e-003 | 163.6054 |
| **Total** | **0.0905** | **1.2601** | **0.8201** | **5.6800e-003** | **0.2916** | **9.1600e-003** | **0.3008** | **0.0787** | **8.7300e-003** | **0.0874** | | **608.6376** | **608.6376** | **0.0170** | **0.0744** | **631.2487** |

### 3.4 Trenchless Pipeline Installation - 2022

**Unmitigated Construction On-Site**

| Category | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/day | | | | | | | | | | lb/day | | | | | |
| Fugitive Dust | | | | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.4742 | 23.6595 | 31.3147 | 0.0550 | | 1.1301 | 1.1301 | | 1.0550 | 1.0550 | | 5,298.5850 | 5,298.5850 | 1.3482 | | 5,332.2903 |
| **Total** | **2.4742** | **23.6595** | **31.3147** | **0.0550** | **0.0000** | **1.1301** | **1.1301** | **0.0000** | **1.0550** | **1.0550** | | **5,298.5850** | **5,298.5850** | **1.3482** | | **5,332.2903** |

**Unmitigated Construction Off-Site**

| Category | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 | 0.0000 |
| Vendor | 9.8200e-003 | 0.2940 | 0.0674 | 9.0000e-004 | 0.0270 | 2.8500e-003 | 0.0298 | 7.7600e-003 | 2.7300e-003 | 0.0105 | | 96.9748 | 96.9748 | 1.9500e-003 | 0.0146 | 101.3748 |
| Worker | 0.0809 | 0.0577 | 0.7196 | 1.6700e-003 | 0.1807 | 1.2400e-003 | 0.1820 | 0.0479 | 1.1400e-003 | 0.0491 | | 170.1138 | 170.1138 | 6.1600e-003 | 5.2400e-003 | 171.8296 |
| **Total** | **0.0907** | **0.3517** | **0.7869** | **2.5700e-003** | **0.2077** | **4.0900e-003** | **0.2118** | **0.0557** | **3.8700e-003** | **0.0596** | | **267.0886** | **267.0886** | **8.1100e-003** | **0.0198** | **273.2044** |

**Mitigated Construction On-Site**

| Category | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/day | | | | | | | | | | lb/day | | | | | |
| Fugitive Dust | | | | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.4742 | 23.6595 | 31.3147 | 0.0550 | | 1.1301 | 1.1301 | | 1.0550 | 1.0550 | 0.0000 | 5,298.5850 | 5,298.5850 | 1.3482 | | 5,332.2903 |
| **Total** | **2.4742** | **23.6595** | **31.3147** | **0.0550** | **0.0000** | **1.1301** | **1.1301** | **0.0000** | **1.0550** | **1.0550** | **0.0000** | **5,298.5850** | **5,298.5850** | **1.3482** | | **5,332.2903** |

**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 | 0.0000 |
| Vendor | 9.8200e-003 | 0.2940 | 0.0674 | 9.0000e-004 | 0.0270 | 2.8500e-003 | 0.0298 | 7.7600e-003 | 2.7300e-003 | 0.0105 | | 96.9748 | 96.9748 | 1.9500e-003 | 0.0146 | 101.3748 |
| Worker | 0.0809 | 0.0577 | 0.7196 | 1.6700e-003 | 0.1807 | 1.2400e-003 | 0.1820 | 0.0479 | 1.1400e-003 | 0.0491 | | 170.1138 | 170.1138 | 6.1600e-003 | 5.2400e-003 | 171.8296 |
| **Total** | **0.0907** | **0.3517** | **0.7869** | **2.5700e-003** | **0.2077** | **4.0900e-003** | **0.2118** | **0.0557** | **3.8700e-003** | **0.0596** | | **267.0886** | **267.0886** | **8.1100e-003** | **0.0198** | **273.2044** |

## 3.4 Trenchless Pipeline Installation - 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 | | | | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.2991 | 21.0782 | 31.2644 | 0.0551 | | 0.9972 | 0.9972 | | 0.9309 | 0.9309 | | 5,305.9453 | 5,305.9453 | 1.3484 | | 5,339.6540 |
| **Total** | **2.2991** | **21.0782** | **31.2644** | **0.0551** | **0.0000** | **0.9972** | **0.9972** | **0.0000** | **0.9309** | **0.9309** | | **5,305.9453** | **5,305.9453** | **1.3484** | | **5,339.6540** |

### 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 | 0.0000 |
| Vendor | 5.8200e-003 | 0.2495 | 0.0570 | 8.7000e-004 | 0.0270 | 1.4300e-003 | 0.0284 | 7.7600e-003 | 1.3700e-003 | 9.1300e-003 | | 93.7752 | 93.7752 | 1.7700e-003 | 0.0141 | 98.0216 |
| Worker | 0.0753 | 0.0510 | 0.6591 | 1.6200e-003 | 0.1807 | 1.1700e-003 | 0.1819 | 0.0479 | 1.0800e-003 | 0.0490 | | 166.0131 | 166.0131 | 5.5400e-003 | 4.8200e-003 | 167.5890 |
| **Total** | **0.0811** | **0.3005** | **0.7161** | **2.4900e-003** | **0.2077** | **2.6000e-003** | **0.2103** | **0.0557** | **2.4500e-003** | **0.0581** | | **259.7883** | **259.7883** | **7.3100e-003** | **0.0189** | **265.6106** |

### 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 | | | | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.2991 | 21.0782 | 31.2644 | 0.0551 | | 0.9972 | 0.9972 | | 0.9309 | 0.9309 | 0.0000 | 5,305.9453 | 5,305.9453 | 1.3484 | | 5,339.6540 |
| **Total** | **2.2991** | **21.0782** | **31.2644** | **0.0551** | **0.0000** | **0.9972** | **0.9972** | **0.0000** | **0.9309** | **0.9309** | **0.0000** | **5,305.9453** | **5,305.9453** | **1.3484** | | **5,339.6540** |

## 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 | 0.0000 |
| Vendor | 5.8200e-003 | 0.2495 | 0.0570 | 8.7000e-004 | 0.0270 | 1.4300e-003 | 0.0284 | 7.7600e-003 | 1.3700e-003 | 9.1300e-003 | | 93.7752 | 93.7752 | 1.7700e-003 | 0.0141 | 98.0216 |
| Worker | 0.0753 | 0.0510 | 0.6591 | 1.6200e-003 | 0.1807 | 1.1700e-003 | 0.1819 | 0.0479 | 1.0800e-003 | 0.0490 | | 166.0131 | 166.0131 | 5.5400e-003 | 4.8200e-003 | 167.5890 |
| **Total** | **0.0811** | **0.3005** | **0.7161** | **2.4900e-003** | **0.2077** | **2.6000e-003** | **0.2103** | **0.0557** | **2.4500e-003** | **0.0581** | | **259.7883** | **259.7883** | **7.3100e-003** | **0.0189** | **265.6106** |

## 3.4 Trenchless Pipeline Installation - 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 | | | | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.1957 | 19.5343 | 31.2683 | 0.0551 | | 0.9116 | 0.9116 | | 0.8504 | 0.8504 | | 5,304.1642 | 5,304.1642 | 1.3455 | | 5,337.8024 |
| **Total** | **2.1957** | **19.5343** | **31.2683** | **0.0551** | **0.0000** | **0.9116** | **0.9116** | **0.0000** | **0.8504** | **0.8504** | | **5,304.1642** | **5,304.1642** | **1.3455** | | **5,337.8024** |

## 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 | 0.0000 |
| Vendor | 5.5400e-003 | 0.2416 | 0.0553 | 8.6000e-004 | 0.0270 | 1.3900e-003 | 0.0284 | 7.7600e-003 | 1.3300e-003 | 9.0900e-003 | | 92.1493 | 92.1493 | 1.7600e-003 | 0.0139 | 96.3211 |
| Worker | 0.0704 | 0.0453 | 0.6081 | 1.5700e-003 | 0.1807 | 1.1000e-003 | 0.1818 | 0.0479 | 1.0200e-003 | 0.0490 | | 162.1512 | 162.1512 | 4.9900e-003 | 4.4600e-003 | 163.6054 |
| **Total** | **0.0759** | **0.2869** | **0.6634** | **2.4300e-003** | **0.2077** | **2.4900e-003** | **0.2102** | **0.0557** | **2.3500e-003** | **0.0580** | | **254.3005** | **254.3005** | **6.7500e-003** | **0.0183** | **259.9265** |

## 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 | | | | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | | 0.0000 | | | 0.0000 |
| Off-Road | 2.1957 | 19.5343 | 31.2683 | 0.0551 | | 0.9116 | 0.9116 | | 0.8504 | 0.8504 | 0.0000 | 5,304.1642 | 5,304.1642 | 1.3455 | | 5,337.8024 |
| **Total** | **2.1957** | **19.5343** | **31.2683** | **0.0551** | **0.0000** | **0.9116** | **0.9116** | **0.0000** | **0.8504** | **0.8504** | **0.0000** | **5,304.1642** | **5,304.1642** | **1.3455** | | **5,337.8024** |

## 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 | 0.0000 |
| Vendor | 5.5400e-003 | 0.2416 | 0.0553 | 8.6000e-004 | 0.0270 | 1.3900e-003 | 0.0284 | 7.7600e-003 | 1.3300e-003 | 9.0900e-003 | | 92.1493 | 92.1493 | 1.7600e-003 | 0.0139 | 96.3211 |
| Worker | 0.0704 | 0.0453 | 0.6081 | 1.5700e-003 | 0.1807 | 1.1000e-003 | 0.1818 | 0.0479 | 1.0200e-003 | 0.0490 | | 162.1512 | 162.1512 | 4.9900e-003 | 4.4600e-003 | 163.6054 |
| **Total** | **0.0759** | **0.2869** | **0.6634** | **2.4300e-003** | **0.2077** | **2.4900e-003** | **0.2102** | **0.0557** | **2.3500e-003** | **0.0580** | | **254.3005** | **254.3005** | **6.7500e-003** | **0.0183** | **259.9265** |

## 3.5 Site Preparation - 2022

**Phase not used**

## 3.6 Grading - 2022

Phase not used

## 3.7 Paving - 2023

Phase not used

## 3.8 Architectural Coating - 2023

Phase not used

## 3.9 Treatment Plant - 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 | 7.4566 | 61.8737 | 85.3535 | 0.1784 | | 2.7439 | 2.7439 | | 2.6295 | 2.6295 | | 17,045.4096 | 17,045.4096 | 2.6375 | | 17,111.3480 |
| **Total** | **7.4566** | **61.8737** | **85.3535** | **0.1784** | | **2.7439** | **2.7439** | | **2.6295** | **2.6295** | | **17,045.4096** | **17,045.4096** | **2.6375** | | **17,111.3480** |

### 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 | 0.0405 | 2.7406 | 0.4182 | 8.9300e-003 | 0.2254 | 0.0185 | 0.2440 | 0.0616 | 0.0177 | 0.0794 | | 972.0818 | 972.0818 | 0.0276 | 0.1540 | 1,018.6595 |
| Vendor | 0.0204 | 0.8734 | 0.1995 | 3.0600e-003 | 0.0945 | 5.0200e-003 | 0.0995 | 0.0272 | 4.8000e-003 | 0.0320 | | 328.2133 | 328.2133 | 6.2100e-003 | 0.0494 | 343.0754 |
| Worker | 0.1780 | 0.1205 | 1.5578 | 3.8300e-003 | 0.4272 | 2.7600e-003 | 0.4299 | 0.1133 | 2.5400e-003 | 0.1159 | | 392.3945 | 392.3945 | 0.0131 | 0.0114 | 396.1195 |
| **Total** | **0.2389** | **3.7344** | **2.1755** | **0.0158** | **0.7471** | **0.0263** | **0.7734** | **0.2021** | **0.0251** | **0.2272** | | **1,692.6896** | **1,692.6896** | **0.0469** | **0.2147** | **1,757.8544** |

### 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 | 7.4566 | 61.8737 | 85.3535 | 0.1784 | | 2.7439 | 2.7439 | | 2.6295 | 2.6295 | 0.0000 | 17,045.4096 | 17,045.4096 | 2.6375 | | 17,111.3480 |
| **Total** | **7.4566** | **61.8737** | **85.3535** | **0.1784** | | **2.7439** | **2.7439** | | **2.6295** | **2.6295** | **0.0000** | **17,045.4096** | **17,045.4096** | **2.6375** | | **17,111.3480** |

**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 | 0.0405 | 2.7406 | 0.4182 | 8.9300e-003 | 0.2254 | 0.0185 | 0.2440 | 0.0616 | 0.0177 | 0.0794 | | 972.0818 | 972.0818 | 0.0276 | 0.1540 | 1,018.6595 |
| Vendor | 0.0204 | 0.8734 | 0.1995 | 3.0600e-003 | 0.0945 | 5.0200e-003 | 0.0995 | 0.0272 | 4.8000e-003 | 0.0320 | | 328.2133 | 328.2133 | 6.2100e-003 | 0.0494 | 343.0754 |
| Worker | 0.1780 | 0.1205 | 1.5578 | 3.8300e-003 | 0.4272 | 2.7600e-003 | 0.4299 | 0.1133 | 2.5400e-003 | 0.1159 | | 392.3945 | 392.3945 | 0.0131 | 0.0114 | 396.1195 |
| **Total** | **0.2389** | **3.7344** | **2.1755** | **0.0158** | **0.7471** | **0.0263** | **0.7734** | **0.2021** | **0.0251** | **0.2272** | | **1,692.6896** | **1,692.6896** | **0.0469** | **0.2147** | **1,757.8544** |

## 3.9 Treatment Plant - 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 | 7.0792 | 56.4681 | 85.0725 | 0.1784 | | 2.4567 | 2.4567 | | 2.3514 | 2.3514 | | 17,045.0038 | 17,045.0038 | 2.6157 | | 17,110.3975 |
| **Total** | **7.0792** | **56.4681** | **85.0725** | **0.1784** | | **2.4567** | **2.4567** | | **2.3514** | **2.3514** | | **17,045.0038** | **17,045.0038** | **2.6157** | | **17,110.3975** |

**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 | 0.0392 | 2.6145 | 0.4208 | 8.7400e-003 | 0.2255 | 0.0179 | 0.2434 | 0.0616 | 0.0171 | 0.0788 | | 951.8412 | 951.8412 | 0.0276 | 0.1508 | 997.4676 |
| Vendor | 0.0194 | 0.8454 | 0.1937 | 3.0000e-003 | 0.0945 | 4.8700e-003 | 0.0993 | 0.0272 | 4.6500e-003 | 0.0318 | | 322.5226 | 322.5226 | 6.1600e-003 | 0.0485 | 337.1240 |
| Worker | 0.1663 | 0.1071 | 1.4373 | 3.7200e-003 | 0.4272 | 2.6000e-003 | 0.4298 | 0.1133 | 2.4000e-003 | 0.1157 | | 383.2664 | 383.2664 | 0.0118 | 0.0105 | 386.7037 |

| Total | 0.2249 | 3.5670 | 2.0517 | 0.0155 | 0.7471 | 0.0254 | 0.7725 | 0.2021 | 0.0242 | 0.2263 | | 1,657.6302 | 1,657.6302 | 0.0456 | 0.2098 | 1,721.2953 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

## 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 | 7.0792 | 56.4681 | 85.0725 | 0.1784 | | 2.4567 | 2.4567 | | 2.3514 | 2.3514 | 0.0000 | 17,045.0038 | 17,045.0038 | 2.6157 | | 17,110.3974 |
| **Total** | **7.0792** | **56.4681** | **85.0725** | **0.1784** | | **2.4567** | **2.4567** | | **2.3514** | **2.3514** | **0.0000** | **17,045.0038** | **17,045.0038** | **2.6157** | | **17,110.3974** |

## 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 | 0.0392 | 2.6145 | 0.4208 | 8.7400e-003 | 0.2255 | 0.0179 | 0.2434 | 0.0616 | 0.0171 | 0.0788 | | 951.8412 | 951.8412 | 0.0276 | 0.1508 | 997.4676 |
| Vendor | 0.0194 | 0.8454 | 0.1937 | 3.0000e-003 | 0.0945 | 4.8700e-003 | 0.0993 | 0.0272 | 4.6500e-003 | 0.0318 | | 322.5226 | 322.5226 | 6.1600e-003 | 0.0485 | 337.1240 |
| Worker | 0.1663 | 0.1071 | 1.4373 | 3.7200e-003 | 0.4272 | 2.6000e-003 | 0.4298 | 0.1133 | 2.4000e-003 | 0.1157 | | 383.2664 | 383.2664 | 0.0118 | 0.0105 | 386.7037 |
| **Total** | **0.2249** | **3.5670** | **2.0517** | **0.0155** | **0.7471** | **0.0254** | **0.7725** | **0.2021** | **0.0242** | **0.2263** | | **1,657.6302** | **1,657.6302** | **0.0456** | **0.2098** | **1,721.2953** |

# 3.10 Weir & 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 | 3.0344 | 24.7058 | 39.1356 | 0.0736 | | 1.1682 | 1.1682 | | 1.1261 | 1.1261 | | 7,014.0173 | 7,014.0173 | 0.8594 | | 7,035.5015 |
| **Total** | **3.0344** | **24.7058** | **39.1356** | **0.0736** | | **1.1682** | **1.1682** | | **1.1261** | **1.1261** | | **7,014.0173** | **7,014.0173** | **0.8594** | | **7,035.5015** |

## Unmitigated Construction Off-Site

| Category | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/day | | | | | | | | | | lb/day | | | | | |
| Hauling | 0.0145 | 0.9830 | 0.1500 | 3.2000e-003 | 0.0809 | 6.6500e-003 | 0.0875 | 0.0221 | 6.3600e-003 | 0.0285 | | 348.6528 | 348.6528 | 9.8800e-003 | 0.0552 | 365.3586 |
| Vendor | 8.7300e-003 | 0.3743 | 0.0855 | 1.3100e-003 | 0.0405 | 2.1500e-003 | 0.0426 | 0.0116 | 2.0600e-003 | 0.0137 | | 140.6629 | 140.6629 | 2.6600e-003 | 0.0212 | 147.0323 |
| Worker | 0.1232 | 0.0834 | 1.0785 | 2.6500e-003 | 0.2957 | 1.9100e-003 | 0.2976 | 0.0784 | 1.7600e-003 | 0.0802 | | 271.6577 | 271.6577 | 9.0600e-003 | 7.8900e-003 | 274.2365 |
| **Total** | **0.1465** | **1.4407** | **1.3140** | **7.1600e-003** | **0.4171** | **0.0107** | **0.4278** | **0.1122** | **0.0102** | **0.1224** | | **760.9734** | **760.9734** | **0.0216** | **0.0843** | **786.6275** |

**Mitigated Construction On-Site**

| Category | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/day | | | | | | | | | | lb/day | | | | | |
| Off-Road | 3.0344 | 24.7058 | 39.1356 | 0.0736 | | 1.1682 | 1.1682 | | 1.1261 | 1.1261 | 0.0000 | 7,014.0173 | 7,014.0173 | 0.8594 | | 7,035.5015 |
| **Total** | **3.0344** | **24.7058** | **39.1356** | **0.0736** | | **1.1682** | **1.1682** | | **1.1261** | **1.1261** | **0.0000** | **7,014.0173** | **7,014.0173** | **0.8594** | | **7,035.5015** |

**Mitigated Construction Off-Site**

| Category | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/day | | | | | | | | | | lb/day | | | | | |
| Hauling | 0.0145 | 0.9830 | 0.1500 | 3.2000e-003 | 0.0809 | 6.6500e-003 | 0.0875 | 0.0221 | 6.3600e-003 | 0.0285 | | 348.6528 | 348.6528 | 9.8800e-003 | 0.0552 | 365.3586 |
| Vendor | 8.7300e-003 | 0.3743 | 0.0855 | 1.3100e-003 | 0.0405 | 2.1500e-003 | 0.0426 | 0.0116 | 2.0600e-003 | 0.0137 | | 140.6629 | 140.6629 | 2.6600e-003 | 0.0212 | 147.0323 |
| Worker | 0.1232 | 0.0834 | 1.0785 | 2.6500e-003 | 0.2957 | 1.9100e-003 | 0.2976 | 0.0784 | 1.7600e-003 | 0.0802 | | 271.6577 | 271.6577 | 9.0600e-003 | 7.8900e-003 | 274.2365 |
| **Total** | **0.1465** | **1.4407** | **1.3140** | **7.1600e-003** | **0.4171** | **0.0107** | **0.4278** | **0.1122** | **0.0102** | **0.1224** | | **760.9734** | **760.9734** | **0.0216** | **0.0843** | **786.6275** |

## 3.10 Weir & Pump Station - 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 | 2.8581 | 22.4143 | 39.1545 | 0.0736 | | 1.0370 | 1.0370 | | 0.9985 | 0.9985 | | 7,014.3234 | 7,014.3234 | 0.8490 | | 7,035.5484 |
| **Total** | **2.8581** | **22.4143** | **39.1545** | **0.0736** | | **1.0370** | **1.0370** | | **0.9985** | **0.9985** | | **7,014.3234** | **7,014.3234** | **0.8490** | | **7,035.5484** |

## 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 | 0.0141 | 0.9377 | 0.1509 | 3.1300e-003 | 0.0809 | 6.4300e-003 | 0.0873 | 0.0221 | 6.1500e-003 | 0.0283 | | 341.3932 | 341.3932 | 9.9000e-003 | 0.0541 | 357.7578 |
| Vendor | 8.3200e-003 | 0.3623 | 0.0830 | 1.2900e-003 | 0.0405 | 2.0900e-003 | 0.0426 | 0.0117 | 1.9900e-003 | 0.0136 | | 138.2240 | 138.2240 | 2.6400e-003 | 0.0208 | 144.4817 |
| Worker | 0.1151 | 0.0741 | 0.9950 | 2.5700e-003 | 0.2957 | 1.8000e-003 | 0.2975 | 0.0784 | 1.6600e-003 | 0.0801 | | 265.3383 | 265.3383 | 8.1700e-003 | 7.3000e-003 | 267.7179 |
| **Total** | **0.1375** | **1.3742** | **1.2290** | **6.9900e-003** | **0.4171** | **0.0103** | **0.4274** | **0.1122** | **9.8000e-003** | **0.1220** | | **744.9554** | **744.9554** | **0.0207** | **0.0822** | **769.9574** |

## 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 | 2.8581 | 22.4143 | 39.1545 | 0.0736 | | 1.0370 | 1.0370 | | 0.9985 | 0.9985 | 0.0000 | 7,014.3234 | 7,014.3234 | 0.8490 | | 7,035.5484 |
| **Total** | **2.8581** | **22.4143** | **39.1545** | **0.0736** | | **1.0370** | **1.0370** | | **0.9985** | **0.9985** | **0.0000** | **7,014.3234** | **7,014.3234** | **0.8490** | | **7,035.5484** |

## 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 | 0.0141 | 0.9377 | 0.1509 | 3.1300e-003 | 0.0809 | 6.4300e-003 | 0.0873 | 0.0221 | 6.1500e-003 | 0.0283 | | 341.3932 | 341.3932 | 9.9000e-003 | 0.0541 | 357.7578 |
| Vendor | 8.3200e-003 | 0.3623 | 0.0830 | 1.2900e-003 | 0.0405 | 2.0900e-003 | 0.0426 | 0.0117 | 1.9900e-003 | 0.0136 | | 138.2240 | 138.2240 | 2.6400e-003 | 0.0208 | 144.4817 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Worker | 0.1151 | 0.0741 | 0.9950 | 2.5700e-003 | 0.2957 | 1.8000e-003 | 0.2975 | 0.0784 | 1.6600e-003 | 0.0801 | | 265.3383 | 265.3383 | 8.1700e-003 | 7.3000e-003 | 267.7179 |
| **Total** | **0.1375** | **1.3742** | **1.2290** | **6.9900e-003** | **0.4171** | **0.0103** | **0.4274** | **0.1122** | **9.8000e-003** | **0.1220** | | **744.9554** | **744.9554** | **0.0207** | **0.0822** | **769.9574** |

## 4.0 Operational Detail - Mobile

**Operational emissions not estimated in this run**

Updating College Lake - - Santa Cruz County, Annual

**EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied**

# Updating College Lake -

**Santa Cruz County, Annual**

## 1.0 Project Characteristics

### 1.1 Land Usage

| Land Uses | Size | Metric | Lot Acreage | Floor Surface Area | Population |
|---|---|---|---|---|---|
| General Light Industry | 1.00 | 1000sqft | 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** | 2025 |
| **Utility Company** | Pacific Gas and Electric Company | | | | |
| **CO2 Intensity (lb/MWhr)** | 203.98 | **CH4 Intensity (lb/MWhr)** | 0.033 | **N2O Intensity (lb/MWhr)** | 0.004 |

### 1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Unit sizes assumed

Construction Phase - Project data

Off-road Equipment - Phase not used

Off-road Equipment - Phase not used

Off-road Equipment - Phase not used

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 -

Off-road Equipment - Project data

Grading - .

Off-road Equipment - Project data

Trips and VMT - Project data

Vehicle Trips - Operational emissions not estimated in this run

| Table Name | Column Name | Default Value | New Value |
|---|---|---|---|
| tblConstructionPhase | NumDays | 5.00 | 0.00 |
| tblConstructionPhase | NumDays | 100.00 | 328.00 |
| tblConstructionPhase | NumDays | 10.00 | 0.00 |
| tblConstructionPhase | NumDays | 2.00 | 0.00 |
| tblConstructionPhase | NumDays | 5.00 | 0.00 |
| tblConstructionPhase | NumDays | 1.00 | 0.00 |
| tblConstructionPhase | NumDays | 100.00 | 348.00 |
| tblConstructionPhase | NumDays | 1.00 | 455.00 |
| tblConstructionPhase | PhaseEndDate | 3/22/2023 | 3/15/2023 |
| tblConstructionPhase | PhaseEndDate | 3/8/2023 | 7/31/2024 |
| tblConstructionPhase | PhaseEndDate | 10/14/2022 | 9/30/2022 |
| tblConstructionPhase | PhaseEndDate | 10/19/2022 | 10/17/2022 |
| tblConstructionPhase | PhaseEndDate | 3/15/2023 | 3/8/2023 |
| tblConstructionPhase | PhaseEndDate | 10/17/2022 | 10/14/2022 |
| tblConstructionPhase | PhaseStartDate | 10/20/2022 | 5/1/2023 |
| tblLandUse | LotAcreage | 0.02 | 1.00 |
| tblOffRoadEquipment | HorsePower | 89.00 | 100.00 |
| tblOffRoadEquipment | HorsePower | 89.00 | 100.00 |
| tblOffRoadEquipment | HorsePower | 64.00 | 63.00 |
| tblOffRoadEquipment | HorsePower | 89.00 | 100.00 |
| tblOffRoadEquipment | HorsePower | 84.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 78.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 81.00 | 402.00 |
| tblOffRoadEquipment | HorsePower | 84.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 84.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 221.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 89.00 | 100.00 |

| | | | |
|---|---|---|---|
| tblOffRoadEquipment | HorsePower | 84.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 78.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 84.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 84.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 78.00 | 172.00 |
| tblOffRoadEquipment | HorsePower | 84.00 | 172.00 |
| tblOffRoadEquipment | LoadFactor | 0.46 | 0.46 |
| tblOffRoadEquipment | LoadFactor | 0.37 | 0.37 |
| tblOffRoadEquipment | LoadFactor | 0.20 | 0.20 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.37 | 0.37 |
| tblOffRoadEquipment | LoadFactor | 0.50 | 0.50 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.29 | 0.29 |
| tblOffRoadEquipment | LoadFactor | 0.42 | 0.42 |
| tblOffRoadEquipment | LoadFactor | 0.42 | 0.42 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.48 | 0.48 |
| tblOffRoadEquipment | LoadFactor | 0.37 | 0.37 |
| tblOffRoadEquipment | LoadFactor | 0.42 | 0.42 |
| tblOffRoadEquipment | LoadFactor | 0.20 | 0.20 |
| tblOffRoadEquipment | LoadFactor | 0.42 | 0.42 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.38 | 0.38 |
| tblOffRoadEquipment | LoadFactor | 0.42 | 0.42 |
| tblOffRoadEquipment | LoadFactor | 0.42 | 0.42 |
| tblOffRoadEquipment | OffRoadEquipmentType | | Plate Compactors |
| tblOffRoadEquipment | OffRoadEquipmentType | | Sweepers/Scrubbers |
| tblOffRoadEquipment | OffRoadEquipmentType | | Tractors/Loaders/Backhoes |
| tblOffRoadEquipment | OffRoadEquipmentType | | Forklifts |

| | | | |
|---|---|---|---|
| tblOffRoadEquipment | OffRoadEquipmentType | | Pumps |
| tblOffRoadEquipment | OffRoadEquipmentType | | Air Compressors |
| tblOffRoadEquipment | OffRoadEquipmentType | | Off-Highway Trucks |
| tblOffRoadEquipment | OffRoadEquipmentType | | Concrete/Industrial Saws |
| tblOffRoadEquipment | OffRoadEquipmentType | | Generator Sets |
| tblOffRoadEquipment | OffRoadEquipmentType | | Off-Highway Trucks |
| tblOffRoadEquipment | OffRoadEquipmentType | | Excavators |
| tblOffRoadEquipment | OffRoadEquipmentType | | Skid Steer Loaders |
| tblOffRoadEquipment | OffRoadEquipmentType | | Pumps |
| tblOffRoadEquipment | OffRoadEquipmentType | | Bore/Drill Rigs |
| tblOffRoadEquipment | OffRoadEquipmentType | | Excavators |
| tblOffRoadEquipment | OffRoadEquipmentType | | Cranes |
| tblOffRoadEquipment | OffRoadEquipmentType | | Other Construction Equipment |
| tblOffRoadEquipment | OffRoadEquipmentType | | Other Construction Equipment |
| tblOffRoadEquipment | OffRoadEquipmentType | | Excavators |
| tblOffRoadEquipment | OffRoadEquipmentType | | Scrapers |
| tblOffRoadEquipment | OffRoadEquipmentType | | Skid Steer Loaders |
| tblOffRoadEquipment | OffRoadEquipmentType | | Other Construction Equipment |
| tblOffRoadEquipment | OffRoadEquipmentType | | Forklifts |
| tblOffRoadEquipment | OffRoadEquipmentType | | Other Construction Equipment |
| tblOffRoadEquipment | OffRoadEquipmentType | | Pumps |
| tblOffRoadEquipment | OffRoadEquipmentType | | Air Compressors |
| tblOffRoadEquipment | OffRoadEquipmentType | | Off-Highway Trucks |
| tblOffRoadEquipment | OffRoadEquipmentType | | Generator Sets |
| tblOffRoadEquipment | OffRoadEquipmentType | | Off-Highway Trucks |
| tblOffRoadEquipment | OffRoadEquipmentType | | Excavators |
| tblOffRoadEquipment | OffRoadEquipmentType | | Other Construction Equipment |
| tblOffRoadEquipment | OffRoadEquipmentType | | Pumps |
| tblOffRoadEquipment | OffRoadEquipmentType | | Air Compressors |
| tblOffRoadEquipment | OffRoadEquipmentType | | Generator Sets |
| tblOffRoadEquipment | OffRoadEquipmentType | | Other Construction Equipment |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 1.00 | 0.00 |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 4.00 | 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 | 2.00 | 1.00 |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 2.00 | 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 | 2.00 | 1.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 4.00 | 3.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 3.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 1.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 4.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 4.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 0.00 |

| | | | |
|---|---|---|---|
| tblOffRoadEquipment | UsageHours | 8.00 | 4.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 6.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 4.00 |
| tblTripsAndVMT | HaulingTripNumber | 0.00 | 1,528.00 |
| tblTripsAndVMT | HaulingTripNumber | 0.00 | 4,520.00 |
| tblTripsAndVMT | HaulingTripNumber | 0.00 | 2,200.00 |
| tblTripsAndVMT | VendorTripNumber | 0.00 | 6.00 |
| tblTripsAndVMT | VendorTripNumber | 0.00 | 14.00 |
| tblTripsAndVMT | VendorTripNumber | 0.00 | 4.00 |
| tblTripsAndVMT | VendorTripNumber | 0.00 | 4.00 |
| tblTripsAndVMT | WorkerTripNumber | 0.00 | 36.00 |
| tblTripsAndVMT | WorkerTripNumber | 0.00 | 52.00 |
| tblTripsAndVMT | WorkerTripNumber | 38.00 | 22.00 |
| tblTripsAndVMT | WorkerTripNumber | 23.00 | 22.00 |

## 2.0 Emissions Summary

### 2.1 Overall Construction

**Unmitigated Construction**

| | ROG | NOx | CO | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | tons/yr | | | | | | | | | | MT/yr | | | | | |
| 2022 | 0.1645 | 1.4568 | 1.9249 | 3.94E-03 | 0.0157 | 0.0649 | 0.0805 | 4.23E-03 | 0.0614 | 0.0656 | 0 | 345.1394 | 345.1394 | 0.0678 | 2.95E-03 | 347.7122 |
| 2023 | 1.6416 | 13.901 | 19.7286 | 0.0417 | 0.1682 | 0.6013 | 0.7695 | 0.0455 | 0.574 | 0.6195 | 0 | 3,650.73 | 3,650.73 | 0.5778 | 0.0372 | 3,676.25 |
| 2024 | 1.0803 | 8.824 | 13.5725 | 0.0288 | 0.1173 | 0.3731 | 0.4904 | 0.0318 | 0.3563 | 0.388 | 0 | 2,522.72 | 2,522.72 | 0.3797 | 0.0259 | 2,539.94 |
| **Maximum** | **1.6416** | **13.901** | **19.7286** | **0.0417** | **0.1682** | **0.6013** | **0.7695** | **0.0455** | **0.574** | **0.6195** | **0** | **3,650.73** | **3,650.73** | **0.5778** | **0.0372** | **3,676.25** |

**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 | | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2022 | 0.1645 | 1.4568 | 1.9249 | 3.9400e-003 | 0.0157 | 0.0649 | 0.0805 | 4.2300e-003 | 0.0614 | 0.0656 | 0.0000 | 345.1391 | 345.1391 | 0.0678 | 2.9500e-003 | 347.7118 |
| 2023 | 1.6416 | 13.9009 | 19.7286 | 0.0417 | 0.1682 | 0.6013 | 0.7695 | 0.0455 | 0.5740 | 0.6195 | 0.0000 | 3,650.7268 | 3,650.7268 | 0.5778 | 0.0372 | 3,676.2503 |
| 2024 | 1.0803 | 8.8240 | 13.5725 | 0.0288 | 0.1173 | 0.3731 | 0.4904 | 0.0318 | 0.3563 | 0.3880 | 0.0000 | 2,522.7212 | 2,522.7212 | 0.3797 | 0.0259 | 2,539.9322 |
| **Maximum** | **1.6416** | **13.9009** | **19.7286** | **0.0417** | **0.1682** | **0.6013** | **0.7695** | **0.0455** | **0.5740** | **0.6195** | **0.0000** | **3,650.7268** | **3,650.7268** | **0.5778** | **0.0372** | **3,676.2503** |

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

| **Quarter** | **Start Date** | **End Date** | **Maximum Unmitigated ROG + NOX (tons/quarter)** | **Maximum Mitigated ROG + NOX (tons/quarter)** |
|---|---|---|---|---|
| **1** | **10-1-2022** | **12-31-2022** | 1.6405 | 1.6405 |
| **2** | **1-1-2023** | **3-31-2023** | 1.4382 | 1.4382 |
| **3** | **4-1-2023** | **6-30-2023** | 4.4720 | 4.4720 |
| **4** | **7-1-2023** | **9-30-2023** | 4.8389 | 4.8389 |
| **5** | **10-1-2023** | **12-31-2023** | 4.8521 | 4.8521 |
| **6** | **1-1-2024** | **3-31-2024** | 4.4145 | 4.4145 |
| **7** | **4-1-2024** | **6-30-2024** | 4.4021 | 4.4021 |
| **8** | **7-1-2024** | **9-30-2024** | 1.0421 | 1.0421 |
| | | **Highest** | 4.8521 | 4.8521 |

## 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 | 1.3000e-004 | 1.2000e-003 | 1.0100e-003 | 1.0000e-005 | | 9.0000e-005 | 9.0000e-005 | | 9.0000e-005 | 9.0000e-005 | 0.0000 | 1.9986 | 1.9986 | 1.4000e-004 | 4.0000e-005 | 2.0132 |
| Mobile | 2.9400e-003 | 3.4400e-003 | 0.0271 | 5.0000e-005 | 4.9000e-003 | 4.0000e-005 | 4.9400e-003 | 1.3100e-003 | 4.0000e-005 | 1.3500e-003 | 0.0000 | 4.4285 | 4.4285 | 3.7000e-004 | 2.2000e-004 | 4.5039 |
| Waste | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.2517 | 0.0000 | 0.2517 | 0.0149 | 0.0000 | 0.6236 |
| Water | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0734 | 0.1158 | 0.1891 | 7.5500e-003 | 1.8000e-004 | 0.4317 |

| Total | 7.6700e-003 | 4.6400e-003 | 0.0281 | 6.0000e-005 | 4.9000e-003 | 1.3000e-004 | 5.0300e-003 | 1.3100e-003 | 1.3000e-004 | 1.4400e-003 | 0.3251 | 6.5429 | 6.8680 | 0.0229 | 4.4000e-004 | 7.5724 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

## 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 | 1.3000e-004 | 1.2000e-003 | 1.0100e-003 | 1.0000e-005 | | 9.0000e-005 | 9.0000e-005 | | 9.0000e-005 | 9.0000e-005 | 0.0000 | 1.9986 | 1.9986 | 1.4000e-004 | 4.0000e-005 | 2.0132 |
| Mobile | 2.9400e-003 | 3.4400e-003 | 0.0271 | 5.0000e-005 | 4.9000e-003 | 4.0000e-005 | 4.9400e-003 | 1.3100e-003 | 4.0000e-005 | 1.3500e-003 | 0.0000 | 4.4285 | 4.4285 | 3.7000e-004 | 2.2000e-004 | 4.5039 |
| Waste | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.2517 | 0.0000 | 0.2517 | 0.0149 | 0.0000 | 0.6236 |
| Water | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0734 | 0.1158 | 0.1891 | 7.5500e-003 | 1.8000e-004 | 0.4317 |
| **Total** | **7.6700e-003** | **4.6400e-003** | **0.0281** | **6.0000e-005** | **4.9000e-003** | **1.3000e-004** | **5.0300e-003** | **1.3100e-003** | **1.3000e-004** | **1.4400e-003** | **0.3251** | **6.5429** | **6.8680** | **0.0229** | **4.4000e-004** | **7.5724** |

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

# 3.0 Construction Detail

## Construction Phase

| Phase Number | Phase Name | Phase Type | Start Date | End Date | Num Days Week | Num Days | Phase Description |
|---|---|---|---|---|---|---|---|
| 1 | Demolition | Demolition | 10/1/2022 | 9/30/2022 | 5 | 0 | |
| 2 | College Lake to CDS Pipeline | Trenching | 10/1/2022 | 6/30/2024 | 5 | 455 | |
| 3 | Trenchless Pipeline Installation | Site Preparation | 10/1/2022 | 6/30/2024 | 5 | 455 | |
| 4 | Site Preparation | Site Preparation | 10/15/2022 | 10/14/2022 | 5 | 0 | |
| 5 | Grading | Grading | 10/18/2022 | 10/17/2022 | 5 | 0 | |
| 6 | Paving | Paving | 3/9/2023 | 3/8/2023 | 5 | 0 | |
| 7 | Architectural Coating | Architectural Coating | 3/16/2023 | 3/15/2023 | 5 | 0 | |
| 8 | Treatment Plant | Building Construction | 4/1/2023 | 7/31/2024 | 5 | 348 | |
| 9 | Weir & Pump Station | Building Construction | 5/1/2023 | 7/31/2024 | 5 | 328 | |

**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: 1,500; Non-Residential Outdoor: 500; Striped Parking Area: 0 (Architectural Coating –**

**OffRoad Equipment**

| Phase Name | Offroad Equipment Type | Amount | Usage Hours | Horse Power | Load Factor |
|---|---|---|---|---|---|
| Architectural Coating | Air Compressors | 0 | 0.00 | 78 | 0.48 |
| Paving | Cement and Mortar Mixers | 0 | 0.00 | 9 | 0.56 |
| Demolition | Concrete/Industrial Saws | 0 | 0.00 | 81 | 0.73 |
| Weir & Pump Station | Cranes | 1 | 3.00 | 231 | 0.29 |
| Weir & Pump Station | Forklifts | 2 | 3.00 | 100 | 0.20 |
| Grading | Graders | 0 | 0.00 | 187 | 0.41 |
| Site Preparation | Graders | 0 | 0.00 | 187 | 0.41 |
| Paving | Pavers | 0 | 0.00 | 130 | 0.42 |
| Paving | Rollers | 0 | 0.00 | 80 | 0.38 |
| Demolition | Rubber Tired Dozers | 0 | 0.00 | 247 | 0.40 |
| Grading | Rubber Tired Dozers | 0 | 0.00 | 247 | 0.40 |
| Weir & Pump Station | Tractors/Loaders/Backhoes | 1 | 4.00 | 97 | 0.37 |
| Demolition | Tractors/Loaders/Backhoes | 0 | 0.00 | 97 | 0.37 |
| Grading | Tractors/Loaders/Backhoes | 0 | 0.00 | 97 | 0.37 |
| Paving | Tractors/Loaders/Backhoes | 0 | 0.00 | 97 | 0.37 |
| Site Preparation | Tractors/Loaders/Backhoes | 0 | 0.00 | 97 | 0.37 |
| Treatment Plant | Cranes | 1 | 4.00 | 231 | 0.29 |
| Treatment Plant | Forklifts | 2 | 4.00 | 100 | 0.20 |
| Trenchless Pipeline Installation | Graders | 0 | 0.00 | 187 | 0.41 |
| Treatment Plant | Tractors/Loaders/Backhoes | 2 | 4.00 | 97 | 0.37 |
| Trenchless Pipeline Installation | Tractors/Loaders/Backhoes | 2 | 6.00 | 97 | 0.37 |
| College Lake to CDS Pipeline | Plate Compactors | 2 | 4.00 | 8 | 0.43 |
| College Lake to CDS Pipeline | Sweepers/Scrubbers | 1 | 1.00 | 63 | 0.46 |
| College Lake to CDS Pipeline | Tractors/Loaders/Backhoes | 2 | 4.00 | 97 | 0.37 |
| College Lake to CDS Pipeline | Forklifts | 1 | 2.00 | 100 | 0.20 |

| | | | | | |
|---|---|---|---|---|---|
| College Lake to CDS Pipeline | Pumps | 2 | 6.00 | 172 | 0.74 |
| College Lake to CDS Pipeline | Air Compressors | 1 | 1.00 | 172 | 0.48 |
| College Lake to CDS Pipeline | Off-Highway Trucks | 1 | 2.00 | 402 | 0.38 |
| College Lake to CDS Pipeline | Concrete/Industrial Saws | 1 | 2.00 | 402 | 0.73 |
| College Lake to CDS Pipeline | Generator Sets | 1 | 6.00 | 172 | 0.74 |
| College Lake to CDS Pipeline | Off-Highway Trucks | 1 | 8.00 | 402 | 0.38 |
| College Lake to CDS Pipeline | Excavators | 1 | 6.00 | 158 | 0.38 |
| College Lake to CDS Pipeline | Skid Steer Loaders | 1 | 6.00 | 65 | 0.37 |
| Trenchless Pipeline Installation | Pumps | 1 | 8.00 | 172 | 0.74 |
| Trenchless Pipeline Installation | Bore/Drill Rigs | 2 | 8.00 | 172 | 0.50 |
| Trenchless Pipeline Installation | Excavators | 1 | 6.00 | 158 | 0.38 |
| Trenchless Pipeline Installation | Cranes | 1 | 8.00 | 231 | 0.29 |
| Trenchless Pipeline Installation | Other Construction Equipment | 1 | 8.00 | 172 | 0.42 |
| Trenchless Pipeline Installation | Other Construction Equipment | 1 | 8.00 | 172 | 0.42 |
| Treatment Plant | Excavators | 2 | 6.00 | 158 | 0.38 |
| Treatment Plant | Scrapers | 2 | 6.00 | 367 | 0.48 |
| Treatment Plant | Skid Steer Loaders | 1 | 6.00 | 65 | 0.37 |
| Treatment Plant | Other Construction Equipment | 1 | 8.00 | 172 | 0.42 |
| Treatment Plant | Forklifts | 1 | 4.00 | 100 | 0.20 |
| Treatment Plant | Other Construction Equipment | 2 | 4.00 | 172 | 0.42 |
| Treatment Plant | Pumps | 8 | 6.00 | 172 | 0.74 |
| Treatment Plant | Air Compressors | 4 | 1.00 | 172 | 0.48 |
| Treatment Plant | Off-Highway Trucks | 1 | 4.00 | 402 | 0.38 |
| Treatment Plant | Generator Sets | 2 | 6.00 | 172 | 0.74 |
| Treatment Plant | Off-Highway Trucks | 1 | 8.00 | 402 | 0.38 |
| Weir & Pump Station | Excavators | 2 | 6.00 | 158 | 0.38 |
| Weir & Pump Station | Other Construction Equipment | 1 | 8.00 | 172 | 0.42 |
| Weir & Pump Station | Pumps | 4 | 6.00 | 172 | 0.74 |
| Weir & Pump Station | Air Compressors | 1 | 1.00 | 172 | 0.48 |
| Weir & Pump Station | Generator Sets | 1 | 6.00 | 172 | 0.74 |
| Weir & Pump Station | Other Construction Equipment | 1 | 4.00 | 172 | 0.42 |

## **Trips and VMT**

| Phase Name | Offroad Equipment Count | Worker Trip Number | Vendor Trip Number | Hauling Trip Number | Worker Trip Length | Vendor Trip Length | Hauling Trip Length | Worker Vehicle Class | Vendor Vehicle Class | Hauling Vehicle Class |
|---|---|---|---|---|---|---|---|---|---|---|
| Demolition | 0 | 0.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Site Preparation | 0 | 0.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Grading | 0 | 0.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Weir & Pump Station | 14 | 36.00 | 6.00 | 1,528.00 | 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 |
| Architectural Coating | 0 | 0.00 | 0.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Treatment Plant | 30 | 52.00 | 14.00 | 4,520.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| College Lake to CDS Pipeline | 15 | 22.00 | 4.00 | 2,200.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Trenchless Pipeline Installation | 9 | 22.00 | 4.00 | 0.00 | 10.80 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |

### 3.1 Mitigation Measures Construction

### 3.2 Demolition - 2022

**Phase not used**

### 3.3 College Lake to CDS Pipeline - 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 | 0.0774 | 0.6244 | 0.8519 | 1.8800e-003 | | 0.0276 | 0.0276 | | 0.0266 | 0.0266 | 0.0000 | 162.5553 | 162.5553 | 0.0272 | 0.0000 | 163.2359 |
| **Total** | **0.0774** | **0.6244** | **0.8519** | **1.8800e-003** | | **0.0276** | **0.0276** | | **0.0266** | **0.0266** | **0.0000** | **162.5553** | **162.5553** | **0.0272** | **0.0000** | **163.2359** |

**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 | 7.6000e-004 | 0.0394 | 5.6100e-003 | 1.1000e-004 | 2.6400e-003 | 3.0000e-004 | 2.9400e-003 | 7.2000e-004 | 2.9000e-004 | 1.0100e-003 | 0.0000 | 11.0341 | 11.0341 | 3.1000e-004 | 1.7500e-003 | 11.5627 |
| Vendor | 3.2000e-004 | 9.8600e-003 | 2.2200e-003 | 3.0000e-005 | 8.5000e-004 | 9.0000e-005 | 9.4000e-004 | 2.5000e-004 | 9.0000e-005 | 3.3000e-004 | 0.0000 | 2.8589 | 2.8589 | 6.0000e-005 | 4.3000e-004 | 2.9888 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Worker | 2.6200e-003 | 2.1300e-003 | 0.0226 | 5.0000e-005 | 5.6600e-003 | 4.0000e-005 | 5.7000e-003 | 1.5100e-003 | 4.0000e-005 | 1.5400e-003 | 0.0000 | 4.8056 | 4.8056 | 1.9000e-004 | 1.7000e-004 | 4.8607 |
| **Total** | **3.7000e-003** | **0.0514** | **0.0304** | **1.9000e-004** | **9.1500e-003** | **4.3000e-004** | **9.5800e-003** | **2.4800e-003** | **4.2000e-004** | **2.8800e-003** | **0.0000** | **18.6987** | **18.6987** | **5.6000e-004** | **2.3500e-003** | **19.4122** |

**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 | 0.0774 | 0.6244 | 0.8519 | 1.8800e-003 | | 0.0276 | 0.0276 | | 0.0266 | 0.0266 | 0.0000 | 162.5551 | 162.5551 | 0.0272 | 0.0000 | 163.2358 |
| **Total** | **0.0774** | **0.6244** | **0.8519** | **1.8800e-003** | | **0.0276** | **0.0276** | | **0.0266** | **0.0266** | **0.0000** | **162.5551** | **162.5551** | **0.0272** | **0.0000** | **163.2358** |

**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 | 7.6000e-004 | 0.0394 | 5.6100e-003 | 1.1000e-004 | 2.6400e-003 | 3.0000e-004 | 2.9400e-003 | 7.2000e-004 | 2.9000e-004 | 1.0100e-003 | 0.0000 | 11.0341 | 11.0341 | 3.1000e-004 | 1.7500e-003 | 11.5627 |
| Vendor | 3.2000e-004 | 9.8600e-003 | 2.2200e-003 | 3.0000e-005 | 8.5000e-004 | 9.0000e-005 | 9.4000e-004 | 2.5000e-004 | 9.0000e-005 | 3.3000e-004 | 0.0000 | 2.8589 | 2.8589 | 6.0000e-005 | 4.3000e-004 | 2.9888 |
| Worker | 2.6200e-003 | 2.1300e-003 | 0.0226 | 5.0000e-005 | 5.6600e-003 | 4.0000e-005 | 5.7000e-003 | 1.5100e-003 | 4.0000e-005 | 1.5400e-003 | 0.0000 | 4.8056 | 4.8056 | 1.9000e-004 | 1.7000e-004 | 4.8607 |
| **Total** | **3.7000e-003** | **0.0514** | **0.0304** | **1.9000e-004** | **9.1500e-003** | **4.3000e-004** | **9.5800e-003** | **2.4800e-003** | **4.2000e-004** | **2.8800e-003** | **0.0000** | **18.6987** | **18.6987** | **5.6000e-004** | **2.3500e-003** | **19.4122** |

## 3.3 College Lake to CDS 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 | 0.2913 | 2.2389 | 3.3963 | 7.5100e-003 | | 0.0968 | 0.0968 | | 0.0932 | 0.0932 | 0.0000 | 650.4110 | 650.4110 | 0.1083 | 0.0000 | 653.1192 |
| **Total** | **0.2913** | **2.2389** | **3.3963** | **7.5100e-003** | | **0.0968** | **0.0968** | | **0.0932** | **0.0932** | **0.0000** | **650.4110** | **650.4110** | **0.1083** | **0.0000** | **653.1192** |

**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 | 1.9300e-003 | 0.1371 | 0.0204 | 4.3000e-004 | 0.0106 | 9.0000e-004 | 0.0115 | 2.9000e-003 | 8.6000e-004 | 3.7600e-003 | 0.0000 | 42.6829 | 42.6829 | 1.2100e-003 | 6.7600e-003 | 44.7281 |
| Vendor | 7.5000e-004 | 0.0335 | 7.5200e-003 | 1.1000e-004 | 3.4000e-003 | 1.9000e-004 | 3.5900e-003 | 9.8000e-004 | 1.8000e-004 | 1.1600e-003 | 0.0000 | 11.0615 | 11.0615 | 2.1000e-004 | 1.6600e-003 | 11.5628 |
| Worker | 9.7600e-003 | 7.5500e-003 | 0.0830 | 2.0000e-004 | 0.0226 | 1.5000e-004 | 0.0228 | 6.0200e-003 | 1.4000e-004 | 6.1600e-003 | 0.0000 | 18.7618 | 18.7618 | 6.9000e-004 | 6.2000e-004 | 18.9641 |
| **Total** | **0.0124** | **0.1781** | **0.1109** | **7.4000e-004** | **0.0366** | **1.2400e-003** | **0.0378** | **9.9000e-003** | **1.1800e-003** | **0.0111** | **0.0000** | **72.5062** | **72.5062** | **2.1100e-003** | **9.0400e-003** | **75.2549** |

**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 | 0.2913 | 2.2389 | 3.3963 | 7.5100e-003 | | 0.0968 | 0.0968 | | 0.0932 | 0.0932 | 0.0000 | 650.4102 | 650.4102 | 0.1083 | 0.0000 | 653.1184 |
| **Total** | **0.2913** | **2.2389** | **3.3963** | **7.5100e-003** | | **0.0968** | **0.0968** | | **0.0932** | **0.0932** | **0.0000** | **650.4102** | **650.4102** | **0.1083** | **0.0000** | **653.1184** |

**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 | 1.9300e-003 | 0.1371 | 0.0204 | 4.3000e-004 | 0.0106 | 9.0000e-004 | 0.0115 | 2.9000e-003 | 8.6000e-004 | 3.7600e-003 | 0.0000 | 42.6829 | 42.6829 | 1.2100e-003 | 6.7600e-003 | 44.7281 |
| Vendor | 7.5000e-004 | 0.0335 | 7.5200e-003 | 1.1000e-004 | 3.4000e-003 | 1.9000e-004 | 3.5900e-003 | 9.8000e-004 | 1.8000e-004 | 1.1600e-003 | 0.0000 | 11.0615 | 11.0615 | 2.1000e-004 | 1.6600e-003 | 11.5628 |
| Worker | 9.7600e-003 | 7.5500e-003 | 0.0830 | 2.0000e-004 | 0.0226 | 1.5000e-004 | 0.0228 | 6.0200e-003 | 1.4000e-004 | 6.1600e-003 | 0.0000 | 18.7618 | 18.7618 | 6.9000e-004 | 6.2000e-004 | 18.9641 |
| **Total** | **0.0124** | **0.1781** | **0.1109** | **7.4000e-004** | **0.0366** | **1.2400e-003** | **0.0378** | **9.9000e-003** | **1.1800e-003** | **0.0111** | **0.0000** | **72.5062** | **72.5062** | **2.1100e-003** | **9.0400e-003** | **75.2549** |

## 3.3 College Lake to CDS 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 | 0.1390 | 1.0234 | 1.6962 | 3.7600e-003 | | 0.0430 | 0.0430 | | 0.0414 | 0.0414 | 0.0000 | 325.2616 | 325.2616 | 0.0538 | 0.0000 | 326.6057 |
| **Total** | **0.1390** | **1.0234** | **1.6962** | **3.7600e-003** | | **0.0430** | **0.0430** | | **0.0414** | **0.0414** | **0.0000** | **325.2616** | **325.2616** | **0.0538** | **0.0000** | **326.6057** |

## 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 | 9.3000e-004 | 0.0654 | 0.0102 | 2.1000e-004 | 5.2800e-003 | 4.3000e-004 | 5.7200e-003 | 1.4500e-003 | 4.2000e-004 | 1.8600e-003 | 0.0000 | 20.8975 | 20.8975 | 6.1000e-004 | 3.3100e-003 | 21.8993 |
| Vendor | 3.6000e-004 | 0.0162 | 3.6500e-003 | 6.0000e-005 | 1.7000e-003 | 9.0000e-005 | 1.7900e-003 | 4.9000e-004 | 9.0000e-005 | 5.8000e-004 | 0.0000 | 5.4351 | 5.4351 | 1.0000e-004 | 8.2000e-004 | 5.6813 |
| Worker | 4.5600e-003 | 3.3500e-003 | 0.0384 | 1.0000e-004 | 0.0113 | 7.0000e-005 | 0.0114 | 3.0100e-003 | 7.0000e-005 | 3.0800e-003 | 0.0000 | 9.1638 | 9.1638 | 3.1000e-004 | 2.9000e-004 | 9.2571 |
| **Total** | **5.8500e-003** | **0.0849** | **0.0523** | **3.7000e-004** | **0.0183** | **5.9000e-004** | **0.0189** | **4.9500e-003** | **5.8000e-004** | **5.5200e-003** | **0.0000** | **35.4964** | **35.4964** | **1.0200e-003** | **4.4200e-003** | **36.8377** |

## 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 | 0.1390 | 1.0234 | 1.6962 | 3.7600e-003 | | 0.0430 | 0.0430 | | 0.0414 | 0.0414 | 0.0000 | 325.2612 | 325.2612 | 0.0538 | 0.0000 | 326.6053 |
| **Total** | **0.1390** | **1.0234** | **1.6962** | **3.7600e-003** | | **0.0430** | **0.0430** | | **0.0414** | **0.0414** | **0.0000** | **325.2612** | **325.2612** | **0.0538** | **0.0000** | **326.6053** |

## 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 | 9.3000e-004 | 0.0654 | 0.0102 | 2.1000e-004 | 5.2800e-003 | 4.3000e-004 | 5.7200e-003 | 1.4500e-003 | 4.2000e-004 | 1.8600e-003 | 0.0000 | 20.8975 | 20.8975 | 6.1000e-004 | 3.3100e-003 | 21.8993 |
| Vendor | 3.6000e-004 | 0.0162 | 3.6500e-003 | 6.0000e-005 | 1.7000e-003 | 9.0000e-005 | 1.7900e-003 | 4.9000e-004 | 9.0000e-005 | 5.8000e-004 | 0.0000 | 5.4351 | 5.4351 | 1.0000e-004 | 8.2000e-004 | 5.6813 |
| Worker | 4.5600e-003 | 3.3500e-003 | 0.0384 | 1.0000e-004 | 0.0113 | 7.0000e-005 | 0.0114 | 3.0100e-003 | 7.0000e-005 | 3.0800e-003 | 0.0000 | 9.1638 | 9.1638 | 3.1000e-004 | 2.9000e-004 | 9.2571 |
| **Total** | **5.8500e-003** | **0.0849** | **0.0523** | **3.7000e-004** | **0.0183** | **5.9000e-004** | **0.0189** | **4.9500e-003** | **5.8000e-004** | **5.5200e-003** | **0.0000** | **35.4964** | **35.4964** | **1.0200e-003** | **4.4200e-003** | **36.8377** |

## 3.4 Trenchless Pipeline Installation - 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 | | | | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.0804 | 0.7689 | 1.0177 | 1.7900e-003 | | 0.0367 | 0.0367 | | 0.0343 | 0.0343 | 0.0000 | 156.2209 | 156.2209 | 0.0398 | 0.0000 | 157.2146 |
| **Total** | **0.0804** | **0.7689** | **1.0177** | **1.7900e-003** | **0.0000** | **0.0367** | **0.0367** | **0.0000** | **0.0343** | **0.0343** | **0.0000** | **156.2209** | **156.2209** | **0.0398** | **0.0000** | **157.2146** |

### 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 | 3.2000e-004 | 9.8600e-003 | 2.2200e-003 | 3.0000e-005 | 8.5000e-004 | 9.0000e-005 | 9.4000e-004 | 2.5000e-004 | 9.0000e-005 | 3.3000e-004 | 0.0000 | 2.8589 | 2.8589 | 6.0000e-005 | 4.3000e-004 | 2.9888 |
| Worker | 2.6200e-003 | 2.1300e-003 | 0.0226 | 5.0000e-005 | 5.6600e-003 | 4.0000e-005 | 5.7000e-003 | 1.5100e-003 | 4.0000e-005 | 1.5400e-003 | 0.0000 | 4.8056 | 4.8056 | 1.9000e-004 | 1.7000e-004 | 4.8607 |
| **Total** | **2.9400e-003** | **0.0120** | **0.0248** | **8.0000e-005** | **6.5100e-003** | **1.3000e-004** | **6.6400e-003** | **1.7600e-003** | **1.3000e-004** | **1.8700e-003** | **0.0000** | **7.6646** | **7.6646** | **2.5000e-004** | **6.0000e-004** | **7.8495** |

### 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 | | | | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.0804 | 0.7689 | 1.0177 | 1.7900e-003 | | 0.0367 | 0.0367 | | 0.0343 | 0.0343 | 0.0000 | 156.2207 | 156.2207 | 0.0398 | 0.0000 | 157.2144 |
| **Total** | **0.0804** | **0.7689** | **1.0177** | **1.7900e-003** | **0.0000** | **0.0367** | **0.0367** | **0.0000** | **0.0343** | **0.0343** | **0.0000** | **156.2207** | **156.2207** | **0.0398** | **0.0000** | **157.2144** |

### 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 | 3.2000e-004 | 9.8600e-003 | 2.2200e-003 | 3.0000e-005 | 8.5000e-004 | 9.0000e-005 | 9.4000e-004 | 2.5000e-004 | 9.0000e-005 | 3.3000e-004 | 0.0000 | 2.8589 | 2.8589 | 6.0000e-005 | 4.3000e-004 | 2.9888 |
| Worker | 2.6200e-003 | 2.1300e-003 | 0.0226 | 5.0000e-005 | 5.6600e-003 | 4.0000e-005 | 5.7000e-003 | 1.5100e-003 | 4.0000e-005 | 1.5400e-003 | 0.0000 | 4.8056 | 4.8056 | 1.9000e-004 | 1.7000e-004 | 4.8607 |
| **Total** | **2.9400e-003** | **0.0120** | **0.0248** | **8.0000e-005** | **6.5100e-003** | **1.3000e-004** | **6.6400e-003** | **1.7600e-003** | **1.3000e-004** | **1.8700e-003** | **0.0000** | **7.6646** | **7.6646** | **2.5000e-004** | **6.0000e-004** | **7.8495** |

## 3.4 Trenchless Pipeline Installation - 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 | | | | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.2989 | 2.7402 | 4.0644 | 7.1600e-003 | | 0.1296 | 0.1296 | | 0.1210 | 0.1210 | 0.0000 | 625.7514 | 625.7514 | 0.1590 | 0.0000 | 629.7268 |
| **Total** | **0.2989** | **2.7402** | **4.0644** | **7.1600e-003** | **0.0000** | **0.1296** | **0.1296** | **0.0000** | **0.1210** | **0.1210** | **0.0000** | **625.7514** | **625.7514** | **0.1590** | **0.0000** | **629.7268** |

### 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 | 7.5000e-004 | 0.0335 | 7.5200e-003 | 1.1000e-004 | 3.4000e-003 | 1.9000e-004 | 3.5900e-003 | 9.8000e-004 | 1.8000e-004 | 1.1600e-003 | 0.0000 | 11.0615 | 11.0615 | 2.1000e-004 | 1.6600e-003 | 11.5628 |
| Worker | 9.7600e-003 | 7.5500e-003 | 0.0830 | 2.0000e-004 | 0.0226 | 1.5000e-004 | 0.0228 | 6.0200e-003 | 1.4000e-004 | 6.1600e-003 | 0.0000 | 18.7618 | 18.7618 | 6.9000e-004 | 6.2000e-004 | 18.9641 |
| **Total** | **0.0105** | **0.0410** | **0.0905** | **3.1000e-004** | **0.0260** | **3.4000e-004** | **0.0264** | **7.0000e-003** | **3.2000e-004** | **7.3200e-003** | **0.0000** | **29.8233** | **29.8233** | **9.0000e-004** | **2.2800e-003** | **30.5268** |

### 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 | | | | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.2989 | 2.7402 | 4.0644 | 7.1600e-003 | | 0.1296 | 0.1296 | | 0.1210 | 0.1210 | 0.0000 | 625.7507 | 625.7507 | 0.1590 | 0.0000 | 629.7261 |
| **Total** | **0.2989** | **2.7402** | **4.0644** | **7.1600e-003** | **0.0000** | **0.1296** | **0.1296** | **0.0000** | **0.1210** | **0.1210** | **0.0000** | **625.7507** | **625.7507** | **0.1590** | **0.0000** | **629.7261** |

**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 | 7.5000e-004 | 0.0335 | 7.5200e-003 | 1.1000e-004 | 3.4000e-003 | 1.9000e-004 | 3.5900e-003 | 9.8000e-004 | 1.8000e-004 | 1.1600e-003 | 0.0000 | 11.0615 | 11.0615 | 2.1000e-004 | 1.6600e-003 | 11.5628 |
| Worker | 9.7600e-003 | 7.5500e-003 | 0.0830 | 2.0000e-004 | 0.0226 | 1.5000e-004 | 0.0228 | 6.0200e-003 | 1.4000e-004 | 6.1600e-003 | 0.0000 | 18.7618 | 18.7618 | 6.9000e-004 | 6.2000e-004 | 18.9641 |
| **Total** | **0.0105** | **0.0410** | **0.0905** | **3.1000e-004** | **0.0260** | **3.4000e-004** | **0.0264** | **7.0000e-003** | **3.2000e-004** | **7.3200e-003** | **0.0000** | **29.8233** | **29.8233** | **9.0000e-004** | **2.2800e-003** | **30.5268** |

## 3.4 Trenchless Pipeline Installation - 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 | | | | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.1427 | 1.2697 | 2.0324 | 3.5800e-003 | | 0.0593 | 0.0593 | | 0.0553 | 0.0553 | 0.0000 | 312.7707 | 312.7707 | 0.0793 | 0.0000 | 314.7542 |
| **Total** | **0.1427** | **1.2697** | **2.0324** | **3.5800e-003** | **0.0000** | **0.0593** | **0.0593** | **0.0000** | **0.0553** | **0.0553** | **0.0000** | **312.7707** | **312.7707** | **0.0793** | **0.0000** | **314.7542** |

**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 | 3.6000e-004 | 0.0162 | 3.6500e-003 | 6.0000e-005 | 1.7000e-003 | 9.0000e-005 | 1.7900e-003 | 4.9000e-004 | 9.0000e-005 | 5.8000e-004 | 0.0000 | 5.4351 | 5.4351 | 1.0000e-004 | 8.2000e-004 | 5.6813 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Worker | 4.5600e-003 | 3.3500e-003 | 0.0384 | 1.0000e-004 | 0.0113 | 7.0000e-005 | 0.0114 | 3.0100e-003 | 7.0000e-005 | 3.0800e-003 | 0.0000 | 9.1638 | 9.1638 | 3.1000e-004 | 2.9000e-004 | 9.2571 |
| **Total** | **4.9200e-003** | **0.0196** | **0.0420** | **1.6000e-004** | **0.0130** | **1.6000e-004** | **0.0132** | **3.5000e-003** | **1.6000e-004** | **3.6600e-003** | **0.0000** | **14.5989** | **14.5989** | **4.1000e-004** | **1.1100e-003** | **14.9384** |

**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 | | | | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.1427 | 1.2697 | 2.0324 | 3.5800e-003 | | 0.0593 | 0.0593 | | 0.0553 | 0.0553 | 0.0000 | 312.7703 | 312.7703 | 0.0793 | 0.0000 | 314.7539 |
| **Total** | **0.1427** | **1.2697** | **2.0324** | **3.5800e-003** | **0.0000** | **0.0593** | **0.0593** | **0.0000** | **0.0553** | **0.0553** | **0.0000** | **312.7703** | **312.7703** | **0.0793** | **0.0000** | **314.7539** |

**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 | 3.6000e-004 | 0.0162 | 3.6500e-003 | 6.0000e-005 | 1.7000e-003 | 9.0000e-005 | 1.7900e-003 | 4.9000e-004 | 9.0000e-005 | 5.8000e-004 | 0.0000 | 5.4351 | 5.4351 | 1.0000e-004 | 8.2000e-004 | 5.6813 |
| Worker | 4.5600e-003 | 3.3500e-003 | 0.0384 | 1.0000e-004 | 0.0113 | 7.0000e-005 | 0.0114 | 3.0100e-003 | 7.0000e-005 | 3.0800e-003 | 0.0000 | 9.1638 | 9.1638 | 3.1000e-004 | 2.9000e-004 | 9.2571 |
| **Total** | **4.9200e-003** | **0.0196** | **0.0420** | **1.6000e-004** | **0.0130** | **1.6000e-004** | **0.0132** | **3.5000e-003** | **1.6000e-004** | **3.6600e-003** | **0.0000** | **14.5989** | **14.5989** | **4.1000e-004** | **1.1100e-003** | **14.9384** |

### 3.5 Site Preparation - 2022

Phase not used

### 3.6 Grading - 2022

Phase not used

### 3.7 Paving - 2023

Phase not used

### 3.8 Architectural Coating - 2023

Phase not used

### 3.9 Treatment Plant - 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 | 0.7270 | 6.0327 | 8.3220 | 0.0174 | | 0.2675 | 0.2675 | | 0.2564 | 0.2564 | 0.0000 | 1,507.6752 | 1,507.6752 | 0.2333 | 0.0000 | 1,513.5075 |
| **Total** | **0.7270** | **6.0327** | **8.3220** | **0.0174** | | **0.2675** | **0.2675** | | **0.2564** | **0.2564** | **0.0000** | **1,507.6752** | **1,507.6752** | **0.2333** | **0.0000** | **1,513.5075** |

**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 | 3.9000e-003 | 0.2761 | 0.0410 | 8.7000e-004 | 0.0213 | 1.8100e-003 | 0.0231 | 5.8400e-003 | 1.7300e-003 | 7.5700e-003 | 0.0000 | 85.9929 | 85.9929 | 2.4300e-003 | 0.0136 | 90.1134 |
| Vendor | 1.9800e-003 | 0.0879 | 0.0197 | 3.0000e-004 | 8.9400e-003 | 4.9000e-004 | 9.4300e-003 | 2.5800e-003 | 4.7000e-004 | 3.0500e-003 | 0.0000 | 29.0365 | 29.0365 | 5.5000e-004 | 4.3700e-003 | 30.3522 |
| Worker | 0.0173 | 0.0134 | 0.1472 | 3.6000e-004 | 0.0401 | 2.7000e-004 | 0.0404 | 0.0107 | 2.5000e-004 | 0.0109 | 0.0000 | 33.2595 | 33.2595 | 1.2300e-003 | 1.1000e-003 | 33.6181 |
| **Total** | **0.0232** | **0.3774** | **0.2079** | **1.5300e-003** | **0.0704** | **2.5700e-003** | **0.0729** | **0.0191** | **2.4500e-003** | **0.0215** | **0.0000** | **148.2889** | **148.2889** | **4.2100e-003** | **0.0191** | **154.0838** |

**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 | 0.7270 | 6.0327 | 8.3220 | 0.0174 | | 0.2675 | 0.2675 | | 0.2564 | 0.2564 | 0.0000 | 1,507.6734 | 1,507.6734 | 0.2333 | 0.0000 | 1,513.5057 |
| **Total** | **0.7270** | **6.0327** | **8.3220** | **0.0174** | | **0.2675** | **0.2675** | | **0.2564** | **0.2564** | **0.0000** | **1,507.6734** | **1,507.6734** | **0.2333** | **0.0000** | **1,513.5057** |

**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 | 3.9000e-003 | 0.2761 | 0.0410 | 8.7000e-004 | 0.0213 | 1.8100e-003 | 0.0231 | 5.8400e-003 | 1.7300e-003 | 7.5700e-003 | 0.0000 | 85.9929 | 85.9929 | 2.4300e-003 | 0.0136 | 90.1134 |
| Vendor | 1.9800e-003 | 0.0879 | 0.0197 | 3.0000e-004 | 8.9400e-003 | 4.9000e-004 | 9.4300e-003 | 2.5800e-003 | 4.7000e-004 | 3.0500e-003 | 0.0000 | 29.0365 | 29.0365 | 5.5000e-004 | 4.3700e-003 | 30.3522 |
| Worker | 0.0173 | 0.0134 | 0.1472 | 3.6000e-004 | 0.0401 | 2.7000e-004 | 0.0404 | 0.0107 | 2.5000e-004 | 0.0109 | 0.0000 | 33.2595 | 33.2595 | 1.2300e-003 | 1.1000e-003 | 33.6181 |
| **Total** | **0.0232** | **0.3774** | **0.2079** | **1.5300e-003** | **0.0704** | **2.5700e-003** | **0.0729** | **0.0191** | **2.4500e-003** | **0.0215** | **0.0000** | **148.2889** | **148.2889** | **4.2100e-003** | **0.0191** | **154.0838** |

## 3.9 Treatment Plant - 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 | 0.5416 | 4.3198 | 6.5080 | 0.0136 | | 0.1879 | 0.1879 | | 0.1799 | 0.1799 | 0.0000 | 1,182.9170 | 1,182.9170 | 0.1815 | 0.0000 | 1,187.4553 |
| **Total** | **0.5416** | **4.3198** | **6.5080** | **0.0136** | | **0.1879** | **0.1879** | | **0.1799** | **0.1799** | **0.0000** | **1,182.9170** | **1,182.9170** | **0.1815** | **0.0000** | **1,187.4553** |

**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 | 2.9500e-003 | 0.2067 | 0.0324 | 6.7000e-004 | 0.0167 | 1.3700e-003 | 0.0181 | 4.5800e-003 | 1.3100e-003 | 5.8900e-003 | 0.0000 | 66.0680 | 66.0680 | 1.9100e-003 | 0.0105 | 69.2350 |
| Vendor | 1.4800e-003 | 0.0668 | 0.0151 | 2.3000e-004 | 7.0100e-003 | 3.7000e-004 | 7.3800e-003 | 2.0300e-003 | 3.6000e-004 | 2.3800e-003 | 0.0000 | 22.3884 | 22.3884 | 4.3000e-004 | 3.3700e-003 | 23.4026 |
| Worker | 0.0127 | 9.3300e-003 | 0.1068 | 2.7000e-004 | 0.0315 | 2.0000e-004 | 0.0317 | 8.3800e-003 | 1.8000e-004 | 8.5600e-003 | 0.0000 | 25.4920 | 25.4920 | 8.7000e-004 | 8.0000e-004 | 25.7516 |
| **Total** | **0.0171** | **0.2828** | **0.1542** | **1.1700e-003** | **0.0552** | **1.9400e-003** | **0.0571** | **0.0150** | **1.8500e-003** | **0.0168** | **0.0000** | **113.9484** | **113.9484** | **3.2100e-003** | **0.0146** | **118.3892** |

**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 | 0.5416 | 4.3198 | 6.5080 | 0.0136 | | 0.1879 | 0.1879 | | 0.1799 | 0.1799 | 0.0000 | 1,182.9156 | 1,182.9156 | 0.1815 | 0.0000 | 1,187.4539 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | **0.5416** | **4.3198** | **6.5080** | **0.0136** | | **0.1879** | **0.1879** | | **0.1799** | **0.1799** | **0.0000** | **1,182.9156** | **1,182.9156** | **0.1815** | **0.0000** | **1,187.4539** |

### 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 | 2.9500e-003 | 0.2067 | 0.0324 | 6.7000e-004 | 0.0167 | 1.3700e-003 | 0.0181 | 4.5800e-003 | 1.3100e-003 | 5.8900e-003 | 0.0000 | 66.0680 | 66.0680 | 1.9100e-003 | 0.0105 | 69.2350 |
| Vendor | 1.4800e-003 | 0.0668 | 0.0151 | 2.3000e-004 | 7.0100e-003 | 3.7000e-004 | 7.3800e-003 | 2.0300e-003 | 3.6000e-004 | 2.3800e-003 | 0.0000 | 22.3884 | 22.3884 | 4.3000e-004 | 3.3700e-003 | 23.4026 |
| Worker | 0.0127 | 9.3300e-003 | 0.1068 | 2.7000e-004 | 0.0315 | 2.0000e-004 | 0.0317 | 8.3800e-003 | 1.8000e-004 | 8.5600e-003 | 0.0000 | 25.4920 | 25.4920 | 8.7000e-004 | 8.0000e-004 | 25.7516 |
| **Total** | **0.0171** | **0.2828** | **0.1542** | **1.1700e-003** | **0.0552** | **1.9400e-003** | **0.0571** | **0.0150** | **1.8500e-003** | **0.0168** | **0.0000** | **113.9484** | **113.9484** | **3.2100e-003** | **0.0146** | **118.3892** |

## 3.10 Weir & 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 | 0.2655 | 2.1618 | 3.4244 | 6.4400e-003 | | 0.1022 | 0.1022 | | 0.0985 | 0.0985 | 0.0000 | 556.7633 | 556.7633 | 0.0682 | 0.0000 | 558.4687 |
| **Total** | **0.2655** | **2.1618** | **3.4244** | **6.4400e-003** | | **0.1022** | **0.1022** | | **0.0985** | **0.0985** | **0.0000** | **556.7633** | **556.7633** | **0.0682** | **0.0000** | **558.4687** |

### 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 | 1.2500e-003 | 0.0889 | 0.0132 | 2.8000e-004 | 6.8500e-003 | 5.8000e-004 | 7.4300e-003 | 1.8800e-003 | 5.6000e-004 | 2.4400e-003 | 0.0000 | 27.6794 | 27.6794 | 7.8000e-004 | 4.3800e-003 | 29.0057 |
| Vendor | 7.6000e-004 | 0.0338 | 7.5900e-003 | 1.1000e-004 | 3.4400e-003 | 1.9000e-004 | 3.6300e-003 | 9.9000e-004 | 1.8000e-004 | 1.1700e-003 | 0.0000 | 11.1679 | 11.1679 | 2.1000e-004 | 1.6800e-003 | 11.6739 |
| Worker | 0.0108 | 8.3100e-003 | 0.0914 | 2.2000e-004 | 0.0249 | 1.7000e-004 | 0.0251 | 6.6300e-003 | 1.5000e-004 | 6.7900e-003 | 0.0000 | 20.6642 | 20.6642 | 7.6000e-004 | 6.8000e-004 | 20.8870 |
| **Total** | **0.0128** | **0.1310** | **0.1122** | **6.1000e-004** | **0.0352** | **9.4000e-004** | **0.0362** | **9.5000e-003** | **8.9000e-004** | **0.0104** | **0.0000** | **59.5115** | **59.5115** | **1.7500e-003** | **6.7400e-003** | **61.5666** |

**Mitigated Construction On-Site**

| Category | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Off-Road | 0.2655 | 2.1618 | 3.4244 | 6.4400e-003 | | 0.1022 | 0.1022 | | 0.0985 | 0.0985 | 0.0000 | 556.7627 | 556.7627 | 0.0682 | 0.0000 | 558.4681 |
| **Total** | **0.2655** | **2.1618** | **3.4244** | **6.4400e-003** | | **0.1022** | **0.1022** | | **0.0985** | **0.0985** | **0.0000** | **556.7627** | **556.7627** | **0.0682** | **0.0000** | **558.4681** |

**Mitigated Construction Off-Site**

| Category | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Hauling | 1.2500e-003 | 0.0889 | 0.0132 | 2.8000e-004 | 6.8500e-003 | 5.8000e-004 | 7.4300e-003 | 1.8800e-003 | 5.6000e-004 | 2.4400e-003 | 0.0000 | 27.6794 | 27.6794 | 7.8000e-004 | 4.3800e-003 | 29.0057 |
| Vendor | 7.6000e-004 | 0.0338 | 7.5900e-003 | 1.1000e-004 | 3.4400e-003 | 1.9000e-004 | 3.6300e-003 | 9.9000e-004 | 1.8000e-004 | 1.1700e-003 | 0.0000 | 11.1679 | 11.1679 | 2.1000e-004 | 1.6800e-003 | 11.6739 |
| Worker | 0.0108 | 8.3100e-003 | 0.0914 | 2.2000e-004 | 0.0249 | 1.7000e-004 | 0.0251 | 6.6300e-003 | 1.5000e-004 | 6.7900e-003 | 0.0000 | 20.6642 | 20.6642 | 7.6000e-004 | 6.8000e-004 | 20.8870 |
| **Total** | **0.0128** | **0.1310** | **0.1122** | **6.1000e-004** | **0.0352** | **9.4000e-004** | **0.0362** | **9.5000e-003** | **8.9000e-004** | **0.0104** | **0.0000** | **59.5115** | **59.5115** | **1.7500e-003** | **6.7400e-003** | **61.5666** |

## 3.10 Weir & Pump Station - 2024

**Unmitigated Construction On-Site**

| Category | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Off-Road | 0.2186 | 1.7147 | 2.9953 | 5.6300e-003 | | 0.0793 | 0.0793 | | 0.0764 | 0.0764 | 0.0000 | 486.7915 | 486.7915 | 0.0589 | 0.0000 | 488.2645 |
| **Total** | **0.2186** | **1.7147** | **2.9953** | **5.6300e-003** | | **0.0793** | **0.0793** | | **0.0764** | **0.0764** | **0.0000** | **486.7915** | **486.7915** | **0.0589** | **0.0000** | **488.2645** |

**Unmitigated Construction Off-Site**

| Category | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | tons/yr | | | | | | | | | | MT/yr | | | | | |
| Hauling | 1.0600e-003 | 0.0741 | 0.0116 | 2.4000e-004 | 5.9900e-003 | 4.9000e-004 | 6.4800e-003 | 1.6400e-003 | 4.7000e-004 | 2.1100e-003 | 0.0000 | 23.6964 | 23.6964 | 6.9000e-004 | 3.7500e-003 | 24.8323 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vendor | 6.3000e-004 | 0.0286 | 6.4500e-003 | 1.0000e-004 | 3.0000e-003 | 1.6000e-004 | 3.1600e-003 | 8.7000e-004 | 1.5000e-004 | 1.0200e-003 | 0.0000 | 9.5950 | 9.5950 | 1.8000e-004 | 1.4400e-003 | 10.0297 |
| Worker | 8.7900e-003 | 6.4600e-003 | 0.0739 | 1.9000e-004 | 0.0218 | 1.4000e-004 | 0.0219 | 5.8000e-003 | 1.3000e-004 | 5.9300e-003 | 0.0000 | 17.6483 | 17.6483 | 6.0000e-004 | 5.5000e-004 | 17.8280 |
| **Total** | **0.0105** | **0.1092** | **0.0920** | **5.3000e-004** | **0.0308** | **7.9000e-004** | **0.0316** | **8.3100e-003** | **7.5000e-004** | **9.0600e-003** | **0.0000** | **50.9397** | **50.9397** | **1.4700e-003** | **5.7400e-003** | **52.6900** |

## 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 | 0.2186 | 1.7147 | 2.9953 | 5.6300e-003 | | 0.0793 | 0.0793 | | 0.0764 | 0.0764 | 0.0000 | 486.7909 | 486.7909 | 0.0589 | 0.0000 | 488.2639 |
| **Total** | **0.2186** | **1.7147** | **2.9953** | **5.6300e-003** | | **0.0793** | **0.0793** | | **0.0764** | **0.0764** | **0.0000** | **486.7909** | **486.7909** | **0.0589** | **0.0000** | **488.2639** |

## 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 | 1.0600e-003 | 0.0741 | 0.0116 | 2.4000e-004 | 5.9900e-003 | 4.9000e-004 | 6.4800e-003 | 1.6400e-003 | 4.7000e-004 | 2.1100e-003 | 0.0000 | 23.6964 | 23.6964 | 6.9000e-004 | 3.7500e-003 | 24.8323 |
| Vendor | 6.3000e-004 | 0.0286 | 6.4500e-003 | 1.0000e-004 | 3.0000e-003 | 1.6000e-004 | 3.1600e-003 | 8.7000e-004 | 1.5000e-004 | 1.0200e-003 | 0.0000 | 9.5950 | 9.5950 | 1.8000e-004 | 1.4400e-003 | 10.0297 |
| Worker | 8.7900e-003 | 6.4600e-003 | 0.0739 | 1.9000e-004 | 0.0218 | 1.4000e-004 | 0.0219 | 5.8000e-003 | 1.3000e-004 | 5.9300e-003 | 0.0000 | 17.6483 | 17.6483 | 6.0000e-004 | 5.5000e-004 | 17.8280 |
| **Total** | **0.0105** | **0.1092** | **0.0920** | **5.3000e-004** | **0.0308** | **7.9000e-004** | **0.0316** | **8.3100e-003** | **7.5000e-004** | **9.0600e-003** | **0.0000** | **50.9397** | **50.9397** | **1.4700e-003** | **5.7400e-003** | **52.6900** |

# 4.0 Operational Detail - Mobile

**Operational emissions not estimated in this run**

# APPENDIX AMP

## Adaptive Management Plan 2022

This appendix includes the College Lake Integrated Resources Management Project Adaptive Management Plan 2022 approved by PV Water's Board of Directors on January 19, 2022.

# COLLEGE LAKE INTEGRATED RESOURCES MANAGEMENT PROJECT

## Adaptive Management Plan 2022

Prepared for
Pajaro Valley Water Management Agency

January 2022

# COLLEGE LAKE INTEGRATED RESOURCES MANAGEMENT PROJECT

## Adaptive Management Plan 2022

Prepared for
Pajaro Valley Water Management Agency

January 2022

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# Contents

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## Figures

# Acronyms and Abbreviations

| | |
|---|---|
| AF, AFY | acre feet, acre feet per year |
| AMP, Plan | adaptive management plan |
| BA | biological assessment |
| BO | biological opinion |
| CDFW | California Department of Fish and Wildlife |
| CDS | Coastal Distribution System |
| CHRIS | California Historical Resources Information System |
| Committee | Ad Hoc Adaptive Management Plan Committee |
| EIR | environmental impact report |
| IRMP | Integrated Resources Management Plan |
| MAVC | Mosquito Abatement and Vector Control |
| MMRP | mitigation monitoring and reporting program |
| NAVD | North American Vertical Datum |
| ND | No Date |
| NMFS | National Marine Fisheries Service |
| NWIC | Northwest Information Center |
| O&M | operations and maintenance |
| PEIR | programmatic environmental impact report |
| Project | College Lake Integrated Resources Management Plan |
| PV Water | Pajaro Valley Water Agency |

| | |
|---|---|
| RD 2049 | Reclamation District 2049 |
| RWQCB | Regional Water Quality Control Board |
| USFWS | U.S. Fish and Wildlife Service |
| WRP | water right permit |
| WSE | water surface elevation |
| WTP | water treatment plant |
| USFWS | U.S. Fish and Wildlife Service |

# Species Names

| | |
|---|---|
| Alder | *Alnus* spp. |
| American bullfrog | *Lithobates catesbeianus* |
| American peregrine falcon | *Falco peregrinus* |
| arroyo willow | *Salix lasiolepis* |
| bald eagle | *Haliaeetus leucocephalus* |
| barnyard grass | *Echinochloa crus-galli* |
| Bermuda grass | *Cynadon dactylon* |
| black bullhead | *Ameiurus melas* |
| black cottonwood | *Populus trichocarpa* |
| bluegill | *Lepomis macrochirus* |
| box elder | *Acer negundo* var. *californicum* |
| bristly ox-tongue | *Helminthotheca echioides* |
| brown bullhead | *Ameiurus nebulosus* |
| Bryant’s savannah sparrow | *Passerculus sandwichensis alaudinus* |
| California blackberry | *Rubus ursinus* |
| California red-legged frog | *Rana draytonii* |
| coast live oak | *Quercus agrifolia* |
| channel catfish | *Ictalurus punctatus* |
| cocklebur | *Xanthium strumarium* |
| common carp | *Cyprinus carpio* |
| coyote brush | *Baccharis pilularis* |

| | |
|---|---|
| curly dock | *Rumex crispus* |
| dogwood | *Cornus* sp. |
| encephalitis mosquito | *Culex tarsalis* |
| floodwater mosquito | *Aedes washinoi* |
| fathead minnow | *Pimephales promelas* |
| at-hen | *Atriplex prostrata* |
| giant reed | *Arundo donax* |
| golden eagle | *Aquila chrysaetos* |
| golden shiner | *Notemigonus chrysoleucas* |
| Himalayan blackberry | *Rubus armeniacus* |
| largemouth bass | *Micropterus salmoides* |
| nettle | *Urtica* sp. |
| red willow | *Salix laevigata* |
| rushes | *Juncus* spp. |
| San Francisco dusky-footed woodrat | *Neotoma fuscipes annectens* |
| Shining pondweed | *Potamogeton illinoensis* |
| shining willow | *Salix lasiandra* var. *lasiandra* |
| short-eared owl | *Asio flammeus* |
| signal crayfish | *Pacifastacus leniusculus* |
| smartweeds | *Persicaria* spp. |
| Steelhead | *Oncorhynchus mykiss* |
| swamp pricklegrass | *Crypsis schoenoides, C. vaginiflora* |
| tricolored blackbird | *Agelaius tricolor* |
| western burrowing owl | *Athene cunicularia* |

| | |
|---|---|
| western pond turtle | *Actinemys marmorata* |
| western red bat | *Lasiurus blossevillii* |
| western sycamore | *Platanus racemosa* |
| white sweetclover | *Melilotus albus* |
| white-tailed kite | *Elanus leucurus* |
| yellow warbler | *Setophaga petechial* |

CHAPTER 1

# Overview

This chapter states the purpose of the Adaptive Management Plan (AMP or Plan), describes its development process, and outlines the document's organization.

## 1.1 Purpose of the Adaptive Management Plan

Adaptive management is a structured process that allows for taking action under uncertain conditions based on the best available science and information, closely monitoring and evaluating outcomes, and then re-evaluating and adjusting decisions as more information is learned.[1]

Implementation of the College Lake Integrated Resources Management Project (Project) will be adaptively managed. The purpose of this AMP is to provide an adaptive management framework, including metrics, triggers, and management actions, to guide operations and maintenance (O&M) of the Project, and in particular to mitigate negative impacts to the College Lake ecosystem.

## 1.2 Adaptive Management Plan Development

This AMP has been developed to fulfill a mitigation measure of the 2014 Basin Management Plan Update Programmatic Environmental Impact Report (PEIR; Pajaro Valley Water Management Agency [PV Water] 2014) and related mitigation measures of the 2019 College Lake Integrated Resources Management Project Draft Environmental Impact Report (EIR; PV Water 2019). It has been developed consistent with the Project's objectives, regulatory requirements, and related plans, and with input from an Ad Hoc AMP Committee (Committee). The development and subsequent implementation of this Plan also fulfills Term and Condition 32 of the Project's Water Right Permit (A032881). The following sections describe the EIR and regulatory requirements, other related plans, and the involvement of the Committee.

### 1.2.1 EIR Requirements

This AMP fulfills Mitigation Measure BIO-2i.1 (Develop Adaptive Management Plan for College Lake Waterfowl Management and Multi-Species Mitigation) that was included in the mitigation

[1] A relevant definition of adaptive management is provided in the Delta Reform Act: "a framework and flexible decision-making process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvements in management planning and implementation of a project to achieve specified objectives" (Water Code Section 85052).

monitoring and reporting program (MMRP) adopted by PV Water's Board of Directors for the 2014 Basin Management Plan Update Programmatic Environmental Impact Report (PV Water 2014). This AMP:

- Was developed in collaboration with state and federal resource agencies and College Lake stakeholders through formation of the Committee
- Applies multi-year baseline waterfowl population and habitat use data developed to inform management
- Applies multi-year baseline steelhead surveys developed to inform management
- Integrates the results of ongoing College Lake hydrology and hydraulic analyses, as well as consultations with state and federal agencies on fish flows and fish bypass criteria
- Includes terms and conditions from applicable permits and agreements as appropriate, and defines provisions for monitoring assignments, scheduling, and responsibility
- Includes habitat replacement and revegetation, protection during ground-disturbing activities, performance standards, maintenance criteria, and monitoring requirements for temporary and permanent impacts consistent with mitigation in the 2019 College Lake Integrated Resources Management Project Draft Environmental Impact Report (2019 Draft EIR)[2] and regulatory requirements established during project-specific review
- Is in conformance with the mitigation measures from the 2019 Draft EIR, and includes terms and conditions consistent with regulatory requirements as applicable from permits

**Table 1-1** provides the text of Mitigation Measure BIO-2.i-1 and two other mitigation measures (HYD-2a and BR-2) of the 2019 Draft EIR that reference the AMP. Both Mitigation Measures HYD-2a and BR-2 require monitoring that is part of management plans closely related to both the initial framework to support adaptive management planning and the anticipated AMP, and which are described in the following section.

| TABLE 1-1<br>ADAPTIVE-MANAGEMENT-RELATED MITIGATION MEASURES OF BASIN MANAGEMENT PLAN PEIR AND COLLEGE LAKE INTEGRATED RESOURCES MANAGEMENT PROJECT EIR |
|---|
| **BIO-2i.1: Develop Adaptive Management Plan for College Lake Waterfowl Management and Multi-Species Mitigation.**<br>To mitigate impacts to existing waterfowl or waterfowl habitat at College Lake, an Adaptive Management Plan for waterfowl management and multi-species mitigation will be developed with the consultation of the state and federal resource agencies and College Lake stakeholders. The Adaptive Management Plan for waterfowl management and multi-species mitigation at College Lake will develop multi-year baseline waterfowl population and habitat use data for future project design, environmental permitting and CEQA impact analysis of project-level alternatives. To the extent practical, it will integrate the results of ongoing College Lake hydrology and hydraulic analyses, as well as future consultations with state and federal agencies on fish flows and fish bypass criteria.<br>The Management Plan will be specific to the level of impact and mitigations under site-specific and project implementation conditions. However, the following standards will apply as defined during project-level design, regulatory review and CEQA analysis: The Management Plan should include terms and conditions from applicable permits and agreements as appropriate |

[2] PV Water. 2019. College Lake Integrated Resources Management Project Environmental Impact Report. SCH# 2017112063

| **TABLE 1-1**<br>**ADAPTIVE-MANAGEMENT-RELATED MITIGATION MEASURES OF BASIN MANAGEMENT PLAN PEIR AND COLLEGE LAKE INTEGRATED RESOURCES MANAGEMENT PROJECT EIR** |
|---|
| and define provisions for monitoring assignments, scheduling, and responsibility. The Management Plan should also include habitat replacement and revegetation, protection during ground-disturbing activities, performance standards, maintenance criteria, and monitoring requirements for temporary and permanent impacts consistent with mitigation in this EIR and regulatory requirements during project- specific review. The Management Plan will be in conformance with the biology mitigation measures from this EIR, and will also include terms and conditions consistent regulatory requirements as applicable from the U. S. Fish and Wildlife Service (USFWS), National Marine Fisheries Services (NMFS), U. S. Army Corps of Engineers (USACE), California State Water Resources Control Board, (SWRCB), Central Coast Regional Water Quality Control Board (RWQCB), and California Department of Fish and Wildlife (CDFW) permits during project design and permitting as applicable. The Management Plan will be prepared for project level project implementation as determined needed through future CEQA review and consultation with agencies as required under the California Endangered Species Act (CESA) and federal Endangered Species Act (ESA). |
| **Mitigation Measure BR-2: Invasive Fish Species Control Plan.**<br>PV Water shall develop an Invasive Fish Species Control Plan. PV Water would submit the plan to the appropriate resource agencies (CDFW, USFWS, and NMFS) for approval within one year of Project implementation. The Fish Species Control Plan shall be implemented at College Lake within two years of Project implementation. The Fish Species Control Plan shall include, at a minimum:<br>1. Measures describing PV Water's methods of draining College Lake to the greatest extent feasible;<br>2. Measures describing PV Water's methods, equipment, and timing of invasive species eradication efforts to be conducted in association with lake drawdown efforts;<br>3. Measures describing the frequency at which invasive species control efforts are to be implemented. |
| **HYD-2a: Water Quality Adaptive Management for College Lake.**<br>To learn about potential impacts of the Project on College Lake water quality and the quality of downstream water bodies, PV Water shall monitor College Lake water for indications of Cyanobacteria blooms. When the proposed weir crest is elevated to 62.5 feet NAVD88, PV Water shall monitor College Lake water temperature within the water column to establish whether a thermocline develops. PV Water shall use results of this monitoring to support the development of the Adaptive Management Plan (refer to Section 2.7) that establishes management actions to minimize the conditions that can contribute to algal blooms, including cyanobacteria blooms, such that this impact is mitigated. |

Source: PV Water 2014, 2019

### 1.2.2 Regulatory Compliance and Related Plans

Consistent with adopted Mitigation Measure BIO-2i.1, PV Water first engaged with state and federal resources agencies (National Marine Fisheries Service [NMFS], U.S. Fish and Wildlife Service [USFWS], Regional Water Quality Control Board [RWQCB], and California Department of Fish and Wildlife [CDFW]) to refine concepts for specific AMP objectives, and to make minor modifications to the proposed operations and maintenance described in 2019 Draft EIR Section 2.7.2 to conform with anticipated conditions in permits and other agreements. Through initial coordination with regulatory stakeholders, PV Water gained a more detailed understanding of the obligations of permits and other approvals that will govern Project O&M and be incorporated into the AMP. These requirements include avoidance and minimization measures and related monitoring and management plans that are described in the following sections.

#### 1.2.2.1 Avoidance and Minimization Measures

Multiple measures required to avoid and minimize impacts to the environment will be implemented as part of the maintenance activities and operations that will be adaptively managed per this Plan. These measures are included in the Project's MMRP or its water right permit (WRP), or are proposed as conservation measures in the biological assessments prepared for NMFS and USFWS. These measures are listed in **Table 1-2** and provided in full in **Appendix A, "Measures to Avoid and Minimize Impacts of Operations and Maintenance**

**Activities**." Conservation measures proposed in the biological assessments (BAs) will be superseded by the conservation measures included in the biological opinions (BOs).

**TABLE 1-2**
**MEASURES TO AVOID AND MINIMIZE IMPACTS OF OPERATIONS AND MAINTENANCE ACTIVITIES**

| Measure Title | Source |
|---|---|
| Promote Farming | MMRP: LU-1a |
| Replacement of Topsoil | MMRP: LU-1c |
| Nesting Bird Surveys | MMRP: BIO-2i |
| California Red-legged Frog Qualified Biologists | MMRP (and USFWS BA): BIO-2j, CRF-1 |
| California Red-legged Frog Survey | MMRP (and USFWS BA): BIO-2j, CRF-2 |
| California Red-legged Frog Training | MMRP (and USFWS BA): BIO-2j, CRF-3 |
| California Red-legged Frog Monitoring | MMRP and USFWS BA: BIO-2j, CRF-4 |
| Staging and Access Routes | MMRP (and USFWS BA): BIO-2j, CRF-5, WPT - 5 |
| California Red-legged Frog Seasonal Restrictions | MMRP (and USFWS BA): BIO-2j, CRF-6 |
| Dewatering Procedures | MMRP (and USFWS BA): BIO-2j, CRF-7 |
| Amphibian Pathogen and Parasite Prevention | MMRP (and USFWS BA): BIO-2j, CRF-8 |
| Water Quality Protection | MMRP: BIO-2j, CRF-9 |
| Western Pond Turtle Qualified Biologists | MMRP: BIO-2k, WPT-1 |
| Western Pond Turtle Survey | MMRP: BIO-2k, WPT-2 |
| Western Pond Turtle Training | MMRP: BIO-2k, WPT-3 |
| Western Pond Turtle Monitoring | MMRP: BIO-2k, WPT-4 |
| Standard measures to maintain water quality and to control erosion and sedimentation | BA for USFWS: Conservation Measure (CM) 1 (California Red-legged Frog)<br>MMRP: BIO-1b |
| Collection of Seeds and Revegetation | MMRP: BIO-3b |
| Revegetate and Restore Mixed Riparian and Willow Riparian Forest | MMRP: BIO-1c (Revised) |
| Open Water and Wetland Revegetation and Restoration | BA for USFWS: CM 1 (California Red-legged Frog)<br>MMRP: BIO-1d |
| Delineate Work Area | BA for USFWS: CM 1 (California Red-legged Frog)<br>MMRP: BIO-2e |
| Special-Status Species Clearance Surveys | BA for USFWS: CM 1 (California Red-legged Frog)<br>MMRP: BIO-2f |
| Exotic Species Removal | BA for USFWS: CM 1 (California Red-legged Frog)<br>MMRP: BIO-2g |
| Notification of Dead or Injured Individuals of Special-Status Species | BA for USFWS: CM 1 (California Red-legged Frog)<br>MMRP: BIO-2h |
| Steep-walled Holes and Trenches | BA for USFWS: CM 1 (California Red-legged Frog) |
| Inspect Pipes for Special-Status Species | BA for USFWS: CM 1 (California Red-legged Frog) |
| Stockpile Storage | BA for USFWS: CM 1 (California Red-legged Frog) |
| Amphibian Friendly Erosion Control Materials | BA for USFWS: CM 1 (California Red-legged Frog) |
| Speed Limit | BA for USFWS: CM 1 (California Red-legged Frog) |
| Avoid Disturbance of Emergent Vegetation | BA for USFWS: CM 1 (California Red-legged Frog) |

| **Table 1-2**<br>**Measures to Avoid and Minimize Impacts of Operations and Maintenance Activities** | |
|---|---|
| **Measure Title** | **Source** |
| Invasive Plant Disposal | BA for USFWS: CM 1 California Red-legged Frog |
| Vegetation Removal | BA for USFWS: CM 1 (California Red-legged Frog) |
| Steelhead Monitoring | BA for NMFS: Steelhead CMs<br>MMRP: BIO-2l FISH-1 |
| Coffer Dam Monitoring | BA for NMFS: Steelhead CMs<br>MMRP BIO-2l FISH-2 |
| Coffer Dam Dewatering | BA for NMFS: Steelhead CMs<br>MMRP: BIO-2l FISH-3 |
| Dewatering Procedures | BA for NMFS: Steelhead CMs<br>MMRP: BIO-2l FISH-4 |
| Coffer Dam Removal | BA for NMFS: Steelhead CMs<br>MMRP: BIO-2l FISH-5 |
| Implement Water Quality BMPs | BA for NMFS: Steelhead CMs<br>MMRP: BIO-2l FISH-6 |
| Water Diversion Seasonal Restrictions | MMRP: BIO-2m |
| Protection of Steelhead Migratory Habitat: Seasonal Restrictions | BA for NMFS: Steelhead CMs<br>MMRP: BIO-2n |
| Protection of Steelhead Migratory Habitat: Bypass Flow Requirements | BA for NMFS: Steelhead CMs<br>MMRP: BIO-2o |
| Streamflow Gauging Stations | BA for NMFS: Steelhead CMs<br>MMRP: BIO-2p |
| Water Quality Permits | BA for NMFS: Steelhead CMs<br>MMRP: HWQ-1 |
| Avoid Rapid Water Level Fluctuations | MMRP: HWQ-2 |
| Well Production and Pumping Rates | MMRP: HWQ-3 |
| Fish Relocations | BA for NMFS: Steelhead CMs<br>MMRP: BR-1a |
| Invasive Fish Species Control Plan | BA for NMFS: Steelhead CMs<br>MMRP: BR-2 |
| Implement Dewatering Best Management Practices for In-Water Construction | BA for NMFS: Steelhead CMs<br>MMRP: HYD-1 |
| Water Quality Adaptive Management for College Lake | MMRP: HYD-2a |
| Avoid Flooding at Pajaro Dunes During Pumped Flow | MMRP: HYD-3 |
| Long-Term Monitoring of CA-SCR-44/H and CA-SCR-150 | MMRP: CUL-1i |

Sources: PV Water, *College Lake Integrated Resources Management Project Environmental Impact Report*, Final Mitigation Monitoring and Reporting Program, October 2019; BA prepared for USFWS and BA and Essential Fish Habitat Assessment prepared for NMFS for the College Lake Integrated Resource Management Project

#### 1.2.2.2 Related Management Plans

The Project will develop and implement several related monitoring and management plans required by the Project's EIR mitigation measures or its WRP, which are described in refer to **Table 1-3**. These related plans include a Water Quality Monitoring Plan, Steelhead Monitoring Plan, Invasive Species Management Plan, Compliance Plan, and Operations and Maintenance Plan. All of these plans have a role in implementation of the Project and will be considered in its adaptive management. The AMP serves as an umbrella document for all of these plans so that management can be evaluated holistically (i.e., these plans are part of the AMP, and adaptive management of the Project includes implementation of these plans).

**TABLE 1-3**
**MONITORING AND MANAGEMENT PLANS RELATED TO THE ADAPTIVE MANAGEMENT PLAN**

| Plan | Origin | Scope | Status |
|---|---|---|---|
| **Water Quality Monitoring Plan** | Mitigation Measure HYD-2a, (Prevention of Cyanobacteria Formation), CDFW requested as condition to dismiss Water Right protest | Addresses monitoring of ecologically important water quality constituents (e.g., dissolved oxygen, temperature) | Drafted and submitted to regulatory agencies |
| **Steelhead Monitoring Plan** | 2014 commitment by PV Water, NMFS requested as condition to dismiss Water Right protest | Addresses effectiveness of fish passage at the weir, and effectiveness of the bypass flows through Salsipuedes Creek. | Completion planned for November 2021 |
| **Invasive Species Management Plan** | CEQA requirement, dismissal of Water Right protest | Addresses management of invasive species, including bullfrogs and non-native piscivorous fishes, in College Lake during Project operations and maintenance. | Drafted and submitted to regulatory agencies |
| **Compliance Plan** | SWRCB requirement | Addresses how compliance with each term of the WRP will be determined | In preparation; to be finalized after receipt of the WRP. |
| **Operations and Maintenance Plan** | Need for guidance for operations including timing of annual weir raising. | Addresses timing of weir raising, timing and size of diversions, operation of fish passageway structure, and maintenance of fish passageway passage structure; during consultations, regulatory agencies may request additional content. | To be developed after all permits secured |

### 1.2.3 Ad Hoc Adaptive Management Plan Committee

Following initial engagement with regulatory agencies, the AMP was developed in conjunction with a series of meetings of the Committee formed by PV Water to solicit stakeholder input through a transparent and inclusive process. During these meetings, which occurred in 2021, key AMP content was discussed and Committee members provided input and made recommendations. The Committee was supported by PV Water staff and consultants, including technical experts in fisheries, terrestrial wildlife, botany and wetlands, and hydrology.

Specifically, Committee members were asked to review and provide recommendations to the PV Water Board of Directors on the following content of the AMP:

- Objectives
- Monitoring metrics
- Monitoring-based thresholds that when crossed, trigger adaptive management actions
- Management actions that could potentially be implemented when thresholds are crossed
- Reporting and Plan update procedures

Committee recommendations and feedback aided development of the draft AMP and are summarized below in Section 1.2.3.2, "Ad Hoc Committee Recommendations."

#### 1.2.3.1 Ad Hoc Adaptive Management Plan Committee Membership

PV Water sought to represent all critical parties on a committee of a manageable size. The resulting Committee consisted of the following members:

- Tom Broz – PV Water Director
- Bob Culbertson – PV Water Director
- Stephen Rider – PV Water Director
- Joel Casagrande – NMFS
- Jessie Maxfield – CDFW
- Adam French – Amah Mutsun Land Trust (Tribal representative)
- Jonathan Pilch – Watsonville Wetlands Watch (non-governmental organization representative)
- Jerry Busch – Representative-Ventana Chapter Sierra Club (non-governmental organization representative)
- John Diffenbaugh – Neighboring landowner
- Dawn Reis – Neighboring landowner
- Christi Suchil – Disadvantaged community representative
- Frank Shields – Local environmental scientist

- John Pritchard – At-large community member

#### 1.2.3.2 Ad Hoc Adaptive Management Plan Committee Recommendations

During its four meetings and through their review of the Draft AMP, Committee members made numerous recommendations regarding AMP content. Most of these recommendations are in the meeting summaries or comments submitted by Committee members on the draft AMP (which are provided as appendices to this Plan).

A large number of these recommendations were regarding the AMP's objectives, monitored metrics, triggers for management actions, and management actions, which were the focus of the Committee meetings. In response to these recommendations, objectives regarding vegetation and cultural resources were added to the AMP, other objectives were revised, and metrics, action triggers, and potential management actions were revised or added. However, several recommended objectives, metrics, action triggers, and management actions were not incorporated into the Plan for reasons given in the responses to comments. Important considerations in evaluating recommendations were the:

- Relative influence of Project O&M on the resource (relative to activities on adjacent lands, for example)
- Ability to reliably interpret monitored changes as being the result of O&M as opposed to other causes (e.g., environmental fluctuations).
- Consistency with the Project's approvals and permits
- Cost and cost-effectiveness

#### 1.2.3.3 AMP Adoption

AMP 2022 was endorsed by the PV Water Board of Directors on XXX.

## 1.3 Organization of This Document

This document is organized as follows:

- Preceding the main document text is a list of acronyms, abbreviations, and list of species names.
- **Chapter 1, Overview.** This chapter states the purpose of the AMP, describes its development process, and outlines the document's organization.
- **Chapter 2, College Lake Setting.** This chapter provides regional and local background information about the College Lake setting related to land cover, biological resources, cultural resources, and existing management activities.

- **Chapter 3, College Lake Project.** This chapter describes the Project's components and design as well as O&M activities.
- **Chapter 4, Adaptive Management Framework.** This chapter describes the framework for adaptive management, which consists of objectives, metrics, action triggers, and potential management actions.
- **Chapter 5, Monitoring and Targeted Studies.** This chapter describes the monitoring that will be conducted to inform O&M of the Project and identifies topics for targeted studies (research or community science) that could reduce key uncertainties
- **Chapter 6, Reporting and Plan Updates.** This chapter describes the evaluations by PV Water staff, reporting, and updating of the Plan that will be components of adaptive management of O&M of the Project
- **Chapter 7, References.** This chapter provides information on literature and other sources cited in the text.
- **Appendix A, Measures to Avoid and Minimize Impacts of Operations and Maintenance Activities.** This appendix provides the text of adopted and anticipated measures to avoid and minimize the impacts of O&M activities.
- **Appendix B, Water Quality Management Plan.** This appendix provides the plan for monitoring water quality at College Lake. It describes the existing monitoring and the additional monitoring that will be implemented in conjunction with the Project, monitoring objectives and reporting, and potential management actions.
- **Appendix C, Steelhead Monitoring Plan.** This appendix provides the plan for monitoring steelhead use of College Lake and their passage at the weir during operation of the Project. It describes the objectives and design of the monitoring plan, and data analysis, reporting, and potential management actions.
- **Appendix D, Invasive Species Management Plan.** This appendix provides the plan for managing invasive animals at College Lake during operation of the Project. It describes the monitoring, management actions, success criteria, and reporting for the management of these invasive species.
- **Appendix E, Revegetation Plan.** This appendix provides the plan for the Project's revegetation treatments (College Lake Integrated Resources Management Project – Revegetation Plan). It includes plant palettes, planting designs, success criteria, and monitoring methods.
- **Appendix F, Seasonal Wetland Monitoring Methodology.** This appendix provides the methodology for transect-based monitoring of the cover and species composition of seasonal wetland vegetation.

- **Appendix G, Plant Species List.** This appendix provides a list of the plant species that have been observed at College Lake and distinguishes native from naturalized species, and indicates which species have been identified by the California Invasive Plant Council as invasive.
- **Appendix H, Bird Species List.** This appendix provides a list of the bird species that have been observed at College Lake.
- **Appendix I, Ad Hoc Adaptive Management Plan Committee Meeting Summaries.** This appendix provides summaries of the meetings of the Committee.
- **Appendix J, Ad Hoc Adaptive Management Plan Committee Member and Sierra Club Comments.** This appendix provides the comments on the Draft AMP submitted by members of the Committee and the Sierra Club, and provides responses to them.

CHAPTER 2

# College Lake Setting

This chapter summarizes regional and local background information about the tuivta[3] or College Lake area related to land cover, biological resources, cultural resources, and existing management activities.

## 2.1 Regional Setting

The Project area, shown on **Figure 1**, is located within the 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. Currently, the Pajaro Valley is mostly agricultural with isolated patches of remnant natural vegetation communities. The valley is drained by the Pajaro River and its major tributary, Salsipuedes Creek, as well as by the Watsonville Slough system and Carneros Creek.

College Lake is a naturally occurring seasonally wet depression that receives water inflows from the Green Valley, Casserly, and Hughes Creek subwatersheds. The College Lake watershed, consists of approximately 11,000 acres of range, rural residential, and crop lands (PV Water 2014). Outflows from College Lake enter Salsipuedes Creek.

Historically, before the construction of the weir and the straightening and widening of the channel of Salsipuedes Creek in the early 1900s, College Lake would have expanded and contracted with seasonal rainfall, but a portion of it would have remained inundated throughout most years. (In fact, the oldest museum specimens of plants from College Lake are aquatic plants: shining pondweed [*Potamogeton illinoensis*] and yellow water lily [*Nuphar polysepala*], collected in 1905 and 1908, respectively [**Appendix G, "Plant Species List"**].) Now however, Reclamation District 2049 (RD 2049, established in 1920) typically pumps the lake dry beginning in mid-March to allow agricultural use of the lakebed through the summer.

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[3] tuivta is the place name for the Amah Mutsun village site that is very near to College Lake and applies to the larger area encompassing College Lake and other nearby lakes and wetlands. Because "t" and "T" represent different sounds in the Mutsun language, this place name is not capitalized.

## 2.2 Land Cover

College Lake and portions of Salsipuedes Creek within the Project's maintenance areas support the following general habitat types as shown on **Figure 2**: riparian scrub, riparian forest, freshwater emergent wetland, coyote brush scrub, seasonal wetland, agriculture, farmed wetlands, annual grassland, urban/developed and upland tree groves, perennial stream, and ditch. The most common habitat types in College Lake and Salsipuedes Creek in the Project area are described below:

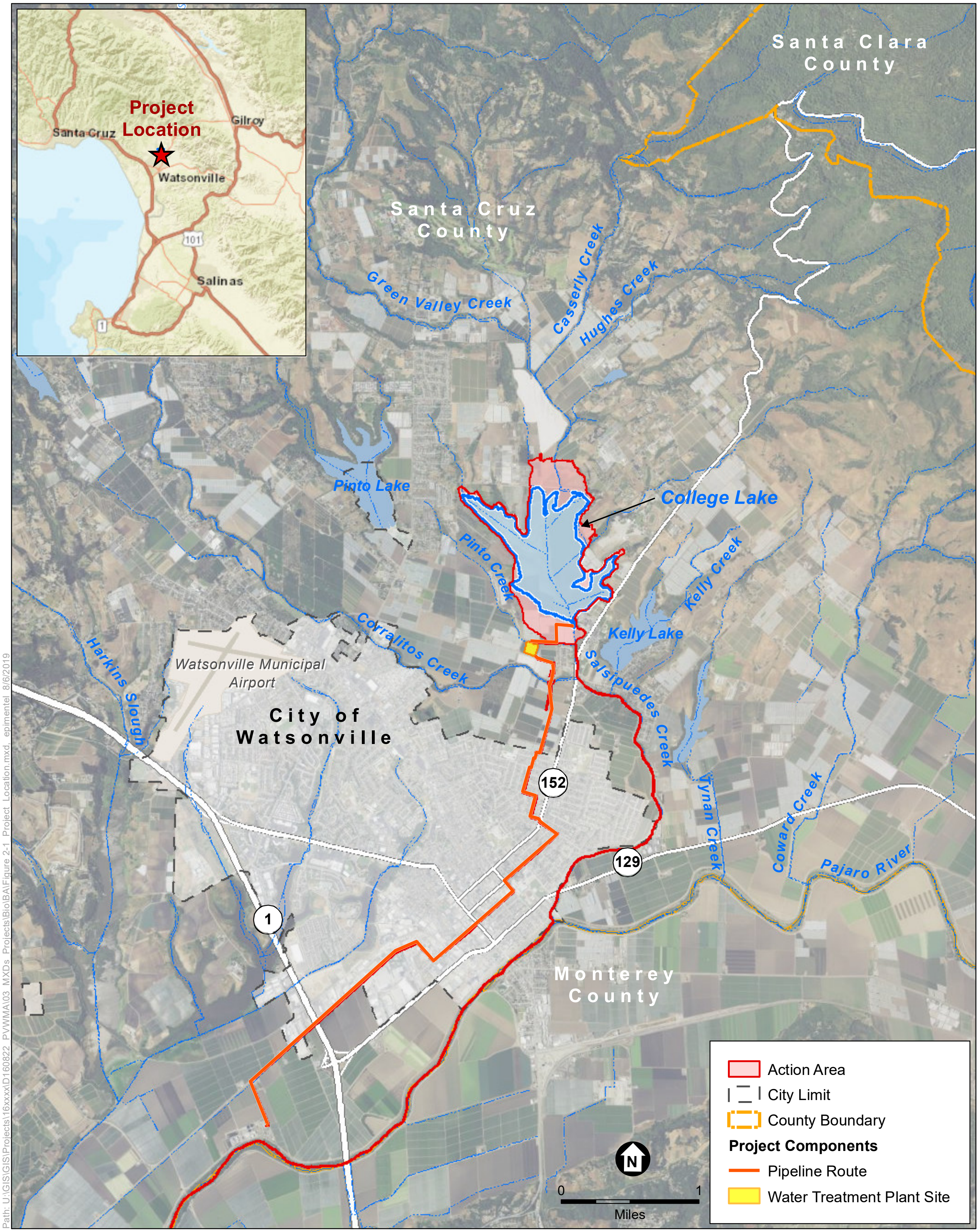
**Riparian Forest**—Riparian forest occurs as a large stand in the northeast quadrant of College Lake and is also present within other portions of College Lake and its tributaries. This broadleaf deciduous forest is dominated by native riparian species including arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), black cottonwood (*Populus trichocarpa*), alder (*Alnus* spp.), western sycamore (*Platanus racemosa*), coast live oak (*Quercus agrifolia*), box elder (*Acer negundo* var. *californicum*), shining willow (*Salix lasiandra* var. *lasiandra*), and dogwood (*Cornus* sp.). Associated understory species include California blackberry (*Rubus ursinus*), nettle (*Urtica* sp.), curly dock (*Rumex crispus*), and coyote brush (*Baccharis pilularis*). These understory species are also the dominants of riparian scrub (i.e., shrub and perennial-dominated riparian vegetation).

**Seasonal Wetland**—Seasonal wetlands are found along the margins of College Lake and in the northwestern and eastern extensions of the lake (particularly east of the main ditch). These areas support a wide variety of mostly non-native annual and perennial herbaceous species. Some abundant species include fat-hen (*Atriplex prostrata*), modest prickle grass (*Cripsus vaginiflora*) Bermuda grass (*Cynodon dactylon*); Italian ryegrass (*Festuca perennis*), bristly ox-tongue (*Helminthotheca echioides*), white sweetclover (*Melilotus albus*), smartweed (*Persicaria* spp.), curly dock (*Rumex crispus*), and cocklebur (*Xanthium strumarium*). California blackberry and Himalayan blackberry (*Rubus armeniacus*) are also prevalent in some areas that are transitional to riparian scrub.

**Agriculture**—Agricultural fields located at elevations above approximately 62.5 feet North American Vertical Datum of 1988 (NAVD88) can be planted with berries and orchards (i.e., crops requiring a longer growing season) while agricultural fields below 65.2 feet NAVD88 are typically planted with annual vegetable row crops. Agricultural habitats are routinely disked, planted, harvested, and subject to the application of herbicides, pesticides, and fertilizers, which prevents the establishment of non-crop perennial plant species and natural habitats.

Agricultural fields on the lakebed of College Lake are periodically fallowed, at the discretion of the farmer. In fallow years, these fields support weedy plant species, including: bristly ox-tongue (*Helminthotheca echioides*), cocklebur; swamp pricklegrass (*Crypsis schoenoides, C. vaginiflora*), fat-hen (*Atriplex prostrata*), smartweeds, and curly dock.

**Farmed Wetlands**—Farmed wetlands include agricultural areas within College Lake that support hydrological conditions of wetlands. This highly managed system presents a unique situation where farm fields provide aquatic habitat during the winter and early spring, seasonal

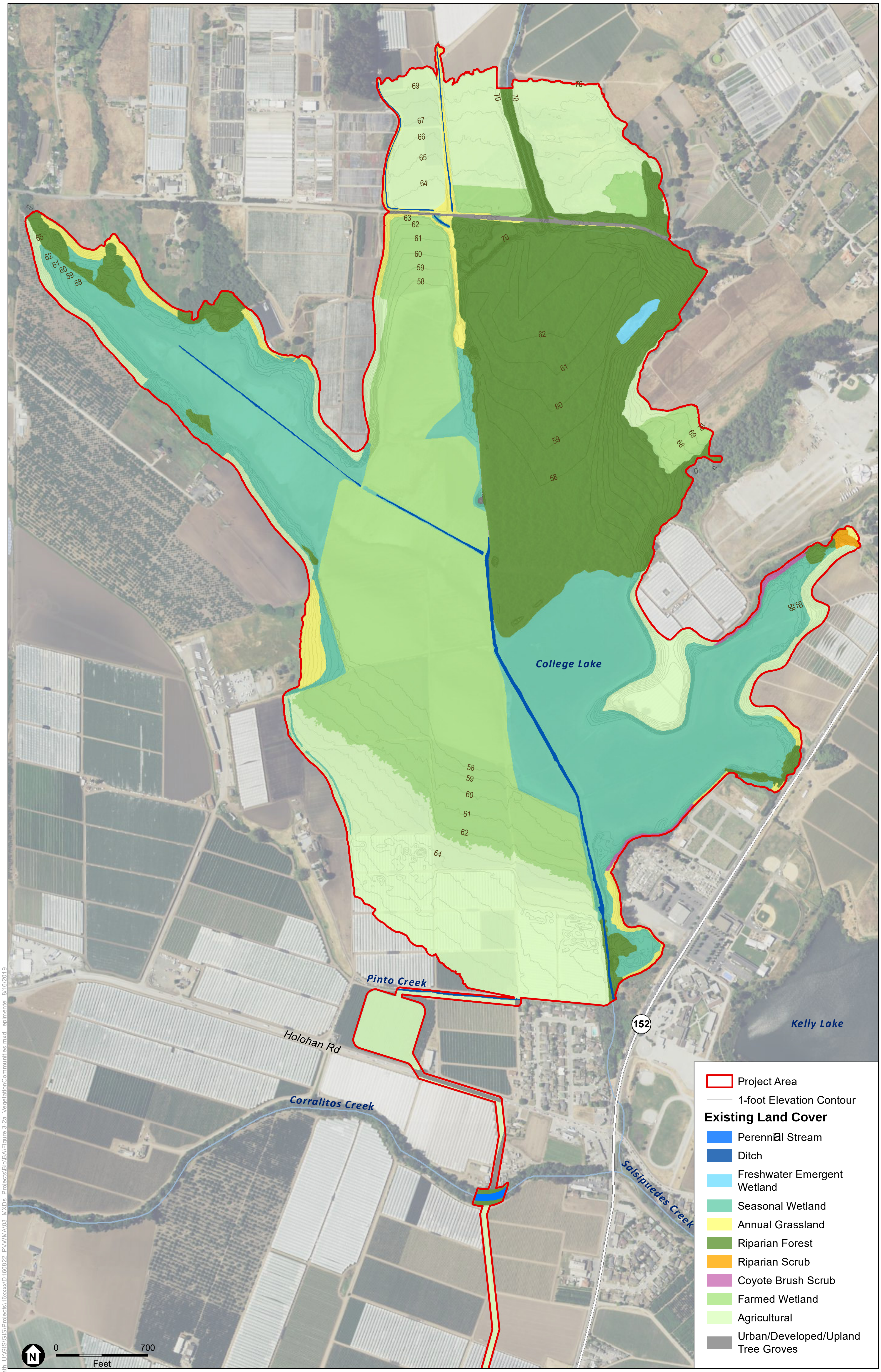



SOURCE: Carollo Engineers, 2019; ESRI World Imagery, 7/23/2016; ESA, 2019

College Lake Integrated Resources Management Project

**Figure 1**
Project Location Map

ESA




SOURCE: USDA, 2016; ESA, 2019

College Lake Integrated Resources Management Project

**Figure 2**
Existing Land Cover

ESA

wetland habitat for a brief period as College Lake is drawn down, arable farmland in the summer, and fallow fields in the fall and early winter.

## 2.3 Biological Resources

Several biological resources are particularly important for Project O&M either because of their potential sensitivity to management actions or their potential to affect sensitive biological resources or Project O&M. These resources include:

- Phytoplankton, zooplankton, and macroinvertebrates of the aquatic ecosystem
- Cyanobacteria
- Invasive animal species
- Invasive plant species
- Riparian forest
- Farmed and seasonal wetlands
- South-central California coast steelhead
- Special-status wildlife species
- Waterfowl and other birds

The following sections briefly describe each of these resources and how\ existing and planned land uses affect them.

### 2.3.1 Phytoplankton, Zooplankton, and Macroinvertebrates of the Aquatic Ecosystem

As the bed of College Lake becomes inundated, its agricultural, seasonal wetland, and other land cover types become an aquatic ecosystem. Along with the incoming water, phytoplankton, zooplankton, other aquatic invertebrates, and fish enter the lakebed along with lakebed invertebrates that emerge from a dormant state or dormant phase of their life cycle. Together with continued inputs of nutrients, detritus, and organisms from upstream, photosynthesis by phytoplankton, other algae, and vascular plants, and decomposition of the lakebed's organic matter support the food web of College Lake's open water ecosystem. This ecosystem provides food for steelhead and migrating waterfowl and shorebirds.

Water management in general affects the area and duration, and seasonality of the aquatic ecosystem.  It also affects the depth, residency time, and quality of water, all of which affect the productivity and composition of the aquatic food web. In addition, agricultural practices and vegetation management can affect the quality and availability of organic matter.

### 2.3.2 Cyanobacteria

Cyanobacteria are single-celled or filamentous, photosynthetic bacteria that are a component of the phytoplankton in College Lake's aquatic ecosystem. These bacteria were previously known as "blue-green algae." Although they are primary producers in the food web providing food for steelhead, waterfowl, wading birds, and shorebirds. Some cyanobacteria produce compounds that are toxic to humans in small amounts (cyanotoxins). When these cyanobacteria become very abundant (during cyanobacteria "blooms"), water quality is degraded.

Water management determines the depth and seasonal timing of inundation, and thus potentially affects the development of cyanobacteria blooms. Nutrient-driven cyanobacteria blooms, and associated cyanotoxins, have been a persistent water quality problem at nearby Pinto Lake (Central Coast Regional Water Quality Control Board 2020). Pinto Lake is a perennial body of water that develops thermal stratification during warmer months, which results in greater nutrient availability that promotes cyanobacteria blooms. Although cyanobacteria are present at College Lake, their concentration and the concentration of cyanotoxins have been much lower than at Pinto Lake (PV Water 2019). Increasing duration and depth of inundation at College Lake could potentially result in water temperatures, nutrient concentrations, and cyanobacteria concentrations more similar to Pinto Lake.

### 2.3.3 Invasive Animal Species

Invasive (non-native [naturalized]) species that compete with or prey on native species are present in College Lake and include common carp (*Cyprinus carpio*), fathead minnow (*Pimephales promelas*), golden shiner (*Notemigonus chrysoleucas*), channel catfish (*Ictalurus punctatus*), black bullhead (*Ameiurus melas*), and brown bullhead (*Ameiurus nebulosus*), bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), American bullfrog (*Lithobates catesbeianus*), and signal crayfish (*Pacifastacus leniusculus*). Other non-native species also may be present.

Water management affects the area and duration of inundation and thus the availability of habitat for invasive animal species. The current RD 2049 operations of draining the lake in spring and periodic pumping during the agricultural season reduces wetted habitat in the summer and fall to the drainage ditches within the lake. While this pumping practice does not entirely eliminate populations of invasive species, it likely helps to control and reduce populations annually by significantly limiting habitat availability. Retention of water in the lake bed for a longer period could potentially allow populations of non-native competing or predatory species to increase.

Management actions hat remove invasive species directly affects their presence and abundance (e.g., actions described in **Appendix D, "Invasive Species Management Plan"**).

### 2.3.4 Invasive Plant Species

Invasive plants, those naturalized species[4] that spread and become abundant on the landscape, are major threats to biological diversity, in large part because they displace native plant species, creating monotypic patches of vegetation with different and lesser values as animal habitat.

At College Lake, naturalized species account for more than half of observed plant species (48 of 90 species, see **Appendix G, "Plant Species List"**). Of the naturalized plant species at College Lake, 22 are included in the California Invasive Plant Council's (Cal IPC's) inventory of invasive plant species, and two of them with a "high" rating because of their severe ecological impacts on physical processes, plant and animal communities, and vegetation structure: giant reed (*Arundo donax*) and Himalayan blackberry (*Rubus armeniacus*) (Cal IPC 2021).

Besides impacting biodiversity, giant reed and Himalayan blackberry, and other invasive plants also can impede O&M by altering water flow and sediment deposition, reducing visibility, and impeding access (California Department of Water Resources 2016). Agriculture and other land uses facilitate the spread of invasive species by inadvertently introducing their seed on equipment or in materials brought to College Lake, and by creating disturbed areas where those seed can become established plants. Management of water and vegetation also facilitates or impedes the spread of invasive species by affecting growing conditions, causing mortality, and altering competition for resources.

### 2.3.5 Riparian Forest

As described in Section 2.2, "Land Cover," riparian forest at College Lake is dominated by native broadleaf, deciduous trees, including black cottonwood and several species of willows. Black cottonwood and willows are among the first riparian tree species to establish on a site (i.e., early successional species) and as such their dispersal and establishment is of particular importance to O&M.

Cottonwoods and willows produce large numbers of extremely small seeds that are dispersed by wind over large areas, and because they float on water, these seed will often accumulate in bands along shorelines. Seed release is concentrated in spring, but the timing of seed release varies between species and among years. If dispersed to exposed soil that is kept moist by a slowly receding water surface (less than approximately 1.5 inches of decline in stage per day [Mahoney and Rood 1998]), these seed germinate and develop into rapidly growing seedlings. Cottonwood and willow seed do not germinate under water or on soil whose surface is moist for less than approximately one week. Seedlings are killed by desiccation, mechanical damage from soil disturbance, and prolonged inundation (of the entire seedling) during the growing season.

Besides eliminating seasonal or farmed wetlands, the development of additional riparian forest could conflict with land uses by altering water flows and sediment deposition, impeding access,

[4] Naturalized species are species that established in California after European contact as a direct or indirect result of human activities.

or reducing visibility. Water management affects the frequency and extent of areas suitable for seedling establishment, and agriculture and other vegetation management can kill seedlings by mechanical damage or application of herbicides.

### 2.3.6 Farmed and Seasonal Wetlands

At College Lake, wetlands and seasonal wetlands are seasonally inundated, typically for periods of approximately six months in most years, and are then pumped dry by RD 2049. Following the dewatering of the lake basin, seasonal wetland vegetation begins to develop. On farmed wetlands, this developing vegetation is removed by tillage and cultivation, whereas on fallow and idled farmland, and at the margins of fields, seasonal wetland vegetation continues to develop. Seasonal wetland vegetation, while initially sparse, soon covers the soil surface. As described in Section 2.2, "Land Cover," seasonal wetlands at College Lake are characterized by a wide variety of, mostly naturalized, herbaceous species, some of which produce seed that are important food resources for waterfowl. These waterfowl food plants include fat-hen (*Atriplex prostrata*), barnyard grass (*Echinochloa crus-galli*), modest prickle grass (*Cripsus vaginiflora*), and smartweeds (in particular *Persicaria lapthifolia*) (Smith et al. 1994, Lane and Jensen 1999)[5].

Water management, agricultural practices, and other vegetation management affect the area, plant cover, height, and species composition of farmed and seasonal wetlands, farmed and seasonal wetlands by determining the period of inundation and the timing and type of disturbances.

### 2.3.7 South-Central California Coast Steelhead

South-Central California Coast (S-CCC) steelhead (Oncorhynchus mykiss) occur in College Lake. Adult steelhead migrate up coastal streams in winter to spawn. Juvenile steelhead grow (rear) in these coastal streams before migrating out to the ocean in April and May. Upstream of College Lake, Casserly Creek and two of its tributaries, Banks Creek and Gaffney Creek, are known to support steelhead. Based on a 2011 study, it is likely that at least some juvenile steelhead from the upper watershed spend time rearing in College Lake during winter and early spring prior to migrating out to the ocean (Podlech 2011).

In general, water management affects the passage of steelhead by causing water depth to drop below or exceed minimum depths, the availability of habitat on the inundated lake bed by altering the area and duration of inundation, and the survival of fish by causing stranding or entrainment.

### 2.3.8 Special-Status Wildlife Species

There are a number of special-status wildlife species that are either known to occur, or have potential to occur within the Project area. California red-legged frog (*Rana draytonii*) and

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[5] Unpublished data collected at College Lake by Jerry Bush and John Pritchard in 2014–2016 document that these species of waterfowl food plants are abundant, with a combined cover of 43–87 percent along five permanently marked transects in the Berry and Church fields. (Annual mean combined cover along the five transects was 59–78 percent cover.

western pond turtle (*Actinemys marmorata*) have not been observed at College Lake, but have potential to occur in suitable aquatic and riparian habitat.

A variety of special-status birds have potential to forage and/or nest at College Lake including tricolored blackbird (*Agelaius tricolor*), short-eared owl (*Asio flammeus*), western burrowing owl (*Athene cunicularia*), Golden eagle (*Aquila chrysaetos*), white-tailed kite (*Elanus leucurus*), American peregrine falcon (*Falco peregrinus*), bald eagle (*Haliaeetus leucocephalus*), yellow warbler (*Setophaga petechia*), and Bryant's savannah sparrow (*Passerculus sandwichensis alaudinus*).

Also, in the Project area's riparian habitats, two special-status western red bat (*Lasiurus blossevillii*) and San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*) could occur.

Human land uses could affect these special-status species by harming individuals, disrupting their activities, or altering, creating, or eliminating their habitat. As noted in Section 1.2.2.1, "Avoidance and Minimization Measures," PV Water will be implementing comprehensive sets of measures to avoid and minimize these effects, in particular for California red-legged frog, western pond turtle, and nesting birds:

- Potential effects to California red-legged frogs will be reduced by conducting maintenance activities during the frog's active season (April 1–November 1) to the extent practicable, surveying potential frog habitat prior to maintenance activities, minimizing disturbed areas, clearly marking project boundaries, training personnel in the measures to avoid and minimize effects to California red-legged frogs, having a biologist on-site to monitor activities, and implementing other measures listed in **Table 1-2**.
- Potential effects to western pond turtles will be reduced by surveying potential turtle habitat prior to maintenance activities, minimizing disturbed areas, clearly marking project boundaries, training personnel in the measures to avoid and minimize effects to western pond turtles, and monitoring of activities by a biologist.
- Potential effects to nesting birds will be reduced by surveying for nesting birds prior to maintenance activities that disturb ground or remove vegetation during the breeding season (February 1–August 31) and if active nests are observed establishing no-work buffers around the nest or rescheduling the activity until the nest is no longer active.

These and the other measures that will be implemented to avoid and minimize effects to special-status species are described in full in **Appendix A, "Measures to Avoid and Minimize Impacts of Operations and Maintenance Activities."**

### 2.3.9 Waterfowl and Other Birds

College Lake, also historically referred to as Laguna Grande, is the largest freshwater lake in Santa Cruz County. It is located within the lower Pajaro Valley in the Interlaken area that includes Pinto Lake, Kelly Lake, Drew Lake, and Lake Tynan. The Interlaken area is north of

Elkhorn Slough and west of the Upper Pajaro River, both of which are recognized by Audubon as "important bird areas" of statewide significance (Cooper 2004). College Lake is recognized as a regionally important waterfowl over-wintering area that supports large numbers of migratory duck species and a diverse assemblage of wading birds, shorebirds, raptors, and songbirds. College Lake differs from the other neighboring Interlaken lacustrine habitats and the coastal slough wetland habitats due to annual draining and conversion of much of the lakebed to agriculture use.

To date, 235 bird species have been documented at College Lake (eBird 2021), which is the fifth highest number of species for a documented habitat area in Santa Cruz County.[6] By comparison, neighboring perennial Pinto Lake has 209 species recorded and Harkins Slough and Struve Slough, which were reclaimed and farmed in the past like College Lake, have 211 species recorded. Nearby Elkhorn Slough in north Monterey County is an estuary with a mix of fresh and saltwater wetlands that has 251 species recorded.

Water management, agriculture, and other vegetation management could affect waterfowl and other birds by several different mechanisms including: the rate of drawdowns and duration of inundation affecting the area, duration, and food resources of aquatic habitat, or disrupting their activities, destroying their nests or harming birds.

## 2.4 Cultural Resources

### 2.4.1 Archaeological Resources

Records searches, a cultural resources survey, and geoarcheaological assessment conducted for the Project identified two known archaeological sites within the water storage area of College Lake and at least a moderate probability of undocumented, significant archaeological resources being present.

Records searches conducted through the California Historical Resources Information System (CHRIS) Northwest Information Center (NWIC) revealed that 138 cultural resources studies have been conducted within a one-half-mile radius of the Project, 22 of which overlap the Project area[7]. As a result of these surveys, the majority of the land within one-half mile of the Project site has been included in previous cultural resources surveys.

These previous cultural resource studies recorded seven archaeological resources recorded within a one-half-mile radius of the Project site. In addition, two resources within the one-half-mile radius but not on file at NWIC include one prehistoric archaeological site and one

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[6] **Appendix F, "Bird List,"** provides a list of all bird species observed during Project monitoring.

[7] Records searches for the Project 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).

historical-period archaeological site. Of the nine resources, two overlap the water storage area at College Lake resulting from the Project.

No archaeological resources were identified as a result of the cultural resources survey, which is described in the following section.

The geoarchaeological assessment indicated that the majority of the Project area has a high sensitivity for prehistoric archaeological resources and that these resources could be shallowly or deeply buried[8]. Areas that have the highest probability of containing significant resources are within 200 meters (656 feet) of the high-water mark of the College Lake water storage area. The lower elevation floodplain area has a moderate probability of containing significant resources include the low-lying floodplain area.

### 2.4.2 Historical Resources

A 2018 cultural resources survey of the Project area did not identify any historical resources eligible for listing in the National Register or California Register. Approximately 40 percent of the Project area was surveyed systematically or opportunistically on foot, or through a "windshield" survey. Other areas were not surveyed because of access limitations, no visible native ground surface, or inundation. 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.

A total of five newly identified historic architectural resources meeting the California Office of Historic Preservation's 45-year-old age threshold were documented during the 2018 survey: ESA-Built-001 (pump intake house and weir), ESA-Built-002 (76 Holohan Road – residence), ESA-Built-003 (38 Holohan Road – agricultural buildings), ESA-Built-004 (canal segment), and ESA-Built-005 (railroad spur). These resources were evaluated for listing in the National Register and California Register and found ineligible.

### 2.4.3 Plants and Animals of Cultural Significance

In the context of this AMP, cultural resources include plants and animals that have cultural significance for the Amah Mutsun Tribe. Steelhead, and most of the waterfowl, other birds, and special-status species of College Lake described in Section 2.3, "Biological Resources," have cultural significance for the Amah Mutsun. Many of the plant species growing at College Lake also have cultural significance for the Amah Mutsun for utilitarian and non-utilitarian reasons. These plants are identified in **Appendix G, "Plant Species List."**

[8] The geoarchaeological study was based on a review of previously recorded archaeological sites obtained through records searches at the CHRIS-NWIC, a literature review, and a review of geologic maps, soils maps, and historical aerial photos and maps covering the project area.

## 2.5 Existing Management of College Lake

### 2.5.1 Water Management

The majority of the water in College Lake enters from the north side of the lake through Casserly Creek, and is supplemented by inflows from the Green Valley and Hughes Creek subwatersheds (Resource Conservation District Santa Cruz County 2014). During wet weather, flow direction in the reach of Salsipuedes Creek between College Lake and Corralitos Creek can reverse due to high flows in Corralitos Creek, and surface water enters the lake as backflow from Salsipuedes Creek. During other periods, outflow from College Lake drains into Salsipuedes Creek, which is a tributary to the Pajaro River. RD 2049 pumps College Lake dry in the spring to accommodate summer farming of the lakebed. Pumping usually begins in mid-March, depending on the amount of spring rain.[9] Pumping the lake dry generally takes 30 to 40 days, typically resulting in a dry lakebed by May 1st to May 10th.[10] Intermittent pumping into Salsipuedes Creek continues after this date as needed to maintain a dry lakebed.

An existing weir with crest at elevation 60.1 feet NAVD88 associated with the pumps spans the Salsipuedes Creek channel and, under certain conditions, controls the water level in College Lake.[11] When the lake water surface elevation (WSE) is at the existing weir crest elevation, approximately 228 acres of the lake basin is inundated, storing about 1,150 acre-feet of water (Resource Conservation District of Santa Cruz County 2014). Subsurface tile drains are present within the College Lake basin; during the summer farming period, flow from these drains is collected and pumped into a channel at the center of the College Lake basin. Water in the channel flows to the weir and pumps.

### 2.5.2 Farming

Once the lake has been pumped and agricultural land within the lakebed is dry enough to accommodate heavy machinery (typically around May 30th), tractors turn the soil; it then takes about one month to prepare the land for planting. Most of the crops in College Lake require at least 60 to 90 days to reach maturity; depending on the water year, two crops can be grown. Growers aim to complete harvesting and other agricultural operations in the lake basin before the fall–winter rains, generally by the end of October, although farming can and has occurred later in the year. Vegetable row crops (including varieties of kale, lettuces, and onions) comprised the largest area under cultivation from 2014 to 2018. Tree and vine crops (e.g.,

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9 RD 2049 was formed in 1920 and was granted express legal authority under State law (California Water Code Section 50000 et. seq.) to pump water from College Lake to reclaim the land for agricultural production.

10 Peixoto, Dick, Lakeside Organic Gardens, LLC, Letter to Mary Bannister, May 12, 2014.

11 The primary purpose of the existing weir is to prevent pumped water from flowing from Salsipuedes Creek into College Lake.

apples, raspberries and blackberries), comprising about 3 acres in total, are grown at higher elevations and extend to just below 64 feet NAVD88.

Farmed lands are periodically disked, planted, harvested, treated with herbicides, pesticides, and fertilizers, and periodically left fallow at the discretion of the farmer.

### 2.5.3 Mosquito Abatement

The College Lake area has a long history of seasonal floodwater mosquito production.[12] The Santa Cruz County Mosquito Abatement and Vector Control (MAVC) implements mosquito control measures in the creek adjacent to the fairgrounds to limit hatching of floodwater mosquitos and the eastern section of Casserly Creek also has issues with mosquitoes.

In Santa Cruz County, mosquito species are breeding, developing, and maturing (emerging as adults) during most of the year. For example, aquatic larvae of the floodwater mosquito (*Aedes washinoi*) develop in temporarily inundated areas in late winter and the adults emerge in spring; whereas the encephalitis mosquito (*Culex tarsalis*), whose habitats also include temporarily inundated areas, breeds throughout summer and fall (Binding, ND).

MAVC employs integrated mosquito management methods that emphasizes the prevention of mosquito production by reducing breeding sources and when necessary the control of aquatic stages to interrupt the mosquito life cycle. MAVC routinely monitors known mosquito breeding locations. Control measures are implemented when a site-specific threshold is exceeded. These thresholds are based on monitoring data (mosquito species, larval stage, and density) and site attributes (distance to residents, presence of mosquito predators and sensitive species), and other factors. Control measures include the application of larvicides, preferentially the selective and non-persistent mosquito growth regulator methoprene (synthesized juvenile hormone) or microbes (*Bacillus thuringiensis israelensis* and *B. sphaericus*).

12 Binding, Paul. Santa Cruz County Mosquito and Vector Control CSA 53. Comments on the Notice of Preparation for Proposed College Lake Integrated Resources Management Project. January 4, 2017

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CHAPTER 3

# College Lake Integrated Resources Management Project

This chapter describes the multiple components of the Project, as well a proposed operations and maintenance activities.

Throughout the Pajaro Valley Groundwater Basin, overdraft conditions[13] 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 approximately three 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.

The purpose of the Project is to help balance the groundwater basin, by decreasing demands on groundwater, preventing further seawater intrusion, and meet water supply needs within PV Water's Coastal Distribution System (CDS) service area by developing College Lake as a water storage and supply source for agricultural irrigation, while accommodating the release of fish bypass flows and facilitating fish passage between Salsipuedes Creek and College Lake.

## 3.1 Project Design

The essential function of the Project is to store water in and divert water from College Lake for treatment, transmission, and distribution for agricultural irrigation. The Project includes the following components:

**Weir Structure and Intake Pump Station.** The Project includes a weir structure with an adjustable crest, and a diversion and intake pump station to divert surface water from College Lake. The diversion weir will have an adjustable weir crest that will be operational through a range of 60.1 to 62.5 feet NAVD 88. The proposed weir crest elevation could be adjusted with one or more pneumatically actuated gates (e.g., Obermeyer Spillway Gates). The intake pump station will pump raw (untreated) water from an intake just upstream of the weir to the proposed College Lake water treatment plant (WTP) via a 30-inch diameter intake pipeline.

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[13] Overdraft occurs when the amount of groundwater withdrawn from a basin exceeds the volume of freshwater replenishing the basin.

A fish passage structure will be located on the west side of the weir and will route fish around the diversion weir during periods when passage over the weir is not possible.

The proposed adjustable weir will be capable of raising the College Lake water level by up to 2.4 feet above the elevation of the existing weir to a water surface elevation of 62.5 feet NAVD88. The storage capacity of College Lake is approximately 1,150 acre feet (AF) at a water surface elevation of 60.1 feet NAVD88 and approximately 1,800 AF at a water surface elevation of 62.5 feet NAVD88.

**Water Treatment Plant.** The WTP will remove sediment, filter, and disinfect the water diverted from College Lake. The WTP will contain sedimentation basins and solids drying beds, filtration and disinfection systems, and a treated water pump station.

**College Lake Pipeline.** The Project will include an approximately 6-mile-long, 24-inch-diameter pipeline from the proposed WTP to the CDS.

## 3.2 Project Operations

This section describes the Project's operations: fish passage flows, weir operations, and water supply diversions.

### 3.2.1 Fish Passage Flows

The proposed weir structure will be designed to accommodate release of fish bypass flows and to facilitate fish passage between Salsipuedes Creek and College Lake. **Table 3-1** lists proposed minimum lake levels and minimum flows for fish passage for adult steelhead migration (December 15th through April 30th) and smolt outmigration (May 1st through May 31st).

Fish bypass releases will begin only when the water surface elevation in College Lake increases to the minimum level at which passable conditions for fish will have occurred without the existing weir in place and with flows being regulated only by the existing channel topography in Salsipuedes Creek. Based on a critical riffle analysis, these water surface elevations are 59.5 feet NAVD88 for the adult season, which corresponds to a depth of 0.6 feet at the critical riffle, and 59.3 feet NAVD88 for the smolt season, which corresponds to a depth of 0.4 feet at the critical riffle. Releases for fish passage will not exceed total inflows into College Lake during any time interval.

**TABLE 3-1**
**PROPOSED FISH PASSAGE FLOWS**

| Proposed Fish Passage, Bypass of Casserly Creek Flows[a] | Adult Steelhead Migration | | Smolt Outmigration |
|---|---|---|---|
| | **Dec. 15 – Mar. 31** | **Apr. 1 – Apr. 30** | **May 1 – May 31[c]** |
| Bypass flow between Corralitos-Salsipuedes Confluence and Pajaro River | 21 cfs | 8 cfs when natural flows are < 18 cfs; or<br>21 cfs when natural flows are ≥ 18 cfs | 8 cfs |
| Bypass flow at weir[b] and in Salsipuedes Creek between weir and Corralitos Creek | 1.8 cfs | 1.8 cfs | 1.0 cfs |
| Minimum lake level | 59.5 feet NAVD88 | 59.5 feet NAVD88 | 59.3 feet NAVD88 |

Source: State Water Resources Control Board (2021) Right to Divert and Use Water, Draft Permit Application AO32881

NOTES:
cfs = cubic feet per second

NAVD88 = North American Vertical Datum of 1988

a Instream flow requirements based on critical riffle surveys conducted in 2017 and 2018. Each minimum flow requirement will be the number specified in this table or the flow resulting from bypassing the total inflow into College Lake, whichever is less. Minimum flow between the Corralitos Creek-Salsipuedes Creek confluence and Pajaro River is for the combined flow from Corralitos Creek and College Lake. Refinements to fish passage assumptions and modeling may occur during permitting based on agency consultations.

b The minimum flows may be refined during design phase of the proposed weir and fish passage structure.

c The smolt outmigration season begins in March, but instream flow requirements for adult steelhead prior to May 1 meet or exceed the smolt requirement and are therefore protective of smolt instream flow needs.

In addition, PV Water anticipates that other future conditions may warrant pumping flows from College Lake into Salsipuedes Creek during the summer and fall. The Project design includes a 30-inch bypass pipeline from the pump station to the downstream side of the proposed weir structure for this purpose. This bypass pipeline could be used to drain College Lake for equipment maintenance or equipment repair, to ensure the lake bottom is able to dry out for purposes of predator control, or to prevent water quality issues such as low dissolved oxygen, algal blooms, or other unforeseen issues from developing within the lake. Although PV Water is not presently able to anticipate the frequency of such operations, the bypass pipeline will be operated in compliance with all applicable regulatory permit conditions.

### 3.2.2 Proposed Weir Operations

PV Water will manage the proposed adjustable weir[14] to avoid exacerbating flood risk while retaining water from late season precipitation events for subsequent treatment and distribution to irrigators in the Pajaro Valley. The proposed weir will be raised to 62.5 feet NAVD88 following the last anticipated significant storm event of the season. Factors that affect the timing of the weir adjustment include water surface elevation and corresponding duration of drawdown, short- and long-term meteorological forecasts, and downstream channel conditions. In the event a significant storm is predicted to occur after the weir has been raised

[14] The weir crest could be adjusted from 60.1 feet NAVD88 (the height of the existing weir) to 62.5 feet NAVD88.

to 62.5 feet NAVD88, PV Water would initiate a pre-storm lowering of the weir from an elevation of 62.5 to 60.1 feet. cbec eco engineering conducted analyses to estimate the rate at which College Lake would drain over the proposed weir to meet pre-event drawdown criteria to prevent exacerbating existing downstream flood risks.[15] Based on the results of these analyses, lowering of the weir from 62.5 feet to 60.1 feet under existing downstream channel conditions would result in an initial draining rate at the weir of approximately 75 cfs, and this rate would decline quickly (i.e., within one hour) as Salsipuedes Creek below the weir reaches capacity.[16] Additional information on estimated drawdown times is provided in College Lake Integrated Resources Management Project Hydrologic and Hydraulic Modeling Technical Memorandum (cbec, inc. 2018, provided as Appendix HYD-1 of PV Water 2019)

### 3.2.3 Water Supply Diversions

Anticipated typical annual water diversion rates for the Project will range between 1,800 and 2,300 AF per year (AFY) and the maximum will be 3,000 AFY. PV Water has estimated monthly demands based on existing conditions for irrigation water for four modeled water year types (i.e., ranging from very wet to extremely dry). Operational criteria used in the water budget model to determine the extent to which projected monthly demand could be met included the following restrictions:

- Water supply diversions could not begin until College Lake achieves the water levels for adult steelhead migration and smolt outmigration shown in **Table 3-1**; and
- For the period December 15 to May 31, only College Lake inflows exceeding the proposed minimum fish bypass flows in **Table 3-1** could be diverted to the treatment plant for irrigation supply.

Depending on water year type, and time of year, monthly demand has been estimated at from a minimum 14 AF to maximum of 470 AF (cbec, inc. 2018).

## 3.3 Project Maintenance

This section describes maintenance of the Project's facilities and of the water storage area. **Table 3-2** summarizes these maintenance activities. Measures to avoid and minimize environmental impacts will be implemented in conjunction with these activities. The adopted and anticipated measures are provided in **Appendix A, "Measures to Avoid and Minimize Impacts of Operations and Maintenance Activities**."

[15] cbec, inc. eco engineering, College Lake Integrated Resources Management Project Hydrologic and Hydraulic Modeling Technical Memorandum, prepared for Environmental Science Associates by cbec, inc., November 8, 2018.

[16] cbec, inc. eco engineering, unpublished data provided to M. Podlech on February 12, 2020.

| **TABLE 3-2**<br>**SUMMARY DESCRIPTION OF ANTICIPATED MAINTENANCE ACTIVITIES** | | | | |
|---|---|---|---|---|
| **Activity** | **Frequency** | **Anticipated Annual Quantity** | **Seasonal Timing** | **Description** |
| Weir, pipeline, pump station Inspections | Weekly | — | Year-round | — |
| Weir, pipeline, pump station repair | As needed | 1 | Year-round | Typically, an unscheduled activity conducted when facilities are damaged. Standard equipment will include light duty trucks, small winches, crane, front end loader, haul truck, chainsaw, and hand tools. |
| Weir repair or maintenance requiring dewatering | As needed | 0.2<br>(1 in 5 years) | Summer – fall | Channel adjoining weir dewatered for weir maintenance and repair. |
| Weir maintenance | Annually | 3 | Late summer – early fall | Typical weir maintenance activities will include debris/sediment removal, cleaning, minor erosion control measures (including replacement of fill in eroded areas), and replacement of the weir gate. Standard equipment will be the same as for weir repair. |
| Sediment and debris removal | Annually | Up to 11,700 cubic yards of sediment | Late summer – early fall | Sediment deposited in channels will be removed every 1–2 years (from 0–100 % of channel length/year), typically by using excavators and bulldozers to load material onto haul trucks for transport to landfill or other upland location.<br>Sediment deposits outside of channels will also be removed in some years. |
| Channel reshaping | Periodic | 1 site | Late summer – early fall | Channel banks “laid back” (bank angle decreased) or other modifications are made to reduce erosion or encourage deposition in away from weir and pumps. |
| Vegetation management—channels | Annually | 1.4 acres[1] | Late summer – early fall | Aquatic vegetation in channels is removed in association with sediment and debris removal. Removal is mechanical using a drag-line and excavator bucket. Removed aquatic vegetation is loaded into haul trucks and deposited in a landfill or upland location. |
| Vegetation management—lakebed | Annually | 75 acres[2] | Late summer – early fall | Uncultivated areas of the lakebed that are not already in woody riparian vegetation may be disked, tilled, ripped or mowed every 1–2 years if necessary to prevent new establishment of woody plants that could trap sediment, or restrict flow or drainage. |

Source: Table content adapted from Draft College Lake Integrated Resources Management Project Environmental Impact Report (PV Water 2019) and draft permit applications for the Project.

Notes:

[1] Corresponds to acreage of entire existing ditch system

[2] Corresponds to the existing acreage of farmed wetland below an elevation of 59 feet NAVD 88 and potentially uncultivated in most years after Project implementation.

### 3.3.1 Weir Structure, Pump Station, Water Treatment Plant, and College Lake Pipeline

Once the Project is fully operational, PV Water staff will periodically conduct routine inspections (e.g., for visual signs of wear and tear, obstructions or leakage) and perform scheduled maintenance of the weir structure, pump station, WTP, and pipelines. Should damage to facilities occur, PV Water would dispatch a crew to conduct the necessary repairs. Typical weir maintenance activities will include debris removal, cleaning, minor erosion control measures (including replacement of fill in eroded areas), and replacement of the weir gate. Standard equipment includes light duty trucks, small winches, crane, front end loader, haul truck, chainsaw, and hand tools. An excavator, backhoe, or crane could be required to lift metal parts from the gate or adjustable weir for maintenance or if sediment removal is required.

To the greatest extent feasible, inspections, maintenance, and repairs to the weir and intake structure will be conducted during periods of low water surface elevations in the lake (i.e., late summer and early fall). However, dewatering of the channel surrounding these structures may be necessary at times. The anticipated frequency of dewatering activities is not expected to exceed once every five years and would occur at a time of year when water surface elevations are low.

Dewatering of surface water could occur by isolating the work area through the use of sheet-pile coffer dams and bypassing flows around the construction site. A passive gravity bypass system could be used if feasible. If not feasible due to site conditions, water may be actively pumped around the work area using pumps. Bypass pumps will be screened in accordance with current NMFS and CDFW guidelines.

If subsurface water is encountered, the water would be discharged to agricultural lands, storm drains, or other waterways, and would be discharged 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.

### 3.3.2 College Lake Water Storage Area

PV Water will conduct routine (annual or semi-annual) vegetation management and sediment and debris removal activities within College Lake to:

- Preserve water storage capacity

- Avoid exacerbating existing flood hazards[17]
- Manage habitat in a manner consistent with requirements established in permits and approvals and in accordance with the AMP.

These maintenance activities may occur in the lake's existing ditches and channels, on portions of the lake bed, and upstream of the weir structure. The amount of these activities needed in any given year will depend on weather and hydrologic conditions, and frequency and extent of past maintenance activities. Additional details regarding methods and timing of maintenance activities will be determined once the Project has been implemented.

#### 3.3.2.1 Vegetation Management

**Figure 3** depicts areas proposed for vegetation management; these are areas that are farmed under baseline conditions and that are expected to support seasonal wetland vegetation with implementation of the Project. Vegetation management will not reduce the current extent of riparian forest but aims to limit new establishment of woody riparian plants that could trap sediment and restrict flow or drainage. PV Water is not proposing any specific vegetation management activities within the existing riparian forest habitat on land currently owned by PV Water.

Vegetation management methods will include disking, tilling, and ripping. Vegetation may also be trimmed or mowed if necessary. These activities may occur in most or all years in portions of the lakebed. Removal of flow-constricting vegetation within channels and around Project components and equipment may also occur annually. Aquatic vegetation in channels may also be removed mechanically using a drag-line and excavator bucket, and in association with sediment and debris removal described below. Debris from vegetation management will be loaded into haul trucks and deposited in a landfill or upland location.

The Project's MMRP includes measures to avoid and minimize impacts to existing habitat features in College Lake and additional measures are being determined in consultation with regulatory agencies with approval authority over the Project. See **Appendix A, "Measures to Avoid and Minimize Operations and Maintenance Activities,"** for adopted and proposed measures for avoiding and minimizing impacts of maintenance activities.

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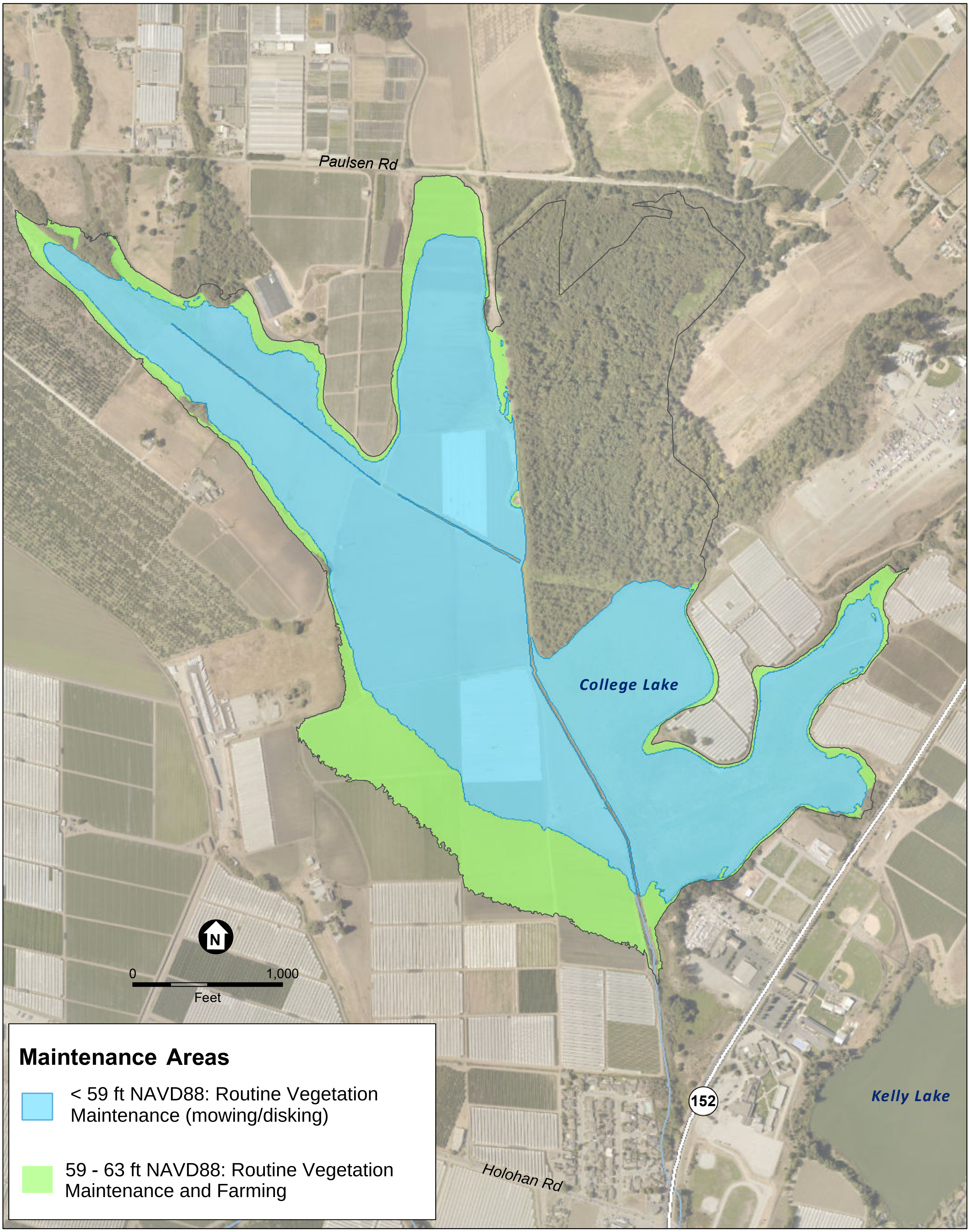
17 The Santa Cruz County Flood Control and Water Conservation District Zone 7 (Zone 7) is responsible for the provision of drainage improvements in the project area. Zone 7 was formed for the primary purpose of improving the flood carrying capacity of the Pajaro River, Salsipuedes, Creek and Corralitos Creek systems within the Pajaro Valley floodplain. This is achieved through funding the maintenance of and minor capital improvements to existing drainage facilities within the zone's boundaries. Santa Cruz County Flood Control and Water Conservation District Zone 7 does not currently have an existing stream maintenance plan or other adopted sediment management plan for the College Lake area. (County of Santa Cruz Department of Public Works, Flood Control and Water Conservation District: Zone No. 7, 2019. Available online at http://www.dpw.co.santa-cruz.ca.us/Home/FloodControlStormwater/FCWCZone7.aspx. Accessed on April 10, 2019.)

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SOURCE: USDA, 2016; ESA, 2018

Note: NAVD88 = North American Vertical Datum of 1988

College Lake Integrated Resoures Management Project

**Figure 3**
Proposed Maintenance Areas within College Lake

ESA

#### 3.3.2.2 Sediment and Debris Removal

PV Water will remove excess sediment and debris from certain areas of College Lake and upstream of the weir structure. The need for sediment removal will be evaluated annually during routine facility monitoring.

Sediment removal is the act of mechanically removing sediment that has deposited within a channel or on the lakebed, typically using excavators and bulldozers, loading material onto haul trucks. Sediment and debris removal will be conducted during the dry season, and could be implemented if sediment accumulations (for example) impede fish passage, significantly compromise channel capacity, or impair operation of the proposed weir and intake structure. Channels within the lakebed may also be reshaped to minimize bank erosion (e.g., laying back banks) or help minimize stranding of fish as water levels recede.

Removed sediment and debris will be hauled to the Buena Vista Landfill or other upland location for disposal.

## 3.4 Anticipated Inundation and Land Cover Changes and Related Uncertainties

Project operations will alter the duration and timing of inundation at College Lake, requiring changes in existing land use activities. Associated changes in land cover are also anticipated. Table 3-3 summarizes these anticipated changes. The primary effect is anticipated to be on the extent of farmed wetlands below elevation 59 feet NAVD88. These farmed wetlands are frequently submerged or in seasonal wetland vegetation for part of the year and also in agricultural production for part of the year. With operation of the Project, these farmed wetlands will be inundated for longer periods of time than under RD 2049's management of College Lake, which will preclude or substantially reduce the frequency of their cultivation.

There are several uncertainties regarding the effects of these changes in inundation and cultivation:

- **Cyanobacteria response**— with implementation of the Project, the area and depth of inundation will be greater in summer, and therefore, the potential for a thermocline to form and a cyanobacteria bloom to develop will be increased.

- **Aquatic food web response**—changes in the depth and residency time of water, and duration of inundation, will affect populations of phytoplankton, zooplankton, and macroinvertebrates (Opperman 2012). Changes in vegetation type or management may also affect the aquatic food web and its production of food for vertebrates. Studies of inundated floodplains have not identified substantial differences among agricultural practices (e.g., discing fields or allowing vegetation to develop on fallowed cropland) in food resources provided for salmon (Katz et al. 2017, Sommer et al. 2020), and studies in wetlands managed for waterfowl have not identified preferred management practices for macroinvertebrate production (Anderson and Smith 2000, Davis and Bidwell 2008, Tapp and

Webb 2015). However, different vegetation types at College Lake could have macroinvertebrate communities with different values for birds.

- **Steelhead response**—fish bypass flows under the Project will allow for steelhead migration and smolt outmigration either over the weir when water levels are high enough, or via the fish passage structure when water levels are below the weir crest, and extensive entrainment and stranding will no longer occur. The Project also will increase the area and duration of habitat on the inundated lakebed, and although steelhead use College Lake during summer months is not expected, there is some uncertainty regarding the seasonal duration of steelhead use of the lakebed.

- **Invasive animal response**—current RD 2049 operations reduce wetted habitat in summer–fall to drainage ditches, which likely limits the size of invasive animal populations. With implementation of the Project, water will be retained in College Lake for a longer period of time in the spring, summer, and fall compared to existing conditions. This extended inundation season could potentially allow populations of non-native species to increase.

- **Vegetation response**— changes in the duration and seasonal timing of inundation are anticipated to affect the extent of vegetation types as summarized in **Table 3-3**, but also could cause other changes to vegetation. Although the area of seasonal wetland is anticipated to increase because of a reduction in farmed wetlands, the extended period of inundation could result in sparser vegetation or reduced abundance of waterfowl food plants in some areas. The more gradual removal of water from the lake could facilitate more frequent or extensive establishment of woody riparian plants in farmed and seasonal wetlands. or the establishment and spread of invasive plant species.

Some of these uncertainties either will be addressed by monitoring, as described in Section 5.1.1, “Monitoring of Metrics for Objectives,” by other actions of related plans incorporated into this Plan (e.g., the invasive species management plan [**Appendix D**]) and the others could potentially be addressed by targeted studies, as described in Section 5.2, “Targeted Studies.”

**TABLE 3-3**
**ANTICIPATED CHANGES TO INUNDATION PERIODS AND LAND COVER AT COLLEGE LAKE**

| Maintenance Area | Water Surface Elevation (feet NAVD88) | Existing Inundation Period[a] | With Project Inundation Period (62.5 foot weir)[b] | Land Cover (Wetland/Water/Upland) | With Project Land Cover, Anticipated Change |
|---|---|---|---|---|---|
| Routine Vegetation Maintenance (mowing/disking) (< 59 feet NAVD88) | 50 up to 57 | 4-7 months | 7-11 months | Ditch (Other Water) | No land cover type change. Ditches will continue to be managed for water conveyance and fish passage. |
| | | | | Farmed Wetland (Wetland)<br>Consists of:<br>1. Open water (November 1 to March 31)<br>2. Seasonal wetland vegetation (April 1 to May 31)<br>3. Agriculture[c] (June 1 to October 31) | Farmed wetland will convert to managed seasonal wetland which will consist of:<br>1. Open water (November 1 to July or August)<br>2. Mudflat with sparse seasonal wetland vegetation (July or August to October 31)<br>No farming will occur at this elevation with the Project. Vegetation management (mowing, disking) will occur annually to maintain open water and mudflat and prevent woody plant encroachment. |
| | | | | Riparian Forest (Wetland) | No land cover type change. Riparian Forest present below 57 feet NAVD88 is expected to persist with its current riparian species composition and abundance in the short term but may shift in species composition and abundance in the future with a dominance of inundation-tolerant species such as Pacific willow (*Salix lasiandra*), and possibly a sparser overstory canopy with freshwater emergent plants in the understory. A small 0.7-acre area of freshwater emergent wetland occurs within the larger riparian forest and will not be actively maintained. |
| | | | | Seasonal Wetland (Wetland) | No land cover type change, though seasonal wetlands that are not currently managed annually through mowing and tilling will be subject to these management practices in the future to prevent woody plant encroachment. The increase in management frequency, combined with the longer inundation period in this elevation range will likely result in sparser vegetation, dominated by annual species. |
| | 57 up to 59 | 4 months | 6-7 months | Ditch (Other Water) | No land cover type change. Ditches will be continued to be managed for water conveyance and fish passage. |
| | | | | Farmed Wetland (Wetland)<br>Consists of:<br>1. Open water (December 1 to March 31)<br>2. Seasonal wetland vegetation (April 1 to May 31)<br>3. Agriculture[c] (June 1 to November 30) | Farmed wetland will convert to managed seasonal wetland, similar to 50 to 57 feet NAVD88. No farming will occur at this elevation with the Project. Vegetation management (mowing, disking) will occur annually to maintain open water, mudflat, and seasonal wetland and prevent woody plant encroachment. |
| | | | | Riparian Forest (Wetland) | No land cover type change, though species composition may change as this forest matures and older trees senesce. A small 0.2 acre area of freshwater emergent wetland occurs within the larger riparian forest and will not be actively maintained. |
| | | | | Seasonal Wetland (Wetland) | No land cover type change. This area will be managed as seasonal open water and wetland through mowing and disking, to prevent woody plant encroachment, similar to existing conditions. |
| Routine Vegetation Maintenance and Farming (59-63 feet NAVD88) | 59 up to 62 | 1-4 months | 2-6 months | Ditch (Other Water) | No land cover type change. Ditches will continue to be managed for water conveyance and fish passage. |
| | | | | Farmed Wetland (Wetland)<br>Consists of:<br>1. Open water (January 1 to March 31)<br>2. Seasonal wetland vegetation (April 1 to May 31)<br>3. Agriculture[c] (June 1 to December 30) | No land cover type change. Although this elevation range will be inundated for longer durations (especially at the lower end of the range) these areas will continue to be used for seasonal crops in years and locations where at least one crop rotation is feasible. Areas that are not farmed will be managed as seasonal open water and wetland through mowing and disking, to prevent woody plant encroachment, similar to existing conditions. |
| | | | | Riparian Forest (Wetland) | No land cover type change. |
| | | | | Seasonal Wetland (Wetland) | No land cover type change. |
| | 62 up to 63 | 1-6 weeks, not continuous | 2-8 weeks, not continuous | Ditch (Other Water) | No land cover type change. Ditches will continue to be managed for water conveyance and fish passage. |
| | | | | Farmed Wetland (Wetland) | No land cover type change. Although this elevation range will be inundated for longer durations these areas will continue to be used for seasonal crops in years and locations where at least one crop rotation is feasible. Areas that are not farmed will be managed as seasonal open water and wetland through mowing and disking, to prevent woody plant encroachment, similar to existing conditions. |

**TABLE 3-3**
**ANTICIPATED CHANGES TO INUNDATION PERIODS AND LAND COVER AT COLLEGE LAKE**

| Maintenance Area | Water Surface Elevation (feet NAVD88) | Existing Inundation Period[a] | With Project Inundation Period (62.5 foot weir)[b] | Land Cover (Wetland/Water/Upland) | With Project Land Cover, Anticipated Change |
|---|---|---|---|---|---|
| | | | | Riparian Forest (Wetland) | No land cover type change. |
| | | | | Seasonal Wetland (Wetland) | No land cover type change. |
| | | | | Agriculture (Upland) | Farmed wetland. This is not likely to change the land use practices or habitat value[d] |
| | | | | Annual Grassland (Upland) | Seasonal Wetland. |
| None/No Maintenance Action (>63 feet NAVD88) | 63 up to 64 | 1-6 weeks, not continuous | 2-8 weeks, not continuous | Ditch (Other Water) | No land cover type change. Ditches will be continued to be managed for water conveyance and fish passage. |
| | | | | Farmed Wetland (Wetland) | No land cover type change. Although this elevation range will be inundated for longer durations these areas will continue to be used for seasonal crops in years and locations where at least one crop rotation is feasible. Farmers may continue to manage farmed wetlands for agricultural purposes. |
| | | | | Riparian Forest (Wetland) | No land cover type change. |
| | | | | Seasonal Wetland (Wetland) | No land cover type change. |
| | | | | Agriculture (Upland) | Farmed wetland. This is not likely to change the land use practices or habitat value.[d] |
| | | | | Annual Grassland (Upland) | Seasonal Wetland. |
| | | | | Riparian Scrub (Upland) | No land cover type change |
| | 64 up to 70 | Periodic inundation of one week or less | Periodic inundation of one week or less | Ditch (Other Water) | No land cover type change. Ditches will continue to be managed for water conveyance and fish passage. |
| | | | | Farmed Wetland (Wetland) | No land cover type change. These farmed wetlands are currently supported by seeps and not by inundation of the College Lake Basin. So changes in the College Lake basin hydrology will not likely change these farmed wetlands. Farmers may continue to manage farmed wetlands for agricultural purposes. |
| | | | | Riparian Forest (Wetland) | No land cover type change. |
| | | | | Seasonal Wetland (Wetland) | No land cover type change. These seasonal wetlands are currently supported by seeps and not by inundation of the College Lake Basin. So changes in the College Lake basin hydrology will not likely change these farmed wetlands |
| | | | | Agriculture (Upland) | No land cover type change. |
| | | | | Annual Grassland (Upland) | No land cover type change. |
| | | | | Coyote Brush Scrub (Upland) | No land cover type change. |
| | | | | Riparian Scrub (Upland) | No land cover type change. |
| | | | | Developed (Upland) | No land cover type change. |

NOTES:

[a] Based on observed water surface elevation during 2016.

[b] Based on the modeled above-average rainfall year (2016). See Appendix HYD and Figures 3.3-7a through 3.3-7d in Section 3.3, Surface Water, Groundwater, and Water Quality in College Lake EIR.

[c] Agriculture includes a fallow period after harvest during which time fields are bare, tilled soil.

[d] The anticipated change of agricultural land to farmed wetland will not affect the agricultural land use of this area.

SOURCES: cbec, inc. eco engineering, Inundation Statistics and Monthly Flows, December 18, 2018; Draft College Lake Integrated Resources Management Project Environmental Impact Report (PV Water 2019)

CHAPTER 4

# Adaptive Management Framework

Adaptive management is a framework and flexible decision-making process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvements in management planning and implementation of a project to achieve specified objectives[18]. This structured process for making decisions informed by monitoring is well suited to situations with clear objectives, some ability to modify actions, and a moderate level of uncertainty. Such situations are common in natural resource management, and include implementation of the College Lake IRMP.

This chapter describes the framework for adaptively managing implementation of the IRMP, as described in the Consolidated Final Environmental Impact Report for the College Lake Integrated Resources Project (PV Water 2019). The framework consists of:

- Objectives (desired outcomes)
- Metrics (monitored variables)
- Action triggers (thresholds, decision criteria)
- Potential management actions

**Table 4-1** presents this framework, which is described further in the following sections.

[18] The Delta Reform Act provides a relevant definition of adaptive management: “a framework and flexible decision-making process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvements in management planning and implementation of a project to achieve specified objectives” (Water Code section 85052)

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**TABLE 4-1**
**SUMMARY OF PROPOSED MANAGEMENT OBJECTIVES, METRICS, AND TRIGGERS**

| Objective | Metric | Management Action Trigger | Potential Management Actions |
|---|---|---|---|
| **Flooding**—Avoid exacerbating existing flood hazards outside the proposed water storage area. | College Lake water surface elevation at weir | Water surface elevation exceeds 62.5 feet NAVD88 when weir is raised above 60.1 feet NAVD88 | Evaluate procedure for defining last major storm event and potential runoff from that event and potentially adjust. Potential procedure evaluations/modifications include:<br>Relationship of forecasted precipitation to observed precipitation and adjust precipitation factor of safety<br>Calibration of hydrologic model<br>Downstream hydraulic conditions/hydraulic model. |
| **Fish Passage**—Facilitate fish passage between the Pajaro River and College Lake between December 15th and May 31st. | Fishway chamber depths, leap heights, and velocities under identified range of flows | Chamber depths, leap heights, and velocities fail to meet approved design passage criteria | Inspect monitoring equipment to confirm no bias resulting from instrumentation.<br>Review operational guidance and records, to confirm compliant bypass flows have been released.<br>Adjust fishway gate controls to meet design passage criteria.<br>Evaluate potential structural and hydraulic issues affecting passage at the weir, and rectify identified issues.<br>Reassess flow requirements for passage at critical riffle, and associated fish passage flows as necessary.<br>Evaluate fish passage needs at potentially critical riffles in Salsipuedes and Creek to verify continued adequacy of bypass flow requirements<br>Coordinate with NMFS and CDFW regarding potential management actions. |
| | Water depths at critical riffles in lower Salsipuedes Creek, and modeled depths in upper Salsipuedes Creek[a] | Water depth at one or more critical riffles less than minimum required for passage (0.6 feet for adults, 0.4 feet for smolts). | |
| | Number of outmigrating PIT-tagged smolts detected upstream of weir versus number of smolts trapped downstream of weir | Significant difference between upstream and downstream detections | |
| | Relative abundance of Age 0 steelhead (% of juveniles) in Casserly Creek | Relative abundance in Casserly Creek significantly lower than in nearby reference stream | |
| **Water Storage**—Preserve water storage capacity within College Lake. | Sediment/debris in ditches—Flow obstructions (presence and location) and ditch depth | Presence of a flow obstruction or depth decrease of 25% or more. | Evaluate need for sediment removal.<br>Remove sediment deposits that are reducing storage capacity or obstructing flow/impeding drainage.<br>Evaluate and consider modifications to ditch system<br>Consider small sediment detention basins or other systems for managing the location of sediment deposition<br>Identify watershed factors contributing to sediment production, transport, and deposition, and coordinate with upstream landowners and Resource |
| | Sediment/debris on lakebed—elevation | Elevation increase > 3 inches by sediment/debris deposited on > 1,000 square feet (> 9 cubic yards). | |

**TABLE 4-1**
**SUMMARY OF PROPOSED MANAGEMENT OBJECTIVES, METRICS, AND TRIGGERS**

| Objective | Metric | Management Action Trigger | Potential Management Actions |
|---|---|---|---|
| | | | Conservation District of Santa Cruz County to reduce sediment deposition in College Lake. |
| **Water Quality**—Minimize conditions that can contribute to algal blooms, including cyanobacteria blooms. | Temperature profile (°C) | Water column temperature gradient > 5 °C[b] | Review monitoring data and consult technical experts and regulatory stakeholders regarding potential responses.<br>Reassess temperature gradient and constituent concentrations used as triggers for management actions<br>Coordinate with the California Cyanobacteria and Harmful Algal Bloom Network (CCHAB) regarding potential management actions<br>Identify watershed factors contributing to phosphorus availability in concentrations in College Lake, and coordinate with upstream landowners and Resource Conservation District of Santa Cruz County to reduce sediment deposition in College Lake.<br>Treat College Lake with aluminum sulfate<br>Lower water level in or drain College Lake |
| | Total phosphorus (mg/L) | Concentrations > 0.17 mg/L[b] | |
| | Chlorophyll-a (µg/L) | Concentrations > 25 µg/L[b] | |
| | Microcystins, total (µg/L) | Concentrations > 0.8 µg/L[b] | |
| **Farming**—Promote farming within the College Lake basin between 59 feet and 63 feet elevation NAVD88. | Acreage cultivated between 59 feet and 63 feet elevation NAVD88 by year | Agricultural land at 59–63 feet in elevation is cultivated in less than one in five of the preceding average, dry, and very dry water years. | Conduct landowner outreach to identify factors limiting area of cultivation<br>Develop revised terms for use in future leases.<br>Adjust rate or timing of water diversions.<br>Adjust timing, frequency, or methods of sediment and debris removal.<br>Maintain, improve, or expand tile drain system. |
| **Vegetation**— Sustain seasonal wetland and native vegetation | Seasonal wetland vegetation—acreage | Acreage less than 2017–2022 range of acreage | Evaluate potential relationships of change in vegetation to hydrology (e.g., duration of inundation) and operations and maintenance activities, particularly inundation period and vegetation management<br>Modify timing or techniques of vegetation management, including consider of alternatives to mechanical and chemical treatments (e.g., grazing, controlled burns).<br>Modify weir operations or water supply diversions (e.g., to modify drawdown rate).<br>Implement woody riparian plant control measures: disking, or localized hand removal. Monitor treated areas and retreat or revegetate as needed.<br>Reassess practices for limiting introduction and spread of invasive plants, and revise as appropriate.<br>Implement invasive plant control measures: hand removal of new/smaller infestations, other mechanical treatments if effective for species, or chemical treatment of larger areas. Monitor treated areas and retreat or revegetate as needed. |
| | Combined cover of waterfowl food plants | Annual combined cover significantly less than cover in preceding years before and after the beginning of Project operations[c] | |
| | Woody riparian plants—location, estimated area, abundance, and height) | 1 location > 0.1 acres in area with >0.5% cover of seedlings of woody riparian plants > 3 inches in height | |
| | Prioritized Invasive Plants—Infestation coordinates, area, and species | 1 new infestation of an invasive plant (Cal-IPC rating “high”) or >50% increase in area of existing infestation from baseline size[d] | |

| **Table 4-1**<br>**Summary of Proposed Management Objectives, Metrics, and Triggers** | | | |
|---|---|---|---|
| **Objective** | **Metric** | **Management Action Trigger** | **Potential Management Actions** |
| | Percent tree survival, invasive cover, and understory cover in revegetated riparian areas[e] | Tree survivorship ≤ 80% in Years 1–5[e]<br>Invasive plant cover ≥ 5% in tree planting basins[e]<br>Understory plant cover < 50% in Years 2–5 | Implement and evaluate use of cover crops to reduce weed/invasive plant cover, stabilize soil surface, or increase above-ground plant matter entering aquatic ecosystem.<br>Implement and evaluate seeding treatments to restore cover of waterfowl food plants or to enhance abundance or diversity of native species, particularly for revegetation following treatment of naturalized invasive plants. |
| | Plant cover in revegetated seasonal wetland[e] | Absolute cover < 50% in Years 2–5[e] | |
| | Native plant cover in areas treated to enhance or restore seasonal wetland or other natural vegetation | Absolute cover in Years 1–3 ≤ pre-treatment | |
| **Waterfowl**—Preserve waterfowl habitat quality in the proposed water storage area. | Annual median of daily abundance and species richness of waterfowl guilds (diving and dabbling ducks) in each lake branch and overall during December–March[f] | Annual median of daily abundance below range of pre-Project (2015–2021) medians<br>Annual median of daily species richness below range of pre-Project (2015–2021) medians | Evaluate College Lake monitoring data, regional data, and other information sources (including technical experts) to identify potential causes of low abundance.<br>Adjust timing or frequency of vegetation management to enhance habitat quality<br>Take additional vegetation management actions to enhance habitat quality (See potential management actions for vegetation objective.)<br>Adjust rate or timing of water diversions |
| **Invasive Animal Species**—Control invasive animal species pursuant to a plan approved by the appropriate regulatory agencies. | Species—Presence | Additional species detected | Determine source of invasive species and develop and implement measures to control spread from identified sources<br>Adjust frequency, extent (partial or complete), or timing of lake draining<br>Physically capture and remove invasive animals<br>Revaluate invasive species control methods |
| | Species—# Individuals / unit area or sampling effort | Increasing trend in abundance | |
| **Cultural Resources—** Preserve significant archaeological and historical resources and sustain plants of cultural significance to the Amah Mutsun Tribe[g]. | Observed condition of Sites CA-SCR-44/H and CA-SCR-150. | Visible evidence of erosion or other damage. | Work with qualified archaeologist to develop and implement a plan to protect the site(s) from further damage.<br>Work with a qualified archaeologist to recover archaeological resources from the affected portion(s) of the site(s) if protective measures are infeasible. |
| | Cover of plants of cultural significance at sites revegetated, restored, or enhanced by implementing avoidance and | Post-treatment cover is less than pre-treatment cover at revegetation, restoration, and enhancement sites. | Reassess treatments<br>Implement site-specific remedial measures<br>Develop, apply and evaluate alternative treatments. |

**TABLE 4-1**
**SUMMARY OF PROPOSED MANAGEMENT OBJECTIVES, METRICS, AND TRIGGERS**

| Objective | Metric | Management Action Trigger | Potential Management Actions |
|---|---|---|---|
| | minimization measures or potential management actions[h] | | |
| **Research**—Support research, including community science, focused on uncertainties affecting management[i] | Studies addressing uncertainties or data gaps (number) | 0 studies initiated at College Lake in first 3 years of implementation | Identify opportunities to improve suitability of College Lake as a research site by improving: access (potentially with assistance of adjacent landowners), safety of researchers and equipment, and availability of supporting site and Project information.<br>Make identified improvements.<br>Conduct additional targeted outreach to potential researchers at local universities, colleges, and environmental non-governmental organizations. |

Notes

a – "Lower" Salsipuedes Creek refers to the reach between the Pajaro River and Corralitos Creek; "upper" Salsipuedes Creek refers to the reach between Corralitos Creek and College Lake weir.

b – Based on Total Maximum Daily Load (TMDL) established for Pinto Lake and supporting assessments; intended to reduce likelihood of cyanobacteria blooms impairing water uses (State of California Regional Water Quality Control Board Central Coast Region Resolution No. R3-2020-0034; R. Ketley, A. Retinger, and M. Los Huertos [2013] Pinto Lake Total Maximum Daily Load (TMDL) Planning and Assessment, State Water Resources Control Board, Sacramento, California.

c – Here "significant" refers to statistical significance ($\alpha$ = 0.05 or less); the vegetation monitoring described in Section 5.1.1.6, "Vegetation," is designed to distinguish substantial changes in cover as statistically significant. To be conservative (in this context, to err on the side of a Type I error), critical values will not be adjusted for multiple comparisons.

d – The California Invasive Plant Council (Cal-IPC) rates invasive plant species based on the level of their negative ecological impacts. Invasive plants with a "high" rating are species that have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure; and their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. An "infestation" is a discrete location where one or more invasive plants are growing.

e – As defined in College Lake Integrated Resources Management Project – Revegetation Plan (provided as **Appendix E, "Revegetation Plan"**)

f – Species richness is the number of species.

g – Plants of cultural significance to the Amah Mutsun are identified in **Appendix G, "Plant Species List."**

h – Cover may be measured using transects as described in Section 5.1.1.6, "Vegetation," in **Appendix E, "Revegetation Plan,"** or using a "releve method" consistent with the releve protocol of the California Native Plant Society (CNPS 2020).

i – Community science is the involvement of the public in scientific research under the guidance of trained scientists and can involve collecting, categorizing, transcribing, or analyzing scientific data. Community science can provide educational and other benefits in addition to supporting scientific research.

## 4.1 Objectives

Objectives are desired outcomes or performance measures that serve to guide decision making and evaluations of success in fulfilling the Project's purpose. Important attributes of objectives include being:

- Specific
- Measurable
- Attainable
- Relevant
- Time-bound

The AMP's objectives must not conflict with the Project's objectives, permit requirements, or other constraints. Each AMP objective and the actions taken to attain it must not conflict with other AMP objectives.

## 4.2 Metrics

Metrics are monitored variables used to evaluate Project outcomes (e.g., progress towards a measurable objective, success). Important attributes for metrics include:

- Relevance—Metrics are related to the Project's objectives and have implications for management activities.
- Responsiveness—Metrics are capable of exhibiting changes in response to actions taken in the time frame required for adaptive management (e.g., within 0–5 years).
- Cost-effectiveness—Individually and collectively, measuring the metrics will involve a reasonable expenditure relative to other metrics that could effectively assess progress and inform management decisions.
- Reliability of interpretation—Changes in the metrics will reliably and clearly document the results of management actions (as opposed to other causes, such as environmental fluctuations) and will highlight the types of changes that are needed in the Project's implementation.
- Transparency/ease of communication—As a set, the metrics will tell a clear and concise story to a broad cross section of the interested public about the results of implementing the Project.

**Table 4-1** presents the metrics for each of the Project's objectives, and Section 5.1, "Monitoring Framework," describes how these metrics will be monitored.

Monitoring of other variables may improve management by increasing understanding of the College Lake ecosystem. Studies that would address key uncertainties are discussed in Section 5.2, "Targeted Studies."

## 4.3 Triggers and Management Actions

Triggers are limiting values of metrics that trigger management actions (e.g., thresholds, decision criteria). The key attributes of an action trigger are its relationship to the objective and its relationship to potential management actions. Action triggers need to indicate risk of an undesirable outcome when there are still potential actions that could be taken to avoid or rectify the undesirable outcome. Natural variability complicates the selection of action triggers, and management responses when they are exceeded. **Table 4-1** presents the action triggers selected for each metric.

For most objectives, there are several different types of management actions that could be implemented, including:

- Evaluation
- Coordination/consultation
- Adjustments to operations and maintenance practices
- Remedial actions
- Collaboration on off-site actions (e.g., actions up or downstream of College Lake)

For each action trigger, **Table 4-1** presents potential management actions that may be implemented in response to the trigger being exceeded. These lists represent the range of potential management actions but do not necessarily include all potential actions. Although no sequencing of actions is indicated in **Table 4-1**, the initial action typically would be an evaluation or assessment of the situation which would inform the selection of subsequent actions, which would be implemented until the trigger is no longer exceeded or applicable.

CHAPTER 5

# Monitoring and Targeted Studies

This chapter describes the monitoring that will be conducted to inform the Project's O&M activities. Topics for targeted studies (research or community science) that could support management by reducing key uncertainties will also be detailed in this chapter.

## 5.1 Monitoring Framework

For each objective of the AMP, the following sections concisely describe how O&M activities will be documented and how metrics will be monitored. The monitoring activities described below will be conducted by PV Water staff, its contractors, or both.

### 5.1.1 Monitoring of Metrics for Objectives

#### 5.1.1.1 Flooding

The flooding metric is the water surface elevation of College Lake, and the action trigger is a water surface elevation above 62.5 feet NAVD88 when the weir height is above 60.1 feet NAVD88. Flooding that occurs naturally, when the weir is in its lowered position (60.1 feet NAVD88), is beyond the scope of the Project. Therefore, monitoring for the flooding objective will consist of weir height and water surface elevation at the weir recorded continuously.

#### 5.1.1.2 Fish passage

The fish passage metrics are passage-related attributes (chamber depths, leap heights, water velocities, and water depth at critical riffles), the number of tagged smolts detected and smolts trapped at the College Lake Weir, and the relative abundance of Age 0 (young-of the year) steelhead in Casserly Creek. These metrics will be monitored and related information collected by:

- Evaluating passage efficiency at and downstream of the weir in Salsipuedes Creek Conducting juvenile steelhead population surveys in the Casserly Creek watershed
- Tagging juvenile steelhead with passive integrated transponder (PIT) tags
- Operating PIT-tag detection arrays
- Trapping outmigrants

The methodology for this monitoring is described in detail in **Appendix C, "Steelhead Monitoring Plan."**

If for the five years after Project operations begin, this monitoring has indicated successful fish passage through College Lake, in coordination with NMFS, PV Water may reduce the frequency or simplify the methods of this monitoring.

#### 5.1.1.3 Water Storage

The water storage metrics are for sediment and debris affecting water storage and Project operations. These will be monitored annually by visual inspections of all ditches and the lakebed. During these inspections, the locations of any flow obstructions and the typical depth reduction in predefined subdivisions of the ditch system will be recorded, as will the location and approximate area and depth of all sediment deposits on the lakebed that are greater than both 1,000 square feet in area and three inches in depth. Additional assessment methods may be considered to support the visual inspections where appropriate (e.g., surveying of elevations, installing staff plates).

#### 5.1.1.4 Water Quality

The water quality metrics are for the water column temperature gradient and concentrations of total phosphorus, chlorophyll-a and microcystins. These metrics will be monitored through PV Water's water quality monitoring program. **Appendix B, "Water Quality Monitoring Plan,"** provides a detailed description of the water quality monitoring program, including sampling locations, water quality constituents analyzed and methods. During Project implementation, PV Water will adapt and add to its existing water quality monitoring program by monitoring:

- Cyanotoxins and algae (taxonomic group and density) in the grab samples collected from College Lake
- Depth, water temperature, dissolved oxygen, specific conductance, pH, chlorophyll-a, and phycocayanin continuously at two locations in College Lake
- Monthly profiles of water temperature, dissolved oxygen, specific conductance, chlorophyll-a, and water clarity (Secchi depth) at the two sample locations

#### 5.1.1.5 Farming

The farming metrics is for the acreage of cultivation of land between 59 feet and 63 feet elevation NAVD88 by year, for average, dry, or very dry water years. Farmed acreage will be recorded annually, including the crop(s) grown on each field, and adding this information as attributes to the geographic information system (GIS) data for the vegetation map of College Lake (see "Vegetation Type Mapping" in Section 5.1.1.5, "Vegetation," below). From this information and elevation data, GIS software will be used to calculate the acreage cultivated between 59 feet and 63 feet elevation NAVD88 in average, dry, or very dry water years, and the frequency of cultivation of all areas of agricultural land at 59–63 feet elevation NAVD88 during average, dry, or very dry years.

#### 5.1.1.6 Vegetation

The vegetation metrics are for the acreage of seasonal wetlands and the cover of waterfowl food plants within them, and for the location, area, and abundance of woody riparian plants and invasive plants. These metrics will be monitored through site assessments, vegetation type mapping from aerial imagery, and plant cover in seasonal wetlands along permanently marked transects. These monitoring methods are described below.

##### Site Assessment

As part of an annual site assessment, the presence, cover, and area infested by invasive species will be visually estimated and recorded, as will the presence, typical height, density, and area with seedlings/saplings of woody riparian plants. Invasive plants are species in the California Invasive Plant Council's (Cal IPC's) database (Cal IPC 2021) with a rating of "High." The estimated absolute cover of these species will be recorded in one of several categories. For woody riparian plants, typical height will be recorded to the nearest quarter foot, and density will be recorded in one of several categories. For invasive plant infestations, there is no minimum size, even a single plant at a new location would be considered a new infestation. Ideally, assessment data will be recorded into a digital form and the perimeter of the invasive plant infestation or area with woody plant recruitment will be mapped in the field.

##### Vegetation Type Mapping

Annually, aerial imagery from that year will be used to review the College Lake vegetation map. Based on that review, and any related field verification, the boundaries, vegetation type, and other attributes of polygons in the geographic information system (GIS) data will be updated as necessary. If new vegetation types develop by changes in dominant species or vegetation structure (including extent of bare ground), they will be added to the classification system of the vegetation map.

Five years after Project operations have begun, if boundaries of vegetation types have been stable, the frequency of this monitoring may be reduced.

##### Seasonal Wetland Plant Cover

Permanently marked transects will be used to monitor changes in the cover and species composition of seasonal wetland vegetation at elevations of 51–63 feet NAVD88. The purpose of this monitoring is to document changes in species composition of seasonal wetland vegetation because of its importance for wildlife, particularly waterfowl. (Changes in the acreage of seasonal wetland would be documented through mapping from aerial imagery as described above.)

In five fields, five 100-meter-long, permanently marked, transects will be randomly located approximately parallel to the elevation contours (25 transects total)[19]. Plant cover by species will be recorded along the transects. Also, photographs of the transects will be taken and the typical height and qualitative seed production information will be recorded for high-value waterfowl food plants. High-value waterfowl food plants are:

- Smartweed (*Persicaria lapathifolia*)
- Fat-hen (*Atriplex prostrata*)
- Swamp timothy (*Crypsis schoenoides*)
- Barnyard grass (*Echinochloa crus-galli*)

The methodology for monitoring seasonal wetland vegetation is fully described in **Appendix F, "Seasonal Wetland Monitoring Methodology."**

If for five years after Project operations begin, the cover of waterfowl food plants has been comparable to or greater than that documented by pre-project monitoring, or has remained stable, the frequency of this monitoring may be reduced or the monitoring discontinued.

#### 5.1.1.7 Waterfowl and Other Birds

PV Water has been monitoring bird use of College Lake since 2014, and will continue to monitor bird use of the lake using comparable methods.

Since 2014, PV Water has been collecting waterfowl, shorebird, wading bird, raptor, and nesting bird data at College Lake during winter and spring. This monitoring consists of bi-weekly to monthly early morning site visits to established observation points around the lake for waterfowl/bird counts. The primary goal of the baseline survey is to develop an understanding of when and how College Lake is used by migratory waterfowl, shorebirds, and wading birds as well as resident nesting bird populations.

As the lake drains and spring-migrant shorebirds are passing through the region, the frequency of site visits is typically increased. The ephemeral dry-out period mudflat conditions that attract migrating shorebirds to College Lake can last just a few weeks, so more frequent visits are required to characterize shorebird use. Migrating and locally nesting herons, egrets, and cormorants also congregate in large numbers during spring lake-draining period to feed on

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[19] Based on the variance among transects in unpublished data collected by Jerry Bush and John Pritchard at College Lake in 2014–2016, and 2016, this size sample for a field should detect a change in cover of 20 percent between years at a high level of significance ($\alpha = 0.05$ [95% "significance"]) with moderate power ($\beta = 0.20$ [80 % "power"]), and should detect smaller differences between years overall (i.e., for all fields combined) at a high level of significance and moderate level of power.

stranded aquatic species. In addition, spring raptor nesting activity is mapped and monitored, while landbird species are noted and reported when encountered, they are not the focus of the survey efforts. Observation points for lake-full surveys have been located to maximize coverage of the flooded lakebed with minimal overlap[20].

Since 2017, PV Water has also been collecting waterfowl, shorebird, wading bird, raptor, and nesting bird data at College Lake during summer and fall because bird observations had not been previously recorded during the crop growing season. Once the lake is drained in the spring, monthly site visits are conducted. A different set of observation points are used during summer–fall when the lake is fully drained and thus more accessible, and observations are also made along four permanent transects. Active agricultural fields, drainage ditches, and accessible parts of the PV Water riparian parcel are surveyed during summer and fall visits.

During lake-full site visits, monitoring is typically conducted by a team of two or three observers, depending on site conditions and availability of personnel. Dry-season surveys are conducted by one or two people and transects are walked. Observers note all bird species identified in the field and for each species record the number of birds observed. These data are compiled in a spreadsheet for analysis and uploaded to the website eBird for public access[21]. Breeding activity and nesting birds are also noted and these observations are contributed to the Santa Cruz Bird Club's Breeding Bird Census.

To support implementation of management actions, waterfowl, hydrology, and vegetation monitoring data would be evaluated for relationships between waterfowl abundance or species richness and inundation (timing and duration) or vegetation (seasonal wetland acreage and waterfowl food plant cover).

If ten years after Project operations have begun, abundance and species richness of waterfowl guilds (diving and dabbling ducks) remains comparable to or becomes greater than that documented by pre-project monitoring, the frequency of this monitoring may be reduced or the monitoring discontinued.

#### 5.1.1.8 Invasive Animal Species

The invasive animal species metrics are for species presence and their abundance (number of individuals per unit area or sampling effort). At permanently marked sites, invasive animals will be monitored in conjunction with their removal. This removal-monitoring will be conducted in late summer–early fall when College Lake has been drawn down and wetted areas are confined to drainage channels. For each species of invasive animal, life stage, number, and location will be recorded for all animals removed. From this information, densities of invasive species

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[20] Beginning in 2022, data will be recorded so as to distinguish waterfowl use of five subdivisions covering the two branches (arms) and center fields of the lake.

[21] All survey data collected, to date, can be found in the "College Lake, Santa Cruz County, CA, US" eBird Hotspot: https://ebird.org/hotspot/L281754?yr=all&m=&rank=mrec

captured per unit effort will be calculated. The methods for this combined monitoring and removal are described in greater detail in **Appendix D, "Invasive Species Management Plan."**

#### 5.1.1.9 Cultural Resources

The cultural resources metrics are for the condition of Sites CA-SCR-44/H and CA-SCR-150 (e.g., evidence of erosion). Consistent with Mitigation Measure CUL-1i, the condition of these sites will be determined by a qualified archaeologist who will prepare a technical memorandum of the inspection with photographs. During the first two years of Project operation, the sites will be inspected quarterly, and during the third through fifth years, the sites will be inspected semi-annually. If after five years, no erosion or other impacts to these sites have been observed, this monitoring may be discontinued.

#### 5.1.1.10 Research

The research metric is the number of studies addressing uncertainties or potentially informing adaptive management of O&M of the Project in addition to monitoring of metrics for the objectives. A description of each study conducted at College Lake will be included in the annual memorandum described in Section 6.2, "Reporting," and copies of study data sets and other work products will be archived.

### 5.1.2 Documenting Management Actions

Records will be kept documenting all O&M conducted by PV Water at College Lake. Documenting O&M activities is an important component of monitoring. These records will be summarized annually to support decision making.

## 5.2 Targeted Studies

Data on College Lake's habitats, ecosystems processes (e.g., hydraulics), and species have been sufficient for the planning and analyses conducted for the Basin Management Plan Update Programmatic Environmental Impact Report and College Lake Integrated Resources Management Project Draft Environmental Impact Report (PV Water 2014, 2017), Project permitting, and this AMP. However, some information that would assist future management is not available or not well understood. Therefore, focused (targeted) studies will be encouraged and facilitated (e.g., by providing access or supporting information) to reduce uncertainties and further inform adaptive management of the Project's O&M.

Section 3.4, "Anticipated Changes in Inundation and Land Use Changes and Related Uncertainties," described several uncertainties in the response of organisms to the Project's implementation. Most of these uncertainties will be reduced through monitoring that is already or will be implemented by PV Water (see Section 5.1.1, Monitoring of Metrics for Objectives"). However, the planned monitoring will not document the response of the aquatic food web to implementation of the Project, and the planned monitoring does not directly compare the effectiveness and consequences of alternative management practices on waterfowl or other organisms, which would require a much greater level of effort.

In addition to uncertainties about organism responses to Project implementation, several potential areas of investigation have been identified during development of this AMP, including:

- **Presence of red-legged frog**—PV Water has committed to implementing multiple measures to avoid and minimize impacts to red-legged frogs, a species federally listed as endangered; however, the presence of red-legged frogs at College Lake has not been confirmed. Surveys confirming the presence or determining the absence of red-legged frog would guide refinements of avoidance and minimization measures and improved management practices.

- **Causes of Inter-Annual Changes in Waterfowl Use**—waterfowl abundance at College Lake varies considerably from year to year, and a better understanding of the causes of this variation would aid interpretation of monitoring data, particularly if monitoring documents substantial increases or decreases in waterfowl use of the lake. Studies of regional waterfowl use, effects of human activities (including active agricultural use of Project lakebed margins and hazing), and spatial patterns of waterfowl use in different arms (branches) of the lake will help in evaluating whether potential changes in waterfowl use of College Lake are independent of or in response to Project O&M.

- **Plant species growing at College Lake**—the species composition of vegetation is relevant to several AMP objectives; however, there is not a complete list of the plants growing at College Lake. A complete list (an inventory) that distinguishes native from non-native species, identifies those species that are ethnobotanical resources and those that are invasive would inform management and support attainment of management objectives.

- **Pre-contact vegetation**—the vegetation of College Lake prior to the alterations that followed European contact (including among other changes the introduction of European plant species and changes to hydrology) could provide guidance for management to promote native plants at College Lake. This information on the historical ecology of College Lake does not currently exist but could be provided by compilation of historical records and field investigations of plant materials in sediments.

- **Vegetation response to management treatments—**if management actions need to be taken in response to changes, then studies of the effectiveness of alternative actions could guide management. While the monitoring described in Section 5.1.1.6, "Vegetation," would provide some evidence of vegetation response to a treatment, a targeted study could better inform decisions regarding alternative treatments.

These investigations of these topics and other useful information obtained through targeted studies by colleges and universities, government agencies, and non-governmental organizations (NGOs). In some cases, community science studies led by academic, agency, or NGO investigators may be appropriate.

Although not required for implementation of the AMP and not being undertaken ore funded by PV Water, PV Water will encourage and facilitate studies by others that provide this data, or otherwise inform Project O&M, and are compatible with ongoing Project O&M and agricultural activities.

CHAPTER 6

# Reporting and Plan Updates

This chapter describes the evaluations by PV Water staff, reporting, and updating of the Plan that will be components of adaptive management of O&M of the Project.

## 6.1 PV Water Evaluations

Beginning with operation of the Project, PV Water staff will annually review summaries of monitoring data, PV Water O&M activities, and evaluate practices. Based on this review, monitoring and management practices will be discussed, and decisions to change practices for the subsequent year will be made if necessary. This evaluation may be supported by technical experts, regulatory agencies, land owners, or other stakeholders.

## 6.2 Reporting

### 6.2.1 Adaptive Management Reporting

Each year a report will be produced that summarizes monitoring methodology and results, along with operations and maintenance conducted by PV Water, and that states if action triggers were exceeded, and if so, what management actions were taken or planned in response. This report also will document any changes in monitoring and O&M practices implemented for other reasons (e.g., changes in regulations or technology), new information that may affect O&M, and revisions to the AMP, if any. Monitoring results will be an important basis not only for adaptive management decisions, but also for revising the AMP. Monitoring reports and reports on targeted studies completed that year will be attachments to the annual report.

Prior to its finalization, the annual report will be presented to the Projects and Facilities Operations Committee for its review with an invitation to the meeting being extended to the members of the former Ad Hoc AMP Committee. The final report will discuss the members' recommendations and incorporate as appropriate.

### 6.2.2 Other Reporting

In addition to monitoring and reporting to support and document operations, maintenance, and other management actions, PV Water will conduct monitoring and provide annual compliance reporting as required by the Project's permits and other authorizations.

## 6.3 Plan Updates

All planning documents eventually become dated and require revision so they can continue to provide practical direction for management. A common and unfortunate situation is that the revision of planning documents is neglected because the revision process is too involved and too cumbersome. To address this problem, this AMP incorporates simple procedures for making revisions to the Plan.

Revisions to the AMP in response to new information may be made annually by PV Water with input from the Committee. New information necessitating revisions to keep the AMP current may include:

- Feedback generated by adaptive management
- Scientific research that directs improved techniques for resource management
- Changes in land use or management of adjacent lands
- New regulatory requirements

Beginning in the first year of Project operations, this information will be summarized annually in the adaptive management report described in 6.2.1, "Adaptive Management Reporting." A draft of this report will be shared with the Projects and Facilities Operations Committee with an invitation being extended to the members of the former Ad Hoc AMP. This report also will contain any proposed changes to the AMP. Proposed changes will be discussed with the Projects and Facilities Operations Committee and the input of committee members solicited prior to the report, and any changes to the AMP it contains, being finalized.

At 5-year intervals, changes to the AMP made in the 5 annual adaptive management reports will be compiled in an updated version of AMP document for ease of reference. It is anticipated that the after the first 5-years of Project O&M, monitoring results and documented management activities will have provided a sound basis for evaluating and where appropriate, revising, all objectives, monitoring methods (including monitoring frequency), metrics, action triggers, and potential management actions.

CHAPTER 7

# References

## 7.1 Chapter 1, "Overview"


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## 7.3 Chapter 3, "College Lake Project"

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# APPENDIX A. MEASURES TO AVOID AND MINIMIZE IMPACTS OF OPERATIONS AND MAINTENANCE ACTIVITIES

**TABLE A-1**
**ADOPTED AND ANTICIPATED MEASURES TO AVOID AND MINIMIZE IMPACTS OF MAINTENANCE ACTIVITIES**

| Measure | Source |
|---|---|
| **Promote Farming.** To reduce the amount of Farmland of Statewide Importance and Unique Farmland converted to other uses and in coordination with affected landowners, PV Water shall adopt practices to promote farming within the areas depicted with red hatching on Figure 3.2-4 of the College Lake Integrated Resources Management Project EIR. Such practices may include, but are not limited to, the following:<br>• Maintain, improve and potentially expand tile drain systems.<br>• If controlling land by easement, establish terms that require land owners to cultivate crops or otherwise productively use the land for agricultural purposes at least once every five years, hydrologic conditions permitting.<br>If acquiring land outright, enter into lease arrangements for the land to be cultivated or otherwise productively used for agricultural purposes at least once every five years, hydrologic conditions permitting. | MMRP LU-1a |
| **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:<br>• Strip 18 inches of topsoil from the area excavated unless otherwise stipulated by the landowner. The topsoil shall be stored separately from subsoil and other construction materials.<br>• 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.<br>Stockpile topsoil on the same property from which it was stripped and return topsoil to same property from which it was stripped. | MMRP LU-1c |
| **Nesting Bird Surveys.** Prior to any project construction or maintenance activities, the project proponent will take the following steps to avoid direct losses of nests, eggs, and nestlings and indirect impacts ton avian breeding success:<br>• If construction or maintenance activities occur only during the non-breeding season, between August 31 and February 1, no surveys will be required.<br>• During the breeding bird season (February 1 through August 31), a qualified biologist will survey construction or maintenance 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.<br>• Surveys will include all potential habitats within 500 feet (for raptors) of activities and all onsite vegetation including bare ground within 250 feet of activities (for all other species).<br>• 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. | MMRP: BIO-2i |
| **California Red-legged Frog Qualified Biologists.** PV Water will annually submit the name(s) and credentials of biologists who would conduct activities specified in the following measures. No project activities would begin until the Agency receives approval from the Service that the biologist(s) is qualified to conduct the work. | MMRP and USFWS BA: BIO-2j, CRF-1 |

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| **California Red-legged Frog Survey.** A USFWS-approved biologist will survey the construction or maintenance 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. | MMRP and USFWS BA: BIO-2j, CRF-2 |
| **California Red-legged Frog Training.** Before any construction or maintenance 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. | MMRP and USFWS BA: BIO-2j, CRF-3 |
| **California Red-legged Frog Monitoring.** A USFWS-approved biologist will be present at the construction or maintenance 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 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. | MMRP and USFWS BA: BIO-2j, CRF-4 |
| **Staging and Access Routes – California Red-legged Frog.** 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. | MMRP and USFWS BA: BIO-2j, CRF-5 |
| **California Red-legged Frog Seasonal Restrictions.** Construction and maintenance 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 USFWS approval. | MMRP and USFWS BA: BIO-2j, CRF-6 |
| **Dewatering Procedures.** If a construction or maintenance site is to be temporarily dewatered by pumping, and would take place within or adjacent to suitable CRF habitat, intakes will be completely screened with wire mesh not larger than five millimeters to prevent CRF from entering the pump system where applicable. Water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction or maintenance activities, any barriers to flow will be removed in a manner that would allow flow to resume with the least disturbance to the substrate. | MMRP and USFWS BA: BIO-2j, CRF-7 |
| **Amphibian Pathogen and Parasite Prevention.** 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. | MMRP and USFWS BA: BIO-2j, CRF-8 |
| **Water Quality Protection.** Implement Mitigation Measure HWQ-1 through HWQ-4. | MMRP: BIO-2j, CRF-9 |
| **Western Pond Turtle Qualified Biologists.** PV Water 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. | MMRP: BIO-2k, WPT-1 |
| **Western Pond Turtle Survey.** A CDFW-approved biologist will survey the work site 48 hours prior to the onset of construction or maintenance activities. If WPT adults or juveniles 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. If WPT eggs or nests are found, no work will be conducted within a 50-foot radius of the nest. Work can resume within the 50-foot radius once the eggs hatch and the juveniles have left the area. | MMRP: BIO-2k, WPT-2 |
| **Western Pond Turtle Training.** Before any construction or maintenance 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. | MMRP: BIO-2k, WPT-3 |
| **Western Pond Turtle Monitoring.** A CDFW-approved biologist will be present at the construction or maintenance site until such time as all removal of WPT, instruction of workers, and disturbance of habitat have been completed. | MMRP: BIO-2k, WPT-4 |
| **Staging and Access Routes – Western Pond Turtle.** 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 | MMRP: BIO-2k, WPT-5 |

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| boundaries will be clearly demarcated. Where impacts occur in these staging areas and access routes, restoration will occur as identified in the general <u>best management practices</u> measures above. | |
| **Standard measures to maintain water quality and to control erosion and sedimentation.** Standard measures to maintain water quality and to control erosion and sedimentation will be implemented. These measures include:<br>• Restrict trenching across all waterways to low-flow periods.<br>• 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.<br>• 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.<br>• 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.<br>• 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.<br>• 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.<br>• 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).<br>• 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.<br>• 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. | BA for USFWS: Conservation Measure 1 (California Red-legged Frog)<br>MMRP: BIO-1b |
| **Collection of Seeds and Revegetation.** 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. | MMRP BIO-3b |
| **Revegetate and Restore Mixed Riparian and Willow Riparian Forest,** Where construction impacts on mixed riparian or willow riparian forest occur, revegetation and restoration 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 applicable agencies, PV Water may choose to coordinate with the Natural Resources Conservation Service 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 riparian habitat lost and for all trees | MMRP BIO-1c (Revised) |

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| 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 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. | |
| **Delineate Work Area.** 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. | BA for USFWS: Conservation Measure 1 (California Red-legged Frog)<br>MMRP: BIO-2e |
| **Special-Status Species Clearance Surveys.** 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. | BA for USFWS: Conservation Measure 1 (California Red-legged Frog)<br>MMRP: BIO-2f |
| **Exotic Species Removal.** 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. | BA for USFWS: Conservation Measure 1 (California Red-legged Frog)<br>MMRP: BIO-2g |
| **Notification of Dead or Injured Individuals of Special-Status Species.** 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. | BA for USFWS: Conservation Measure 1 (California Red-legged Frog)<br>MMRP: BIO-2h |
| **Steep-walled Holes and Trenches.** Before steep-walled holes or trenches are filled, they shall be thoroughly inspected for trapped animals. If trapped animals are observed, escape ramps or structures shall be installed immediately to allow escape. If listed species are trapped, the USFWS and/or CDFW, as appropriate, shall be contacted to determine the appropriate method for relocation. | BA for USFWS: Conservation Measure 1 (California Red-legged Frog) |
| **Inspect Pipes for Special-Status Species.** All construction pipes, culverts, or similar structures that are stored at a construction site for one or more overnight periods and with a diameter of 4 inches or more shall be inspected for CRF before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If CRF is discovered inside a pipe, that section of pipe shall not be moved until the appropriate resource agency, with jurisdiction over that species, has been consulted to determine the appropriate method for relocation. If necessary, under the direct supervision of the biological monitor, the pipe may be moved once to remove it from the path of construction activity until the animal has escaped. | BA for USFWS: Conservation Measure 1 (California Red-legged Frog) |
| **Stockpile Storage.** Excavated soils shall be stockpiled in disturbed areas lacking native vegetation. | BA for USFWS: Conservation Measure 1 (California Red-legged Frog) |
| **Amphibian Friendly Erosion Control Materials.** Plastic monofilament netting (erosion control matting), loosely woven netting, or similar material in any form will not be used at the Project site because CRF can become entangled and trapped in them. Any such material found on site will be immediately removed by the Service-approved biologist, construction personnel, or the applicant. Materials utilizing fixed weaves (strands cannot move), polypropylene, polymer or other synthetic materials will not be used. | BA for USFWS: Conservation Measure 1 (California Red-legged Frog) |
| **Speed Limit.** Project-related vehicles shall be required to observe a 15-mile-per-hour speed limit on unpaved roads within the limits of construction. | BA for USFWS: Conservation Measure 1 (California Red-legged Frog) |
| **Avoid Disturbance of Emergent Vegetation.** Disturbance of emergent vegetation in areas with suitable habitat for California red-legged frog will be minimized. | BA for USFWS: Conservation Measure 1 (California Red-legged Frog) |
| **Invasive Plant Disposal.** Invasive plant species that are removed will be prevented from entering watercourses and be disposed of in a manner that will not contribute to further spread of the species. | BA for USFWS: Conservation Measure 1 California Red-legged Frog |

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| **Vegetation Removal.** Removal of native vegetation in non-native vegetation removal areas will be minimized. | BA for USFWS: Conservation Measure 1 (California Red-legged Frog) |
| **Steelhead Monitoring.** A NMFS-approved fisheries biologist would be onsite to provide preconstruction training on steelhead life-history to construction crews and to provide daily monitoring during construction activities. | BA for NMFS: Steelhead Conservation Measures<br>MMRP: BIO-2l FISH-1 |
| **Coffer Dam Monitoring.** If the preliminary construction concept proposes the use of temporary coffer dams for isolating the work areas at the upstream and downstream extent of the project, installation and removal of the temporary coffer dams would be monitored by the NMFS-approved fisheries biologist. | BA for NMFS: Steelhead Conservation Measures<br>MMRP BIO-2l FISH-2 |
| **Coffer Dam Dewatering.** Following initial construction of the coffer dam bypass system, isolated standing water would be pumped from the work area to adjacent vegetated terraces, settling tanks or back into the river, if turbidity is not elevated more than 10 percent of background turbidity levels. | BA for NMFS: Steelhead Conservation Measures<br>MMRP: BIO-2l FISH-3 |
| **Dewatering Procedures.** If a work site is to be temporarily de-watered by pumping, intakes will be completely screened with wire mesh not larger than 0.2 inch to prevent steelhead or other native fish 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. | BA for NMFS: Steelhead Conservation Measures<br>MMRP: BIO-2l FISH-4 |
| **Coffer Dam Removal.** The installation and removal of the coffer dam structures would be controlled to minimize turbidity in the water. | BA for NMFS: Steelhead Conservation Measures<br>MMRP: BIO-2l FISH-5 |
| **Implement Water Quality BMPs.** The use of best management practices would be implemented to reduce the probability of sediment and/or contaminated material from entering the creek. | BA for NMFS: Steelhead Conservation Measures<br>MMRP: BIO-2l FISH-6 |
| **Water Diversion Seasonal Restrictions.** No water shall be diverted from College Lake from the time the lake begins filling in late fall/early winter through the end of the smolt outmigration period (approximately May 31 or June 15) unless sufficient bypass flows are provided at the dam for unimpeded adult upstream migration through March 31, and sufficient bypass flows are provided at the dam for unimpeded smolt outmigration through May 31. The precise bypass flow levels required to achieve unimpeded migrations are not known at this time. After May 31 or June 15, the entire storage of College Lake could potentially be diverted. College Lake would likely be too warm to allow summer rearing by steelhead, especially in the presence of warm water predatory fishes. | MMRP: BIO-2m |
| **Protection of Steelhead Migratory Habitat: Seasonal Restrictions.** Impacts to steelhead migration passage shall be minimized by carrying out construction in College Lake/Casserly Creek/Salsipuedes Creek after June 15 and prior to October 15, during which time adults and smolts do not migrate through the area. | BA for NMFS: Steelhead Conservation Measures<br>MMRP: BIO-2n |
| **Protection of Steelhead Migratory Habitat: Bypass Flow Requirements.** The Project shall be operated such that it complies with all minimum required bypass flow requirements during the steelhead migration period, including those developed through a new bypass flow study to be conducted by a NMFS-approved fisheries biologist in consultation with the relevant regulatory agencies. | BA for NMFS: Steelhead Conservation Measures<br>MMRP: BIO-2o |
| **Streamflow Gauging Stations.** The PV Water shall install and operate surface-water streamflow gaging stations on Casserly Creek upstream and on Salsipuedes Creek downstream of the proposed College Lake diversion structure to monitor available diversion inflows and to provide and document future Biological Opinion-required fish bypass flows. | BA for NMFS: Steelhead Conservation Measures<br>MMRP: BIO-2p |
| **Water Quality Permits:** 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:<br>• Source identification<br>• Preparation of a site map<br>• Description of construction materials, practices, and equipment storage and maintenance<br>• List of pollutants likely to contact stormwater<br>• Estimate of the construction site area and percent impervious area | BA for NMFS: Steelhead Conservation Measures<br>MMRP: HWQ-1 |

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| • 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<br>• Proposed construction dewatering plans<br>• Provisions to eliminate or reduce discharge of materials to stormwater<br>• Description of waste management practices<br>• Maintenance and training practices | |
| **Avoid Rapid Water Level Fluctuations.** 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. | MMRP: HWQ-2 |
| **Well Production and Pumping Rates.** 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:<br>1. Improving irrigation efficiency<br>2. Modifying irrigation and agricultural operations<br>3. Lowering the pump in the irrigation well<br>4. Lowering and changing the pump in the irrigation well<br>5. Adding storage capacity for irrigation supply<br>6. Replacing the irrigation well<br>7. Replacing the irrigation water source.<br>To determine if well production loss can be attributed to one of the project components, the PVWMA will allow well owners to enroll in a monitoring and mitigation program (MMP). PVMWA 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, PVWMA 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 PVWMA 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 PVWMA staff or their designee, for review and concurrence. | MMRP: HWQ-3 |
| **Fish Relocations.** Prior to, or concurrent with, draining of College Lake and/or dewatering of the construction site, special-status and other native fish species shall be captured and relocated by a qualified fisheries biologist. The following measures shall be taken to minimize harm and mortality to steelhead and other native fish resulting from fish relocation and dewatering activities:<br>1. Fish relocation shall be performed by a qualified fisheries biologist, with all necessary state and federal authorizations. Captured fish shall be moved to the nearest appropriate site outside of the work area. A record of relocation activities shall be maintained and include the date of capture and relocation, the method of capture, the location of the relocation site in relation to the Project site, and the number and species of fish captured and relocated;<br>2. Electrofishing shall be conducted by properly trained personnel following NOAA Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act, June 2000.<br>3. Prior to capturing fish, the most appropriate release location(s) shall be determined.<br>4. The most efficient method for capturing fish shall be determined by the biologist. Complex stream habitat generally requires the use of electrofishing equipment, whereas in outlet pools, fish may be concentrated by pumping-down the pool and then seining or dip-netting fish.<br>5. Handling of salmonids shall be minimized. However, when handling is necessary, hands or nets shall be wetted prior to touching fish. | BA for NMFS: Steelhead Conservation Measures<br>MMRP: BR-1a |

| | |
|---|---|
| 6. Captured fish shall be held in cool, shaded, aerated water in a container with a lid. Aeration shall be provided with a battery-powered external bubbler. Fish shall be protected from jostling and noise, and shall not be removed from this container until time of release.<br>7. Air and water temperatures shall be measured periodically. A thermometer shall be placed in holding containers and, if necessary, periodically conduct partial water changes to maintain a stable water temperature. If water temperature reaches or exceeds 18 degrees Celsius, fish shall be released and rescue operations ceased, if feasible.<br>8. Overcrowding in containers shall be avoided by having at least two containers and segregating young-of-year fish from larger age-classes to avoid predation. If fish are abundant, the capturing of fish and amphibians shall cease periodically and shall be released at the predetermined locations.<br>9. Species and year-class of fish shall be visually estimated at time of release. The number of fish captured shall be counted and recorded. Anesthetization or measuring fish shall be avoided unless requested by appropriate resource agencies (NMFS, CDFW).<br>10. Fish relocation activities are typically restricted to the period of June 15 through November 1. However, draining of College Lake may have to commence prior to June 1 to ensure the lake is fully drained prior to the start of construction. If lake draining commences prior to June 1 (as it regularly does under existing conditions), fish relocations would be timed accordingly. Given that steelhead present at the time of draining are likely to be smolts attempting to reach the ocean, pre-June 1 relocations concurrent with lake draining would ensure suitable downstream passage conditions and timing for relocated smolts. | |
| **Invasive Fish Species Control Plan.** PV Water shall develop an Invasive Fish Species Control Plan. PV Water would submit the plan to the appropriate resource agencies (CDFW, USFWS, and NMFS) for approval within one year of Project implementation. The Fish Species Control Plan shall be implemented at College Lake within two years of Project implementation. The Fish Species Control Plan shall include, at a minimum:<br>1. Measures describing PV Water's methods of draining College Lake to the greatest extent feasible;<br>2. Measures describing PV Water's methods, equipment, and timing of invasive species eradication efforts to be conducted in association with lake drawdown efforts;<br>Measures describing the frequency at which invasive species control efforts are to be implemented. | BA for NMFS: Steelhead Conservation Measures<br>MMRP: BR-2 |
| **Water Quality Adaptive Management for College Lake.** To learn about potential impacts of the Project on College Lake water quality and the quality of downstream water bodies, PV Water shall monitor College Lake water for indications of Cyanobacteria blooms. When the proposed weir crest is elevated to 62.5 feet NAVD88, PV Water shall monitor College Lake water temperature within the water column to establish whether a thermocline develops. PV Water shall use results of this monitoring to support the development of the Adaptive Management Plan (refer to Section 2.7) that establishes management actions to minimize the conditions that can contribute to algal blooms, including cyanobacteria blooms, such that this impact is mitigated. | MMRP: HYD-2a |
| **Avoid Flooding at Pajaro Dunes During Pumped Flow.** PV Water shall not pump flow exceeding fish passage requirements into Salsipuedes Creek until receiving approval from the Santa Cruz County Flood Control District indicating that pumped flow can occur without lagoon breaching, based on current water surface elevation conditions in Pajaro Lagoon. Existing hypsometric curves will be used to develop a lookup table to relate capacity of College Lake and Pajaro Lagoon that will assess whether pumped flows would require lagoon breaching. PV Water pumped flows shall not result in lagoon water surface elevations exceeding the threshold elevation identified based on the lookup table. The College Lake operations plan will discuss scenarios where lake draining activities may supersede lagoon flooding and breaching activities. | MMRP: HYD-3 |
| **Long-Term Monitoring of CA-SCR-44/H and CA-SCR-150.** PV Water shall retain a qualified archaeologist to conduct quarterly inspections of the portions of CA-SCR-44/H and CA-SCR-150 that overlap with the proposed lake storage area to ensure that lake water levels are not resulting in site erosion. If erosion or other indirect impacts are noted, PV Water shall work with the qualified archaeologist to develop a plan to protect the site(s) from further damage, or a plan to conduct data recovery of the affected portion(s) if protective measures are determined by PV Water to be infeasible. Quarterly inspections shall be conducted for two years after which time they shall be reduced to semi-annual inspections for an additional three years. If after five years no erosion or other indirect impacts are noted, the long-term monitoring program shall be discontinued. After each inspection, the qualified archaeologist shall prepare a memorandum documenting the results of the inspection with photographs. Memoranda shall be submitted to PV Water within 30 days of the completion of each inspection. | MMRP CUL-1i |

Sources: Mitigation Monitoring and Reporting Program, USFWS Biological Assessment, and NMFS Biological Assessment and Essential Fish Habitat Assessment for the College Lake Integrated Resource Management Project

# Appendix B
## Water Quality Monitoring Plan

*Final*

# Water Quality Monitoring Plan

**For**

# College Lake Integrated Resources Management Project

Prepared for

Pajaro Valley Water Management Agency

Prepared by

Mike Podlech, Aquatic Ecologist

March 2021

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# Water Quality Monitoring Plan for College Lake Integrated Resources Management Project

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# CHAPTER 1
# Introduction

## 1.1 Background

The Pajaro Valley Water Management Agency (PV Water) is planning to implement the College Lake Integrated Resources Management Project (College Lake Project or Project). The Project will store and divert water from College Lake for treatment, transmission, and distribution for agricultural irrigation. The primary purposes of the Project are to help balance the Pajaro Valley groundwater basin, prevent further seawater intrusion, and meet water supply needs in PV Water's service area by developing College Lake as a water storage and supply source. In support of this project, PV Water submitted water right Application A032881 to the State Water Resources Control Board for the storage and diversion of up to 3,000 acre-feet of water per year (AFY) at College Lake. The California Department of Fish and Wildlife (CDFW) initially protested the application but subsequently dismissed the protest conditionally, provided the water right permit contains a number of specific terms, including the following:

> "Prior to the initial diversion of water, the right holder shall submit to CDFW for written approval a College Lake water quality plan. The plan shall include appropriate lake water quality treatment measures, parameters, and water quality monitoring methodologies."

In October 2019, PV Water certified the *Final College Lake Integrated Resources Management Project Environmental Impact Report* (2019 EIR). The 2019 EIR identifies a potential for cyanobacteria blooms to occur in College Lake later in the summer if water of sufficient depth is present, given that the land uses in areas draining to College Lake are similar to those draining to nearby Pinto Lake where heavy cyanobacteria blooms have been documented in the past.[1] To mitigate this potential impact, the 2019 EIR stipulates implementation of the following measure:

> **Mitigation Measure HYD-2a: Water Quality Adaptive Management for College Lake**
>
> To learn about potential impacts of the Project on College Lake water quality and the quality of downstream water bodies, PV Water shall monitor College Lake water for indications of Cyanobacteria blooms. When the proposed weir crest is elevated to 62.5 feet NAVD88, PV Water shall monitor College Lake water temperature within the water column to establish whether a thermocline develops. PV Water shall use results of this monitoring to support the development of the Adaptive Management Plan (refer to Section 2.7 [of the 2019 Draft EIR]) that establishes management actions to minimize the conditions that can contribute to algal blooms, including cyanobacteria blooms, such that this impact is mitigated.

[1] Central Coast Regional Water Quality Control Board (CCRWQCB). 2015. *Progress Report to Support Development of Total Maximum Daily Loads Addressing Nutrients and Algal Toxins in Waterbodies of the Pinto Lake Catchment*, CCRWQCB, San Luis Obispo, CA.

This College Lake Water Quality Monitoring Plan has been prepared in response to the CDFW-requested protest dismissal term and the requirements of Mitigation Measure HYD-2a in the 2019 EIR.

## 1.2 Setting and Project Description

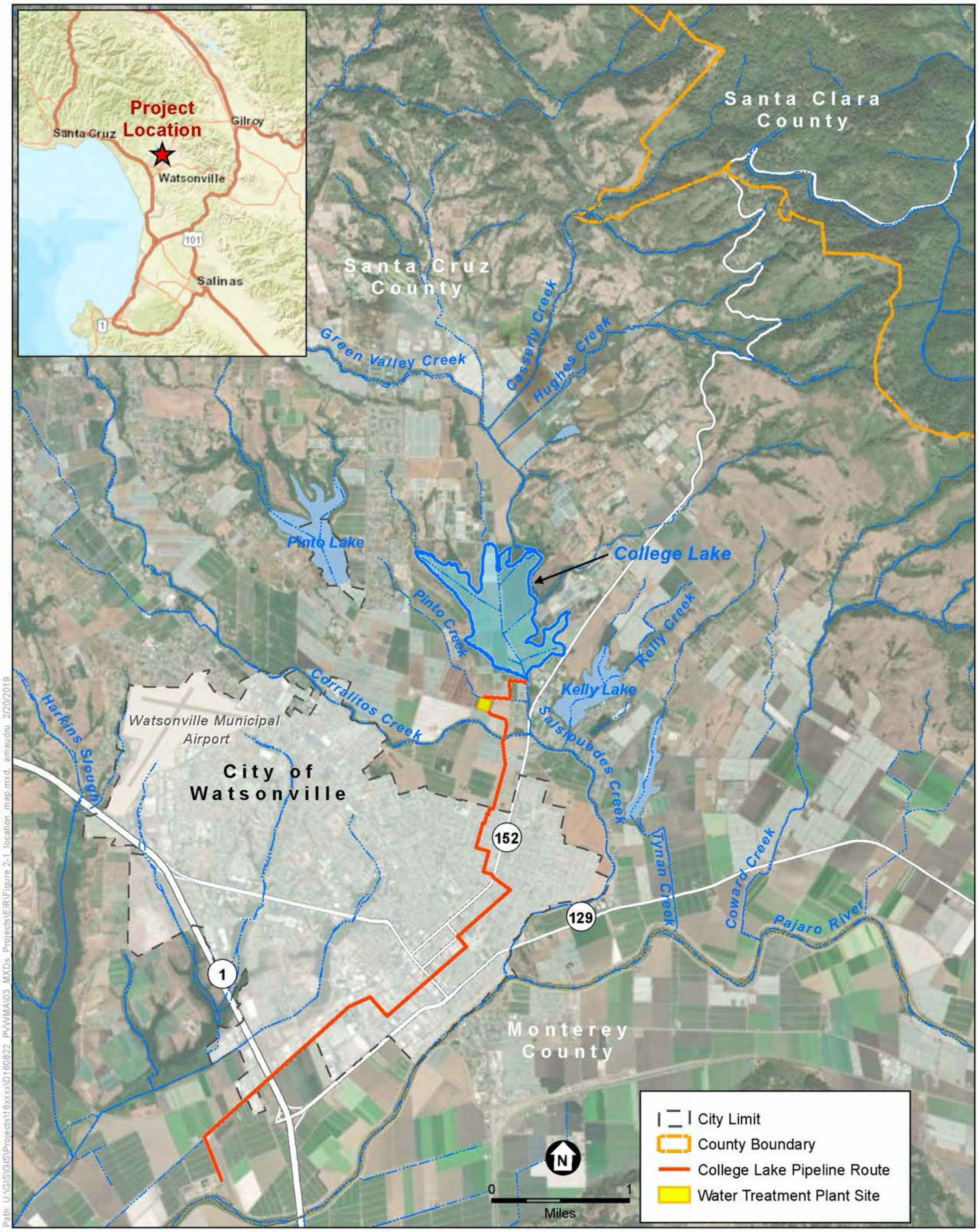
College Lake is a seasonal lake that forms in a topographic depression along the Zayante-Vergeles Fault zone. The lake receives inflows from several tributaries (including Green Valley, Casserly, and Hughes Creeks, shown on **Figure 1**) and drains into Salsipuedes Creek, which is a tributary to the Pajaro River. The College Lake watershed consists of approximately 11,000 acres of range, rural residential, and crop lands. Approximately 2,000 feet downstream of College Lake, surface water enters Salsipuedes Creek from Corralitos Creek. At times during the wet season, the flow direction in the reach of Salsipuedes Creek between College Lake and the Corralitos Creek confluence can reverse. When these conditions occur, surface water can flow from Corralitos and Salsipuedes creeks into College Lake. Flow magnitudes and directions in this reach of Salsipuedes Creek are controlled by several factors, including the water level of College Lake, the flow rate in Corralitos Creek, and the flow rate in Salsipuedes Creek downstream of the Corralitos Creek confluence. During wet years, surface water overflowing from Pinto Lake flows through a drainage channel (called Pinto Creek) into this reach of Salsipuedes Creek between College Lake and the Corralitos Creek confluence (**Figure 1**).

Under current conditions, Reclamation District 2049 (RD 2049) operates an existing weir and associated pump station located at the outlet of College Lake, which is at its south end. Flooding in and around College Lake occurs in association with wet weather events; during the wet season, water surface elevations regularly exceed the elevation of the existing weir (60.1 feet North American Vertical Datum of 1988 [NAVD88])). To allow summer farming in the lakebed, RD 2049 currently pumps water out of College Lake in the spring, usually beginning in mid-March, with each year's starting date depending on spring rain patterns. Pumping continues intermittently during the summer and fall as necessary to keep the lakebed dry while crops are growing. The purpose of the existing weir is to prevent water that is pumped from College Lake into Salsipuedes Creek from flowing back into the lake. Under existing RD 2049 operations, no water is pumped out of the lake for water supply purposes.

Under the Project, PV Water will construct a new adjustable weir to seasonally raise the controlled College Lake water surface level by up to 2.4 feet to an elevation of 62.5 feet NAVD88. Depending on water supply needs, PV Water will pump water from College Lake (either by direct diversions of water flowing into the lake or re-diversions of water previously stored in the lake) to a new water treatment plant. PV Water will convey the treated water through a new pipeline to its existing Coastal Distribution System (CDS) for deliveries to farmers who will use the water for irrigation in lieu of pumping equivalent amounts of groundwater.

## 1.3 Adaptive Management Plan

The 2019 EIR incorporates mitigation measures previously adopted by PV Water's Board of Directors under the 2014 Basin Management Plan (BMP) Update Programmatic EIR. Mitigation Measure BIO-2i.1 (Develop Adaptive Management Plan for College Lake Waterfowl Management and Multi-Species Mitigation) was included in the *Final Environmental Impact Report for the Basin Management Plan Update* (2014 BMP Update PEIR) in response to public comment. PV Water is committed to preparing an Adaptive Management Plan (AMP) as part of the College Lake Project, as outlined below:




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

College Lake Integrated Resources Management Project

**Figure 1**
Project Location Map

ESA

**BIO-2i.1: Develop Adaptive Management Plan for College Lake Waterfowl Management and Multi- Species Mitigation.** To mitigate impacts to existing waterfowl or waterfowl habitat at College Lake, an Adaptive Management Plan for waterfowl management and multi-species mitigation will be developed with the consultation of the state and federal resource agencies and College Lake stakeholders. The Adaptive Management Plan for waterfowl management and multi-species mitigation at College Lake will develop multi-year baseline waterfowl population and habitat use data for future project design, environmental permitting and CEQA impact analysis of project-level alternatives. To the extent practical, it will integrate the results of ongoing College Lake hydrology and hydraulic analyses, as well as future consultations with state and federal agencies on fish flows and fish bypass criteria.

The Management Plan will be specific to the level of impact and mitigations under site-specific and project implementation conditions. However, the following standards will apply as defined during project-level design, regulatory review and CEQA analysis: The Management Plan should include terms and conditions from applicable permits and agreements as appropriate and define provisions for monitoring assignments, scheduling, and responsibility. The Management Plan should also include habitat replacement and revegetation, protection during ground-disturbing activities, performance standards, maintenance criteria, and monitoring requirements for temporary and permanent impacts consistent with mitigation in this EIR and regulatory requirements during project- specific review. The Management Plan will be in conformance with the biology mitigation measures from this EIR, and will also include terms and conditions consistent regulatory requirements as applicable from the USFWS, USACE, SWRCB, and CDFW permits during project design and permitting as applicable. The Management Plan will be prepared for project level project implementation as determined needed through future CEQA review and consultation with agencies as required under CESA and ESA.

Adaptive management is defined as "a framework and flexible decision-making process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvements in management planning and implementation of a project to achieve specified objectives."[2] An adaptive management approach provides a structured process that allows for taking action under uncertain conditions based on the best available science, closely monitoring and evaluating outcomes, and re-evaluating and adjusting decisions as more information is learned.[3] Adaptive management encourages an ecosystem-level approach to resource management and promotes collaboration among scientists, managers, and other stakeholders on decisions. To be effective, that decision-making processes must be flexible enough to adjust in the face of uncertainties, variances or other unforeseen outcomes from management actions and other external events. With an established AMP, the project will be set up to use tools such as monitoring, modeling, or other applied studies to generate the science-based information that managers need for decision-making. Once this information is available, managers can "Adapt" a project. If needed, possible adaptive management actions include additional studies or monitoring and corrective on-the-ground actions. It is imperative when approaching a project with significant uncertainties, that all stages of the "Plan" phase are open to adaptive management consideration.

In response to environmental review and permitting requirements, the College Lake Project is generating several plans that are related to adaptive management. These include this water quality monitoring plan, a steelhead (*Oncorhynchus mykiss*) monitoring plan, an invasive species management plan, an operations and maintenance

2 2011 California Water Code, Division 35. Sacramento-San Joaquin Delta Reform Act of 2009, Chapter 4, Section 85052.

3 California Department of Fish and Wildlife, Adaptive Management. Available online at https://www.dfg.ca.gov/erp/adaptive_management.asp. Accessed on August 6, 2019.

(O&M) plan, and a water right compliance plan. All of these plans have a role in the project process and will need to be comprehensively considered in the adaptive management process. The intention is for the AMP to serve as an umbrella document where the data and information generated by these various elements can be evaluated holistically in the context of the project objectives. The AMP therefore will become a critical process document and serve as the central organizing "spine" of most of the other plans, including this water quality monitoring plan. Most of these plans will already be complete prior to the development of the AMP. As such, the AMP will include a feedback process to each of those plans to account for any future management decisions that have the potential to ripple through various other documents. Since these other plans are driven largely by the regulatory process, the AMP will have to account for a process by which stakeholder education and feedback are incorporated back into those plans through the adaptive management process if warranted. For example, if data collected during implementation of this water quality monitoring plan indicate that a parameter exceeds a certain pre-determined threshold, it may trigger an adaptive management action such as source identification, targeted treatment, or perhaps a direct change in water management. Conversely, the management action may then necessitate additional/refined water quality monitoring. PV Water would be responsible for reporting action triggers and implementing management actions based on these triggers as part of the development of the AMP. In short, this water quality monitoring plan is intended to feed science-based data and information into the adaptive management decision-making process, which may include, among others, adaptively managed changes to this monitoring plan itself.

# CHAPTER 2
# Monitoring Plan Design

## 2.1 Existing PV Water Surface Water Monitoring

PV Water has been collecting water quality data in College Lake since 1994. PV Water's current monitoring program includes bimonthly (i.e., every two months) grab samples collected at the College Lake pumphouse located immediately upstream of the existing weir and monthly sampling when accessible (approximately spring through fall) collected at another College Lake site (added to the program in May 2019), located approximately 800 feet upstream of the pumphouse. Samples are submitted to an Environmental Laboratory Approval Program (ELAP) certified laboratory for analysis of the constituents listed in **Table 1**. Since 2012, PV Water has also been operating a pressure transducer data logger at the pumphouse site to collect continuous (15-minute interval) pressure, depth, water temperature, actual conductance, and specific conductance data. At the upstream sampling site, the monthly grab sample data is currently augmented by biweekly (i.e., every two weeks) field measurements of water temperature, dissolved oxygen (DO), specific conductance, turbidity, and hydrogen ion concentration (pH).

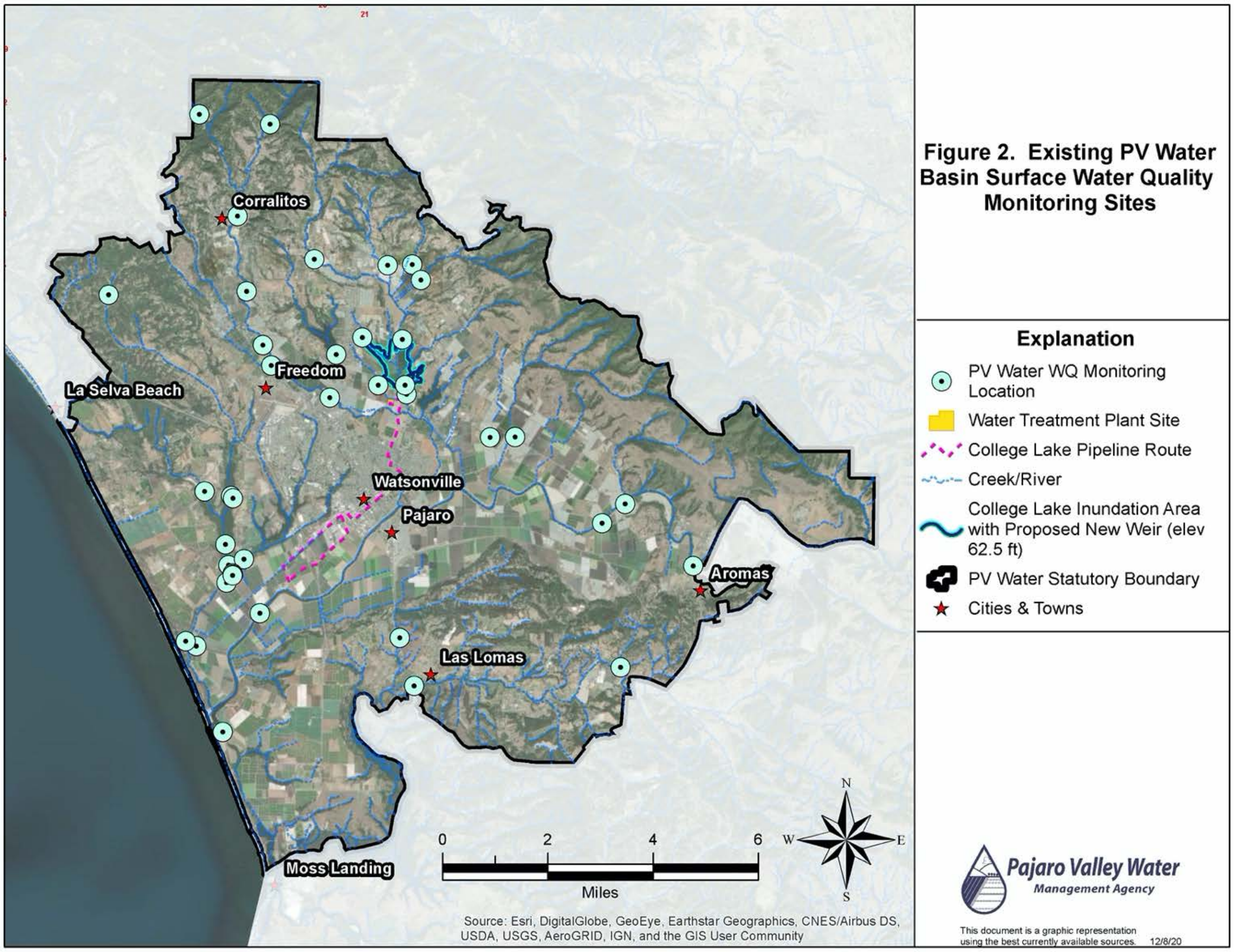
In addition to the two College Lake sampling sites, PV Water also conducts bimonthly (i.e., every two months) water quality monitoring for the majority of constituents listed in Table 1 in a number of College Lake inflow tributaries, including Green Valley, Casserly, and Hughes creeks, as well as other sites within the Pinto Lake and Corralitos Creek sub-basins that may contribute surface water inflows to College Lake during certain backflow conditions (i.e., when Corralitos Creek flows are high). **Figure 2** depicts the sampling locations of PV Water's current basin-wide water quality monitoring program.

As part of the planning process for the Project, PV Water conducted a study in 2017 to characterize the lake water quality for the conceptual design of the College Lake treatment plant. While the study was mostly based on historical water quality data collected by PV Water, grab samples were collected and analyzed for algae and algal toxins. In April, May, and July 2017, cyanobacteria were present in College Lake in low concentrations and none of the toxins analyzed (microsystins, anatoxin-a, cylindrospermopsin) were detected. However, during a visual bloom on September 13, 2017, the sample contained 1,130 cyanobacteria cells per milliliter (#/ml), but again none of the toxins analyzed were detected. For reference, cyanobacteria concentrations of more than 100,000 cells per ml have been measured in nearby Pinto Lake.

**TABLE 1**

**COLLEGE LAKE WATER QUALITY CONSTITUENTS CURRENTLY MONITORED BY PV WATER**

| Constituent | Methodology | | Units |
|---|---|---|---|
| Alkalinity, Total (as CaCO3) | SM2320B | mg/L | Alkalinity, Total (as CaCO3) |
| Anion-Cation Balance | Calculation | | % |
| Bicarbonate (as HCO3-) | SM2320B | | mg/L |
| Boron | EPA200.7 | | mg/L |
| Bromide | EPA300.0 | mg/L | Bromide |
| Calcium | EPA200.7 | mg/L | Calcium |
| Carbonate as CaCO3 | SM2320B | mg/L | Carbonate as CaCO3 |
| Chloride | EPA300.0 | mg/L | Chloride |
| Fluoride | EPA300.0 | mg/L | Fluoride |
| Hardness (as CaCO3) | SM2340B/Calc | mg/L | Hardness (as CaCO3) |
| Langlier Index, 15°C | SM2330B | | NA |
| Langlier Index, 60°C | SM2330B | NA | Langlier Index, 60°C |
| Magnesium | EPA200.7 | mg/L | Magnesium |
| Nitrate as N | EPA300.0 | mg/L | Nitrate as N |
| Nitrate+Nitrite as N | EPA300.0 | mg/L | Nitrate+Nitrite as N |
| Nitrite as N | EPA300.0 | mg/L | Nitrite as N |
| Orthophosphate as P | EPA300.0 | mg/L | Orthophosphate as P |
| pH (Laboratory) | SM4500-H+B | pH (H) | pH (Laboratory) |
| Potassium | EPA200.7 | mg/L | Potassium |
| QC Anion Sum x 100 | Calculation | % | QC Anion Sum x 100 |
| QC Cation Sum x 100 | Calculation | | % |
| QC Ratio TDS/SEC | Calculation | NA | QC Ratio TDS/SEC |
| SAR (Sodium Adsorption Ratio) | Suarez, 1981 | | NA |
| SAR, Adjusted | Suarez, 1981 | | NA |
| Sodium | EPA200.7 | mg/L | Sodium |
| Specific Conductance (EC) | SM2510B | µmhos/cm | Specific Conductance (EC) |
| Sulfate | EPA300.0 | mg/L | Sulfate |
| Total Dissolved Solids | SM2540C | | mg/L |
| Total Suspended Solids | SM2540D | mg/L | Total Suspended Solids |
| Turbidity | EPA180.1 | NTU | Turbidity |




## 2.2 Monitoring Plan Goals and Objectives

Seasonal hydrology, lake management, and surrounding land uses can affect water quality in lakes. College Lake has been actively managed for agricultural production for a century, and farming will continue to occur on surrounding lands. Implementation of the Project will alter the existing hydrologic regime of College Lake, primarily during the summer and fall when the lake will be operated for water supply storage and diversion rather than agricultural production, thereby extending the duration, extent, and depth of lake inundation compared to existing (mostly dry) summer and fall conditions. Although PV Water has been collecting water quality data from the in-lake drainage channel during the summer and fall period, the lakebed has not been inundated during the dry season for approximately 100 years[4], and baseline water quality data are therefore not available for such conditions. Therefore, it will be necessary to establish a new summer/fall water quality baseline for College Lake.

[4] RD 2049 was formed in 1920 and was granted express legal authority under State law (California Water Code Section 50000 et. seq.) to pump water from College Lake to reclaim the land for agricultural production.

The goals of this plan are to develop a program for monitoring water quality in and around College Lake to (1) conform with EIR Mitigation Measure HYD-2a and the CDFW water right protest dismissal term, (2) contribute to an understanding of the evolution of aquatic habitat conditions under a new management and hydrologic regime, and (3) generate data and insights that will support the adaptive management decision-making process.

The primary objectives of the College Lake Water Quality Monitoring Plan are to:

(1) determine if and how the water quality characteristics of the lake are affected by PV Water's implementation of the College Lake Integrated Resources Management Project (i.e., seasonally deeper lake, extended inundation period);

(2) evaluate the temporal and spatial suitability of the lake's water quality for biological resources (e.g., fish and wildlife) during target seasons (e.g., winter, spring) under Project operations; and

(3) establish whether a thermocline and/or other conditions conducive to potential cyanobacteria blooms develop in the lake.

These objectives will be met through routine sampling (grab sampling) and continuous measurements (sonde deployment) and analysis of surface water quality parameters at selected sites to capture spatial (upstream, downstream, and within College Lake) and temporal (annual, seasonal, rainfall-driven) trends in water quality.

During the initial 3-5 years of Project operations, a broad monitoring protocol will be implemented to develop a thorough understand of spatial and temporal variabilities in water quality parameters throughout the lake, particularly during the summer and fall storage and diversion period. Depending on the results obtained during this initial period, the scope of the monitoring program may later be reduced or otherwise modified. For example, if data indicate relatively homogenous conditions throughout the lake, a reduction in the number of data collection sites and/or events may be considered through the AMP.

## 2.3 Monitoring Parameters

The focus of PV Water's existing monitoring program is to track water quality to ensure suitability for water supply and distribution. However, the program already includes a number of parameters (e.g., temperature, turbidity, pH, etc.) that are also relevant to seasonal habitat suitability for fish and wildlife species. In addition, sampling for nitrate and orthophosphate under the existing monitoring program allows PV Water to monitor whether concentrations of these constituents approach levels that may promote toxic algal blooms such as those documented to occur in nearby Pinto Lake.[5] PV Water's extensive existing program therefore provides a strong foundation for the College Lake Water Quality Monitoring Plan. This College Lake Water Quality Monitoring Plan adopts portions of the existing monitoring program that are directly relevant to College Lake such as in-lake and source tributary sampling sites and parameters, and expands upon those with additional parameters related to cyanobacteria bloom monitoring, as well as additional sampling sites, frequencies (see Section 2.4), and sampling methods (i.e., additional continuous sonde deployments). Components of the existing basin-wide monitoring

[5] Central Coast Regional Water Quality Control Board (CCRWQCB). 2015. *Progress Report to Support Development of Total Maximum Daily Loads Addressing Nutrients and Algal Toxins in Waterbodies of the Pinto Lake Catchment*, CCRWQCB, San Luis Obispo, CA.

program that are not specifically included in this College Lake Water Quality Monitoring Plan remain discretionary to PV Water.

Parameters selected for this College Lake Water Quality Monitoring Plan include periodic grab sampling of the constituents listed in Table 1 as well as algal identification/enumeration and cyanotoxins listed in Table 2. In addition to periodic grab sampling, additional sondes will be deployed in-lake for continuous sampling of depth, water temperature, dissolved oxygen, specific conductance, pH, chlorophyll-a, and phycocayanin. Monthly profile sampling of water temperature, dissolved oxygen, specific conductance, chlorophyll-a, and water clarity (Secchi depth) will alos be conducted. Sampling locations and frequencies are described in Section 2.4 below and summarized in Table 3.

**TABLE 2**

**ADDITIONAL CONSTITUENTS FOR COLLEGE LAKE WATER QUALITY MONITORING PLAN**

| Constituent | Methodology | Units |
|---|---|---|
| Algal identification and enumeration | Microscopy | #/ml |
| Microcystins, total | EPA Method 546 | mg/L |
| Anatoxin-a | EPA Method 545 | mg/L |
| Cylindrospermopsin | EPA Method 545 | mg/L |

## 2.4 Monitoring Locations and Frequency

Sampling locations for the College Lake Water Quality Monitoring Plan were selected based on (a) in-lake and source inflow sites currently sampled by PV Water, (b) an additional in-lake site to assess spatial variability, (c) additional in-lake sonde deployment to assess vertical variability, and (d) an outflow sampling site downstream of the new weir to monitor potential effects of lake water quality on downstream waterways (i.e., Salsipuedes Creek and Pajaro River). In total, the monitoring program consists of six sampling sites: Two in-lake sites (CL1 and CL2), three inflow sites (CA2W, CA2E, PLO)[6], and one outflow site (SA1). Sampling site locations are depicted in **Figure 3**.

Grab samples for analysis of Table 1 constituents will be collected at monthly intevals at all six sampling sites when surface water is present, as well as during or immediatley following the first runoff event of the season (i.e., first flush sampling). In parallel, grab samples for the parameters listed in Table 2 will be collected at the in-lake (CL1 and CL2) and outflow (SA1) sites. Field equipment will be used to measure water temperature, DO, and specific conductance concurrent with grab sample collection.

Multi-parameter sondes for continuous (i.e., hourly) measurements of water temperature, DO, and specific conductance will be deployed at the two in-lake sites (CL1 and CL2). At each sampling site, a pair of sondes will be deployed to assess vertical variability and potential stratification: one approximately 0.5 ft below the water surface (i.e., attached to floating buoy) and one approximately 0.5 ft above the lake bottom. In addition, the surface sondes will also be fitted with chlorophyll-a and phycocyanin sensors to support characterization of

[6] Note that existing inflow sampling site CA2E is located on Casserly Creek downstream of the Green Valley Creek and Hughes Creek confluences and is therefore representative of cumulative water quality conditions entering the lake. Water quality monitoring at existing sampling locations within each of the main upper watershed tributaries will continue as part of PV Water's existing basinwide monitoring program.

potentially harmful algal bloom conditions. The continuous monitoring sondes will be operated year-round unless the lake water surface elevation at the individual sonde location falls below the elevation of individual sondes during lake drawdown or sondes have to be removed temporarily to protect them from damage (e.g., major storm events). Deployment of top and bottom sondes will allow for increased resolution of temporal (e.g., diel, ambient weather, etc) and spatial variability to augment potential stratification information derived from monthly profiles. Should sonde data prove superfluous after a few initial (3-5) years of operation (e.g., no evidence of thermocline), the bottom sondes may be considered for elimination from the monitoring program through the AMP process.

Vertical-profile measurements of water temperature, DO, specific conductance, chlorophyll-a, and water clarity (Secchi depth) will be conducted at monthly intervals at the two in-lake sampling locations using multi-probe field instruments and a Secchi disk. The vertical profile measurements will be conducted at 1-foot depth intervals concurrent with the monthly grab sampling of Table 1 and Table 2 constituents.

The sampling parameters and frequencies for each monitoring location are summarized in **Table 3**. Each monthly sampling event will occur at approximately the same time of day.

**TABLE 3**

**WATER QUALITY MONITORING SITES, PARAMETERS, AND FREQUENCIES**

| Source | Sampling Site | Parameter | Sampling Method | Frequency |
|---|---|---|---|---|
| College Lake (at weir) | CL1 (existing site) | Table 1 (existing) Table 2 | Grab | Monthly + First Flush |
| | | Temp, DO, Conductance, Depth, Chlorophyll-a, Phycocyanin | Surface sonde | Continuous |
| | | Temp, DO, Conductance | Bottom sonde | Continuous |
| | | Temp, DO, Conductance, Chlorophyll-a, Clarity (Secchi depth) | 1 ft vertical profiles | Monthly |
| College Lake (mid-lake) | CL2 (new site) | Table 1 (existing) Table 2 | Grab | Monthly + First Flush |
| | | Temp, DO, Conductance, Depth, Chlorophyll-a, Phycocyanin | Surface sonde | Continuous |
| | | Temp, DO, Conductance | Bottom sonde | Continuous |
| | | Temp, DO, Conductance, Chlorophyll-a, Clarity (Secchi depth) | 1 ft vertical profiles | Monthly |
| College Lake Inflow | CA2W, CA2E, PLO (existing sites) | Table 1 (existing) | Grab | Monthly + First Flush |
| College Lake Outflow | SA1 (new site) | Table 1 (existing) Table 2 | Grab | Monthly + First Flush |

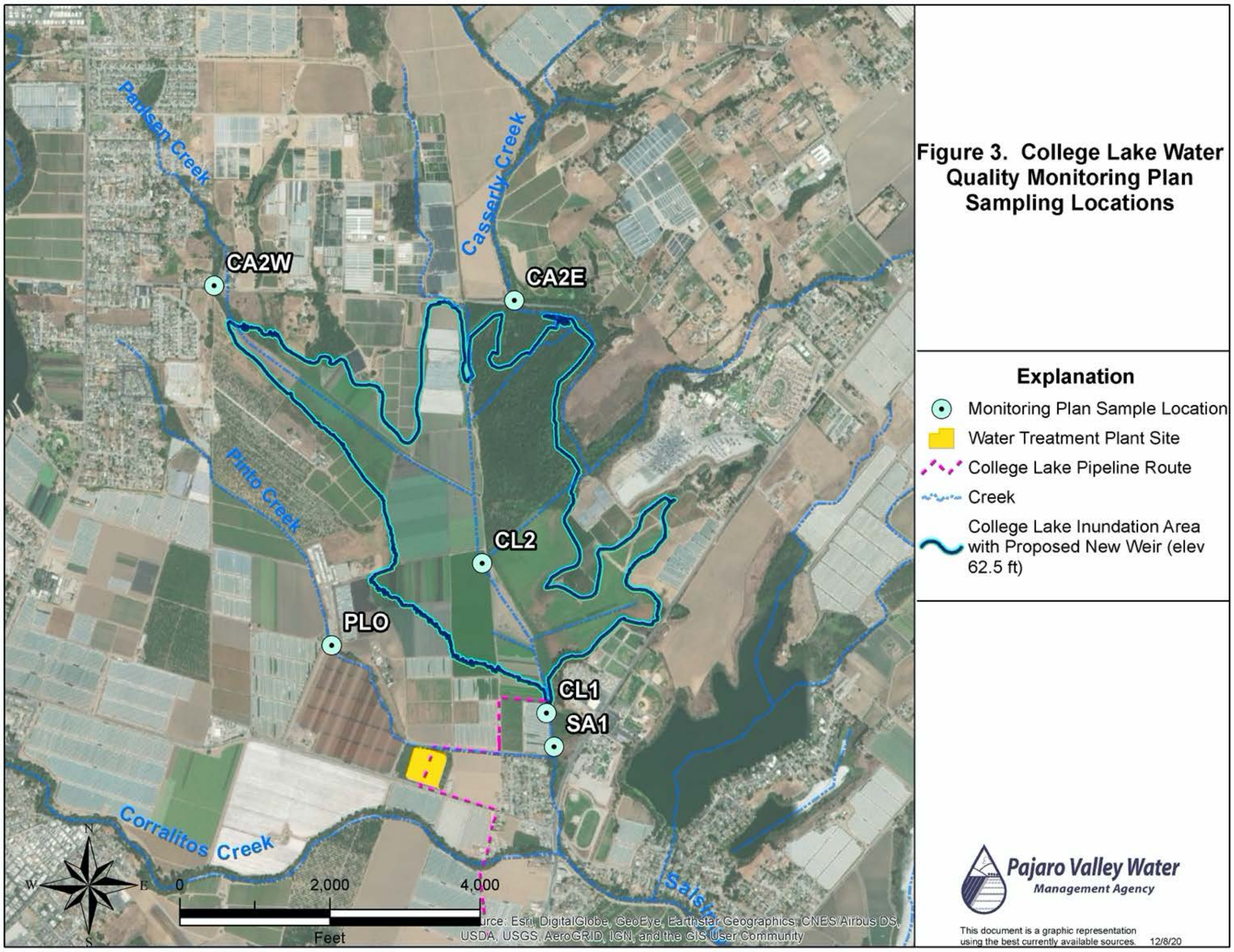


Figure 3. College Lake Water Quality Monitoring Plan Sampling Locations

## 2.5 Sampling and Analysis Methodologies

### 2.5.1 Field Measurement Methods

Field measurements will be collected in situ using a multi-parameter water quality meter with probes to record water temperature, DO, and specific conductance in accordance with CDFW's Standard Operating Procedure (SOP) for the *Collections of Water and Bed Sediment Samples with Associated Field Measurements and Physical Habitat in California*.[7] Manufacturer's instructions for instrument setup, calibration, and sample collection will be followed. Ambient data such as date, time, weather conditions (e.g., cloud cover), and air temperature will also be recorded. Depending on sampling location and ambient conditions, samples will be collected from a small boat, wading, or from shore using a pole sampler. During vertical profiling at in-lake sampling sites, probes will be maintained at each sampling depth until readings stabilize. Field measurement instruments will be serviced

[7] California Department of Fish and Wildlife (CDFW). 2014. *Collections of Water and Bed Sediment Samples with Associated Field Measurements and Physical Habitat in California*, Version 1.1 updated March-2014, Surface Water Ambient Monitoring Program, Marine Pollution Studies Laboratory – Department of Fish and Wildlife.

regularly in accordance with manufacturer specifications. Measurement results will be recorded on data sheets and electronically stored on the meter until data is transferred to computer spreadsheet software. Multi-parameter sondes will be downloaded, checked, cleaned, and calibrated on a monthly basis in accordance with manufacturer instructions.

To ensure sampling crew safety during high streamflow events at the lake inflow and outflow sites, extendable dipsticks will be used to collect samples from a distance of up to 16 feet. If conditions are unsafe even for dipstick sample collection, staff will wait for peak flows to pass and sample during receding flows.

### 2.5.2 Sample Collection for Laboratory Analyses

Surface water samples will be analyzed for the parameters shown in Tables 1 and 2. Grab samples will be collected in accordance with the CDFW SOP for the *Collections of Water and Bed Sediment Samples with Associated Field Measurements and Physical Habitat in California*[8] using laboratory-approved containers appropriate for the analyte and analytical method requirements of the laboratory. Sample bottles (i.e., container type, sample volume, preservative requirements) and holding time until analysis will be provided by the contracted laboratory.

### 2.5.3 Laboratory Analyses

Water samples will be submitted to a California Environmental Laboratory Accreditation Program (ELAP) ELAP-accredited analytical laboratory within the specified holding time and temperature. ELAP-certified analytical methods, including appropriate detection limits and reporting accuracy, will be applied by the California ELAP-accredited laboratory.

The approved laboratory will perform industry-accepted quality control measures to maintain the analytical testing process within acceptable limits of accuracy and precision. Method blanks, laboratory control samples, second source samples, matrix spikes, duplicates, and replicates will be utilized and analyzed as applicable for each parameter. Quality control requirements for each analytical technique will be provided by the approved laboratory and included in the annual College Lake Water Quality Monitoring Program reports.

## 2.6 Reporting Procedures

Field and laboratory data from the six sampling sites will be synthesized, analyzed, and reported annually. The analysis will include spatial and temporal comparisons of water quality data and possible sources (e.g., inflows, management practices) of any water quality changes observed. Monitoring results will be compared to relevant habitat suitability thresholds, toxicity thresholds, and Central Coast Regional Water Quality Control Board (CCRWQCB) Basin Plan and Total Maximum Daily Load (TMDL) objectives, where applicable. Site-specific performance criteria will be developed through the AMP process to evaluate whether objectives are being achieved.

[8] California Department of Fish and Wildlife (CDFW). 2014. *Collections of Water and Bed Sediment Samples with Associated Field Measurements and Physical Habitat in California*, Version 1.1 updated March-2014, Surface Water Ambient Monitoring Program, Marine Pollution Studies Laboratory – Department of Fish and Wildlife.

Given the lack of baseline data directly applicable to future conditions in College Lake under the Project, it is likely that too little data will be available in the first few years to make statistically significant assessments of the results. However, as the datasets grow over several years, confidence in the analysis should increase.

An annual report will describe monitoring efforts over the prior hydrologic year (October 1 – September 30) and will be submitted to CDFW, CCRWQCB, and National Marine Fisheries Service (NMFS) by February 1 of the following year. If requested, raw data collected during monthly in-lake profile measurements will be provided to CDFW, CCRWQCB, and NMFS staff within 7 days of sample collection.

# CHAPTER 3
# Response Actions

As described in Section 1.3 above, College Lake and the Project will be managed adaptively through an AMP. The AMP will serve as an umbrella document where the data and information generated by various monitoring efforts, including the water quality monitoring program, can be evaluated holistically in the context of the project objectives. The AMP will provide a set of objectives and an associated set of monitored parameters. The AMP will also define thresholds for the monitored parameters that when exceeded would require management actions (i.e., action triggers). The exact management action will depend on the nature of the problem and the appropriate remedies available. Typically, the first management action will be to conduct a thorough review of the available information that can inform project managers regarding the applicability of various actions. Often, technical experts (both associated with and external to the project, as warranted) will be consulted before taking a management action to analyze the relevant information and provide a range of appropriate management actions, including their risks and costs.

Within the context of the AMP, the annual report (Section 2.6) for this water quality monitoring program will provide the values of monitored parameters to be compared to the values of the action triggers, related discussions of the potential reasons for any threshold exceedences and, if warranted, will make recommendations for potential remedial response action for consideration by PV Water and regulatory stakeholders (CDFW, CCRWQCB, NMFS) through the adaptive management process. Depending on the source of the adverse conditions (e.g., lake inflows vs. project operations), PV Water will identify feasible response actions. For example, if lake inflows are found to contain high concentrations of nutrients, PV Water may propose to conduct outreach to upstream landowners to discuss potential remedial actions. If adverse conditions are determined to be the direct cause of lake management practices, PV Water will coordinate with regulatory stakeholders to identify potential response actions that are consistent with Project needs and objectives. It should be noted that some water quality conditions that are typically considered adverse (e.g., high summer water temperatures) are fully expected to occur in this broad, shallow lake and would not require response actions.

CDFW's water right protest dismissal term requests that the College Lake Water Quality Monitoring Plan include "appropriate lake water quality treatment measures". As noted previously, College Lake has not been inundated during the summer and fall for approximately 100 years under current management practices. As such, insufficient data is currently available to allow for meaningful predictions of potential water quality concerns that may arise or how to treat them if they do arise. For example, cyanobacterial blooms that have occurred in nearby Pinto Lake in the past have been successfully treated with aluminum sulfate.[9] However, incorporating a treatment recommendation based on Pinto Lake experiences into this College Lake Water Quality Monitoring Plan prior to implementation of the Project and associated water quality monitoring would be premature as significant difference in Pinto Lake conditions (perennially wetted) and future College Lake conditions (seasonally dry)

[9] Central Coast Regional Water Quality Control Board (CCRWQCB). 2015. *Progress Report to Support Development of Total Maximum Daily Loads Addressing Nutrients and Algal Toxins in Waterbodies of the Pinto Lake Catchment*, CCRWQCB, San Luis Obispo, CA.

could potentially affect treatment effectiveness. Instead, PV Water would outline potential response action alternatives in the annual monitoring reports for consideration by AMP stakeholders, including CDFW, CCRWQCB, and NMFS. In the case of the cyanobacteria bloom example above, such a recommendation may include coordination with the California Cyanobacteria and Harmful Algal Bloom Network (CCHAB), a statewide interagency workgroup assembled to work towards the development and maintenance of a comprehensive, coordinated program to identify and address the causes and impacts of cyanobacteria and harmful algal blooms, to evaluate site-specific College Lake treatment options.

In addition to applying the holistic, ecosystem-level approach of the AMP to resolving potential water quality concerns, the feedback loop aspect of adaptive management may lead to recommendations for modifications to the College Lake Water Quality Monitoring Program itself. For example, the frequency of sample collection may be increased for greater temporal resolution, or parameters may be added to fill data gaps. Conversely, parameters or sampling sites that prove superfluous over time may be eliminated.

# Appendix C
## Steelhead Monitoring Plan

# Steelhead Monitoring Plan

**For**

College Lake Integrated Resources Management Project

Prepared for

Pajaro Valley
Water Management Agency

Prepared by

Mike Podlech, Aquatic Ecologist

February 2022

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# Steelhead Monitoring Plan for College Lake Integrated Resources Management Project

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# CHAPTER 1
# Introduction

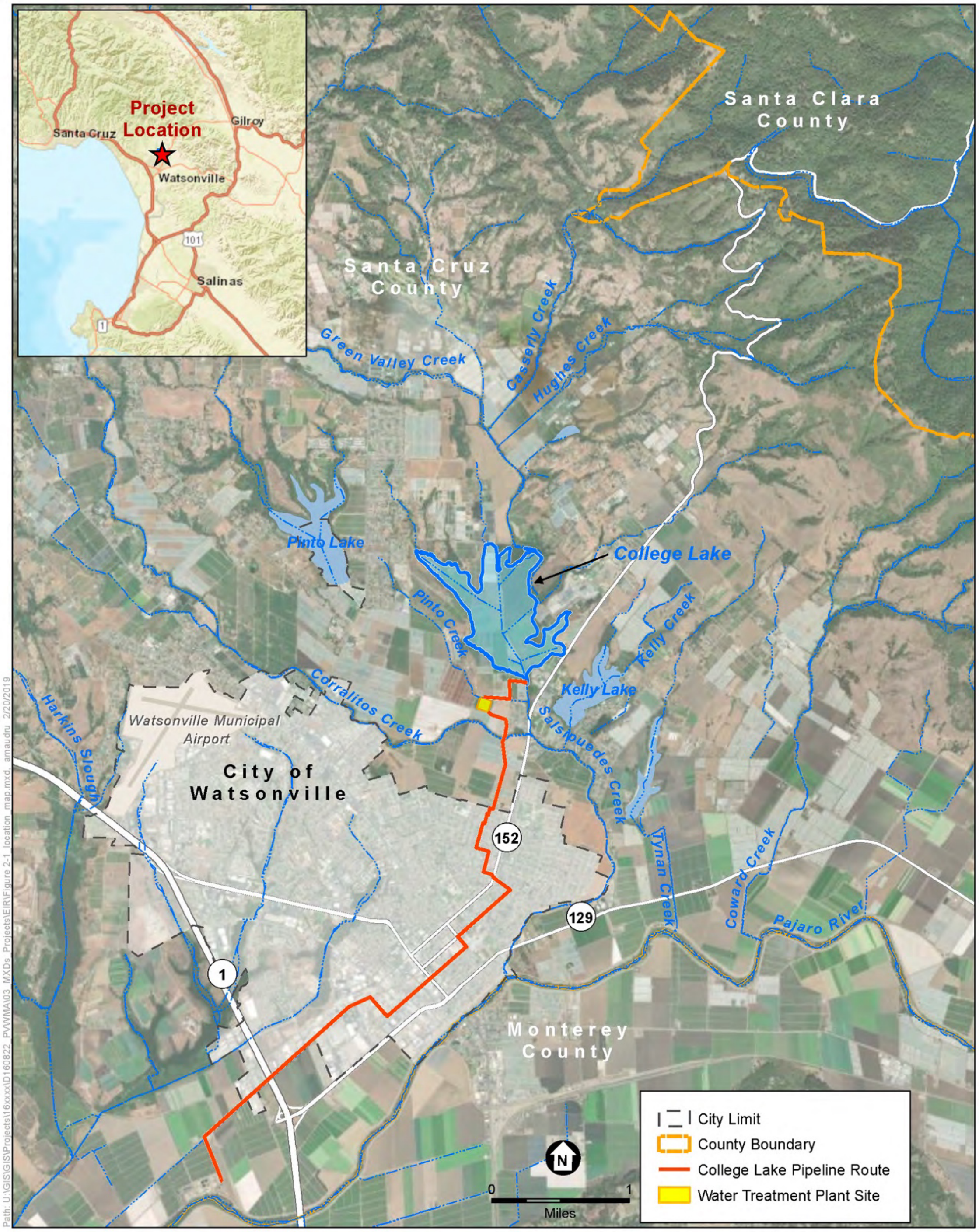
## 1.1 Background

The Pajaro Valley Water Management Agency (PV Water) is planning to implement the College Lake Integrated Resources Management Project (College Lake Project or Project). The project will store and divert water from College Lake for treatment, transmission, and distribution for agricultural irrigation. The primary purposes of the Project are to help balance the Pajaro Valley groundwater basin, prevent further seawater intrusion, and meet water supply needs in PV Water's service area by developing College Lake as a water storage and supply source. On December 7, 2021, the State Water Resources Control Board (SWRCB) issued Water Right Permit 21422 (Application A032881) to PV Water for the storage and diversion of up to 3,000 acre-feet of water per year (AFY) at College Lake.

PV Water, following negotiations with the National Marine Fisheries Service (NMFS) and the California Department of Fish and Wildlife (CDFW) regarding protests filed on the original water right permit application, reached a protest settlement agreement that included condition that PV Water shall prepare a steelhead (*Oncorhynchus mykiss*) monitoring plan, obtain written approvals of CDFW and NMFS for this plan, and implement the approved plan. Water right hearing testimony provided by NMFS staff indicated that the intended goals of the monitoring plan are to "evaluate fish passage success past the weir and the performance of the bypass flows for meeting fish passage objectives" and that NMFS also expects "the steelhead monitoring plan would provide information on residence times and growth rates of juvenile steelhead that rear in College Lake." This Steelhead Monitoring Plan has been prepared in compliance with Term 14 of Water Right Permit 21422.

## 1.2 Setting and Project Description

College Lake is a seasonal lake that forms in a topographic depression along the Zayante-Vergeles Fault zone. The lake receives inflows from several tributaries (including Green Valley, Casserly, and Hughes Creeks, shown on **Figure 1**) and drains into Salsipuedes Creek, which is a tributary to the Pajaro River. The College Lake watershed consists of approximately 11,000 acres of range, rural residential, and crop lands. Approximately 2,000 feet downstream of College Lake, surface water enters Salsipuedes Creek from Corralitos Creek. At times during the wet season, the flow direction in the reach of Salsipuedes Creek between College Lake and the Corralitos Creek confluence can reverse. When these conditions occur, surface water can flow from Corralitos and Salsipuedes creeks into College Lake. Flow magnitudes and directions in this reach of Salsipuedes Creek are controlled by several factors, including the water level of College Lake, the flow rate in Corralitos Creek, and the flow rate in Salsipuedes Creek




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

College Lake Integrated Resources Management Project

**Figure 1**
Project Location Map

ESA

downstream of the Corralitos Creek confluence. During wet years, surface water overflowing from Pinto Lake flows through a drainage channel (called Pinto Creek) into this reach of Salsipuedes Creek between College Lake and the Corralitos Creek confluence (Figure 1).

Under current conditions, Reclamation District 2049 (RD 2049) operates an existing weir and associated pump station located at the outlet of College Lake, which is at its south end. Flooding in and around College Lake occurs in association with wet weather events; during the wet season, water surface elevations regularly exceed the elevation of the existing weir (60.1 feet North American Vertical Datum of 1988 [NAVD88]). To allow summer farming in the lakebed, RD 2049 currently pumps water out of College Lake in the spring, usually beginning in mid-March, with each year's starting date depending on spring rain patterns. Pumping continues intermittently during the summer and fall as necessary to keep the lakebed dry while crops are growing. The purpose of the existing weir is to prevent water that is pumped from College Lake into Salsipuedes Creek from flowing back into the lake.

South-central California coast (S-CCC) Distinct Population Segment (DPS) steelhead, a federally-listed threatened species, are known to utilize College Lake seasonally for winter and spring juvenile rearing prior to outmigration to the ocean.[1] However, the current practice of draining College Lake through pumping occurs annually during the peak juvenile (smolt) steelhead outmigration period. The current operations do not account for fish passage past the existing weir and consequently a presumably large portion of the steelhead smolt population in College Lake and the upstream watershed are currently prevented from migrating to the ocean. An unknown number of juvenile steelhead likely perish annually in the drawn-down lake or as a result of being entrained by the existing unscreened pumps operated by RD 2049.

To implement the Project, PV Water will construct a new adjustable weir to seasonally raise the controlled College Lake water surface level by up to 2.4 feet to an elevation of 62.5 feet NAVD88. Depending on water supply needs, PV Water will pump water from College Lake (either by direct diversions of water flowing into the lake or re-diversions of water previously stored in the lake) to a new water treatment plant. PV Water will convey the treated water through a new pipeline to its existing Coastal Distribution System (CDS) for deliveries to farmers who will use the water for irrigation in lieu of pumping equivalent amounts of groundwater. With implementation of the Project, water would be retained in College Lake for a longer period of time in the spring, summer, and fall compared to existing conditions. The Project will also include a screened intake to prevent entrainment and impingement of juvenile steelhead, a fishway past the adjustable weir to provide unimpeded upstream and downstream passage of steelhead, and life-stage specific bypass flows to support steelhead migration through Salsipuedes Creek downstream of the weir.

## 1.3 Adaptive Management Plan

The 2019 EIR incorporates mitigation measures previously adopted by PV Water's Board of Directors under the 2014 Basin Management Plan (BMP) Update Programmatic EIR. Mitigation Measure BIO-2i.1 (Develop Adaptive Management Plan for College Lake Waterfowl Management and Multi-Species Mitigation) was included in the *Final Environmental Impact Report for the Basin Management Plan*

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[1] Podlech, M., College Lake Smolt Outmigrant Study–Spring 2011. Prepared for Resource Conservation District of Santa Cruz County, 2011.

*Update* (2014 BMP Update PEIR) in response to public comment. PV Water is committed to preparing an Adaptive Management Plan (AMP) as part of the College Lake Project, as outlined below:

> **BIO-2i.1: Develop Adaptive Management Plan for College Lake Waterfowl Management and Multi- Species Mitigation.** To mitigate impacts to existing waterfowl or waterfowl habitat at College Lake, an Adaptive Management Plan for waterfowl management and multi-species mitigation will be developed with the consultation of the state and federal resource agencies and College Lake stakeholders. The Adaptive Management Plan for waterfowl management and multi-species mitigation at College Lake will develop multi-year baseline waterfowl population and habitat use data for future project design, environmental permitting and CEQA impact analysis of project-level alternatives. To the extent practical, it will integrate the results of ongoing College Lake hydrology and hydraulic analyses, as well as future consultations with state and federal agencies on fish flows and fish bypass criteria.
>
> The Management Plan will be specific to the level of impact and mitigations under site-specific and project implementation conditions. However, the following standards will apply as defined during project-level design, regulatory review and CEQA analysis: The Management Plan should include terms and conditions from applicable permits and agreements as appropriate and define provisions for monitoring assignments, scheduling, and responsibility. The Management Plan should also include habitat replacement and revegetation, protection during ground-disturbing activities, performance standards, maintenance criteria, and monitoring requirements for temporary and permanent impacts consistent with mitigation in this EIR and regulatory requirements during project- specific review. The Management Plan will be in conformance with the biology mitigation measures from this EIR, and will also include terms and conditions consistent regulatory requirements as applicable from the USFWS, USACE, SWRCB, and CDFW permits during project design and permitting as applicable. The Management Plan will be prepared for project level project implementation as determined needed through future CEQA review and consultation with agencies as required under CESA and ESA.

Adaptive management is defined as "a framework and flexible decision-making process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvements in management planning and implementation of a project to achieve specified objectives."[2] An adaptive management approach provides a structured process that allows for taking action under uncertain conditions based on the best available science, closely monitoring and evaluating outcomes, and re-evaluating and adjusting decisions as more information is learned.[3] Adaptive management encourages an ecosystem-level approach to resource management and promotes collaboration among scientists, managers, and other stakeholders on decisions. To be effective, that decision-making processes must be flexible enough to adjust in the face of uncertainties, variances or other unforeseen outcomes from management actions and other external events. With an established AMP, the project will be set up to use tools such as monitoring, modeling, or other applied studies to generate the science-based information that managers need for decision-making. Once this information is available, managers can "Adapt" a project. If needed, possible adaptive management actions include additional studies or monitoring and corrective on-the-ground

2 2011 California Water Code, Division 35. Sacramento-San Joaquin Delta Reform Act of 2009, Chapter 4, Section 85052.

3 California Department of Fish and Wildlife, Adaptive Management. Available online at https://www.dfg.ca.gov/erp/adaptive_management.asp. Accessed on August 6, 2019.

actions. It is imperative when approaching a project with significant uncertainties, that all stages of the "Plan" phase are open to adaptive management consideration.

In response to environmental review and permitting requirements, the College Lake Project is generating several plans that are related to adaptive management. These include this Steelhead Monitoring Plan, an Invasive Species Management Plan, a Water Quality Monitoring Plan, an Operations and Maintenance (O&M) plan, and a Compliance Plan. All of these plans have a role in the project process and are being comprehensively considered in the adaptive management process. The intention is for the AMP to serve as an umbrella document where the data and information generated by these various elements can be evaluated holistically in the context of the project objectives. The AMP therefore will become a critical process document and serve as the central organizing "spine" of most of the other plans, including this Steelhead Monitoring Plan. Most of these plans will already be complete prior to the development of the AMP. As such, the AMP will include a feedback process to each of those plans to account for any future management decisions that have the potential to ripple through various other documents. Since these other plans are driven largely by the regulatory process, the AMP will have to account for a process by which stakeholder education and feedback are incorporated back into those plans through the adaptive management process if warranted. At 5-year intervals, changes to the AMP will be compiled in an updated version of the AMP document for ease of reference. It is anticipated that the after the first 5-years of Project operations and maintenance, monitoring results, and documented management activities will have provided a sound basis for evaluating and where appropriate, revising, objectives, monitoring methods (including monitoring frequency), metrics, action triggers, and potential management actions. For example, if data collected under this Steelhead Monitoring Plan indicate significantly lower spawning success in the watershed above the lake (e.g., Casserly Creek) than in comparable control sites in the Pajaro River watershed, it may trigger an adaptive management action such as an evaluation of potential structural and hydraulic issues affecting adult steelhead passage at the adjustable weir and fishway. PV Water would be responsible for reporting action triggers and implementing management actions based on these triggers as part of the development of the AMP. In short, this Steelhead Monitoring Plan defines the methods PV Water will implement to evaluate steelhead utilization of College Lake under the Project and, in the process, feed science-based data and information into the adaptive management decision-making process, which may include, among others, adaptively managed changes to this plan itself.

# CHAPTER 2
# Monitoring Plan Design

## 2.1 Existing Data

The Pajaro River watershed is one of the major components of the S-CCC DPS of steelhead. Studies from the 1960s report steelhead runs in the Pajaro River ranging from 1,000 to 2,000 individuals.[4] Reliable data to estimate current run size are not available,[5] but population size is likely substantially smaller.[6]

Few fish surveys have been conducted in the Salsipuedes Creek watershed, but available data confirm the presence of S-CCC steelhead. Upstream of College Lake, Casserly Creek and two of its tributaries, Banks Creek and Gaffney Creek, are known to support steelhead.[7] Streamflows in this drainage appear to be sufficient for juvenile (smolt) outmigration to the ocean via College Lake through May in most years.[8] Green Valley Creek, a major tributary to Casserly Creek immediately upstream of College Lake, is unlikely to support steelhead due to low spring flows that may prevent smolt outmigration, but the creek is thought to support a healthy rainbow trout population.[9]

Although unbiased estimates of spatial structure based on stratified-random sampling are not available for the Pajaro River watershed,[10] annual juvenile steelhead density surveys have been conducted at eight sampling sites within the Salsipuedes Creek watershed since 2006.[11] Seven of the sampling sites are located within the Corralitos Creek subbasin and one is located on Casserly Creek approximately 2.5 miles upstream of College Lake. Based on 2016 and 2017 survey results, D.W. Alley & Associates (DWA) noted that the high proportions of young-of-the-year steelhead in Casserly Creek were comparable to findings at the sampling sites located in the Corralitos Creek subbasin and indicative of successful adult steelhead migration through College Lake to spawn in Casserly Creek in both years.[12] However, DWA suggest that the small channel size and limited streamflow in Casserly Creek result in

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4 62 FR 43937

5 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.

6 National Marine Fisheries Service. 2013. *South-Central California Coast Steelhead Recovery Plan*. West Coast Region, California Coastal Area Office, Long Beach, California.

7 Smith, J. J., Fisheries Issues Associated with the Present and Potential Future Operation of the College Lake Complex (Pajaro River Watershed) – Draft, San Jose State University, November 30, 2010.

8 Ibid.

9 Ibid.

10 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.

11 D.W. Alley & Associates, *2017 Summary Report – Juvenile Steelhead Densities in the San Lorenzo, Soquel, Aptos and Pajaro Watersheds, Santa Cruz County*. Prepared for Santa Cruz County Environmental Health Department, Santa Cruz, CA

12 Ibid.

relatively slow juvenile growth rates.[13] Surveys conducted by Podlech in September 2019 for the City of Watsonville and PV Water at the eight sites previously sampled by DWA documented a total juvenile steelhead density of 41.2 fish per 100 feet in Casserly Creek, second highest of the eight sites, and a young-of-the-year steelhead density of 34.3 fish per 100 feet, highest of all sites sampled.[14] In September 2020, the young-of-the-year steelhead density in Casserly Creek decreased substantially to 5.5 fish/100 ft, but similar decreases in age class densities were documented at the seven Corralitos Creek sampling sites as a result of poor adult migration conditions (i.e., low flows) during much of the 2020 winter/spring spawning season.[15] Based on available baseline data to date, juvenile steelhead population trends in Casserly Creek have been comparable to those observed in the seven Corralitos Creek, which can therefore serve as effective control sites for the purpose of this Steelhead Monitoring Plan.

Steelhead have been documented to rear seasonally in College Lake[16] and available evidence suggests that when the lake is inundated, it provides the highly productive juvenile steelhead rearing habitat commonly associated with estuaries and floodplains. Podlech conducted a steelhead smolt outmigration study in the spring of 2011 at the outlet of College Lake to gather pertinent data on relative population size, seasonal use, and general condition of the steelhead population in this subbasin.[17] However, the study was compromised by overwhelmingly high flows and tampering of the trap, and therefore did not provide sufficient data to develop population size estimates. Based on the limited data generated by the 2011 study, it appears likely that at least some juvenile steelhead from the upper watershed (and possibly including the Corralitos Creek basin) spend time rearing in College Lake during the winter and early spring prior to migrating out to the ocean.[18] Scale samples collected from two steelhead smolts indicated recent growth rates, based on back calculation, of approximately 130 percent between winter annulus formation and the spring (April) capture dates.[19] Upper watershed streams are typically not sufficiently productive to support such rapid growth rates in winter, but ponds, lakes, and seasonally inundated floodplains and agricultural fields have been shown to provide highly productive rearing habitat for juvenile salmonids.[20,21] Therefore, steelhead captured during the 2011 smolt outmigration season were assumed to have reared in College Lake for some time prior to capture.

Between College Lake and the confluence of Corralitos Creek, Salsipuedes Creek consists of a moderately vegetated stream with a relatively uniform stream bottom dominated by fine sediment. Downstream of the Corralitos Creek confluence, Salsipuedes Creek consists of a degraded channel flowing in a series of high grassy terraces contained by levees. The stream bottom is generally grassy, due to repeated clearing of woody vegetation, and tree cover is sparse. Summer flows are low and variable

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13 Ibid.

14 Podlech, M., *2019 Juvenile Steelhead Densities in the Corralitos Creek and Casserly Creek Watersheds*. Prepared for the City of Watsonville and PV Water, November 2019.

15 Podlech, M., *2020 Juvenile Steelhead Densities in the Corralitos Creek and Casserly Creek Watersheds*. Prepared for the City of Watsonville and PV Water, October 2020.

16 Podlech, M., *College Lake Smolt Outmigrant Study*. Prepared for Resource Conservation District of Santa Cruz County, Spring 2011.

17 Ibid.

18 Ibid.

19 Ibid.

20 Jeffres, C.A, J.J. Opperman, and P.B. Moyle, *Ephemeral floodplain habitats provide best growth conditions for juvenile Chinook salmon in a California river*, Environmental Biology of Fishes, 2008.

21 ESA, San Vicente Creek and Pond Smolt Outmigramt Study, Prepared for National Marine Fisheries Service on behalf of Coast Dairies & Land Company, Spring 2003.

(due to current intermittent pumping from College Lake). Salsipuedes Creek does not provide suitable spawning or summer rearing habitat for steelhead. While no focused fish surveys have been conducted in Salsipuedes Creek, no juvenile steelhead were observed during biological monitoring of dewatering and in-channel construction activities at approximately ten U.S. Army Corps of Engineers' storm damage repair sites on Salsipuedes Creek during summer 2018.[22]

Invasive (i.e., non-native) species are also known to occur in College Lake. The 2011 juvenile steelhead outmigration study documented the presence of invasive species such as common carp (*Cyprinus carpio*), fathead minnow (*Pimephales promelas*), golden shiner (*Notemigonus chrysoleucas*), channel catfish (*Ictalurus punctatus*), black bullhead (*Ameiurus melas*), and brown bullhead (*Ameiurus nebulosus*).[23] Bluegill (*Lepomis macrochirus*) and largemouth bass (*Micropterus salmoides*) have also been observed in College Lake and other non-native species may be present. Non-native fish species compete with native species for habitat and resources, and some (e.g., bass) may also pray on juvenile steelhead. A separate Invasive Species Management Plan for the Project has been prepared[24] in coordination with NMFS and CDFW, and its implementation will be coordinated with this Steelhead Monitoring Plan.

## 2.2 Goals and Objectives

College Lake currently provides suitable and productive seasonal rearing habitat for juvenile steelhead during the winter and spring inundation period, but subsequent smolt outmigration conditions are impaired by current operations. College Lake has been actively managed for agricultural production for a century, and farming will continue to occur on surrounding lands. Implementation of the Project will alter the existing hydrologic regime of College Lake, primarily during the summer and fall when the lake will be operated for water supply storage and diversion rather than agricultural production, thereby extending the duration, extent, and depth of lake inundation compared to existing (mostly dry) summer and fall conditions.

Future Project operations have been designed to avoid and minimize adverse effects to steelhead, maintain rearing habitat conditions, and provide for unimpeded adult and smolt migration across the new weir and through Salsipuedes Creek. The goals of this Steelhead Monitoring Plan are to evaluate the effectiveness of these measures and to provide information on the status and ecology of steelhead in College Lake and the Casserly Creek under future operation and management of the College Lake Integrated Resources Management Project. The objectives of the plan are to evaluate fish passage success past the weir, assess the performance of bypass flows for meeting fish passage objectives in Salsipuedes Creek, and to provide information on residence times and growth rates of juvenile steelhead that rear in College Lake. The objectives will be accomplished through implementation of the following monitoring activities:

[22] Podlech, M., personal observations, July 2018.

[23] Ibid.

[24] Podlech, M., *Final Invasive Species Management Plan for College Lake Integrated Resources Management Project*. Prepared for PV Water, June 2021.

(1) Juvenile steelhead population surveys and passive integrated transponder (PIT) tagging;

(2) Operation of PIT-tag detection arrays;

(3) Outmigrant trapping; or

(4) Passage efficiency evaluations.

## 2.3 Monitoring Program Components and Methodologies

### 2.3.1 Juvenile Population Surveys

#### *Methods*

PV Water will continue to conduct annual juvenile steelhead surveys in the Casserly Creek watershed to assess relative population abundance and age structure, and to provide an opportunity to tag individual steelhead with passive integrated transponder (PIT) tags. At a minimum, surveys will be conducted at one established sampling site on Casserly Creek (CA-3) that has been surveyed since 2016. Depending on access permission, additional sampling sites may be added or expanded (i.e., longer sampling reach) on Casserly Creek, Gaffey Creek, and/or Green Valley Creek. All steelhead surveys will be conducted by a NMFS-approved biologist.

Juvenile steelhead surveys will be conducted in late summer/early fall using standard electrofishing techniques[25] and in accordance with the NMFS *Guidelines for Electrofishing Water Containing Salmonids Listed Under the Endangered Species Act* and conditions set forth in applicable Endangered Species Act Section incidental take authorizations for the Project.

Block nets will be set at the upstream and downstream ends of sampling reaches, and standard water quality parameters (water temperature, dissolved oxygen, and specific conductivity) will be measured using a handheld multipurpose meter. Using a standard multi-pass depletion method, repeated (2-3) electrofishing passes will be made with a backpack electrofisher and dipnets. Captured fish will be placed in 5-gallon buckets containing stream water and battery-powered aerators. All captured steelhead will be counted, measured to fork length, and scanned for PIT tags using a handheld reader.

Untagged juvenile steelhead with fork lengths exceeding 65 millimeters (mm) will be selected for implanting 12-millimeter half duplex (HDX) PIT tags. Fish selected for PIT tagging will be anesthetized with sodium bicarbonate (e.g., Alka Seltzer™ Gold) dissolved in stream water and weighed using a portable electronic scale. PIT tags will be implanted into the body cavity between the posterior tip of the pectoral fin and the anterior point of the pelvic girdle using sterilized syringes fitted with 12-gauge veterinary-grade needles. Scale samples will also be collected from all tagged fish using standard salmonid research protocols. After handling, fish will be returned to holding bucket containing stream

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[25] Johnson, David H. & Shrier, Brianna & O'Neal, Jennifer & Knutzen, John & O'Neil, Thomas & Pearsons, Todd. (2007). *The Salmonid Field Protocol Handbook Techniques For Assessing Status and Trends in Salmon and Trout Populations*. American Fisheries Society, Bethesda, Maryland.

water and an aerator until recovered from the anesthesia and released to the same stream reach where they were captured.

While captured steelhead recover from anesthesia and handling, a basic aquatic habitat assessment of the sampling reach will be conducted using the Level II habitat typing protocol described in the *California Salmonid Stream Habitat Restoration Manual*.[26] Level II habitat typing classifies habitat units into riffles, flatwater, and pools, which are the three broad habitat types offering different ecological function for fisheries resource. The assessments will measure the quantity (length, depth, width) and quality (shelter, substrate, riparian canopy) of individual habitat units to allow for year-to-year comparisons of habitat availability and conditions.

Currently, the City of Watsonville (City) funds a juvenile steelhead and habitat assessment program at seven sampling sites in the Corralitos Creek watershed. Fish captured under this program are currently not being PIT-tagged. At times during the wet season, the flow direction in the reach of Salsipuedes Creek between College Lake and the Corralitos Creek confluence can reverse, resulting in flows from Corralitos Creek entering College Lake. It is therefore reasonable to assume that some juvenile steelhead originating from the Corralitos Creek basin may enter College Lake during the winter/spring season to rear. To evaluate this hypothesis, PV Water will coordinate with the City to explore the feasibility of incorporating a PIT-tagging effort, using the same methods as described above, into the ongoing Corralitos Creek steelhead survey program. However, PV Water cannot guarantee the long-term continuity of the City's current Corralitos Creek monitoring program.

### *Frequency and Duration*

The juvenile steelhead population surveys will be conducted annually in late summer/early fall following initiation of Project operations. As part of the AMP (Section 1.3), results of monitoring activities will be reviewed and evaluated at 5-year intervals to determine, in coordination with NMFS and CDFW, whether changes to the monitoring methods, including monitoring frequency, are warranted. .

## 2.3.2 PIT-Tag Detection Array

### *Methods*

A minimum of two PIT detection arrays will be installed and operated in the vicinity of the new College Lake weir to monitor the movement of tagged steelhead. As described above, fish passage past the weir will be provided during the winter and spring for adult upstream migration and juvenile (smolt) downstream migration. Depending on water surface elevations and inflows to the lake, the primary migration path during that time consists of unimpeded passage across the lowered and inundated weir. At times when swim-across conditions are not available (i.e., early season lake filling, late season raised weir), passage will be provided through a fishway incorporated into the weir facility. To ensure tagged fish are detected regardless of the migration path available at any given time, the PIT-tag detection systems will be installed immediately upstream and downstream of the weir and fishway exit. Final site selection will occur in coordination with the detection array manufacturer and NMFS/CDFW staff. Although the PIT tag antenna arrays will primarily detect juvenile steelhead tagged in Casserly and/or

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[26] Flosi, G., S. Downie, J. Hopelain, M. Bird, R. Coey, and B. Collins. 2010. *California Salmonid Stream Habitat Restoration Manual*. 4th edition, California Department of Fish and Game, Inland Fisheries Division. Sacramento, CA.

Corralitos creeks, some individuals tagged in prior years may also be detected by the system when they return as adults in subsequent years.

#### *Frequency and Duration*

The PIT-tag antenna array(s) will be operated throughout the year following initiation of Project operations. As part of the AMP (Section 1.3), results of monitoring activities will be reviewed and evaluated at 5-year intervals to determine, in coordination with NMFS and CDFW, whether changes to the monitoring methods, including monitoring frequency, are warranted.

### 2.3.3 Outmigrant Trapping

#### *Methods*

During the spring smolt outmigration season, a down-migrant trap will be operated at the College Lake weir to capture juvenile steelhead, determine relative smolt abundance, apply PIT-tags to untagged fish, and recapture previously tagged fish to evaluate growth rates. The appropriate trap type (e.g., fyke net, hoop net, rotary screw trap) and location will be determined based on final site conditions present after Project construction and in coordination with NMFS and CDFW staff. All out-migrant trapping activities will be conducted by a NMFS-approved biologist.

The trap will be operated 3-5 days per week from mid-March through May when hydrologic conditions permit. While in operation, the trap will be checked at least once daily in the morning but may be rechecked later in the day during peak migration periods. The trap will be set to non-trapping position (i.e., open) or removed entirely during excessively high flows. Juvenile steelhead captured in the trap will be scanned for PIT tags, weighed, and measured. Untagged juveniles exceeding 65 mm in fork length will be implanted with PIT tags using procedures described above in Section 2.3.1. Scale samples will be collected from a subset of captured juveniles, including previously tagged fish, to assess age, structure, growth rates, and lake residence time. Trapped and processed juvenile steelhead will typically be released downstream of the weir and trap. However, depending on final trapping configuration, a subset of PIT-tagged steelhead smolts may be released upstream of the weir and trap for mark/recapture trapping efficiency and population size estimations consistent with methods described in the Salmonid Field Protocols Handbook.[27]

Occasional unintended captures of post-spawned adult steelhead (kelts) may occur in the downstream migrant traps. Visual estimates of size and sex of trapped adults will be noted. These fish will also be checked for PIT-tags and a few scales will be collected from each prior to being released immediately downstream of the trap.

#### *Frequency and Duration*

Outmigrant trapping will be conducted in spring for a three of the first five years following initiation of Project operations. Final trapping schedule (i.e., three consecutive years or every second year) will be determined in coordination with NMFS and CDFW staff. As part of the AMP (Section 1.3), results of

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[27] Johnson, David H. & Shrier, Brianna & O'Neal, Jennifer & Knutzen, John & O'Neil, Thomas & Pearsons, Todd. (2007). *The Salmonid Field Protocol Handbook Techniques For Assessing Status and Trends in Salmon and Trout Populations*. American Fisheries Society, Bethesda, Maryland.

monitoring activities will be reviewed and evaluated at 5-year intervals to determine, in coordination with NMFS and CDFW, whether changes to the monitoring methods, including monitoring frequency, are warranted.

## 2.3.4 Passage Efficiency Evaluations

### *Methods*

Suitable fish passage conditions at the new College Lake weir will be provided through operation of the adjustable weir (i.e., open during much of the winter and early spring migration period) and a dedicated fishway integrated into the weir and diversion facility (open only during early season lake filling and spring raised-weir conditions). Individual fishway gates will be automated to raise or lower depending on upstream and downstream water surface elevations. The fishway is being designed in consultation with NMFS and CDFW to meet their respective fish passage criteria, and the design will need to be approved by these agencies prior to construction and operation of the facility. As such, it is reasonable to expect the fishway to provide suitable adult upstream passage and smolt downstream passage. However, during the first two years of operation, assessments of hydraulic conditions (chamber depths, leap heights, velocities) will be conducted under a range of flow conditions to ensure the fishway is performing as designed. If necessary, fishway gate controls will be adjusted to meet design passage conditions. Data gathered from the operation of a PIT-tag detection arrays upstream and downstream of the weir (Section 2.3.2) and a down-migrant trap downstream of the weir (Section 2.3.3) will provide additional information regarding fish passage conditions at the weir and fishway.

In addition to providing suitable fish passage conditions at the weir, the Project will also be operated to bypass sufficient streamflow to meet fish passage needs downstream of the weir in Salsipuedes Creek. Life stage- and season-specific steelhead passage flow requirements were determined in two reaches of Salsipuedes Creek (**Table 1**) through a critical riffle analysis[28] conducted in consultation with NMFS and CDFW and in accordance with CDFW standard operating procedures[29] downstream of the Corralitos Creek confluence and through hydraulic modeling[30] upstream of Corralitos Creek.

Although these bypass flow requirements were determined using standard, widely applied assessment methodologies and are therefore expected to maintain hydrologically appropriate fish passage conditions throughout the winter and spring steelhead migration periods, PV Water will conduct periodic stream-walk assessments of Salsipuedes Creek timed to coincide, to the extent feasible, with streamflow events that are within the range of the established bypass flow targets (i.e., +/- 8 cfs and 21 cfs). Water depths across shallow portions of the streambed (i.e., critical riffles) will be measured and observed conditions will be photo-documented to verify that passage flow needs are being met.

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[28] Podlech, M., *College Lake Integrated Resource Management Project*, *Fish Passage Assessment*, March 2019.

[29] California Department of Fish and Game (CDFG). 2012 (Updated February 2015). *Critical Riffle Analysis for Fish Passage in California*. California Department of Fish and Game Instream Flow Program Standard Operating Procedure DFG-IFP-001.

[30] cbec, inc. 2018. *College Lake Integrated Resources Management Project Hydrologic and Hydraulic Modeling Technical Memorandum*. Prepared for Environmental Science Associates.

**TABLE 1**
**FISH PASSAGE FLOWS**

| Fish Passage, Bypass of Casserly Creek Flows[a] | Adult Steelhead Migration | | Smolt Outmigration |
|---|---|---|---|
| | **Dec. 15 – Mar. 31** | **Apr. 1 – Apr. 30** | **May 1 – May 31[c]** |
| Bypass flow between Corralitos-Salsipuedes Confluence and Pajaro River | 21 cfs | Net inflow when natural flow < 8 cfs;<br>8 cfs when natural flow ≥ 8 cfs and < 18 cfs;<br>Net inflow when natural flow ≥ 18 cfs and < 21 cfs;<br>21 cfs when natural flows are ≥ 21 cfs | 8 cfs |
| Bypass flow at weir[b] and in Salsipuedes Creek between weir and Corralitos Creek | 1.8 cfs | 1.8 cfs | 1.0 cfs |
| Minimum lake level | 59.5 feet NAVD88 | 59.5 feet NAVD88 | 59.3 feet NAVD88 |

NOTES:
cfs = cubic feet per second
NAVD88 = North American Vertical Datum of 1988

a Instream flow requirements based on critical riffle surveys conducted in 2017 and 2018. Each minimum flow requirement would be the number specified in this table or the flow resulting from bypassing the total inflow into College Lake, whichever is less. Minimum flow between the Corralitos Creek-Salsipuedes Creek confluence and Pajaro River is for the combined flow from Corralitos Creek and College Lake. Refinements to fish passage assumptions and modeling may occur during permitting based on agency consultations.
b The minimum flows may be refined during design phase of the proposed weir and fish passage structure.
c The smolt outmigration season begins in March, but instream flow requirements for adult steelhead prior to May 1 meet or exceed the smolt requirement and are therefore protective of smolt instream flow needs.

### *Frequency and Duration*

Passage efficiency evaluations of the fishway will be conducted annually during the migration period for a minimum of two years following initiation of Project operations.

Passage efficiency evaluations of the permitted bypass flows in Salsipuedes Creek will be conducted during the first two years following Project initiation and every two years thereafter. As part of the AMP (Section 1.3), results of monitoring activities will be reviewed and evaluated at 5-year intervals to determine, in coordination with NMFS and CDFW, whether changes to the monitoring methods, including monitoring frequency, are warranted.

## 2.4 Related Monitoring Plans

As noted above, PV Water has committed to developing and implementing other monitoring and operations plans for the Project. Implementation of these plans will generate data that will be directly relevant to this Steelhead Monitoring Plan. These data may therefore inform decisions regarding appropriate timing for steelhead monitoring activities and be considered and incorporated into data analysis and synthesis. The related plans include the following:

***Water Quality Monitoring Plan***

PV Water has been conducting an extensive water quality monitoring program throughout its service area for over 25 years. The current monitoring program[31] includes bimonthly (i.e., every two months) grab samples collected at two sites within College Lake as well as several upstream and downstream sites. These grab samples are submitted to a certified laboratory for analysis of thirty water quality constituents. In addition, PV Water also operates a pressure transducer data logger to collect continuous (15-minute interval) pressure, depth, water temperature, actual conductance, and specific conductance data in College Lake immediately upstream of the existing weir as well as biweekly (i.e., every two weeks) field measurements of water temperature, dissolved oxygen (DO), specific conductance, turbidity, and hydrogen ion concentration (pH) at a second lake sampling site. Additional pressure transducers are operated in select College Lake inflow and outflow channels.

Upon Project implementation, PV Water will expand upon the College Lake portion of the existing monitoring program through (1) an additional in-lake site to assess spatial variability, (2) additional in-lake sonde deployment to assess vertical variability, and (3) an outflow sampling site downstream of the new weir to monitor potential effects of lake water quality on downstream waterways. In total, the expanded monitoring program will consist of six Project-related sampling sites: Two in-lake sites, three inflow sites, and one outflow site. In addition, the suite of monitoring parameters at the two in-lake sites will be expanded to include measurements of:

(1) Monthly grab sampling for cyanotoxins and algae;

(2) Continuous logger readings of water temperature, DO, specific conductance, pH, chlorophyll-a, and phycocayanins;

(3) Monthly profiles of water temperature, DO, specific conductance, chlorophyll-a, and water clarity (Secchi depth).

The results of the water quality monitoring activities will inform PV Water and regulatory agency stakeholders about steelhead habitat suitability conditions within College Lake and identify the relative extent to which Project operations and/or lake inflows affect those conditions.

***Compliance Plan***

Per water right permit requirements, PV Water will develop and implement a Compliance Plan that will include a streamflow monitoring component to ensure compliance with agreed-upon bypass flow terms (Table 2-1). Per Term 13 of Water Right Permit 21422, PV Water will install, operate, and maintain streamflow gages on Casserly Creek upstream of College Lake and on Salsipuedes Creek downstream of the Corralitos Creek confluence, and/or collaborate with other agencies (i.e., U.S. Army Corps of Engineers/U.S. Geological Survey) to meet the need. PV Water will also utilize streamflow measurements from an existing U. S. Geological Survey gage (11159200) located on Corralitos Creek upstream of its confluence with Salsipuedes Creek. In addition, data from the in-lake pressure transducer will be used to monitor changes in College Lake water surface elevations and storage levels. Together, these hydrologic

[31] See https://www.pvwater.org/basin-monitoring

data will provide important information about steelhead habitat conditions such as streamflow rates and migration opportunity windows as well as seasonal depths and volumes of rearing habitat in College Lake.

***Invasive Species Management Plan***

As noted above, PV Water will implement an Invasive Species Management Plan to control or eradicate non-native animal species that compete with and/or pray upon native species such as steelhead. Management methods will include a combination of passive (i.e., periodic lake draining) and active (i.e., capture) control methods and will occur during late summer or early fall. Although juvenile steelhead are not expected to occur in the lake at those times, the invasive species control activities will be conducted and monitored by a NMFS-approved biologist with authorization to capture, handle, and if necessary, relocate steelhead that are incidentally captured or stranded. As such, the invasive species management activities will provide important information about the timing and duration of seasonal lake utilization by steelhead.

## 2.5 Data Analysis and Reporting Procedures

Surveys and assessments conducted under this Steelhead Monitoring Plan will generate extensive data sets. Detailed field logs of all field activities will be kept and transferred to electronic databases upon return to the office. All written logs will include, at a minimum: 1) date and time of each survey and monitoring effort, 2) methods and equipment used, 3) weather conditions, and 4) pertinent observations. In addition, the following survey-specific data will be recorded:

***Juvenile Population Surveys***

- Juvenile steelhead count, size, weight, age class
- PIT-tag identification code recorded or implanted
- Scale samples collected
- Habitat data (type, width, depth, instream cover, substrate composition, riparian condition)
- Water quality (temperature, DO, conductivity)

***PIT-Tag Detection Array***

- Date, time, and identification code of detected tags
- Direction of movement (i.e., upstream, downstream)
- Fish passage success at weir

***Outmigrant Trapping***

- Trap status (e.g., open/closed, problems);

- Juvenile steelhead count, size, weight, age class, smoltification status
- PIT-tag identification code recorded (juveniles and adults) or implanted (juveniles)
- Scale samples collected from juveniles and adults (kelts)

***Passage Efficiency Evaluations***

- Weir: Depths, velocities, leap heights within fishway chambers, photo documentation (e.g., time lapse camera at weir/fishway)
- Salsipuedes Creek (weir to Pajaro River): Riffle depths, widths, streamflow (from compliance gages), pertinent observations (e.g., newly developed riffles, sediment deposits, and other potential passage obstacles), photo documentation (i.e., photo-points along Salsipudes Creek)

These data will be analyzed and summarized individually (e.g., number of individuals per 100 feet of stream channel, estimate of population size based on smolt outmigration numbers, etc.) as well as relative to each other (e.g., growth rates based on juveniles measured and tagged during stream surveys and subsequently recaptured during outmigrant trapping). The data will also be analyzed relative to information provided by the water quality monitoring, compliance (streamflow) monitoring, and invasive species management efforts. Available data of steelhead population trends from similar monitoring efforts conducted by the City of Watsonville and the County of Santa Cruz will also be reviewed and incorporated into the data analyses for comparison to documented regional trends.

All data and analyses from steelhead monitoring activities as well as relevant information gathered as part of other monitoring activities (e.g., steelhead encountered during invasive species management activities) will be synthesized into a comprehensive annual summary report that will describe monitoring efforts over the prior hydrologic year (October 1 – September 30) and include overall findings regarding steelhead population status and trends, conclusions regarding the extent to which the objectives of the plan have been achieved, and recommendations regarding potential future monitoring or Project operations changes. The annual report will be submitted to NMFS and CDFW by February 1 of the following year. If requested, raw data collected during individual monitoring efforts (e.g., juvenile steelhead surveys) will be provided to NMFS and CDFW staff within 10 business days following field activities.

# CHAPTER 3
# Response Actions

As described in Section 1.3 above, College Lake and the Project will be managed adaptively through an AMP. The AMP will serve as an umbrella document where the data and information generated by various monitoring efforts, including this Steelhead Monitoring Plan, can be evaluated holistically in the context of the Project objectives. The AMP will provide a set of objectives and an associated set of monitored parameters. The AMP will also define thresholds for the monitored parameters that when exceeded would require management actions (i.e., action triggers). The exact management action will depend on the nature of the problem and the appropriate remedies available. Typically, the first management action will be to conduct a thorough review of the available information that can inform project managers regarding the applicability of various actions. Often, technical experts (both associated with and external to the project, as warranted) will be consulted before taking a management action to analyze the relevant information and provide a range of appropriate management actions, including their risks and costs.

Within the context of the AMP, the annual reports (Section 2.5) for this steelhead monitoring program will provide the values of monitored parameters to be compared to the values of the action triggers, related discussions of the potential reasons for any threshold exceedances and, if warranted, will make recommendations for potential remedial response actions for consideration by PV Water and regulatory stakeholders (NMFS, CDFW) through the adaptive management process. Depending on the reasons for thresholds not being met, PV Water will identify feasible response actions. For example, if passage criteria within the fishway are not within design specifications, PV Water may consider potential remedial actions such as evaluating if the problem is operational (e.g., related to software errors in automated gate operations) or structural (e.g., excessive jump heights) and will coordinate with regulatory stakeholders to identify potential response actions that are consistent with Project needs and objectives. On the other hand, if monitoring conducted during the first years of Project operations indicates successful fish passage at the weir, PV Water may reduce the frequency or simplify the methods of this Steelhead Monitoring Plan in coordination with NMFS and CDFW.

# Appendix D
## Invasive Species Management Plan

*Final*

# Invasive Species Management Plan

**For**

# College Lake Integrated Resources Management Project

Prepared for

Pajaro Valley
Water Management Agency

Prepared by

Mike Podlech, Aquatic Ecologist

June 2021

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# Invasive Species Management Plan for College Lake Integrated Resources Management Project

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# CHAPTER 1
# Introduction

## 1.1 Background

The Pajaro Valley Water Management Agency (PV Water) is planning to implement the College Lake Integrated Resources Management Project (College Lake Project or Project). The Project will store and divert water from College Lake for treatment, transmission, and distribution for agricultural irrigation. The primary purposes of the Project are to help balance the Pajaro Valley groundwater basin, prevent further seawater intrusion, and meet water supply needs in PV Water's service area by developing College Lake as a water storage and supply source. In support of this project, PV Water submitted water right Application A032881 to the State Water Resources Control Board for the storage and diversion of up to 3,000 acre-feet of water per year (AFY) at College Lake. The California Department of Fish and Wildlife (CDFW) initially protested the application but subsequently dismissed the protest conditionally, provided the water right permit contains a number of specific terms, including the following:

> "Prior to the initial diversion of water, the right holder shall submit to NMFS[1] and CDFW for written approval an invasive species management plan. The invasive species management plan shall include, at a minimum, an annual survey for bullfrogs and non-native piscivorous fishes. If bullfrogs and/or non-native piscivorous fishes are identified, the plan shall provide potential actions to eradicate those species from the reservoir. Actions may include direct removal, such as seining and/or other lawful capture methods. The plan shall also include measures to be implemented should the above actions prove ineffective."

In October 2019, PV Water certified the *Final College Lake Integrated Resources Management Project Environmental Impact Report* (2019 EIR). The 2019 EIR identifies a potential for populations of non-native predatory species to increase in College Lake as a result of the extended inundation season under the Project. To mitigate this potential impact, the 2019 EIR stipulates implementation of the following measure:

> **Mitigation Measure BR-2: Invasive Fish Species Control Plan**
>
> PV Water shall develop an Invasive Fish Species Control Plan.[2] PV Water would submit the plan to the appropriate resource agencies (CDFW, USFWS[3], and NMFS) for approval within one year of Project implementation. The Fish Species Control Plan shall be implemented at College Lake

[1] National Marine Fisheries Service (NMFS).

[2] This Invasive Species Management Plan addresses control of non-native fish, amphibian, and invertebrate species and thus satisfies the 2019 EIR requirement for an Invasive Fish Species Plan.

[3] U.S. Fish and Wildlife Service (USFWS).

within two years of Project implementation. The Fish Species Control Plan shall include, at a minimum:

1. Measures describing PV Water's methods of draining College Lake to the greatest extent feasible;

2. Measures describing PV Water's methods, equipment, and timing of invasive species eradication efforts to be conducted in association with lake drawdown efforts;

3. Measures describing the frequency at which invasive species control efforts are to be implemented.

This Invasive Species Management Plan for the College Lake Project has been prepared in response to the CDFW-requested protest dismissal term and the requirements of Mitigation Measure BR-2.

## 1.2 Setting and Project Description

College Lake is a seasonal lake that forms in a topographic depression along the Zayante-Vergeles Fault zone. The lake receives inflows from several tributaries (including Green Valley, Casserly, and Hughes Creeks, shown on **Figure 1**) and drains into Salsipuedes Creek, which is a tributary to the Pajaro River. The College Lake watershed consists of approximately 11,000 acres of range, rural residential, and crop lands. Approximately 2,000 feet downstream of College Lake, surface water enters Salsipuedes Creek from Corralitos Creek. At times during the wet season, the flow direction in the reach of Salsipuedes Creek between College Lake and the Corralitos Creek confluence can reverse. When these conditions occur, surface water can flow from Corralitos and Salsipuedes creeks into College Lake. Flow magnitudes and directions in this reach of Salsipuedes Creek are controlled by several factors, including the water level of College Lake, the flow rate in Corralitos Creek, and the flow rate in Salsipuedes Creek downstream of the Corralitos Creek confluence. During wet years, surface water overflowing from Pinto Lake flows through a drainage channel (called Pinto Creek) into this reach of Salsipuedes Creek between College Lake and the Corralitos Creek confluence (Figure 1).

South-central California coast (S-CCC) steelhead (*Oncorhynchus mykiss*), a federally-listed threatened species, are known to utilize College Lake seasonally for winter and spring juvenile rearing prior to outmigration to the ocean.[4] Invasive (i.e., non-native) species are also known to occur in College Lake. A juvenile steelhead outmigration study conducted at College Lake in 2011 documented the presence of invasive species such as common carp (*Cyprinus carpio*), fathead minnow (*Pimephales promelas*), golden shiner (*Notemigonus chrysoleucas*), channel catfish (*Ictalurus punctatus*), black bullhead (*Ameiurus melas*), and brown bullhead (*Ameiurus nebulosus*).[5] Bluegill (*Lepomis macrochirus*) and largemouth bass (*Micropterus salmoides*) have also been observed in College Lake and other non-native species may be present. Non-native fish species compete with native species for habitat and resources, and some (e.g., catfish, bass) may also pray on juvenile steelhead.

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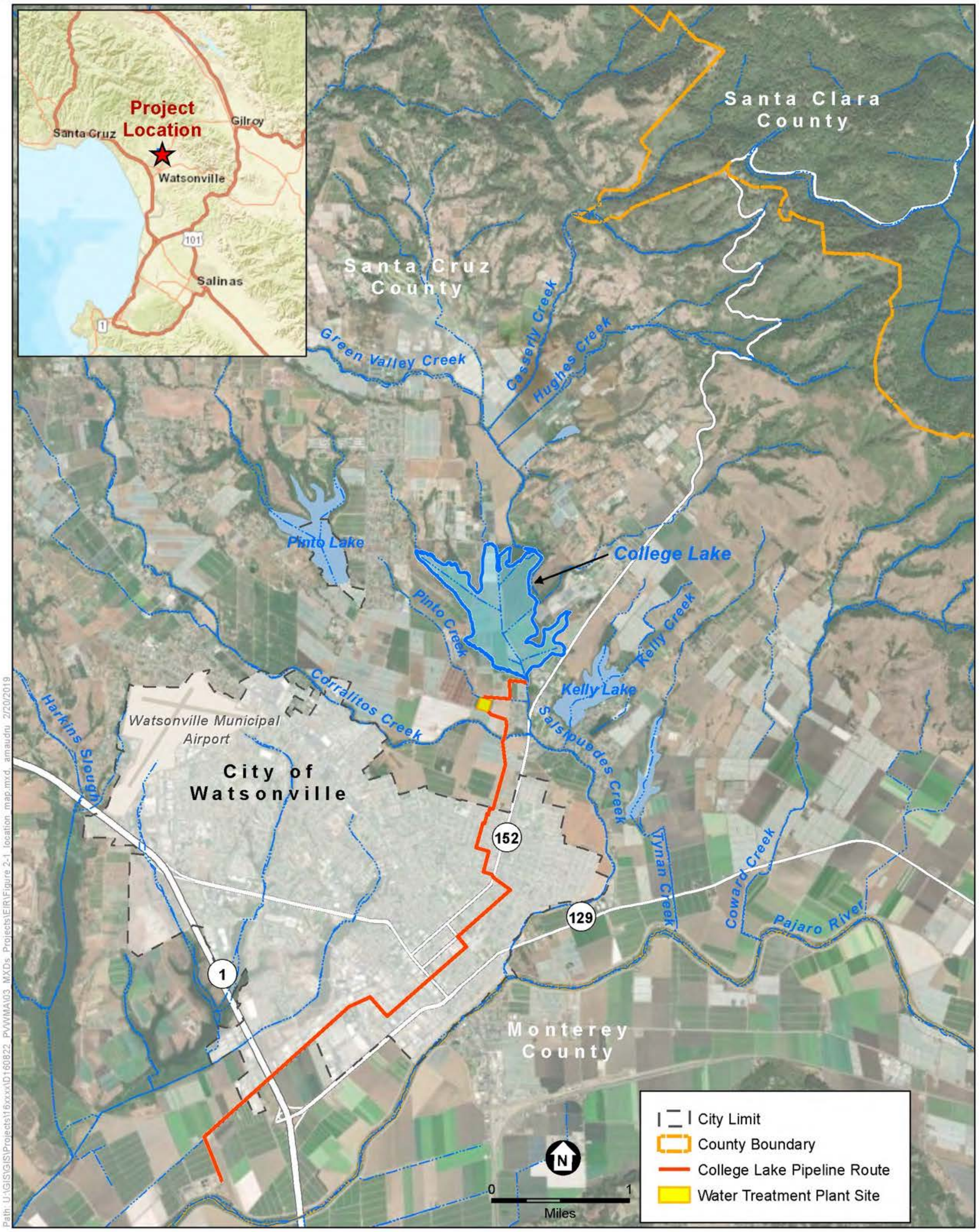
[4] Podlech, M., College Lake Smolt Outmigrant Study–Spring 2011. Prepared for Resource Conservation District of Santa Cruz County, 2011.

[5] Ibid.




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

College Lake Integrated Resources Management Project

**Figure 1**
Project Location Map

ESA

While there are no recorded observations of California red-legged frogs (*Rana draytonii*), a federally-listed threatened species, in College Lake, suitable breeding habitat for this species is present in the woodland along the shore of College Lake and in channels near the existing weir and in Salsipuedes Creek. However, American bullfrog (*Lithobates catesbeianus*), a non-native predator of California red-legged frogs, is known to occur in College Lake.[6] Non-native signal crayfish (*Pacifastacus leniusculus*) are also present. This species is capable of preying on small native fish and amphibians.

Under current conditions, Reclamation District 2049 (RD 2049) operates an existing weir and associated pump station located at the outlet of College Lake, which is at its south end. Flooding in and around College Lake occurs in association with wet weather events; during the wet season, water surface elevations regularly exceed the elevation of the existing weir (60.1 feet North American Vertical Datum of 1988 [NAVD88]). To allow summer farming in the lakebed, RD 2049 currently pumps water out of College Lake in the spring, usually beginning in mid-March, with each year's starting date depending on spring rain patterns. The spring draining of the lake allows the lakebed to dry out for summer crop planting. However, continued inflow from the Casserly Creek watershed, as well as agricultural irrigation drainage from lands within and adjacent to College Lake continue to maintain wetted conditions within drainage channels traversing the lake (**Figure 2**). Thus, pumping continues intermittently during the summer and fall as necessary to lower water levels in the drainage channels and keep the lakebed dry while crops are growing. The purpose of the existing weir is to prevent water that is pumped from College Lake into Salsipuedes Creek from flowing back into the lake. The current operations of draining the lake in spring and periodic pumping during the agricultural season, reduces wetted habitat in the summer and fall to the drainage ditches within the lake at a time when steelhead are not expected to occupy the lake. While this pumping practice does not entirely eliminate populations of invasive species, it likely helps to control and reduce populations annually by significantly limiting habitat availability.

To implement the Project, PV Water will construct a new adjustable weir to seasonally raise the controlled College Lake water surface level by up to 2.4 feet to an elevation of 62.5 feet NAVD88. Depending on water supply needs, PV Water will pump water from College Lake (either by direct diversions of water flowing into the lake or re-diversions of water previously stored in the lake) to a new water treatment plant. PV Water will convey the treated water for approximately six miles through the new College Lake Pipeline to its existing Coastal Distribution System for deliveries to farmers who will use the water for irrigation in lieu of pumping equivalent amounts of groundwater. With implementation of the Project, water would be retained in College Lake for a longer period of time in the spring, summer, and fall compared to existing conditions. An extended inundation season in College Lake could potentially allow populations of non-native predatory species to increase. However, depending on water year type and agricultural demand, PV Water will draw down most or all of the lake storage in most years, typically by September. This will result in the majority of the lakebed drying out and water remaining only within drainage channels in most years, as it does under existing conditions. Moreover, PV Water also plans to drain College Lake fully every two to three years for equipment maintenance or repair, to ensure the lake bottom is able to dry out for purposes of vegetation and/or sediment management, predator control, or to prevent water quality issues such algal blooms or other unforeseen issues from developing within the lake.

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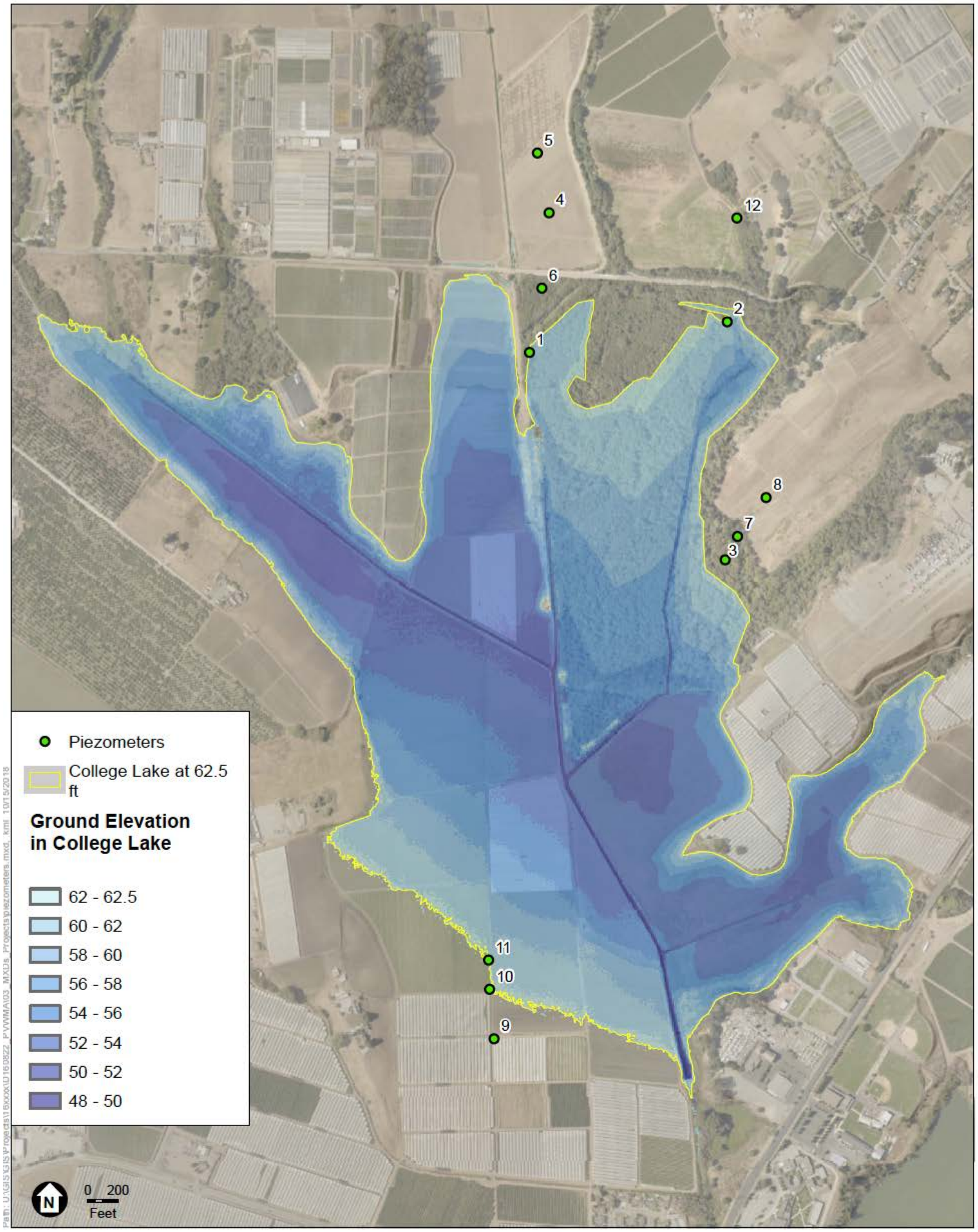
6 Kittleson, G., Kittleson Environmental Consulting, pers. comm., December 30, 2020.




SOURCE: cbec, 2018

College Lake Integrated Resources Management Project

**Figure 2.** College Lake ground elevations and drainage channels.

## 1.3 Adaptive Management Plan

The 2019 EIR incorporates mitigation measures previously adopted by PV Water's Board of Directors under the 2014 Basin Management Plan (BMP) Update Programmatic EIR. Mitigation Measure BIO-2i.1 (Develop Adaptive Management Plan for College Lake Waterfowl Management and Multi-Species Mitigation) was included in the *Final Environmental Impact Report for the Basin Management Plan Update* (2014 BMP Update PEIR) in response to public comment. PV Water is committed to preparing an Adaptive Management Plan (AMP) as part of the College Lake Project, as outlined below:

> **BIO-2i.1: Develop Adaptive Management Plan for College Lake Waterfowl Management and Multi- Species Mitigation.** To mitigate impacts to existing waterfowl or waterfowl habitat at College Lake, an Adaptive Management Plan for waterfowl management and multi-species mitigation will be developed with the consultation of the state and federal resource agencies and College Lake stakeholders. The Adaptive Management Plan for waterfowl management and multi-species mitigation at College Lake will develop multi-year baseline waterfowl population and habitat use data for future project design, environmental permitting and CEQA impact analysis of project-level alternatives. To the extent practical, it will integrate the results of ongoing College Lake hydrology and hydraulic analyses, as well as future consultations with state and federal agencies on fish flows and fish bypass criteria.
>
> The Management Plan will be specific to the level of impact and mitigations under site-specific and project implementation conditions. However, the following standards will apply as defined during project-level design, regulatory review and CEQA analysis: The Management Plan should include terms and conditions from applicable permits and agreements as appropriate and define provisions for monitoring assignments, scheduling, and responsibility. The Management Plan should also include habitat replacement and revegetation, protection during ground-disturbing activities, performance standards, maintenance criteria, and monitoring requirements for temporary and permanent impacts consistent with mitigation in this EIR and regulatory requirements during project- specific review. The Management Plan will be in conformance with the biology mitigation measures from this EIR, and will also include terms and conditions consistent regulatory requirements as applicable from the USFWS, USACE, SWRCB, and CDFW permits during project design and permitting as applicable. The Management Plan will be prepared for project level project implementation as determined needed through future CEQA review and consultation with agencies as required under CESA and ESA.

Adaptive management is defined as "a framework and flexible decision-making process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvements in management planning and implementation of a project to achieve specified objectives."[7] An adaptive management approach provides a structured process that allows for taking action under uncertain conditions based on the best available science, closely monitoring and evaluating outcomes, and re-evaluating and adjusting decisions as more information is learned.[8] Adaptive management encourages an ecosystem-level approach to resource management and promotes collaboration among scientists, managers, and other

---

7 2011 California Water Code, Division 35. Sacramento-San Joaquin Delta Reform Act of 2009, Chapter 4, Section 85052.

8 California Department of Fish and Wildlife, Adaptive Management. Available online at https://www.dfg.ca.gov/erp/adaptive_management.asp. Accessed on August 6, 2019.

stakeholders on decisions. To be effective, that decision-making process must be flexible enough to adjust in the face of uncertainties, variances or other unforeseen outcomes from management actions and other external events. With an established AMP, the project will be set up to use tools such as monitoring, modeling, or other applied studies to generate the science-based information that managers need for decision-making. Once this information is available, managers can "Adapt" a project. If needed, possible adaptive management actions include additional studies or monitoring and corrective on-the-ground actions. It is imperative when approaching a project with significant uncertainties, that all stages of the "Plan" phase are open to adaptive management consideration.

In response to environmental review and permitting requirements, the College Lake Project is generating several plans that are related to adaptive management. These include this invasive species management plan, a steelhead monitoring plan, a water quality monitoring plan, an operations and maintenance (O&M) plan, and a water right compliance plan. All of these plans have a role in the project process and will need to be comprehensively considered in the adaptive management process. The intention is for the AMP to serve as an umbrella document where the data and information generated by these various elements can be evaluated holistically in the context of the project objectives. The AMP therefore will become a critical process document and serve as the central organizing "spine" of most of the other plans, including this invasive species management plan. Most of these plans will already be complete prior to the development of the AMP. As such, the AMP will include a feedback process to each of those plans to account for any future management decisions that have the potential to ripple through various other documents. Since these other plans are driven largely by the regulatory process, the AMP will have to account for a process by which stakeholder education and feedback are incorporated back into those plans through the adaptive management process if warranted. For example, if data collected during implementation of this invasive species plan indicate that the population of one exotic species is not responding to suppression efforts, it may trigger an adaptive management action such as an evaluation of alternative management methods or perhaps a direct change in water management. PV Water would be responsible for reporting action triggers and implementing management actions based on these triggers as part of the development of the AMP. In short, this invasive species management plan defines the methods PV Water will implement in an effort to suppress and/or eradicate non-native species from College Lake and, in the process, feed science-based data and information into the adaptive management decision-making process, which may include, among others, adaptively managed changes to this plan itself.

# CHAPTER 2
# Management Plan Design

## 2.1 Goals and Objectives

Non-native aquatic species reduce diversity and abundance of native species through competition, predation, parasitism, genetic dilution, introduction of pathogens, smothering and loss of habitat.[9] College Lake has been actively managed for agricultural production for a century, and farming will continue to occur on surrounding lands. Implementation of the Project will alter the existing hydrologic regime of College Lake, primarily during the summer and fall when the lake will be operated for water supply storage and diversion rather than agricultural production, thereby extending the duration, extent, and depth of lake inundation later into the summer compared to existing conditions. Although PV Water will draw down most of the College Lake storage every year and further drain it every 2-3 years, shallow residual water will remain within existing drainage channels and additional active management methods for controlling invasive species populations are therefore necessary.

The goal of this Invasive Species Management Plan is to promote aquatic habitat conditions in College Lake that are conducive to native species utilization by eliminating or limiting competitive and predatory pressures by invasive species. The objective of the plan is to minimize proliferation of, suppress, and/or eradicate invasive species in College Lake as part of ongoing operation and management of the Project. The means of accomplishing this objective include:

(1) Determining potential sources of invasive species and developing and implementing appropriate strategies to control spread from identified sources;

(2) Fully draining the lake every two to three years;

(3) Direct removal of invasive species;

(4) Monitoring invasive species composition and abundance;

(5) Periodic reevaluation of invasive species control methods and continued need for management through the AMP process.

## 2.2 Monitoring

The CDFW water right protest dismissal term specifically states that this invasive species management plan "shall include, at a minimum, an annual survey for bullfrogs and nonnative piscivorous fishes. If bullfrogs and/or non-native piscivorous fishes are identified, the plan shall provide potential actions to

9 California Department of Fish and Game. 2008. California Aquatic Invasive Species Management Plan.

eradicate those species from the reservoir." The surface area of College Lake is approximately 228 acres when fully inundated to the existing weir elevation of 60.1 feet (North American Vertical Datum of 1988 [NAVD88]) and is estimated to increase to approximately 285 acres when the future Project weir is raised to the maximum water surface elevation of 62.5 feet NAVD88.[10] Surveys for invasive species during times of full or partial inundation (i.e., spring/early summer) would likely be inconclusive over such a large area. Moreover, spring surveys for non-native piscivorous fishes during these conditions would require the use of direct capture methods (e.g., seining) that would be likely to result in incidental capture of federally-listed threatened S-CCC steelhead known to be present in College Lake during the winter and spring.

Given the ineffectiveness of surveying across a large body of water and the known presence of invasive fish, amphibians, and crustaceans in College Lake, as well as the near-annual drawdown of the lake, pre-management presence/absence monitoring surveys are not necessary at this time. Rather, the invasive species management activities described below (Section 2.4) will be implemented based on presumed presence, and monitoring of invasive species population trends will be conducted concurrently to track the effectiveness of invasive species management. As such, the direct removal activities described below will also serve to monitor ongoing population trends and management effectiveness. Monitoring parameters will include species, life stage, numbers, locations, and densities of invasive species captured per unit effort. Index sites will be established to allow for quantitative comparisons of species composition and abundance over time. All management and monitoring activities will occur when water in College Lake is confined to the drainage channels and the presence of listed steelhead is highly unlikely (i.e., late summer/early fall), as described in Section 2.4 below.

In summary, monitoring for invasive species presence is typically conducted in order to determine whether subsequent removal activities are necessary, but as described below, PV Water is committed to implementing near-annual invasive species removal efforts for the foreseeable future. Detailed record keeping during these efforts will serve as a quantitative monitoring tool for tracking invasive species presence, abundance, and management effectiveness over time.

## 2.3 Success Criteria

The levels of effort needed to successfully manage invasive species populations vary by site. College Lake is a relatively large, natural, onstream lake that is hydrologically connected to other waterbodies known to support non-native species (e.g., Pinto Lake, Salsipuedes Creek, Pajaro River). Additionally, amphibian species such as bullfrogs are capable of traveling long distances overland. As such, even if full control of invasive species is achieved, recolonization may occur. Therefore, invasive species control in College Lake will be considered successful if the proliferation of invasive species is minimized and populations are either eradicated or significantly suppressed over time, as measured by species abundances and/or densities per unit effort. Detailed success criteria will be incorporated into the AMP and may be reevaluated and/or adjusted through that process based on the results of initial control efforts.

[10] cbec, College Lake Integrated Resources Management Project Hydrologic and Hydraulic Modeling Technical Memorandum, Figure 4, Stage-Storage and Stage-Surface Area Curves, November 2018.

## 2.4 Management Methods

In general, there are two main methods available for the control of invasive species: Indirect removal through lake draining, and direct (i.e., manual) removal through physical capture. Implementing both indirect and direct removals is generally considered the most effective approach. For invasive species management at College Lake, PV Water will use a combination of these two approaches.. The lake will be mostly or entirely drawn down for water supply purposes on a near-annual basis and, when necessary, drained further to the greatest extent feasible for maintenance activities every two to three years. Direct removal of invasive species will occur within areas of the lake that remain wetted after lake draw-down, as described further below.

### 2.4.1 Lake Draining

Under the Project, an intake pump station will pump raw (untreated) water from a screened intake just upstream of a new adjustable weir to a water treatment plant via a 30-inch diameter intake pipeline. The intake pump station will have a maximum pumping capacity of 30 cubic feet per second (cfs). Depending on water year type and agricultural demand, PV Water will draw down most or all of the lake storage in most years, typically by September. This will result in the majority of the lakebed drying out in most years. However, similar to existing conditions, inflows to the lake may continue to occur throughout the summer and fall, but will be confined to the lake's drainage ditch channels (**Photos 1** and **2**). Project designs include a 30-inch bypass pipeline from the pump station to the downstream side of the new weir structure. This bypass pipeline will be used to further drain College Lake (including drainage channels) every two to three years for equipment maintenance or equipment repair, invasive species control, or to prevent water quality issues such algal blooms or other unforeseen issues from developing within the lake.[11] The intake is expected to be able to pump water down to a surface water elevation of approximately 51 feet NAVD88 while the channel elevation at that location will be at approximately 48 feet NAVD88.[12] If deemed necessary, it may be feasible to further drain water levels below 51 feet NAVD88 using appropriately-screened temporary submersible pumps. Nevertheless, some water is expected to remain within the drainage channels and PV Water will conduct direct manual removal during these minimum surface water elevation periods, as described below.

[11] Lake draining will occur in compliance with applicable federal and state water quality regulations, such as the federal Clean Water Act and the State Porter-Cologne Water Quality Control Act.

[12] Friedlander, P., Carollo Engineers, pers. comm., January 8, 2021.

**Photo 1.** College Lake drainage channel immediately upstream of existing weir, August 11, 2020

**Photo 2.** College Lake drainage channel 150 ft upstream of existing weir, August 11, 2020

## 2.4.2 Direct Removal

Direct removal activities will occur in late summer/early fall when College Lake has been drawn down and remaining wetted areas are confined to the existing drainage channels similar to conditions depicted in Photos 1 and 2. This will concentrate and confine invasive species remaining after drawdown to habitats with residual depth that can be effectively targeted for capture.

All direct capture and removal efforts will be conducted by qualified biologists with expertise in invasive and native aquatic species identification. A team of two or more biologists may use a variety of standard methods to capture invasive species, including seining, dip-netting, -electrofishing, or other methods recommended and authorized by CDFW and NMFS. All captured organisms will be identified and the number and location of captured individuals of each invasive species will be recorded. Invasive species will be euthanized and disposed of in accordance with applicable management authorizations (see Section 2.5 below). Native species, including California red-legged frogs, that are captured during the direct removal efforts will be returned to the habitat where they were captured.

Although highly unlikely to be present in College Lake during late summer due to expected unsuitable habitat conditions, S-CCC steelhead may inadvertently be captured during removal efforts. In such an event, steelhead will be transported to suitable habitat in coolers filled with lake water and fitted with battery-powered aerators in accordance with applicable federal authorizations (see Section 2.5 below). A separate Steelhead Monitoring Plan will also be prepared for the Project and will establish steelhead handling and relocation protocols in coordination with NMFS and CDFW.

### 2.4.3 Management Frequency

Multiple annual management efforts are typically needed to fully eradicate invasive species, but even with such extensive efforts, success cannot be guaranteed. College Lake is a natural lake and has likely been occupied by invasive species for decades. Moreover, potential sources of invasive species such as Pinto Lake and Salsipuedes Creek are hydrologically connected to College Lake and may facilitate reintroductions. Existing management by RD 2049, particularly the annual draining of the lakebed for agricultural production, has undoubtedly helped to control proliferation of non-native populations by limiting available habitat to existing drainage ditches during the summer/fall and thereby exposing them to predation by birds and mammals.

As noted above, PV Water will continue to draw down most or all of the lake storage in most years, typically by September, several months later than under current operations. Depending on water year type and demand, however, the lake may not be fully dried every year. In addition to the annual drawdown for water supply, PV Water also plans to further drain the lake and drainage ditches, to the greatest extent feasible, every two to three years for maintenance activities (e.g., equipment maintenance or equipment repair, vegetation and/or sediment management). The full or substantial annual drawdown of the lake for water supply, combined with additional periodic draining for maintenance, will result in significant to complete lake drying of the lakebed on a near-annual basis and help to control invasive species populations by reducing available habitat to the existing drainage ditches.

Direct removal activities are only expected to be effective when water surface elevations in the lake are very low and confined to existing drainage channels such that remaining invasive species are concentrated in shallow wetted areas. Direct removal activities will be conducted whenever such conditions are present in College Lake. Based on anticipated water supply and maintenance needs, direct removal activities may occur as frequently as every year and no less frequently than every three years.

Index sites established for monitoring purposes will be surveyed annually in late summer/early fall when the water surface elevation of the lake is at the expected minimum for that year. Index site will be established in locations that are expected to retain residual depths after drawdown and draining (e.g., immediately upstream of the weir and other depressions within the drainage ditches). Final site selection will occur during the first 1-3 years of plan implementation when typical conditions become evident. All non-natives captured during index site monitoring will be removed. Depending on water storage levels in the lake, additional direct removal efforts in non-index locations will be conducted in most years when feasible, as described above). If significant increases in non-native abundance are noted during index monitoring but the lake has not been fully drained for maintenance, PV Water will drain the lake to the greatest extent feasible to support direct removal efforts.

## 2.5 Management Authorizations

California Fish and Game Code (FGC) Section 5501 allows CDFW, as limited by the commission, to issue a permit to destroy fish[13] that are harmful to other wildlife, as regulated under Section California

[13] FGC 45 defines "Fish" as "a wild fish, mollusk, crustacean, invertebrate, amphibian, or part, spawn, or ovum of any of those animals". Therefore, take of invasive signal crayfish is permitted under FGC Section 5501.

Code of Regulations (CCR), Title 14 (T-14) 226.5 *Issuance of Permits to Destroy Harmful Species of Fish in Private Waters for Management Purposes*. This allows CDFW to issue free permits to destroy harmful aquatic species by seining and draining. PV Water expects CDFW will issue such a permit upon approval of this invasive species management plan.

Additionally, take of bullfrogs is specifically allowed in CCR T-14 section 5.05(a)(28), under the authority of a sport fishing license. There is no daily bag limit, possession limit or hour restriction, but bullfrogs can only be taken by hand, hand-held dip net, hook and line, lights, spears, gigs, grabs, paddles, bow and arrow or fish tackle.

CDFW may also authorize ongoing invasive species management activities as part of a Lake or Streambed Alteration Agreement (LSAA) issued for project maintenance activities pursuant to FGC Section 1602. Given that PV Water intends to request an LSAA for maintenance activities such as facility repairs and sediment management, this appear to be the most appropriate permitting approach for this invasive species management plan, pending further discussion with CDFW.

Incidental capture and subsequent release/relocation of steelhead and/or of California red-legged frogs to suitable habitat will occur in accordance with applicable federal Endangered Species Act take authorizations for the Project from NMFS and USFWS.

## 2.6 Reporting Procedures

Written logs of management and monitoring efforts will be kept. The written logs will include: 1) date and time of each management and monitoring effort, 2) methods and equipment used, 3) locations of monitoring/management efforts, 4) approximate number and life-stages of each species detected and/or removed per effort, and 5) capture per unit effort. An annual summary report of the results of monitoring and management activities, as well as discussions of the level of success and recommendations for potential modifications to the management protocols, will be submitted to CDFW, NMFS, and USFWS by December 31 of each year.

# CHAPTER 3
# Response Actions

As described in Section 1.3 above, College Lake and the Project will be managed adaptively through an AMP. The AMP will serve as an umbrella document where the data and information generated by various monitoring efforts, including this invasive species management plan, can be evaluated holistically in the context of the Project objectives. The AMP will provide a set of objectives and an associated set of monitored parameters. The AMP will also define thresholds for the monitored parameters that when exceeded would require management actions (i.e., action triggers). The exact management action will depend on the nature of the problem and the appropriate remedies available. Typically, the first management action will be to conduct a thorough review of the available information that can inform project managers regarding the applicability of various actions. Often, technical experts (both associated with and external to the project, as warranted) will be consulted before taking a management action to analyze the relevant information and provide a range of appropriate management actions, including their risks and costs.

Within the context of the AMP, the annual reports (Section 2.6) for this invasive species management plan will provide the values of monitored parameters (e.g., numbers of an invasive species captured) to be compared to the value of the action trigger, related discussions of the effectiveness of implemented control measures, and, if warranted, recommendations for potential remedial response actions for consideration by PV Water and regulatory stakeholders (CDFW, NMFS, USFWS) through the adaptive management process. Depending on the reasons for invasive species persistence (e.g., ineffective capture methods, re-colonization from nearby waterbodies, illegal stocking, etc.), PV Water will identify feasible response actions. For example, if recolonization from Pinto Lake is found to be the primary source of invasive species in College Lake, PV Water may discuss potential remedial actions (e.g., screening of Pinto Lake outlet) with the City of Watsonville. If invasive species persistence or proliferation are determined to be the direct cause of lake management practices, PV Water will coordinate with regulatory stakeholders (CDFW, NMFS, USFWS) to identify potential response actions (e.g., more extensive direct removal efforts) that are consistent with Project needs and objectives.

# Appendix E
## Revegetation Plan

# COLLEGE LAKE INTEGRATED RESOURCES MANAGEMENT PROJECT

## Revegetation Plan

Prepared for
Pajaro Valley Water Management Agency

March 2020

# COLLEGE LAKE INTEGRATED RESOURCES MANAGEMENT PROJECT

## Revegetation Plan

Prepared for
Pajaro Valley Water Management Agency

March 2020

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# College Lake Integrated Resources Management Project Revegetation Plan

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# CHAPTER 1
# Introduction

This Revegetation Plan (Plan) was prepared for the Pajaro Valley Water Management Agency's (PV Water's) College Lake Integrated Resources Management Project (Project) weir and pump station replacement Project elements. This Plan provides details for revegetating seasonal wetland and riparian forest understory habitat along Salsipuedes Creek that will be temporarily impacted during the demolition of the existing weir and pump station and construction of the new weir structure and pump station along the creek, estimated to occur in 2022.

In 2019, PV Water proposed to construct a new weir structure and intake pump station in Salsipuedes Creek at the College Lake outlet, which is at the south end of the lake near the location of the existing weir in unincorporated Santa Cruz County (**Figure 1**). The proposed weir structure would have an adjustable crest and a diversion and intake pump station to divert surface water from College Lake. The intake pump station would pump raw (untreated) water from an intake just upstream of the weir to the proposed water treatment plant (WTP) via a 30-inch diameter intake pipeline. The intake pump station would have a maximum pumping capacity of 30 cubic feet per second (cfs). The proposed weir structure would consist of a reinforced concrete spillway with mechanically adjustable weir, abutment retaining walls on both sides of the structure, reinforced concrete aprons upstream and downstream of the weir, riprap installation immediately downstream of the weir, and a fish passage structure. The intake would be screened compliant with National Marine Fisheries Service (NMFS) and the California Department of Fish and Wildlife (CDFW) screening criteria for anadromous salmonids. The fish passage structure is designed and will be operated to meet NMFS and CDFW criteria. The pump station would be located on the western bank of the Salsipuedes Creek adjacent to the weir structure, as shown on Figure 1. The proposed adjustable weir would be capable of raising the College Lake water level by up to 2.4 feet above the elevation of the existing weir to a water surface elevation of 62.5 feet North American Vertical Datum of 1988 (NAVD88).

The Project's 2019 Mitigation Monitoring and Reporting Plan supporting the Final Environmental Impact Report for the College Lake Integrated Resources Management Project[1] require the following measures to be implemented and provide the framework for this Revegetation Plan. Mitigation Measure BIO-1c (Revised) applies to the temporary construction impacts to riparian forest understory habitat and one tree that would be removed (see Chapter 2 of this Plan for discussion of Project impacts), and Mitigation Measure BIO-1d (Revised) applies to the temporary construction impacts to seasonal wetland and the creeks.

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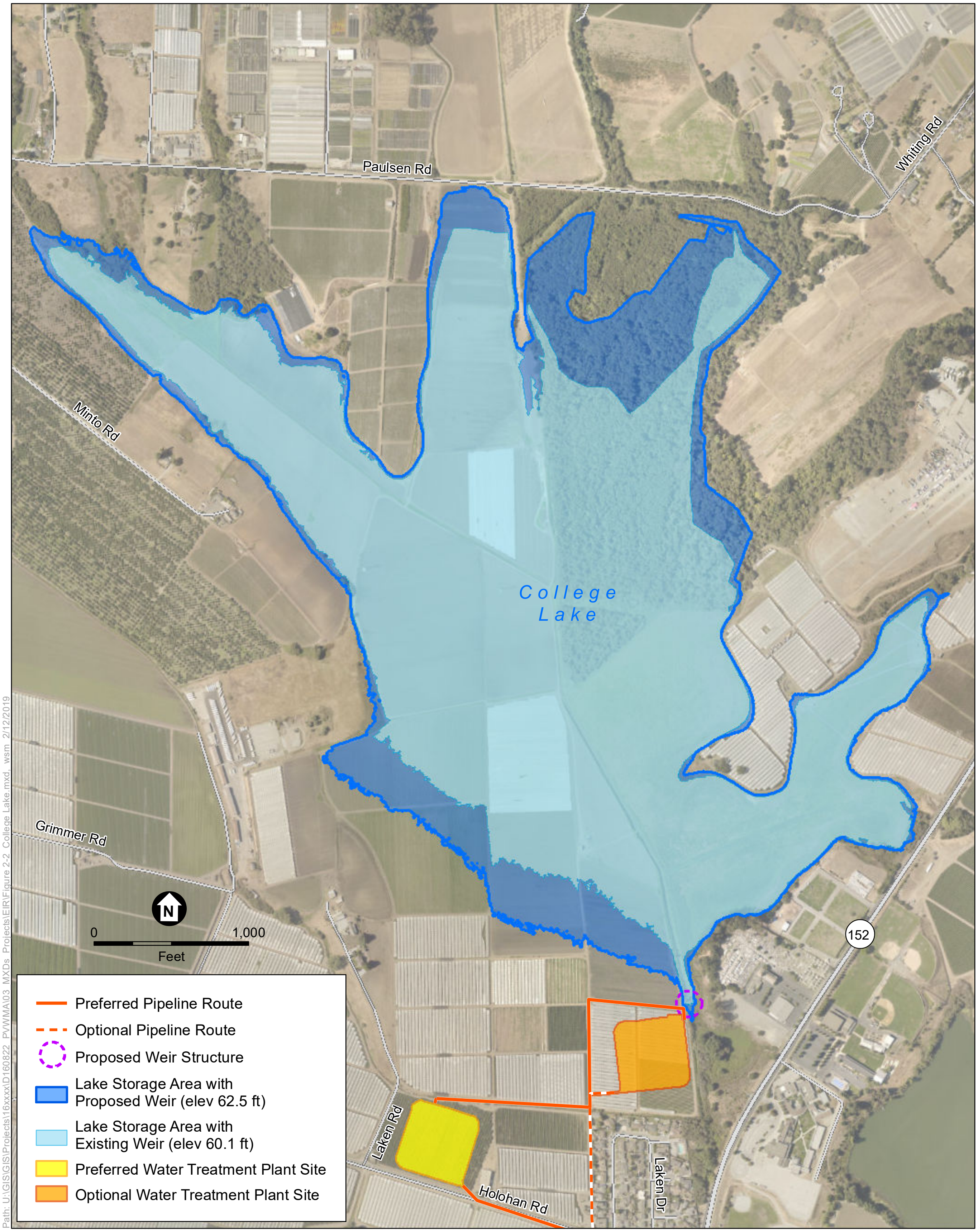
1 Environmental Science Associates (ESA), 2019. Final Environmental Impact Report for the College Lake Integrated Resources Management Project. Prepared for PV Water. Certified October 2019.

**BIO-1c (Revised)**. Where construction impacts on mixed riparian or willow riparian forest occur, revegetation and restoration measures will be developed as part of a revegetation plan approved by CDFW, Regional Water Quality Control Board (RWQCB), and if applicable, the U.S. Army Corps of Engineers (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 applicable agencies, PV Water may choose to coordinate with the Natural Resources Conservation Service 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 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 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.

**BIO-1d (Revised)**. Where construction impacts on open water (creeks, streams, jurisdictional ditches), seasonal wetlands, or coastal freshwater marsh occurs, revegetation and restoration measures will be developed as part of a revegetation plan approved by CDFW, RWQCB, USACE, California Coastal Commission, and/or Santa Cruz County, pursuant to regulatory agency permitting. Upon approval by applicable agencies, PV Water may choose to coordinate with the Natural Resources Conservation Service and the Santa Cruz County 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 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 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.




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

College Lake Integrated Resources Management Project

**Figure 1**
College Lake

ESA

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# CHAPTER 2
# Summary of Impacts and Proposed Revegetation

## 2.1 Summary of Impacts

In 2022, the PV Water will construct a weir structure, a portion of which would be dedicated for fish passage, approximately 105 feet by 65 feet, and an intake pump station, approximately 36 feet by 36 feet, resulting in approximately 0.26 acre of temporary impacts to seasonal wetlands, farmed wetlands, and riparian forest understory, and the removal of one black walnut (*Juglans* sp.) tree within the construction footprint (refer to **Table 2-1** and **Figure 2**).

**TABLE 2-1**
**WEIR AND INTAKE PUMP STATION PROJECT TEMPORARY IMPACTS**

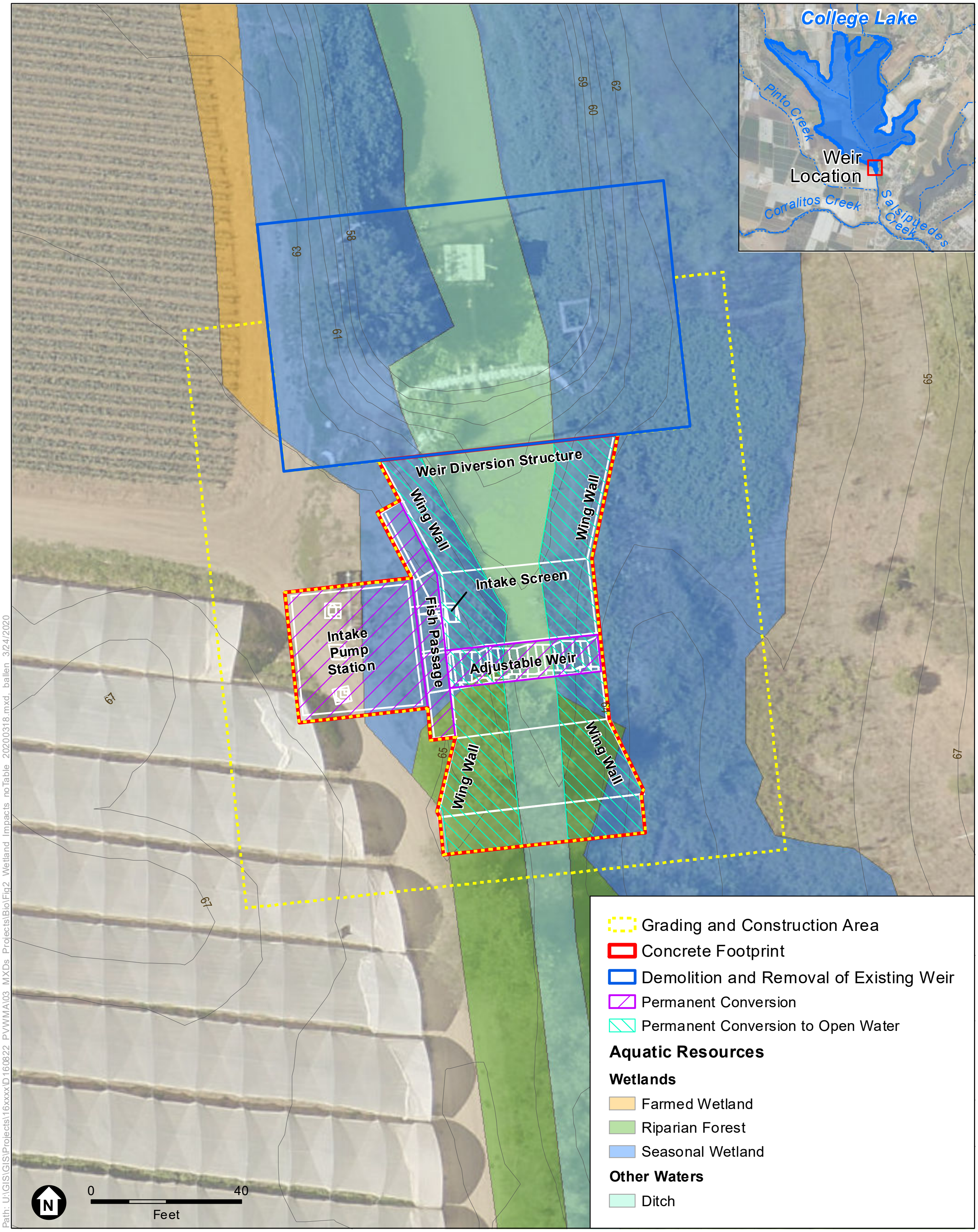
| Resource Temporarily Impacted | Location | Weir and Intake Pump Station Footprint | Impact Type | Required Revegetation Totals |
|---|---|---|---|---|
| Seasonal/Farmed Wetland | Salsipuedes Creek | 0.25 acre | Temporary | 0.25 acre[a] |
| Riparian Forest Understory | Salsipuedes Creek | 0.01 acre | Temporary | 0.01 acre[a] |
| Tree | Salsipuedes Creek | 1 tree | Temporary | 3 trees |

NOTES:
[a] Seasonal wetland and riparian forest understory will be restored to pre-construction conditions with equivalent or greater habitat quality.

SOURCE: ESA, 2020

The Project's temporary impacts to seasonal wetland, farmed wetland, riparian forest understory, and one tree are considered temporary because the wetland habitat impacted is expected to be restored to pre-construction conditions of equivalent habitat or greater habitat quality. Seasonal wetlands and riparian forest understory will be restored to pre-construction conditions with equivalent or greater habitat quality as described in measures BIO-1c and BIO-1d of the EIR.[2] Revegetation of all trees lost will include a 3:1 replacement ratio to account for the reduced habitat values of smaller trees that will be planted compared with mature vegetation removed for Project construction.

[2] ESA, 2019. Final Environmental Impact Report for the College Lake Integrated Resources Management Project. Prepared for PV Water. Certified October, 2019.




SOURCE: DigitalGlobe, 2016; Carollo Engineers, 2020; ESA, 2020

College Lake Integrated Resources Management Project

**Figure 2**

Weir and Pump Station: Impacts to Waters of the U.S.

ESA

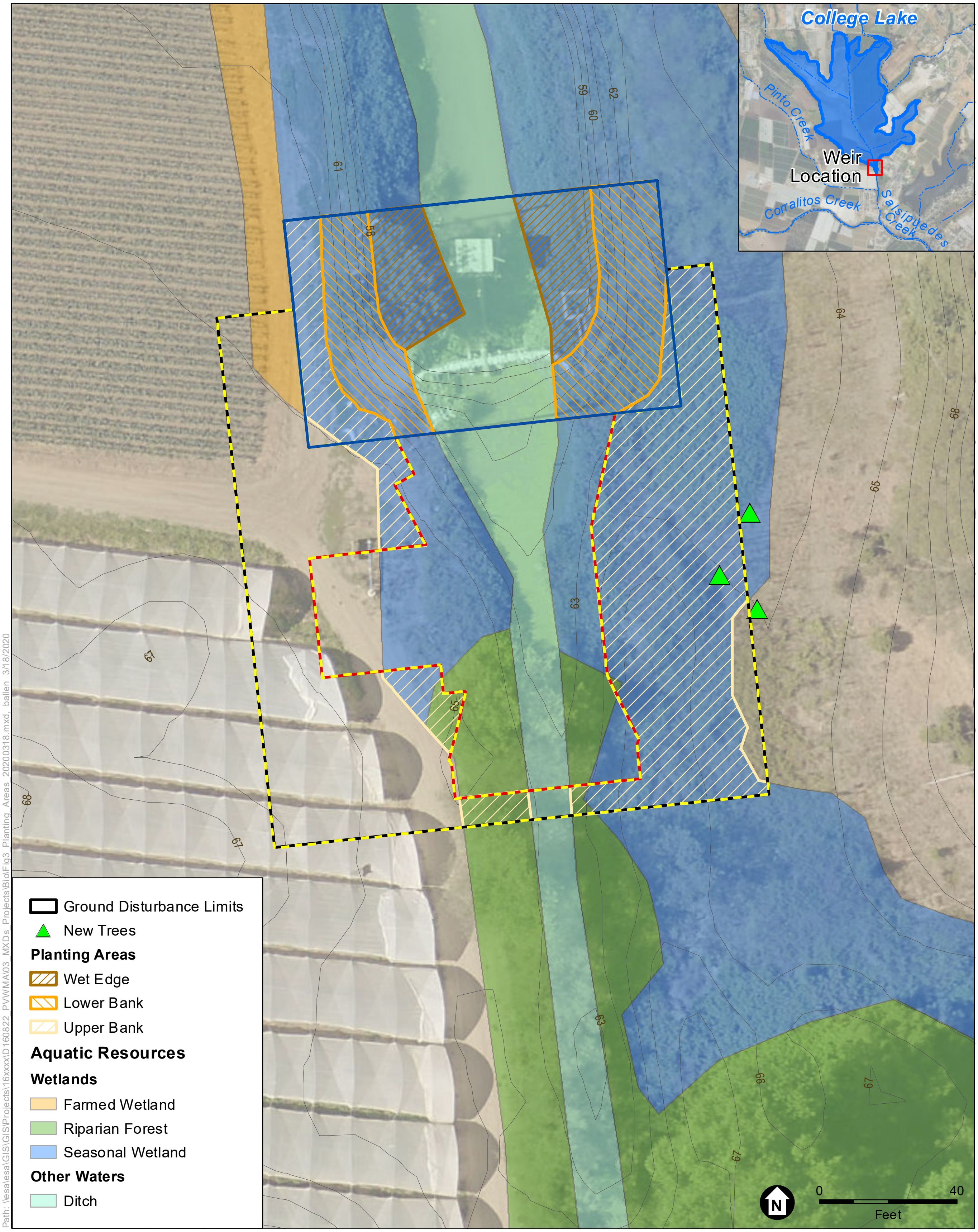
# 2.2 Summary of Revegetation Requirements

## 2.2.1 Revegetation Area

The proposed seasonal wetland and riparian forest understory planting area is located along the Salsipuedes Creek, within the same location as the temporary impacted areas, in unincorporated Santa Cruz County, CA (**Figure 3**). The proposed revegetation area is suitable for seasonal wetland species, and native shrubs and trees. The revegetation for the seasonal wetland and riparian forest understory site will include removal of existing invasive plant species, preparation of the existing top layer of native soil, application of a native herbaceous seed mix, and planting of perennial native wetland plants at the conclusion of construction. Representative photographs of the seasonal wetland to be restored are reflected in **Figure 4** and **Figure 5**.

The seasonal wetland and riparian forest understory community is adjacent to Salsipuedes Creek and is exposed to seasonal flooding. Installation of seasonal wetland sedges and rushes along the lower elevations, and willows and shrubs in the higher elevations will enhance the existing habitat by increasing species diversity and vertical vegetation complexity in the short-term, and upland bank stabilization and channel shading in the long-term.

The tree replacement planting area is east of the seasonal wetland. It is an upland area on a gentle slope, contiguous with seasonal wetlands and annual grasslands. This location does not currently support woody vegetation. Installation of trees in this area will enhance the existing habitat by increasing age diversity and vertical complexity in the short-term, and increase channel shading in the long-term while connecting to the existing riparian forest to the south.




SOURCE: DigitalGlobe, 2016; Carollo Engineers, 2020; ESA, 2020

College Lake Integrated Resources Management Project

**Figure 3**

Weir and Pump Station: Planting Areas

ESA

Path: \\esa\esa\GIS\GIS\Projects\16xxxx\D160822_PVWMA\03_MXDs_Projects\Bio\Fig3_Planting_Areas_20200318.mxd, ballen 3/18/2020

SOURCE: ESA 2018 College Lake Revegetation Plan / 160822.00

**Figure 4**
Seasonal Wetlands Near Existing Weir Structure (Facing Upstream)


SOURCE: ESA 2018 College Lake Revegetation Plan / 160822.00

**Figure 5**
Revegetation Area (Facing College Lake)

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# CHAPTER 3
# Revegetation Plan

## 3.1 Planting Schedule and Design

The goal of this revegetation is to restore temporarily impacted seasonal wetland and riparian understory habitat along Salsipuedes Creek and provide tree replacement for the one tree removed during Project construction. Planting areas for the seasonal wetlands and riparian understory will encompass 0.26 acre along both banks of Salsipuedes Creek. The replacement tree plantings will be located in upland habitat east of Salsipuedes Creek (Figure 3). The plantings will increase vertical complexity and age diversity of trees, thus enhancing the seasonal wetland habitat and extending the nearby riparian community, while minimizing channel roughness. These areas are intended to meet requirements from PV Water and the CDFW, RWQCB, USACE, California Coastal Commission's, and/or Santa Cruz County compensatory mitigation measures, and will require minimal irrigation during the establishment period (years 1-5).

All plantings shall occur between October 1st (or the onset of the rainy season, if later) and December 31st to take advantage of winter rains and moist soil conditions.

## 3.2 Plant Palette and Sources

### 3.2.1 Plant Palette

The plant palette provided in **Table 3-1** was developed based on seasonal wetland and riparian understory species and tree species present within existing habitat along Salsipuedes Creek, species native to the area, and knowledge of what will most likely establish well.

### 3.2.2 Plant Sources

Trees should be propagated from locally sourced seeds, as close to the planting areas as possible. Notice should be given to potential nurseries in advance, so that the nursery has ample lead time to secure sufficient quantities of plantings. Some potential suppliers include:

**Central Coast Wilds Nursery**
336 Golf Club Drive,
Santa Cruz, CA 95060
831.459.0655;
info@centralcoastwilds.com
http://www.centralcoastwilds.com/

**Rana Creek Nursery**
7495 Williams Ranch Road
Carmel, CA 93923
831.659.2830;
nursery@ranacreeknursery.com
https://www.ranacohabitat.com/nursery/

**TABLE 3-1**
**PLANT SPECIES FOR REVEGETATION**

| Common Name | Scientific Name | Spacing | Size | Quantity |
|---|---|---|---|---|
| **Trees** | | | | |
| Western sycamore | *Platanus racemosa* | 20 ft. on center | tree pot (4" square by 14" deep) | 3 |
| **Seasonal Wetland and Riparian Understory** | | | | |
| ***Upper Bank*** | | | | |
| Arroyo willow | *Salix lasiolepis* | 5 ft. on center | live stakes/poles | 20 units |
| California blackberry | *Rubus ursinus* | 5 ft. on center | 1 gallon | 15 units |
| Blue elderberry | *Sambucus nigra* | 5 ft. on center | 1 gallon | 15 units |
| Purple needle grass | *Stipa pulchra* | - | PLS (pure live seed) | 10 lbs./acre |
| Blue wild rye | *Elymus glaucus* | - | PLS | 10 lbs./acre |
| ***Lower Bank*** | | | | |
| California oat grass | *Danthonia californica* | - | PLS | 10 lbs./acre |
| Creeping wild-rye | *Elymus triticoides* | - | PLS | 10 lbs./acre |
| Brown-headed rush | *Juncus phaeocephalus* | groups of 3-5, 2 ft. on center | plug | 175 units |
| Common rush | *Juncus patens* | groups of 3-5, 2 ft. on center | plug | 175 units |
| Foothill sedge | *Carex tumulicola* | groups of 3-5, 2 ft. on center | plug | 175 units |
| ***Wet Edge*** | | | | |
| Creeping wild-rye | *Elymus triticoides* | - | PLS | 5 lbs./acre |
| Meadow barley | *Hordeum brachyantherum* | - | PLS | 5 lbs./acre |
| Water smartweed | *Persicaria amphibia* | - | PLS | 5 lbs./acre |
| Tall flatsedge | *Cyperus eragrostis* | - | PLS | 5 lbs./acre |

SOURCE: ESA, 2020

Care should be taken to source material from nurseries implementing best management practices (BMPs) for preventing *Phytophthora* infections in the nursery and in the container stock. Exotic *Phytophthora* species, also known as water molds, have been introduced accidently in California, including Santa Cruz County, and other parts of the world. Some *Phytophthora* species are plant pathogens that attack the roots, stems, or leaves and eventually cause plant mortality. Several large-scale habitat restoration projects in the San Francisco Bay Area region have unknowingly introduced *Phytophthora* species at their sites through the planting of contaminated container stock from nurseries, resulting in costly clean-up efforts that have included both large-scale and localized soil solarization and replacement plantings. Without proper BMPs, *Phytopthora* species can spread rapidly in a plant nursery environment where there are abundant host plants and conditions are moist and humid with well aerated soils and mild temperatures.

# 3.3 Installation Sequence

## 3.3.1 Trees

Trees will be planted from container-grown plant stock and adhere to the minimum spacing requirements recommended in Table 3-1. Planting basins will be prepared and planted according to the following steps or as otherwise approved by a qualified restoration professional:

1. Clear vegetation and thatch within an area of approximately a 4-foot radius. Minimize vegetation disturbance outside of the 4-foot radius planting area.

2. Planting hole depth for planting trees shall be 1½ times deeper than the depth of the root ball, but may be adjusted depending on soil type and location; planting hole width shall be twice as wide as the width of the root ball.

3. The planting holes will be backfilled with pulverized soil from the site, maintaining the crown of the plant slightly above the grade of the soil. The top of the rootball and crown of the plant will not be covered with backfill soil, as the plant will settle after watering to meet the surrounding soil grade.

4. The plants will be lightly firmed in place by hand.

5. Install watering basin with 3-inch high berm using native soil, at least the diameter of the crown of plant.

6. Backfill the basin with uncompacted native soil.

7. Install weed fabric around the planting basin and anchor with ground staples.

9. Install wire cage for browse protection. Cages should be cylindrical and composed of two gauge (minimum) galvanized 2 by 4-inch mesh wire fence fabric, 4 or 5 feet wide, which will be the height of the cage once the cylindrical cage is installed upright. Cages should be supported by two 5-foot steel t-post (medium or heavy weight) or 5/8 inch diameter steel rebar, 48 inches long. The cages should be constructed large enough to accommodate several years of healthy growth.

10. Attach tree tag with a unique identification number to either the trees or wire cages for monitoring purposes.

## 3.3.2 Seasonal Wetland and Riparian Forest Understory

### 3.3.2.1 Site Preparation

In the wetland and riparian restoration area, any areas of compacted soil should be decompacted through cultivation using a rototiller, farm disc, harrow or other approved equipment. Clear all thatch and weeds from areas to be planted.

#### 3.3.2.2 Broadcast Seed Application

Seeds of wetland plants will be broadcast throughout the revegetation area. Seeds can be broadcast by hand or by mechanical means (e.g. using a hopper with a material regulating system in the bottom that feeds seed at a given rate either onto a spinner or directly onto the soil). Broadcasting will meet the following specifications:

- Half the seed will be spread in one direction and the other half will be spread in the other direction (i.e., first east-west horizontally and then north-south vertically).

- Broadcast seed will be rake, harrowed, chain dragged, or tracked into the soil as feasible to enhance seed to soil contact.

#### 3.3.2.3 Erosion Control Installation

Installation of short-term single net erosion control blanket, such as North American Green BioNet S75BN, will occur in all areas of ground disturbance to ensure protection of seeds, especially during seasonal flooding of the area. The erosion control blanket shall be 100 percent agricultural straw based with natural organic netting and will be 100 percent biodegradable shortly after 12 months from the date of installation. Anchor with ground staples per the manufacturer specifications and ensure staples are installed so they will not be dislodged during seasonal flooding.

#### 3.3.2.4 Shrubs and Herbaceous Plantings

Container plants and plugs will be planted from container and plug-grown plant stock and adhere to the minimum spacing requirements recommended in Table 3-1. Planting basins will be prepared and planted according to the following steps or as otherwise approved by a qualified restoration professional:

1. Using a small hand tool, such as a spade, clear a small hole in the erosion control blanket twice the width of the root ball. Minimize disturbance to the erosion control blanket outside of the planting area radius.

2. Planting hole depth for shrubs and plugs shall be 1.5 times deeper than the depth of the root ball, but may be adjusted depending on soil type and location; planting hole width shall be twice as wide as the width of the root ball.

3. The top of the rootball and crown of the plant will not be covered with backfill soil, as the plant will settle after watering to meet the surrounding soil grade.

4. The plants will be lightly firmed in place by hand.

5. Backfill the basin with uncompacted native soil.

#### 3.3.2.5 Willow Installation

Willows will be planted from live stakes and adhere to the minimum spacing requirements recommended in Table 3-1. Planting basins will be prepared and planted according to the following steps or as otherwise approved by a qualified restoration professional:

1. All live stakes and live poles will be collected locally at College Lake and planted during the dormant season (October to January).

2. Live stakes/poles should be at least 0.5-inch in diameter and 4 to 5 feet long, with a sharp basal (bottom) end of the stake/pole. Live stakes/poles should be soaked for 24 hours prior to planting or collected and planted on the same day. A digging bar, auger, or rebar will be used to prepare the holes for the poles/stakes.

3. Live stakes should be placed 5 feet apart along the upper east bank of Salsipuedes Creek between approximately 63 to 64 elevation, or at a sufficient elevation for the willows to reach the water table, especially during the first 1 to 2 years of establishment.

4. Live willow stakes/poles should be driven through erosion control blanket into the soil to 75 to 80 percent of their total length, leaving one or two buds exposed. Stakes/poles should be positioned at a slight angle to increase growth success. Holes will be filled, tamping down the soil to remove air pockets, and watered immediately.

## 3.4 Irrigation and Maintenance

### 3.4.1 Irrigation

Irrigation frequency and duration will be dependent on the weather conditions and the recommendations of the restoration professional. Once installed, tree plantings shall be irrigated with one gallon of water on a weekly basis during the dry season (May to October) through the first year. If drought conditions are present irrigation should continue through the winter or as determined by the qualified biologist. Irrigation will be provided by a water truck or water buffalo. Willow plantings should not require supplemental irrigation as it is anticipated that groundwater will be available at the planting location based on historical water surface elevations. Seasonal wetland irrigation needs should be assessed weekly to monthly in the first two years after installation, then quarterly or as needed in years three through five. The assessment of plant health and vigor from annual monitoring should also be used to inform irrigation needs as well. Watering may be provided through an irrigation system tied into an existing water line, if possible. If no existing line is available, a water truck, stationary tank, or other method could be used. Appropriate watering will be vital towards successful establishment of plantings.

### 3.4.2 Maintenance

Regular maintenance including weed management and maintenance of plant protection is critical. Invasive weeds and non-native plants will be controlled in all revegetation areas during the five year monitoring period utilizing integrated approaches as directed by a restoration professional. Control methods could include mechanical methods such as hand pulling or weed whacking/ brush cutting.

Invasive weeds and non-native plants will be controlled in all revegetation areas with the goal of preventing seed production and other methods of spread. Monitoring during the early part of the growing season (February to April) is critical for identifying invasive weed and non-native plant seedlings and planning maintenance activities. Invasive weeds and non-native plants containing seed or other reproductive propagules (vegetative reproductive structures such as rhizomes, tubers, stem fragments etc., capable of regenerating plants) will be carefully collected in trash bags or closed vehicles and disposed of at a landfill in such a way so as not to spread weed seeds or propagules.

The following tasks should be carried out approximately monthly in the first two years after installation, then approximately quarterly or as needed in years three through five:

- All vegetation (annual grasses, herbs, and weeds) that were not installed should be removed from the planting areas in the winter, spring, and summer. This will reduce competition for light and water;

- Wire cages should be adjusted to accommodate growth of the installed trees (sycamores). The tree canopy should never be crowded. The wire cage can be removed once the plants are sufficiently established to withstand browsing;

- If irrigation infrastructure is installed, regular checking for leaks or plugging should be conducted. When the revegetation areas have been deemed successful by the restoration professional and regulatory agencies, all irrigation materials shall be removed from the revegetation areas;

- Dead or missing plantings should be replanted during the same time period discussed in Section 3.1 as needed to meet to final success criteria identified in Table 3-1;

- All trash and debris shall be removed from the revegetation areas on an annual basis.

# CHAPTER 4

# Success Criteria, Monitoring, and Reporting

## 4.1 Success Criteria

Survivorship will be the metric used to determine success of installed trees, according to Mitigation Measure BIO-1c (revised). Percent cover will be the metric used to determine success of seasonal wetland and riparian forest understory areas according to Mitigation Measure BIO-1d. The success criteria for each year are summarized in **Table 4-1**, below.

**TABLE 4-1**
**SUCCESS CRITERIA**

| Year | Tree Survivorship | Invasive Cover at Tree Basins | Seasonal Wetland and Riparian Understory Plant Cover |
|---|---|---|---|
| 1 | 80% | less than or equal to 5% | n/a |
| 2 | 80% | less than or equal to 5% | 50% |
| 3-5 | 80% | less than or equal to 5% | 50% |

SOURCE: ESA, 2020

## 4.2 Monitoring

A qualified biologist will monitor the revegetation area for a minimum of five years to ascertain if the wetland and riparian revegetation is successful. Monitoring shall be conducted once a year when leaves are still present on trees and shrubs (e.g., late summer) thus allowing the restoration professional to obtain an accurate measure of both survivorship, as well as plant health and vigor. Identification tags will be used on trees to track survivorship and health and vigor within and among individuals and years.

### 4.2.1 Tree Survivorship

Survivorship of native trees is a count of individuals that are living, compared with the number of individuals planted, and shall be used as the metric to determine revegetation success. For trees that have died since the last monitoring event, the restoration professional will make observations of herbivory, desiccation, or other environmental stress that may have caused mortality, which will be used to inform maintenance recommendations and replanting. 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.

### 4.2.2 Percent Cover

Line transect methods will be used to monitor percent cover of all seasonal wetland and riparian understory revegetation areas. Transects will be placed in areas where wetland and riparian understory vegetation occurs, but will not cover the wetted channel. The fixed transect locations will be re-established and utilized to document annual percent cover of vegetation during subsequent annual monitoring. The transect length would be determined during the initial survey and determined based on what would properly represent the site. The monitoring area extends from the top of bank to the ordinary high water mark.

The overall cover of non-native/invasive plant cover will be visually estimated for each replacement tree planting basin, recorded, and compared from year to year. Cover provided by invasive, non-native plant species shall not exceed 5 percent during each year of the 5-year monitoring period.

### 4.2.3 Plant Health and Vigor

The overall health and vigor of each tree and shrub (excluding willows) will be evaluated each year using the definitions in **Table 4-2**, below.

**TABLE 4-2**
**HEALTH AND VIGOR RATINGS**

| Ratings | Description |
|---|---|
| Excellent | Plant is vigorously growing and healthy, with no sign of disease or injury |
| Good | Plant is healthy and moderately vigorous; may have limited signs of disease or injury |
| Fair | Plant is surviving but lacks signs of vigorous growth; may have signs of disease or injury |
| Poor | Plant exhibits low vitality, or main stem dead, but basal sprouts emerging; survival is uncertain |
| Dead | Plant shows no signs of growth and is not expected to recover |

SOURCE: ESA, 2020

Plant health and vigor will be recorded for each individual. This metric gives the restoration professional important insights on how to best adaptively manage the plants and planting areas. This information can be used to supplement or improve plant protection hardware, adjust the irrigation timing (if any), frequency and duration, or other maintenance actions that will improve survivorship and health in subsequent years.

### 4.2.4 Overall Site Assessment

Conditions will be assessed including: habitat characteristics (e.g., increase/decrease/new occurrence of invasive species, general health and productivity of vegetation communities, natural recruitment of native plants), observation of wildlife species, human disturbances, trash, and natural disturbances (e.g., tree fall, wind damage, drought), all of which may have an impact on the success of the planting areas. Observations will be recorded in a field notebook or standardized data form in the same manner during each site visit.

### 4.2.5 Photo Documentation

Photos will be taken from set points and orientations annually to document landscape level changes over time in the planting areas. Permanent photo-monitoring points can be established in the planting areas at the time of installation. Photos from each monitoring event can be qualitatively compared with the baseline conditions and previous monitoring years to provide a visual record of changes over time.

### 4.2.6 Analysis of Results

Data will be collected in the field according to the methods described above. This includes both quantitative and qualitative data that will be entered into a database, written up for the annual report (refer to Section 4.3, below), or otherwise saved in a place that can be easily retrieved for summarizing results and for comparison during the next monitoring event. Monitoring data and results will be compared to the success criteria in order to make conclusions about the extent to which successful revegetation is being achieved.

## 4.3 Reporting

According to Mitigation Measures BIO-1c (revised) and BIO-1d (revised), annual reports documenting progress towards meeting the success criteria shall be submitted to the regulatory agencies by December 31 following each monitoring year. Annual reports will describe the results of the monitoring and any remedial actions needed to achieve revegetation for temporary impacts on wetlands and riparian understory. Documentation during the fifth monitoring year shall demonstrate the revegetation plantings are surviving, thriving, enhancing seasonal wetland habitat, and are not expected to decline in health over the next five years and beyond.

The first year report will summarize the as-built information as well as the first year monitoring results. The ‘as-built’ information may include plans, drawings, or maps, that accurately depict what was planted and where. Thereafter, annual reports will consist of a summary of information contained in previous reports, as well as a presentation of the current year’s results and discussion of any comparisons between years or trends noted.

Annual reports will include, at the minimum, the following information:

- A summary of previous years monitoring results for discussion and comparison, and a discussion of trends noted (for annual reports in years 2 to 5);
- Summary description of the monitoring methods, including data collection and analysis;
- An overview of the revegetation planting effort, including a general discussion of site conditions, changes since previous report, and quantitative and qualitative comparisons (plant health and vigor, survivorship, and cover as applicable);

- Analysis of success;
- A map of the area with relevant features, and;
- A discussion of any corrective actions needed or undertaken, including invasive plant control efforts, changes in irrigation, and replanting.

# Attachment F

## Seasonal Wetland Monitoring Methodology

## Seasonal Wetland Monitoring Methodology

Permanently marked transects will be used to monitor changes in the species composition of seasonal wetland vegetation at elevations of 51–63 feet North American Vertical Datum (NAVD)88. The purpose of this monitoring is to document changes in species composition of seasonal wetland vegetation because of its importance for wildlife. (Changes in the acreage of seasonal wetland would be documented through mapping from aerial imagery as described above.)

In five fields, five 100-meter-long, permanently marked, transects will be randomly located (25 transects total)[1]. One end of each transect will be randomly located along a baseline at the field margin extending from 51 to 63 feet in elevation NAVD 88. (These markers may be offset from the transect terminus a specified distance.) From their starting point along the baseline, transects will be oriented to follow a bearing that more or less parallels the contour of elevation.

Each year in October, species cover will be recorded at 2-meter intervals along the transect by holding a rod perpendicular to the transect line and recording each plant species that has a leaf or stem touching the pole (i.e., data are recorded for 50 "points" along each transect). The same diameter rod should be used during each year of monitoring, and should be between 0.375 and 1.125 inches (0.953 and 2.86 cm) in diameter.

For each transect, based on its 50 points, the absolute cover of each plant species and of bare ground, and the absolute cover of high-value waterfowl food plants will be calculated for each species on a scale of 0–100 percent. For a point to count as bare ground, there can be no plant touching the rod. If one or more high-value waterfowl food plants touches the rod at a point, that point counts as being covered by high-value waterfowl food plants.

For each transect, a photograph will be taken along the transect from each end, and for each species of high-value waterfowl food plants in a 1-meter-wide band centered on the transect (i.e., 0.5 meters on each side of the transect line), the percentage of plants producing fruit will be visually estimated and recorded in one of five categories: 0–20, >20–40, >40–60, >60–80, or >80–100 percent. The typical height of the plants will also be recorded, and a qualitative reproductive vigor/quality rating may be recorded (similar to the "quality" ratings of Naylor and Eadie 2005). High-value waterfowl food plants are:

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[1] Based on the variance among transects in unpublished data collected by Jerry Bush and John Pritchard at College Lake in 2014–2016, and 2016, this size sample for a field should detect a change in cover of 20 percent between years at a high level of significance ($\alpha$ = 0.05 [95% "significance"]) with moderate power ($\beta$= 0.20 [80 % "power"]), and should detect smaller differences between years overall (i.e., for all fields combined) at a high level of significance and moderate level of power.

- Smartweed (*Persicaria lapathifolia*)
- Fat-hen (*Atriplex prostrata*)
- Swamp timothy (*Crypsis schoenoides*)
- Barnyard grass (*Echinochloa crus-galli*)

Because transects are permanently marked, changes in cover of bare ground, waterfowl food plants, or individual plant species of interest will be evaluated by first calculating the difference in that cover along a transect between years, and then reviewing the differences or statistically testing them for a significant difference from zero (i.e., no overall change in cover). The primary hypotheses of interest are if differences in bare ground are greater than zero (bare ground increasing) or differences in waterfowl food plant cover are less than zero (food plant cover is decreasing). Year-to-year changes in cover along transects can also be plotted against elevation to explore the effects of duration and seasonal timing of inundation (e.g., increasing cover of bare ground at the lowest elevations), and changes can be compared among fields to explore the effects of vegetation management activities (e.g., reduced waterfowl food plant cover in a single field).

**References**

Naylor, L. W. and J. M. Eadie. 2005. A Simple Method to Predict Seed Yield in Moist-Soil Habitats. Wildlife Society Bulletin 33(4); 1335–1341.

# Attachment G

## Plant Species List

# College Lake Plant List

This list of vascular plants at College Lake was compiled by Environmental Science Associates in 2021. It follows the nomenclature of the Jepson eFlora[1] and is based on observations by:

- Environmental Science Associates (ESA) botanists during the wetland delineation conducted for the College Lake Integrated Resources Management Project[2]
- Jerry Busch and John Pritchard during seasonal wetland monitoring and other visits to College Lake[3]
- Botanists who collected plant specimens at College Lake that are now in an herbarium and recorded in the database of the Consortium of California Herbaria (CCH)[4]

For each species, the source observation is provided, and so is its growth form and rating, if any, as an invasive plant by the California Invasive Plan Council (Cal-IPC)[5][6]. The Cal-IPC ratings for invasive plants are:

- **High** – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
- **Moderate** – These species have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
- **Limited** – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Plants with cultural significance for the Amah Mutsun Tribe are also noted[7].

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[1] The Jepson Herbarium. 2021. Jepson eFlora. University of California Berkeley. Available: California Flora, Jepson eFlora Main Page (berkeley.edu). Accessed: October 11, 2021.

[2] Environmental Science Associates (ESA). 2019. College Lake Integrated Resources Management Project Aquatic Resources Delineation Report. Prepared to Pajaro Valley Water Management Agency. April.

[3] J. Busch and J. Pritchard. No Date. College Lake Plant List – Preliminary.

[4] Consortium of California Herbaria (CCH). 2021. Specimen Data from the Consortium of California Herbaria. Available: CCH2 Portal Home. Accessed: October 18, 2021.

[5] California Invasive Plant Council (Cal-IPC). 2021. The Cal-IPC Inventory. Available: The Cal-IPC Inventory – California Invasive Plant Council. Accessed: October18, 2021.

[6]

[7] Based on October 26, 2021 email from Rick Flores, Research Associate, Amah Mutsun Land Trust, and Steward, Amah Mutsun Relearning Program, Arboretum, University of California, Santa Cruz, to John Hunter, Environmental Science Associates, providing comments on a draft College Lake plant list.

**Amaranthaceae**

*Amaranthus deflexus*, large-fruited amaranth, perennial forb/herb, Cal-IPC rating: not nominated for inclusion in inventory, observed by Busch-Pritchard (2013–2020)

**Anacardiaceae**

***Toxicodendron diversilobum***, western poison oak, shrub/vine with cultural significance for the Amah Mutsun Tribe, observed by ESA (2018)

**Apiaceae**

*Conium maculatum*, poison hemlock, biennial forb/herb, Cal-IPC rating: moderate, observed by ESA (2018)

***Oenanthe sarmentosa,*** water parsley, perennial forb/herb with cultural significance for the Amah Mutsun Tribe, observed by Busch-Pritchard (2013–2020)

**Asteraceae**

*Anthemis cotula*, mayweed, annual forb/herb, Cal-IPC rating: evaluated but not included in the inventory, observed by Busch-Pritchard (2013–2020)

*Artemisia biennis*, biennial wormwood, annual/biennial forb/herb, Cal-IPC rating: not nominated for inclusion in the inventory. Source: CCH (1954).

*Artemisia vulgaris*, wormwood, perennial forb/herb, Cal-IPC rating: not nominated for inclusion in the inventory, observed by Busch-Pritchard (2013–2020)

***Baccharis pilularis***, coyote bush, shrub with cultural significance for the Amah Mutsun Tribe, observed by ESA (2018)

*Cirsium vulgare*, bull thistle, biennial forb/herb, Cal-IPC rating: moderate, observed by Busch-Pritchard (2013–2020)

***Erigeron canadensis***, horseweed, annual forb/herb, observed by Busch-Pritchard (2013–2020)

***Euthamia occidentalis***, western goldenrod, perennial forb/herb, observed by Busch-Pritchard (2013–2020)

*Helminthotheca echioides*, bristly ox-tongue, annual/biennial forb/herb, Cal-IPC rating: limited, ESA (2018)

***Hemizonia congesta* subsp. *luzulifolia***, hayfield tarweed, annual forb/herb with cultural significance for the Amah Mutsun Tribe, observation from CCH (1933). Note: specimen is annotated “College Lake, Hecker Pass Road…” and so may have been collected near but not at College Lake.

***Holocarpha macradenia***,Santa Cruz tarplant, annual forb/herb with cultural significance for the Amah Mutsun Tribe, observation from CCH (1933). Note: specimen is annotated “College Lake, Hecker Pass Road…” and so may have been collected near but not at College Lake.

***Madia sativa***, coast tarweed, annual forb/herb with cultural significance for the Amah Mutsun Tribe. Source: CCH (1933). Note: specimen is annotated “College Lake, Hecker Pass Road…” and so may have been collected near but not at College Lake.

***Matricaria occidentalis***, valley mayweed, annual forb/herb, observed by ESA (2018)

*Pseudognaphalium luteoalbum*, Jersey cudweed, annual forb/herb, Cal-IPC rating: not nominated for inclusion in the inventory, observed by Busch-Pritchard (2013–2020)

*Sonchus asper*, spiny sowthistle, Cal-IPC rating: evaluated and not included in inventory, observed by ESA (2018)

*Sonchus oleraceus*, common sow thistle, annual forb/herb, Cal-IPC rating: not nominated for inclusion in the inventory, observed by ESA (2018)

***Symphyotrichum subulatum***, annual saltmarsh aster, annual forb/herb, observed by ESA (2018).

***Xanthium strumarium***, cocklebur, annual forb/herb with cultural significance for the Amah Mutsun Tribe, observed by ESA (2018)

**Boraginaceae**

***Plagiobothrys bracteatus***, bracted popcornflower, annual forb/herb, observation from CCH (1994)

**Brassicaceae**

*Hirschfeldia incana*, shortpod mustard, annual/perennial forb/herb, Cal-IPC rating: moderate, observed by ESA (2018)

*Raphanus sativus*, radish, annual/perennial forb/herb, Cal-IPC rating: limited, observed by ESA (2018)

***Rorippa curvisiliqua***, yellow cress, annual forb/herb, observed by Busch-Pritchard (2013–2020)

**Chenopodiaceae**

*Atriplex prostrata*, fat-hen, annual forb/herb, Cal-IPC rating: not nominated for inclusion in the inventory, observed by Busch-Pritchard (2013–2020)

*Dysphania ambrosioides*, Mexican tea. Annual/perennial forb/herb. Cal-IPC rating: not nominated for inclusion in the inventory, observation from CCH (1954)

**Convolvulaceae**

*Convolvulus arvensis*, bindweed, perennial forb/herb, Cal-IPC rating: evaluated and not included in the inventory, observed by Busch-Pritchard (2013–2020)

***Cuscuta campestris***, field dodder, annual forb/herb, parasitic, observed by Busch-Pritchard (2013–2020).

**Cornaceae**

***Cornus sericea***, American dogwood (a.k.a. red dogwood and red osier), shrub with cultural significance for the Amah Mutsun Tribe, observed by Busch-Pritchard (2013–2020)

**Cyperaceae**

***Carex obnupta***, slough sedge, perennial forb/herb, observed by Busch-Pritchard (2013–2020). Note: this identification is uncertain, the botanist noted that this plant also may be whiteroot sedge (*C. barbarae*), a perennial forb/herb with cultural significance for the Amah Mutsun tribe.

***Cyperus eragrostis***, tall flat sedge (a.k.a. umbrella sedge and by other names), perennial forb/herb. Source: ESA (2018).

***Cyperus erythrorhizos***, red-root flatsedge, annual graminoid, observation from CCH (1954).

***Scirpus microcarpus***, smallfruit bulrush (a.k.a. panicled bulrush), perennial graminoid with cultural significance for the Amah Mutsun Tribe, observed by Busch-Pritchard (2013–2020)

**Euphorbiaceae**

*Euphorbia peplus*, petty spurge, annual forb/herb, Cal-IPC rating: not nominated for inclusion in the inventory, observed by ESA (2018)

**Fabaceae**

*Lotus corniculatus*, bird's-foot trefoil, perennial forb/herb, Cal-IPC rating: evaluated and not included in the inventory, observed by Busch-Pritchard (2013–2020)

*Medicago polymorpha*, California burclover, annual forb/herb, Cal-IPC rating: limited, observed by ESA (2018)

*Melilotus albus*, white sweetclover, annual/biennial forb/herb, Cal-IPC rating: nominated for inclusion in the inventory and assessment pending. Source: ESA (2018).

***Vicia americana*** subsp. ***Americana***. American vetch, perennial forb/herb, observed by ESA (2018)

*Vicia sativa*, common vetch, annual forb/herb, Cal-IPC rating: not nominated for inclusion in the inventory, observed by ESA (2018).

**Geraniaceae**

*Geranium dissectum*, cutleaf geranium, annual/biennial forb/herb, Cal-IPC rating: limited, observed by ESA (2018)

*Geranium molle*, dove's-foot geranium, annual forb/herb, Cal-IPC rating: evaluated and not included in inventory, observed by ESA (2018)

**Juncaceae**

***Juncus effusus***, soft rush, perennial forb/herb with cultural significance for the Amah Mutsun Tribe, observed by ESA (2018).

***Juncus patens***, spreading rush, perennial forb/herb with cultural significance for the Amah Mutsun Tribe, observed by Busch-Pritchard (2013–2020)

**Lamiaceae**

*Melissa officinalis*, lemon balm, perennial forb/herb with cultural significance for the Amah Mutsun Tribe, Cal-IPC rating: nominated for inclusion in the inventory and assessment pending, observed by Busch-Pritchard (2013–2020)

*Mentha pulegium*, pennyroyal, perennial forb, Cal-IPC rating: moderate, observed by ESA (2018)

**Lilliaceae**

*Agapanthus* sp., lily of the Nile, perennial forb/herb, Cal-IPC rating: not nominated for inclusion in the inventory, observed by ESA (2018)

### Lythraceae

*Lythrum hyssopifolia*, hyssop-leaved loosestrife, annual/perennial forb/herb, Cal-IPC rating: moderate, observed by ESA (2018)

### Myrsinaceae

*Lysimachia arvensis*, scarlet pimpernel, annual forb/herb, Cal-IPC rating: nominated for inclusion in the inventory and assessment pending, observed by ESA (2018)

### Nymphaeaceae

***Nuphar polysepala***, yellow water-lily, aquatic perennial, observed by CCH (1908)

### Onagraceae

***Epilobium brachycarpum***, tall willowherb, annual forb/herb, observed by Busch-Pritchard (2013–2020)

### Orchidaceae

*Epipactis helleborine*, broad-leaved helleborine, perennial forb/herb, Cal-IPC rating: nominated for inclusion in the inventory and assessment pending, observed by Busch-Pritchard (2013–2020)

### Plantaginaceae

*Plantago lanceolata*, English plantain, perennial forb/herb, Cal-IPC rating: limited, observed by ESA (2018)

*Plantago major*, common plantain, annual/perennial forb/herb, Cal-IPC rating: not nominated for inclusion in the Cal-IPC inventory, observed by Busch-Pritchard (2013–2020)

***Veronica peregrina* subsp. *xalapensis***, purslane speedwell, annual forb/herb, observed by ESA (2018)

### Poaceae

*Arundo donax*, giant reed, perennial (woody) grass, Cal-IPC rating: high, observed by ESA (2018)

*Avena barbata*, wild oats, annual grass, Cal-IPC rating: moderate, observed by ESA (2018)

*Bromus diandrus*, rip-gut brome, annual grass, Cal-IPC rating: moderate. Observed by ESA (2018)

*Bromus hordeaceus*, soft brome, annual grass, Cal-IPC rating: limited, observed by ESA (2018)

*Crypsis schoenoides*, swamp prickle grass (a.k.a. swamp timothy), annual grass, Cal-IPC rating: not nominated for inclusion in the inventory, observed by Busch-Pritchard (2013–2020)

*Crypsis vaginiflora*, modest prickle grass, annual grass, Cal-IPC rating: not nominated for inclusion in the inventory, observation from CCH (2013)

*Cynodon dactylon*, Bermuda grass, perennial grass, Cal-IPC rating: moderate, observed by ESA (2018)

*Echinochloa crus-galli*, barnyard grass (a.k.a water grass), annual grass, Cal-IPC rating: nominated for inclusion in the inventory and assessment pending, observed by Busch-Pritchard (2013–2020)

*Festuca bromoides*, rat's-tail fescue, annual grass, Cal-IPC rating: moderate, observed by ESA (2018)

*Festuca perennis*, Italian ryegrass, annual/perennial grass, Cal-IPC rating: moderate, observed by ESA (2018)

*Holcus lanatus*, common velvet grass, perennial grass, Cal-IPC rating: moderate, observed by Busch-Pritchard (2013–2020)

*Stipa miliacea* var. *miliacea*, smilo grass, perennial grass, Cal-IPC rating: limited, observed by Busch-Pritchard (2013–2020)

**Polygonaceae**

***Persicaria amphibia***, water smartweed (a.k.a. swamp knotweed), perennial forb/herb, observed by Busch-Pritchard (2013–2020)

***Persicaria lapathifolia***, willow weed (a.k.a. smartweed), annual forb/herb, observed by Busch-Pritchard (2013–2020)

*Persicaria maculosa*, lady's thumb, annual forb/herb, Cal-IPC rating: not nominated for inclusion in the inventory, observed by ESA (2018)

*Polygonum aviculare*, knotweed, annual forb/herb, Cal-IPC rating: nominated for inclusion in the inventory and assessment pending, observed by ESA (2018)

*Rumex acetosella*, sheep sorrel, perennial forb/herb, Cal-IPC rating: moderate, observed by ESA (2018)

*Rumex crispus*, curly dock, perennial forb/herb with cultural significance for the Amah Mutsun Tribe, Cal-IPC rating: limited, observed by ESA (2018)

***Rumex fueginus***, golden dock, annual/biennial forb/herb, observed by Busch-Pritchard (2013–2020).

**Potamogetonaceae**

***Potamogeton illinoensis***, shining pondweed, aquatic perennial, observation from CCH (1908)

**Ranunculaceae**

*Ranunculus muricatus*, spiny-fruit buttercup, annual/biennial forb/herb, Cal-IPC rating: nominated for inclusion in the inventory and assessment pending, observed by ESA (2018)

**Rosaceae**

*Rubus armeniacus*, Himalayan blackberry, vine, Cal-IPC rating: high, observed by ESA (2018)

***Rubus ursinus***, California blackberry, vine with cultural significance for the Amah Mutsun Tribe, observed by ESA (2018)

**Salicaeae**

***Salix exigua***, sandbar willow, shrub with cultural significance for the Amah Mutsun Tribe, observed by Busch-Pritchard (2013–2020)

***Salix laevigata***, red willow, tree with cultural significance for the Amah Mutsun Tribe, observed by Busch-Pritchard (2013–2020)

***Salix lasiandra***, Pacific willow, shrub/tree, observed by Busch-Pritchard (2013–2020)

***Salix lasiolepis***, arroyo willow, shrub/tree with cultural significance for the Amah Mutsun Tribe, observed by Busch-Pritchard (2013–2020)

**Sapindaceae**

***Acer negundo***, box elder, tree, observed by ESA (2018)

**Solanaceae**

***Datura stramonium***, jimsonweed, annual forb/herb, observed by Busch-Pritchard (2013–2020)

***Solanum americanum***, American black nightshade, annual/perennial forb/herb/subshrub with cultural significance for the Amah Mutsun Tribe, observed by Busch-Pritchard (2013–2020)

*Solanum nigrum*, black nightshade, annual/perennial forb/herb, Cal-IPC rating: nominated for inclusion in the inventory and assessment pending, observed by ESA (2018)

**Urticaceae**

***Urtica dioica***, stinging nettle, perennial forb/herb with cultural significance for the Amah Mutsun Tribe, observed by ESA (2018)

# Attachment H
## Bird Species List

# Bird Species Observed at College Lake 2014–2021[1]

| Common Name | Scientific Name |
|---|---|
| Acorn Woodpecker | *Melanerpes formicivorus* |
| Allen's Hummingbird | *Selasphorus sasin* |
| American Avocet | *Recurvirostra americana* |
| American Coot | *Fulica americana* |
| American Crow | *Corvus brachyrhynchos* |
| American Goldfinch | *Spinus tristis* |
| American Kestrel | *Falco sparverius* |
| American Pipit | *Anthus rubescens* |
| American Robin | *Turdus migratorius* |
| American White Pelican | *Pelecanus erythrorhynchos* |
| American Wigeon | *Mareca americana* |
| Anna's Hummingbird | *Calypte anna* |
| Bald Eagle | *Haliaeetus leucocephalus* |
| Band-tailed Pigeon | *Patagioenas fasciata* |
| Barn Owl | *Tyto alba* |
| Barn Swallow | *Hirundo rustica* |
| Belted Kingfisher | *Megaceryle alcyon* |
| Bewick's Wren | *Thryomanes bewickii* |
| Black Phoebe | *Sayornis nigricans* |
| Black-bellied Plover | *Pluvialis squatarola* |
| Black-crowned Night-Heron | *Nycticorax nycticorax* |
| Black-headed Grosbeak | *Pheucticus melanocephalus* |
| Black-necked Stilt | *Himantopus mexicanus* |
| Black-throated Gray Warbler | *Setophaga nigrescens* |
| Blue Grosbeak | *Passerina caerulea* |
| Blue-gray Gnatcatcher | *Polioptila caerulea* |
| Blue-winged Teal | *Spatula discors* |
| Bobolink | *Dolichonyx oryzivorus* |
| Bonaparte's Gull | *Chroicocephalus philadelphia* |
| Brewer's Blackbird | *Euphagus cyanocephalus* |

[1] Based on observations made by Gary Kittleson, Kittleson Environmental, and others during monitoring conducted for the College Lake Integrated Resources Management Project.

| **Common Name** | **Scientific Name** |
|---|---|
| Brown Creeper | *Certhia americana* |
| Brown-headed Cowbird | *Molothrus ater* |
| Bufflehead | *Bucephala albeola* |
| Bullock's Oriole | *Icterus bullockii* |
| Bushtit | *Psaltriparus minimus* |
| Cackling Goose | *Branta hutchinsii* |
| California Gull | *Larus californicus* |
| California Quail | *Callipepla californica* |
| California Scrub-Jay | *Aphelocoma californica* |
| California Thrasher | *Toxostoma redivivum* |
| California Towhee | *Melozone crissalis* |
| Canada Goose | *Branta canadensis* |
| Canvasback | *Aythya valisineria* |
| Caspian Tern | *Hydroprogne caspia* |
| Cattle Egret | *Bubulcus ibis* |
| Cedar Waxwing | *Bombycilla cedrorum* |
| Chestnut-backed Chickadee | *Poecile rufescens* |
| Cinnamon Teal | *Spatula cyanoptera* |
| Clark's Grebe | *Aechmophorus clarkii* |
| Cliff Swallow | *Petrochelidon pyrrhonota* |
| Common Gallinule | *Gallinula galeata* |
| Common Goldeneye | *Bucephala clangula* |
| Common Loon | *Gavia immer* |
| Common Merganser | *Mergus merganser* |
| Common Raven | *Corvus corax* |
| Common Yellowthroat | *Geothlypis trichas* |
| Cooper's Hawk | *Accipiter cooperii* |
| Dark-eyed Junco | *Junco hyemalis* |
| Double-crested Cormorant | *Nannopterum auritum* |
| Downy Woodpecker | *Dryobates pubescens* |
| Dunlin | *Calidris alpina* |
| Eared Grebe | *Podiceps nigricollis* |
| Eurasian Collared-Dove | *Streptopelia decaocto* |
| Eurasian Wigeon | *Mareca penelope* |

| **Common Name** | **Scientific Name** |
|---|---|
| European Starling | *Sturnus vulgaris* |
| Forster's Tern | *Sterna forsteri* |
| Fox Sparrow | *Passerella iliaca* |
| Gadwall | *Mareca strepera* |
| Golden Eagle | *Aquila chrysaetos* |
| Golden-crowned Sparrow | *Zonotrichia atricapilla* |
| Great Blue Heron | *Ardea herodias* |
| Great Egret | *Ardea alba* |
| Great Horned Owl | *Bubo virginianus* |
| Greater Scaup | *Aythya marila* |
| Greater White-fronted Goose | *Anser albifrons* |
| Greater Yellowlegs | *Tringa melanoleuca* |
| Great-tailed Grackle | *Quiscalus mexicanus* |
| Green Heron | *Butorides virescens* |
| Green-winged Teal | *Anas crecca* |
| Hairy Woodpecker | *Dryobates villosus* |
| Hermit Thrush | *Catharus guttatus* |
| Herring Gull | *Larus argentatus* |
| Hooded Merganser | *Lophodytes cucullatus* |
| Hooded Oriole | *Icterus cucullatus* |
| Horned Grebe | *Podiceps auritus* |
| House Finch | *Haemorhous mexicanus* |
| House Sparrow | *Passer domesticus* |
| House Wren | *Troglodytes aedon* |
| Hutton's Vireo | *Vireo huttoni* |
| Indigo Bunting | *Passerina cyanea* |
| Killdeer | *Charadrius vociferus* |
| Laughing Gull | *Leucophaeus atricilla* |
| Lazuli Bunting | *Passerina amoena* |
| Least Sandpiper | *Calidris minutilla* |
| Lesser Goldfinch | *Spinus psaltria* |
| Lesser Scaup | *Aythya affinis* |
| Lesser Yellowlegs | *Tringa flavipes* |
| Lincoln's Sparrow | *Melospiza lincolnii* |

| Common Name | Scientific Name |
|---|---|
| Loggerhead Shrike | *Lanius ludovicianus* |
| Long-billed Curlew | *Numenius americanus* |
| Long-billed Dowitcher | *Limnodromus scolopaceus* |
| Mallard | *Anas platyrhynchos* |
| Marsh Wren | *Cistothorus palustris* |
| Merlin | *Falco columbarius* |
| Mourning Dove | *Zenaida macroura* |
| Northern Flicker | *Colaptes auratus* |
| Northern Harrier | *Circus hudsonius* |
| Northern Mockingbird | *Mimus polyglottos* |
| Northern Pintail | *Anas acuta* |
| Northern Rough-winged Swallow | *Stelgidopteryx serripennis* |
| Northern Shoveler | *Spatula clypeata* |
| Northern Waterthrush | *Parkesia noveboracensis* |
| Nuttall's Woodpecker | *Dryobates nuttallii* |
| Oak Titmouse | *Baeolophus inornatus* |
| Olive-sided Flycatcher | *Contopus cooperi* |
| Orange-crowned Warbler | *Leiothlypis celata* |
| Osprey | *Pandion haliaetus* |
| Pacific Wren | *Troglodytes pacificus* |
| Pacific-slope Flycatcher | *Empidonax difficilis* |
| Peregrine Falcon | *Falco peregrinus* |
| Pied-billed Grebe | *Podilymbus podiceps* |
| Pine Siskin | *Spinus pinus* |
| Purple Finch | *Haemorhous purpureus* |
| Red-breasted Sapsucker | *Sphyrapicus ruber* |
| Redhead | *Aythya americana* |
| Red-necked Grebe | *Podiceps grisegena* |
| Red-necked Phalarope | *Phalaropus lobatus* |
| Red-shouldered Haw | *Buteo lineatus* |
| Red-tailed Hawk | *Buteo jamaicensis* |
| Red-winged Blackbird | *Agelaius phoeniceus* |
| Ring-billed Gull | *Larus delawarensis* |
| Ring-necked Duck | *Aythya collaris* |

| Common Name | Scientific Name |
|---|---|
| Ring-necked Pheasant | *Phasianus colchicus* |
| Rock Pigeon | *Columba livia* |
| Ross's Goose | *Anser rossii* |
| Ruby-crowned Kinglet | *Corthylio calendula* |
| Ruddy Duck | *Oxyura jamaicensis* |
| Savannah Sparrow | *Passerculus sandwichensis* |
| Say's Phoebe | *Sayornis saya* |
| Semipalmated Plover | *Charadrius semipalmatus* |
| Sharp-shinned Hawk | *Accipiter striatus* |
| Short-billed Dowitcher | *Limnodromus griseus* |
| Short-billed Gull | *Larus brachyrhynchus* |
| Snow Goose | *Anser caerulescens* |
| Snowy Egret | *Egretta thula* |
| Solitary Sandpiper | *Tringa solitaria* |
| Song Sparrow | *Melospiza melodia* |
| Sora | *Porzana carolina* |
| Spotted Sandpiper | *Actitis macularius* |
| Spotted Towhee | *Pipilo maculatus* |
| Steller's Jay | *Cyanocitta stelleri* |
| Swainson's Hawk | *Buteo swainsoni* |
| Swainson's Thrush | *Catharus ustulatus* |
| Townsend's Warbler | *Setophaga townsendi* |
| Tree Swallow | *Tachycineta bicolor* |
| Tricolored Blackbird | *TAgelaius tricolor* |
| Tundra Swan | *Cygnus columbianus* |
| Turkey Vulture | *Cathartes aura* |
| Vaux's Swift | *Chaetura vauxi* |
| Violet-green Swallow | *Tachycineta thalassina* |
| Virginia Rail | *Rallus limicola* |
| Warbling Vireo | *Vireo gilvus* |
| Western Bluebird | *Sialia mexicana* |
| Western Grebe | *Aechmophorus occidentalis* |
| Western Gull | *Larus occidentalis* |
| Western Kingbird | *Tyrannus verticalis* |

| **Common Name** | **Scientific Name** |
|---|---|
| Western Meadowlark | *Sturnella neglecta* |
| Western Sandpiper | *Calidris mauri* |
| Western Wood-Pewee | *Contopus sordidulus* |
| Whimbrel | *Numenius phaeopus* |
| White-crowned Sparrows | *Zonotrichia leucophrys* |
| White-faced Ibis | *Plegadis chihi* |
| White-tailed Kite | *Elanus leucurus* |
| White-throated Sparrow | *Zonotrichia albicollis* |
| White-throated Swift | *Aeronautes saxatalis* |
| Willet | *Tringa semipalmata* |
| Wilson's Snipe | *Gallinago delicata* |
| Wilson's Warbler | *Cardellina pusilla* |
| Wood Duck | *Aix sponsa* |
| Wrentit | *Chamaea fasciata* |
| Yellow Warbler | *Setophaga petechia* |
| Yellow-rumped Warbler | *Setophaga coronata* |

# Attachment I

## Ad Hoc Adaptive Management Plan Committee Meeting Summaries

*PAJARO VALLEY WATER MANAGEMENT AGENCY*

36 BRENNAN STREET, WATSONVILLE, CA 95076
TEL: (831) 722-9292 FAX: (831) 722-3139
pvwater.org

# Ad Hoc Adaptive Management Plan Committee

## Meeting #1 Summary

## April 29, 2021, 2:00 p.m.

| Adaptive Management Plan Committee Members | |
|---|---|
| **Present** | **Not Present** |
| Stephen Rider (Chair) | Frank Shields |
| Jerry Busch (Vice-Chair) | |
| Tom Broz | |
| Bob Culbertson | |
| Joel Casagrande | |
| Jessie Maxfield | |
| Adam French | |
| John Diffenbaugh | |
| Dawn Reis | |
| Jonathan Pilch | |
| **Staff and Other Attendees** | |
| Brian Lockwood, General Manager (GM) | Mike Guth, Sierra Club |
| Casey Meusel, Associate Hydrologist | David McCabe, Member of public |
| Marcus Mendiola, Water Conservation and Outreach Specialist | Aldo Lopez, Watsonville Wetlands Watch |
| Helen Rodriguez, Finance & Administrative Services Manager | Chris Hammersmark, Ph.D., cbec eco engineering |
| John Hunter, Ph.D., ESA | Gary Kittleson, Wildlife Biologist, Kittleson Environmental Consulting |
| Alena Maudru, ESA | Mike Podlech, Aquatic Ecologist, Independent Consultant |

1. **INTRODUCTIONS**
   a. Meeting called to order at 2:05 p.m. GM Lockwood welcomed meeting participants, introduced staff and consultants, and called the roll of the Ad Hoc Adaptive Management Plan (AMP) Committee (attendance presented in the above table).

2. **OVERVIEW OF THE COLLEGE LAKE INTEGRATED RESOURCES MANAGEMENT PROJECT**
   a. GM Lockwood provided an overview of the College Lake Integrated Resources Management Project (Project).

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   b. Roundtable discussion ensued on the following topics: Project status; construction schedule; sediment management; climate change; flood control; habitat preservation.

3. **OVERVIEW OF ADAPTIVE MANAGEMENT AND COMMITTEE'S ROLE IN DEVELOPMENT OF THE ADAPTIVE MANAGEMENT PLAN (AMP)**
   a. Dr. Hunter provided an overview of adaptive management in general and as it applies to the College Lake Project.
   b. Roundtable discussion ensued on the purpose and role of the Committee.
4. **CONSIDER APPROVAL OF COMMITTEE BYLAWS**
   a. GM Lockwood presented the draft bylaws.
   b. Committee members expressed concern the Committee would be disbanded after the original four meetings. In response it was proposed that Article II of the bylaws be amended to state "The Committee shall constitute an ad hoc committee of the Agency and is anticipated to meet up to four times through fall 2021<u>, and then again at the end of the initial adaptive management planning process and thereafter at minimum annually.</u>"

   **ACTION:** Director. Rider moved to adopt the bylaws as amended, Mr. Diffenbaugh seconded the motion. The motion carried by the following voice vote.

   **Ayes:** Rider, Busch, Broz, Culbertson, Casagrande, Maxfield, French, Diffenbaugh, Reis, Pilch
   **Noes:** None
   **Abstain**: None
   **Absent:** Shields

5. **ELECTION OF COMMITTEE OFFICERS: CHAIR AND VICE CHAIR**
   a. GM Lockwood introduced the topic of Committee officers.
   b. The Committee discussed qualifications of members to serve as officers.

   **ACTION:** Director Culbertson moved to approve Director Rider Chair and Mr. Busch as Vice Chair. The motion carried by the following voice vote:

   **Ayes:** Rider, Busch, Broz, Culbertson, Casagrande, Maxfield, French, Diffenbaugh, Reis, Pilch
   **Noes:** None
   **Abstain**: None
   **Absent:** Shields

6. **DISCUSSION OF DRAFT OBJECTIVES**
   a. Dr. Hunter presented the draft AMP objectives and noted that suggestions on objectives can be submitted in writing after the meeting to Mr. Mendiola (mendiola@pvwater.org)

b. The Committee discussed the topics below.
   i. *Fish Passage between Salsipuedes Creek and College Lake, December 15th through May 31st*
      1. Role of the California Department of Fish and Wildlife (CDFW) in drafting the objective
      2. A suggestion to revise the objective to state “fish passage between the Pajaro River through College Lake and Salsipuedes Creek”
      3. Was “improving the habitat quality for fish within College Lake” considered?
   ii. *Substantially contribute to the Pajaro Valley’s water supply needs in a timely manner consistent with the BMP Update goals*
      1. How is “substantially” defined? Suggested including values from water right permit (average of 1,800 to 2,300 acre feet per year [AFY] and up to 3,000 AFY) into the objective.
      2. Concern regarding incorporating Project objective language into AMP objectives.
   iii. *Avoid exacerbating existing flood hazards outside the proposed water storage area*
      1. No comments.
   iv. *Promote farming within the College Lake basin between 59 feet and 63 feet elevation NAVD88*
      1. A suggestion to add “that would not conflict with the other objectives” to the end of the objective (meaning that farming should be done in a way that controls nutrient runoff, plastic, etc., and promotes wetland vegetation)
      2. Concern that promoting farming may conflict with other objectives.
      3. Concern that waterfowl food could be impacted.
   v. *Preserve waterfowl habitat quality of College Lake*
      1. Concern regarding the wet/dry cycle in the lake bottom and the desire to maintain conditions as well as possible for waterfowl.
      2. A suggestion to revise the objective to state “Preserve and enhance habitat quality.”
      3. Clarification on the definition of the word “preserve.”

c. Due to time constraints, it was determined that objectives regarding water quality, invasive species, and research objectives would be discussed at the next meeting of the Committee.

**7. NEXT STEPS**

a. Mr. Busch requested that meeting materials be circulated further in advance of the next meeting date.
b. Staff will prepare and circulate a poll to schedule the June meeting.

**8. Meeting adjourned at 4:45 p.m.**

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**Ad Hoc Adaptive Management Plan Committee**

**Meeting #2 Summary**

**June 15, 2021 2:00 p.m. to 5:00 p.m.**

| Adaptive Management Plan Committee Members | |
|---|---|
| **Present** | **Not Present** |
| Stephen Rider (Chair) | Tom Broz |
| Jerry Busch (Vice-Chair) | Frank Shields |
| Bob Culbertson | |
| Joel Casagrande | |
| Jessie Maxfield | |
| Adam French | |
| John Diffenbaugh | |
| Dawn Reis | |
| Jonathan Pilch | |
| John Pritchard | |
| Christi Suchil | |
| **Staff and Other Attendees** | |
| Brian Lockwood, General Manager (GM) | Mike Guth, Sierra Club |
| Casey Meusel, Associate Hydrologist | Chris Hammersmark, Ph.D., cbec eco engineering |
| Marcus Mendiola, Water Conservation and Outreach Specialist | Gary Kittleson, Wildlife Biologist, Kittleson Environmental Consulting |
| Marino Hernandez, Water Resource Technician | Mike Podlech, Aquatic Ecologist, Independent Consultant |
| Laura Taay, Administrative Analyst/Board Secretary | Reyn Akiona |
| John Hunter, Ph.D., ESA (Dr. Hunter) | |
| Alena Maudru, ESA | |

## 1. INTRODUCTIONS/ROLE CALL/MEETING OBJECTIVES

a. Meeting called to order at 2:04 p.m. Ms. Maudru took roll call (attendance presented in the above table)

## 2. CONSIDER CORRECTIONS TO APRIL 29, 2021 MEETING SUMMARY

a. The meeting summary was corrected to note the following (~~strikethrough~~ notes text that was deleted, and underlining notes text that was added):

36 BRENNAN STREET, WATSONVILLE, CA 95076
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i. Under 6.b.iv.1: A suggestion to add "that would not conflict with the other objectives" to the end of the objective (meaning that farming should be done in a way that controls nutrient runoff, plastic, etc., and promotes wetland vegetation.)

ii. Under 6.b.v.2: *A suggestion to revise the objective to state "Preserve and enhance ~~and/or improve with the use of native vegetation waterfowl~~ habitat quality"*

**3. RECEIVE SUMMARY OF MONITORING PROGRAMS**

a. Chris Hammersmark, Casey Meusel, Mike Podlech, and Gary Kittleson gave short presentations about College Lake hydrology, water quality, fisheries resources, and ornithological monitoring

b. Committee members asked questions regarding agricultural impacts on water quality, turbidity and water quality standards, sedimentation rates, what steelhead eat at College Lake, avian species community composition, and the willow forest on the PV Water parcel

**4. DISCUSS DRAFT AMP OBJECTIVES**

a. Dr. Hunter continued the presentation and discussion about AMP objectives

b. *Preserve waterfowl habitat quality of College Lake*

 i. A suggestion was made to add the following new objective, but with modifications like removing the word "manage": Manage vegetation to maximize the acreage and quality of wetland vegetation and waterfowl food plants at all elevations, consistent with maintaining water yields.

 ii. A suggestion was made to include an objective that relates to cultural resources management

c. *Minimize conditions that can contribute to algal blooms, including cyanobacteria blooms*

d. *Confirm conditions are unsuitable for steelhead rearing in College Lake during June-September*

 i. A suggestion was made to add that PV Water would address both internal and external contributing factors, and that measures related to monitoring and active management would be taken

e. *Control invasive animal species pursuant to a plan approved by the appropriate regulatory agencies*.

 i. A suggestion was made to put managing invasive plant species in this same section because both require monitoring and treatments

 ii. Staff specified that animal and plant monitoring plans should be separate because one is a permitting requirement (animals) and one may be coming out of the AMP process (plants)

 iii. A suggestion was made to include baseline monitoring of invertebrate productivity and quality as an objective for community science data development.

f. *Support research and citizen science focused on key uncertainties affecting management.*

 i. A suggestion was made to use the term "community science" instead of "citizen science"

**5. DISCUSS DRAFT AMP MONITORING METRICS AND MONITORING-BASED MANAGEMENT TRIGGERS**

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a. Dr. Hunter gave a presentation regarding draft AMP monitoring metrics and monitoring-based management triggers.
*b. Fish Passage:*
  i. A suggestion was made to link the metrics back to the objectives.
*c. Flooding:*
  i. Staff noted that during the first few years of operation, the weir height may be tested at different heights to be able to accept a precipitation event.

**6. NEXT STEPS**

a. Staff will prepare and circulate a poll to schedule a meeting in late August/early September

**7. Meeting adjourned at 4:59 p.m.**

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**Ad Hoc Adaptive Management Plan Committee**

**Meeting #3 Summary – Final**

**September 2, 2021 2:00 p.m. to 5:00 p.m.**

| **Adaptive Management Plan Committee Members** | |
|---|---|
| **Present** | **Not Present** |
| Stephen Rider (Chair) | Tom Broz |
| Jerry Busch (Vice-Chair) | Frank Shields |
| Bob Culbertson | John Diffenbaugh |
| Joel Casagrande | |
| Jessie Maxfield | |
| Adam French | |
| Dawn Reis | |
| Jonathan Pilch | |
| John Pritchard | |
| Christi Suchil | |
| **Staff and Other Attendees** | |
| Brian Lockwood, General Manager | Mike Guth, Sierra Club |
| Casey Meusel, Associate Hydrologist | Chris Hammersmark, Ph.D., cbec eco engineering |
| Marcus Mendiola, Water Conservation and Outreach Specialist | Gary Kittleson, Wildlife Biologist, Kittleson Environmental Consulting |
| Marino Hernandez, Water Resource Technician | Mike Podlech, Aquatic Ecologist, Independent Consultant |
| Laura Taay, Administrative Analyst/Board Secretary | Margie Kay, Member of the public |
| John Hunter, Ph.D., ESA | Kristen Sandel, Sierra Club Member |
| Alena Maudru, ESA | |

1. **INTRODUCTIONS/ROLE CALL/MEETING OBJECTIVES**
    a. Meeting called to order at 2:00 p.m. Ms. Maudru welcomed attendees and called the roll of Committee members (attendance presented in the above table)

2. **CONSIDER CORRECTIONS TO JUNE 15, 2021 MEETING SUMMARY**
    a. The committee had no comments on the June 15, 2021 meeting summary.

3. **PRESENTATION ON ECOLOGY OF COLLEGE LAKE WETLAND VEGETATION**
    a. Jerry Bush presented a summary of the ecology of College Lake wetland vegetation, including data from monitoring that was completed by himself and John Pritchard.
    b. Dr. Hunter discussed vegetation monitoring as it related to adaptive management planning.

**4. CONTINUE DISCUSSION OF DRAFT AMP MONITORING METRICS AND MONITORING-BASED MANAGEMENT TRIGGERS/POTENTIAL MANAGEMENT ACTIONS**

Dr. Hunter continued the presentation and discussion about draft AMP monitoring metrics and monitoring-based management triggers, and introduced potential management actions. Roundtable discussion ensued, and key points/suggestions are noted below following each respective preliminary objective. For multiple objectives, consideration of management actions or additional monitoring prior to project implementation was suggested.

a. **Water storage:** Provide mechanisms for implementing best management practices with landowners and on PV Water land.
b. **Water Quality:** No comments were received.
c. **Farming:** Mr. Busch suggested including an action trigger related to cultivation occurring less than once per 5-year interval or offering lands to farmers in exchange for help in disking treatments, maintaining winter crop residue, or planting waterfowl food in narrower slope bands.
    i. Ms. Reis made a suggestion that if no farmers want to take the risk of growing under 60 feet, that area look at BMPs to support native plants and wildlife that would not interfere with water storage capacity. GM Lockwood indicated that there are provisions to maintain the land and would prevent certain things from occurring on the land when it's not flooded.
d. **Vegetation:** Suggestions were made to include a trigger related to waterfowl food plant cover and management action related to prescribed burning.
e. **Waterfowl:** Discussion regarding waterfowl data collection ensued. A suggestion was made to include a metric about species diversity of water birds and raptors instead of just a high number of birds.
f. **Invasive Animal Species:** A recommendation was made to have a separate metric where invasive species that are in direct competition with protection fish species are prioritized. Mr. Pritchard noted that controlling carp would reduce turbidity which would promote the growth of submerged plants and increase the productivity of the ecosystem.
g. **Cultural Resources:** Mr. French noted that the objective should address preserving archaeological resources and enhancing culturally significant plants. Tribal leadership can be brought into the conversation to get their perspective about use of the cultural resources for traditional and educational purposes.
h. **Research:** Committee members noted that it will be helpful to develop a list of key data gaps for potential research opportunities, and that research should happen once the Project is operational. Access to the sites will need to be determined before research can occur.

**5. INTRODUCE DRAFTED SECTIONS OF AMP**

a. Dr. Hunter introduced the format and content of the AMP.

**6. NEXT STEPS**

a. Staff will prepare and circulate a poll to schedule meeting #4 in November
b. Committee members will provide comments on drafted sections of the AMP by Friday, September 17

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**Ad Hoc Adaptive Management Plan Committee**

**Meeting #4 Summary**

**November 10, 2021 9:00 a.m. to 12:00 p.m.**

| Adaptive Management Plan Committee Members | |
|---|---|
| **Present** | **Not Present** |
| Stephen Rider (Chair) | Tom Broz |
| Jerry Busch (Vice-Chair) | Bob Culbertson |
| Joel Casagrande | Dawn Reis |
| Jessie Maxfield | |
| Adam French | |
| Jonathan Pilch | |
| John Pritchard | |
| Christi Suchil | |
| Frank Shields | |
| John Diffenbaugh | |
| **Staff and Other Attendees** | |
| Brian Lockwood, General Manager (GM) | Mike Guth, Sierra Club |
| Casey Meusel, Associate Hydrologist | Chris Hammersmark, Ph.D., cbec eco engineering |
| Marcus Mendiola, Water Conservation and Outreach Specialist | Gary Kittleson, Wildlife Biologist, Kittleson Environmental Consulting |
| John Hunter, Ph.D., ESA (Dr. Hunter) | Mike Podlech, Aquatic Ecologist, Independent Consultant |
| Alena Maudru, ESA | Sarah Faraola |

1. **INTRODUCTIONS/ROLE CALL/MEETING OBJECTIVES**
   a. Chair Rider called the meeting called to order at 9:07 a.m. Ms. Maudru took roll call (attendance presented in the above table).

2. **CONSIDER CORRECTIONS TO SEPTEMBER 2, 2021 MEETING SUMMARY**
   a. The Committee had no corrections.

3. **SUMMARY AND DISCUSSION OF REVISIONS IN RESPONSE TO COMMENTS ON THE DRAFT AMP**
   a. Dr. Hunter provided a summary of comments and revisions by topic. Most comments on the AMP were on the setting section and Adaptive Management Framework.
   b. Mr. Diffenbaugh suggested that College Lake should be renamed as its indigenous name.
      i. GM Lockwood noted that PV Water does not have the authority to change the name of the lake.

   c. Vice Chair Busch made the suggestion to clarify when a management response is no longer needed by adding "Management actions shall be implemented until the trigger for management no longer applies" to the AMP.

4. **OVERVIEW OF CONTENT ADDED TO COMPLETE DRAFT AMP**
   a. Dr. Hunter provided an overview of new content that was added to the AMP.
   b. Vice Chair Busch suggested adding swamp pricklegrass/swamp timothy (*Crypsis schoenoides*) to the list of waterfowl plants, and extending the elevation discussed for monitoring down to the 51-foot contour, from the 59-foot contour, for the purpose of vegetation monitoring.
      i. Dr. Hunter said that he would add swamp pricklegrass and noted that the elevation range should include the elevation of existing and of future seasonal wetlands, and he would follow up with PV Water about this suggestion.
   c. Vice Chair Busch inquired about what constitutes a new invasive species infestation and suggested including language regarding a 25% or greater increase in the area of existing infestation over the previous 3 to 5 years.
      i. Dr. Hunter explained that the intent of the trigger/type of monitoring would apply to any new infestation, even of one single plant.
   d. Garry Kittleson suggested monitoring waterfowl by lake arm and roundtable discussion ensued. Vice Chair Busch noted that this would be an improvement.

5. **DISCUSSION OF CONTENT ADDED TO AMP**
   a. Vice Chair Bush expressed a concern about the implementation process and accountability on making decisions concerning management actions and suggested that changes should be brought to AMP Committee earlier in process.
      i. Dr. Hunter referred the Committee to Sections 6.1 and 6.2. The content of the annual meeting could include updates to the AMP, as well as options for further responses based on the actions that are implemented. The previous years' tables could be appended to the plan to see which actions were taken/management triggers were hit.
      ii. GM Lockwood noted that the Committee's recommendation to revise the bylaws to state "The Committee shall constitute an ad hoc committee of the Agency and is anticipated to meet up to four time<u>s</u> through fall 2021 <u>and then again at the end of the initial adaptive management planning process and thereafter at minimum annually</u>" may be in conflict with the definition of an "ad hoc committee" and that he is following up with PV Water's general counsel on this matter.

6. **NEXT STEPS**
   a. Comments on the Draft AMP are due from the AMP Committee members by December 3.
   b. PV Water and consultants will incorporate committee member comments into the Draft AMP.
   c. Staff will present the Draft AMP to the Board as an informational item on December 22, 2021; the AMP will be presented to the Board a second time, on January 19, 2022 for consideration of approval. The Board approved document will take on the name AMP 2022, and would be updated as needed based on the nature of adaptive management planning and as described in the plan itself.

7. **ADJOURNMENT**
   a. Meeting adjourned at 11:37 a.m.

c. ESA/PV Water team will incorporate comments into the AMP document before Meeting #4.

**7. Meeting adjourned at 5:02 p.m.**

# Attachment J

## Ad Hoc Adaptive Management Plan Committee Member Comments

## Ad Hoc Adaptive Management Plan Committee Member and Sierra Club Comments

Comments on the September and November drafts of the Adaptive Management Plan (AMP) for the College Lake Integrated Resources Management Plan (Project) were made by members of the Ad Hoc Adaptive Management Plan Committee (Committee) and by the Santa Cruz County Group of the Ventana Chapter of the Sierra Club (Sierra Club). The Sierra Club submitted its comments on the September and November 2021 drafts of the AMP in letters dated October 26, 2021 and December 2, 2021, respectively. These letters are attached to this appendix.

Table J-1 provides those comments and responses to them. The responses describe revisions made in response or related to the comments or explain why suggested revisions were not made.

**TABLE J-1**

**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS**

| Comment/Suggested Revision | Response to Comment |
|---|---|
| **Comments on September 2021 Draft of the Adaptive Management Plan** | |
| **Comment 1—Joel Casagrande**<br>Page 2-4, Section 2.1<br>This section should briefly describe the historic ecology of College Lake as a perennial body of water with a mosaic of surrounding wetland types. This context is important when considering expectations for plant and animal species management with the future project. College Lake is the only one in a series of perennial, natural lakes, that is drained annually and early in the growing season.<br>**Suggested Revision**<br>— | Text noting the historical hydrology of College Lake has been added to Section 2.1. |
| **Comment 2—Joel Casagrande**<br>Page 2-4, Section 2.3.8<br>It should be noted that the bird monitoring at College Lake has been conducted in an artificial setting (a drained and largely farmed lake). This has undoubtedly shaped the bird species community and abundance. This condition has persisted for a century. Meanwhile, neighboring Pinto Lake, which remains perennial, although with its water quality problems, apparently supports a very robust bird species community, with more than 130 species recorded by CDFW to date (see link below).<br>https://www.cityofwatsonville.org/724/History-Facts<br>**Suggested Revision** | A brief description of College Lake's hydrology prior to alteration has been added to the AMP as has some description of the species richness of birds at nearby areas, including Pinto Lake. |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
|---|---|
| **Comment/Suggested Revision** | **Response to Comment** |
| — | |
| **Comment 3—Joel Casagrande**<br>Page 2-4, Section 2.3.8<br>A range of species observed (82-140) is listed but it is not clear if that is specific to waterfowl (the subject of the sentence/section) or a total of all bird species? If this section is focused on water fowl, it should restrict data to water fowl, otherwise rename the section heading to Bird or Avian Wildlife.<br>**Suggested Revision**<br>— | This block of text has been replaced. |
| **Comment 4—Joel Casagrande**<br>Page 2-7, Section 2.5.3<br>Consider explaining typical recent management actions implemented in College Lake for mosquito control. What can we expect moving forward? Seasonality?<br>Suggested Revision:<br>— | Text has been added that provides a general description of Santa Cruz Mosquito and Vector Control management actions. |
| **Comment 5—Joel Casagrande**<br>Page 3-8, Section 3.3.2.2<br>Has there been any consideration/discussion about creating small sediment detention basins (strategically placed excavated pools) within the ditch network to capture sediment as it enters the lake, erosion within the lake, etc, and to help concentrate fish, wildlife (including invasives) once the lake is drawn down?<br>**Suggested Revision**<br>— | A revision has been made that adds sediment detention basins as a potential management action. |
| **Comment 6—Joel Casagrande**<br>Page 4-4, Table 4-1<br>Water quality. This objective was struck out. NMFS would like to understand the temperature regime in the lake during all seasons water is present in the lake. Is this being revised, or permanently omitted? | Determination of temperature and steelhead use in all seasons has been moved from an objective to another section of the plan, where it is discussed as an uncertainty that would be addressed through monitoring (Section 3.4, but see also Section 5.2). |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
|---|---|
| **Comment/Suggested Revision** | **Response to Comment** |
| **Suggested Revision**<br>— | |
| **Comment 7—Joel Casagrande**<br>Page 4-4, Table 4-1<br>Water fowl. As noted earlier, the water fowl species and composition are in part a reflection of the artificial condition of draining the lake every year for the past 100 years. How does guild and abundance differ from Pinto and Kelly lakes, which remain perennial? The project will change the hydro-condition of College Lake by leaving water in the lake for several months. Perhaps shorebird species return in bigger numbers/diversity. But is it a reasonable expectation for bird species guild and abundance that were shaped by a prolonged land use pattern, to persist while the proposed project is expected to change the habitat closer to its historic hydro-condition?<br>**Suggested Revision**<br>— | Monitoring data for bird abundance at Pinto and Kelly Lakes comparable to that at College Lake is not available. There is some uncertainty regarding the response to the Project of vegetation and wildlife, including waterfowl; and waterfowl use of College Lake could change with Project implementation. It is for this reason that an AMP is being developed.<br>It is not unreasonable, however, to expect that use of College Lake by waterfowl post-Project could remain comparable to pre-Project use and to make that an objective of the AMP. Although the Project will result in hydrologic conditions that are much closer to the lake's pre-alteration state, which could reduce the abundance of waterfowl that are dependent on the current highly altered conditions, College Lake will remain an altered system. And, the anticipated Post-Project land cover, as summarized in AMP Table 3-3, will continue to provide habitat for waterfowl: farmed and seasonal wetlands will likely continue to be the predominant land cover, although agriculture will likely be constrained to higher elevations than at present. |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
|---|---|
| **Comment/Suggested Revision** | **Response to Comment** |
| **Comment 8—Joel Casagrande**<br>Page 4-4, Table 4-1<br>Water fowl. Why is there such emphasis on this specific sector of the bird community? Why not include other sectors such as shorebirds, raptors, etc? Are any of the water fowl species protected under ESA or CESA?<br>**Suggested Revision**<br>— | None of the waterfowl species at College Lake are protected under the federal or California Endangered Species Act. Sustaining habitat values for waterfowl is emphasized in the AMP because of content in the Project's Environmental Impact Report and its Water Right Permit. College Lake is also an important resource for shorebirds, wading birds, and raptors. However, shorebirds use a narrow band of habitat at the receding water's edge for a short period of time and so are problematic to monitor and manage for, and raptors and wading birds use a large area of habitat, most of it outside of College Lake, which results in Pajaro Valley Water Management Agency (PV Water) having more limited influence on use of the College Lake area by these guilds. Therefore, objectives for these other guilds have not been included in the AMP; however, these species are and will be monitored and measures to avoid and minimize effects to nesting birds are part of operations and maintenance (O&M) and the AMP. |
| **Comment 9—Joel Casagrande**<br>Page 4-5, Table 4-1<br>Research. Does "Community science" really need to be an objective with metrics? In other words, if this is about addressing key prioritized data gaps, could this not be conducted by any entity (City, County, Private, NGO, academia, etc)? Community science should be defined, and it should be clear that any research conducted by the community to assess objectives/metrics or to address key priortized data gaps must adhere to the same levels of scientific integrity as professional/academic entities.<br>**Suggested Revision**<br>— | A note has been added to the table defining community science and explicitly stating that the research would be conducted under the guidance/supervision of professionally trained scientists. Text also has been added to Section 5.2 stating that investigations could potentially be conducted by academic, government, or non-governmental organizations (NGOs), including through community science led by an academic, agency, or NGO investigator. |

| TABLE J-1<br>AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS | |
|---|---|
| **Comment/Suggested Revision** | **Response to Comment** |
| **Comment 10—Joel Casagrande**<br>Page 4-5, Table 4-1<br>Research. Should this be Research **and Monitoring**? Also, what are the key prioritized data gaps? I do not believe the ad hoc committee has discussed these.<br>**Suggested Revision**<br>— | The objective is for facilitating studies that could support management but are not part of the ongoing monitoring framework of the AMP. The title "research" has been retained to avoid potential confusion between monitoring committed to as part of the AMP, and other supplemental studies by others, some of which could entail monitoring. Text describing uncertainties and investigations that could inform adaptive management have been added to the AMP. Uncertainties in the response to inundation and changes in land management practices resulting from the Project have been added to Section 3.4, where anticipated changes in inundation and land cover are summarized, and potential future investigations that could inform adaptive management are now listed in Section 5.2. |
| **Comment 11—Frank Shields**<br>Page —<br>Access to the land possiblly through the farmer. That if the research could improve crop production. I'm thinking of biochar research; filters sediment, algae, nutrients and metals, then improves the soil when left and spread out.<br>**Suggested Revision**<br>— | For the research objective, text has been added to the potential management action for improving access; this added text that states that access may be improved "potentially with assistance of adjacent landowners." |
| **Comment 12—Jerry Busch**<br>Page 2-2, Paragraph 2<br>Seasonal wetlands also comprise most of the basin habitat found east of the main ditch.<br>**Suggested Revision** | "Particularly east of the main ditch" has been added to the sentence stating where seasonal wetlands are present at College Lake. |
| **Comment 13—Unattributed**<br>Page—<br>Compare predicted precipitation amount with observed precipitation amount.<br>**Suggested Revision** | Comparing predicted to observed precipitation has been added as a potential management action for the flooding objective. |

**TABLE J-1**

**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS**

| Comment/Suggested Revision | Response to Comment |
|---|---|
| **Comment 14—Jerry Busch**<br>Page 2-3<br>Important biological resources also include plants and wildlife important to First Nation cultures for food, shelter, industry, medicine or spiritual practice.<br>**Suggested Revision**<br>— | Text has been added stating that in the context of the AMP, plants and animals can be culturally significant resources, and in an appendix, plants that are culturally significant plants for the Amah Mutsun Tribe are noted. Also, the cultural resources objective has been revised to include sustaining plants of cultural significance. |
| **Comment 15—Jerry Busch**<br>Page 2-3, Section 2.3.3<br>The discussion about invasive plants should disuss the large biomass of Arundo donax (Giant reed) that has invaded of the riparian habitat and is supplanting native understory plants and reducing reservoir capacity. The section should address Xanthium strumarium (cocklebur) and Melilotus alba (white sweet clover) which are both becoming increasingly dominant in seasonal wetlands on the east side of the lake.<br>**Suggested Revision**<br>— | Giant reed and Himalayan blackberry are now discussed specifically in the section describing invasive plants. Also, a plant list has been added as an appendix and the California Invasive plant Council's rating has been included for each plant species identified as an invasive in their inventory. |
| **Comment 16—Jerry Busch**<br>Page 2-3, Section 2.3.5<br>The discussion on seasonal wetlands should present the results of baseline monitoring and initial reconaissance. This must include describing the plant composition of the seasonal wetlands on the east side of the lake. The most frequently occurring plants include swamp timpothy, Polygonum lapathifolium (nodding smartweed) and Echinochloa crus-galli (Japanese millet), and Atriplex triangularis (fat hen), four highly selected waterfowl food plants that produce heavy yields of highly nutritious seeds that are particularly important to female waterfowl for pre-nesting nutrition. The seed crops are also important to passerines such as Bryant's savannah sparrow and other sparrows and finches, which provide a prey base for raptors including Cooper's hawk, sharp-shinned hawk, merlin and others. Another important species is goldenrod, found on the east side of the ditch, supporting sparrows, blackbirds and other birds.<br>**Suggested Revision**<br>— | Text has been added describing seasonal wetlands. This text states the importance of these species and a brief summary of data collected on their cover by Jerry Busch and John Pritchard is provided in a footnote. The importance of the seed to other species, or the importance of other plants was not included as the text is not intended to be comprehensive but to introduce the biological resources most relevant to O&M. |

| **Table J-1**<br>**Ad Hoc Adaptive Management Plan Committee Member Comments** | |
|---|---|
| **Comment/Suggested Revision** | **Response to Comment** |
| **Comment 17—Jerry Busch**<br>Page 2-4, Section 2.3.5<br>The discussion of seasonal wetlands should also address the increasing dominance of cocklebur in the wetlands on the east side of the lake, a plant with low habitat value that is directly competing with and displacing food plants for waterfowl and other groups of birds and other wildlife.<br>**Suggested Revision**<br>— | Text has not been added to the AMP describing cocklebur or recent changes in its abundance. Text has been added to the AMP stating that high value waterfowl food plants are abundant in the seasonal wetlands of College Lake because their abundance is an attribute that will be directly managed for. Also, the descriptive text in the AMP does not provide a detailed summary of available monitoring data or a comprehensive description of each resource. |
| **Comment 18—Jerry Busch**<br>Page 2-5, Section 2.3.5<br>In the seasonal wetlands in the western arm of the Lake, Persicaria amphibia is now the dominant species in much of the wetted area. This species is unpalatable to waterfowl and has an inverse association with waterfowl abundance and diversity in Harkins Slough and other water bodies.<br>**Suggested Revision**<br>— | Thank you for the information. The text was not revised in response to this comment because the text describing seasonal wetlands is part of a section providing brief introductions to biological resources affected by or affecting management and are a focus of the plan's objectives. These descriptions are not detailed or comprehensive descriptions of each resource.<br>Note: although *Persicaria amphibia* may be unpalatable to waterfowl, its potential effects may be more related to it being a perennial plant with low levels of seed production. (Seed are a much more important food sources for waterfowl in seasonal wetlands than foliage.) |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
|---|---|
| **Comment/Suggested Revision** | **Response to Comment** |
| **Comment 19—Jerry Busch**<br>Page 2-4, Section 2.3.8<br>The discussion of waterfowl should discuss the significance of the Lake to waterfowl in comparison to other wetlands in the region and on the West Coast of the United States. It should also address the ecology of the Lake in providing abundant waterfowl food resources based the Spring drawdown that provides ample time for wetlands in the basin to produce emergent vegetation and seed set.<br>**Suggested Revision**<br>The Lake has the highest numbers and concentrations of diving, dabbling and fish-eating waterfowl in the Monterey Bay Region, with winter counts consistently among the highest recorded on any water body in the region, and among the top 5-10 wetlands on the Western seaboard, based on e-bird data. | The text describing waterfowl and other birds has been replaced and now states the regional significance of College Lake. Also, the proximity of College Lake to Elkhorn Slough and the Upper Pajaro River, both designated by Audubon as Important Bird Areas of statewide significance, is now noted in the text.<br>The text has not been revised to state that the numbers and concentrations of diving, dabbling, and fish-eating waterfowl are among the highest on the Western Seaboard. characterize College Lake as one of the most important wetlands along the West Coast because this could give a mistaken impression of College Lake's importance to the Pacific Flyway: it is not one of the 177 Important Bird Areas designated in California by Audubon (California Important Bird Areas \| Audubon, accessed October 29, 2021), which include areas of statewide and global significance. In some of these areas the numbers and congregations of waterfowl are much greater than at College Lake. For example, a half million waterfowl and 200,000 shorebirds annually use the globally significant Grasslands Ecological Area in Merced County. So, although College Lake provides valuable habitat for waterfowl, and is of regional significance for these species, it is not of global significance which is how the revision suggested in the comment could be read. |

**TABLE J-1**

**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS**

| Comment/Suggested Revision | Response to Comment |
|---|---|
| **Comment 20—Jerry Busch**<br>Page 2-4, Section 2.4.1<br>The cultural resources section should disuss the importance of the Lake's plant and animal resources to the large indigenous villiage found on the south shore of the Lake, and describe some of the culturally significant plants and wildlife found in the Lake, both at the time and today.<br>**Suggested Revision**<br>— | Text has been added to the cultural resources section of the AMP stating that plants and animals are also culturally significant to the Amah Mutsun. Also, in an appendix, culturally significant plants growing at College Lake are identified.<br>However, historical information regarding vegetation at the lake is insufficient to describe the culturally significant plants and animals of the past. In part, such information is limited because College Lake is a highly altered system whose predominant land cover types, agricultural land and seasonal wetlands, were not the predominant vegetation under the unaltered state when College Lake (previously known as Laguna Grande) expanded and contracted in size but with much of the lake inundated year-round. Also, the majority of plants currently growing at College Lake are naturalized species that were absent pre-contact; and some important species (e.g., elk) have been eradicated from the region. This high degree of alteration coupled with scant historical records and a lack of historical ecology investigations at this site, prevents the pre-contact vegetation from being described in detail. (Conducting historical ecology investigations has been included in the list of targeted studies that could inform management.) |
| **Comment 21—Jerry Busch**<br>Page 1-12, Table 1-2<br>Discussion of regulatory framework.<br>**Suggested Revision**<br>Please add: The regulatory framework for preparation of the Lake AMP also includes an agreement by the PVWMA as part of the Water Right Permit that the AMP shall include systematic studies of fish, wildlife, and vegetation, and that the plan shall also include measures to preserve waterfowl habitat quality. Also, that no diversion is authorized under this permit unless right holder is implementing the approved plan. | Table 1-2 only includes the titles of specific measures, so the suggested revision was not made to Table 1-2. However, in Section 1.2, "Adaptive Management Plan Development," the following text was added to make explicit the requirement to not only develop but also implement the AMP: "The development and subsequent implementation of this plan also fulfills Term and Condition 32 of the Project’s Water Right Permit." |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| **Comment/Suggested Revision** | **Response to Comment** |
| **Comment 22—Jerry Busch**<br>Page 2-5, Table 2-2<br>The Draft Adaptive Management Plan (DAMP) states, "Uncultivated areas of the lakebed that are not already in woody riparian vegetation are disked, tilled, ripped or mowed every 1–2 years to prevent new establishment of woody plants that could trap sediment, or restrict flow or drainage."<br><br>This proposed management measure would adversely impact non-woody vegetation across the Lake and is unnecessary and excessive. The process of Adoptive Management entails developing and refining management measures that are appropriate to the objective but not in conflict with other management objectives and requirements, such as preserving waterfowl habitat quality.<br>**Suggested Revision**<br>Uncultivated areas of the lakebed that are not already in woody riparian vegetation are managed to prevent new establishment of woody plants that could trap sediment, or restrict flow or drainage, using adaptive measures to control woody vegetation while maintaining waterfowl food plants, emergent herbaceous plants and other wetland vegetation. | This text, which is in Table 3-2, has been corrected as follows: "Uncultivated areas of the lakebed that are not already in woody riparian vegetation may be ~~are~~ disked, tilled, ripped or mowed every 1–2 years if necessary to prevent new establishment of woody plants that could trap sediment, or restrict flow or drainage." The intent is not to pre-emptively treat large areas of the lake bed, which would entail unnecessary impacts and costs, but rather to treat areas of the lakebed where riparian woody riparian plants have established.<br>Note: because areas of seasonal wetland exist that have not been annually disked, tilled, or mown, and because with operation of the Project, portions of the lakebed will be submerged during when willow and cottonwood seeds are being dispersed (preventing those woody plants from establishing in those areas), at portions of the lakebed should be free of woody plant establishment in most years. |
| **Comment 23—Jerry Busch**<br>Page 3-7, Section 3.3.2.1<br>The DAMP states, "In general, areas below 59 feet NAVD88 in elevation will be managed as open water habitat during the wet season. Vegetation management in this area during the dry season will sustain open water habitat during the wet season. Vegetation management methods will include disking, tilling, and ripping. Vegetation may also be trimmed or mowed if necessary."<br><br>This appears to propose that all soils below the 59' elevation will be kept effectively clear of all vegetation to maintain "open water" . Combined with the intent to maintain farming above 59', this management approach would effectively preclude any natural vegetation at the lake. No vegetation monitoring would be necessary, because there would be no vegetation. No evidence is presented in support of the assertion that eliminating all vegetation is necessary to control woody vegetation. This management approach would nullify "measures to preserve waterfowl habitat quality."<br>**Suggested Revision**<br>Please revise this section to read: "Areas below 59 feet will be managed to control growth of woody vegetation | This text has been removed from the AMP. |

**Table J-1**

**Ad Hoc Adaptive Management Plan Committee Member Comments**

| Comment/Suggested Revision | Response to Comment |
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| while maintaining productive seasonal marsh vegetation. Adaptive treatments that control woody vegetation but minimize disturbance of emergent marsh vegetation will be implemented. Treatment areas will be monitored to evaluate effects on marsh vegetation and adjusted as necessary to preserve wetland plant productivity." | |
| **Comment 24—Jerry Busch**<br>Page 3-9-10, Table 2-3<br>This table on anticipated changes should be clearly attributed to the EIR and moved to the Appendicies or eliminated from the AMP text, because the intent of the AMP is to address ACTUAL changes to the Lake habitat and to apply treatments to meet stated objectives, and not to implement or confirm speculative "anticipated changes." Many of the AMP's stated objectives, such as those relating to preserving waterfowl habitat quality and promoting culturally important resources, conflict with the "anticipated changes." This table also conflicts substantially with Table 4-1.<br>**Suggested Revision**<br>Please omit this table, reduce it to a referece, or move to the Appendices and clearly attribute to the project EIR. | The notes to the table attribute it to the Project's EIR. The table has been retained because it summarizes the anticipated changes, and the uncertainty associated with them, that have guided development of the AMP. For example, the table describes the anticipated changes in seasonal wetlands: that they will increase in area because of a decrease in area of farmed wetlands, but that at lower elevations the structure of the wetland vegetation (its total cover of the ground), and potentially its species composition, is expected to change; thus, the area, total vegetation cover, and species composition of seasonal wetlands will be monitored.<br>This section of the AMP has been expanded, however, to include a description of the uncertainties associated with the response of organisms to the changes in hydrology associated with the project. This added text is now the primary content of this section (supported by the table). |
| **Comment 25—Jerry Busch**<br>Page 4-4, Table 4-1<br>The DAMP states, "Sustain waterfowl habitat quality in the proposed<br>water storage area." The pending Water Right Permit reflects the commitment of the PVWMA to "preserve waterfowl habitat quality." Futher, this object should be detailed to provide clearer guidance to reflect the waterfowl guilds being monitored in baseline studies.<br>**Suggested Revision** | This objective has been revised with “Sustaining” replaced by “Preserve.” |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| **Comment/Suggested Revision** | **Response to Comment** |
| "Waterfowl— Preserve waterfowl habitat quality (overwintering and refueling) for dabbling, diving and fishing waterfowl in the proposed water storage area." | |
| **Comment 26—Jerry Busch**<br>Page 4-4, Table 4-1<br>The DAMP metric proposes "Median daily abundance of waterfowl guilds during December–March." This proposed metric is subject to the wide variation in waterfowl numbers both regionally and statewide from year to year and month to month. The wide variance makes it very difficult to obtain specific results with respect to the Lake. A comparison of changes in waterfowl numbers and activities between study fields at the wetland is necessary to generate usable information about the effects of project operation, and is mandated by the Basin Management Plan EIR mitigation measure to monitor waterfowl "habitat utilization." Addtional variability is introduced to the waterfowl sampling by variation in sampling methods between multiple observers and single observers and a range of starting times relative to sunrise. Use of multiple observers is critical to enable the entire lake to be sampled at the same time, to eliminate variabilty associated with sampling parts of the lake at dawn and other areas later in the morning after higher levels of activity are initiated nearby. Please implement "systematic studies" of waterfowl as required by the PVWMA Water Rights Permit committment, evaluating habitat utilization between study fields, and utilizing a consistent sampling protocol with multiple observers."<br>**Suggested Revision**<br>"Establish and implement a systematic survey methodology to monitor median daily abundance of waterfowl guilds – both basin-wide and between survey fields -- during December–March. Record waterfowl adjacent to fields above 63' elevation. Use multiple observers to ensure the entire lake is sampled within an established interval after dawn. Expand sampling methodology to generally characterize guild behaviors (feeding, loafing, flushing, nuptial). For dabbling ducks, record location as primarily "nearshore" (within ~50 feet of shore) or "offshore" (not within ~50 feet of shore.)" | The action trigger for the waterfowl objective has been designed to account for the high level of variability in waterfowl abundance data from day-to-day, month-to-month, and year-to-year, and still distinguish substantial changes in abundance. The action trigger uses the median which makes the action trigger less responsive to extreme data points (very high or low counts) on one to several days of sampling, and using the median for an entire season reduces variability from year-to-year than would using metrics for portions of the migration season.<br>An additional action trigger has been added to this objective, however: reduction in the median number of species of waterfowl observed using College Lake. Similar to abundance, this metric would use the annual median of the daily observations.<br>Also, please note that the current monitoring method is to census (i.e., count all) waterfowl, not just the waterfowl in a random or representative set of locations; thus, the high variability in numbers of birds or waterfowl species in the baseline data set represent the high level of variability in waterfowl use of the lake, not an artifact of data collection methodology.<br>Differences among observers and movement of waterfowl during the observation period are sources of inaccuracy in each daily census. To reduce errors because of observer bias, the methodology does use two or more observers working together to collect most data, as suggested by the comment. Revising the methodology to record data by field would likely increase the errors caused by waterfowl movement; conversely, revising the methodology to record data by "arm" of the lake would likely reduce the errors caused by waterfowl movement. Neither of these changes has been made to the census methodology at this time; rather, the methodology used to collect baseline data has been retained, unaltered, which maximizes the ability to compare pre and post-project data. |
| **Comment 27—Jerry Busch**<br>Page 4-4, Table 4-1<br>The requirement to "preserve waterfowl habitat quality" inherently requires evaluating pre- and post-project habitat baseline conditions and productivity. The most important constituent of waterfowl plant habitat quality is | Vegetation monitoring has been added to the AMP for the area of seasonal wetland vegetation and the cover of waterfowl food plants within these wetlands. A qualitative assessment of seed production by these plants will also be made. |

| **TABLE J-1<br>AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| seed production, which provides protein essential to the pre-nesting nutritive and capacity of female birds. Vegetative food sources are also critical for overall food production and invertebrate habitat, also key to protein build-up.<br>**Suggested Revision**<br><u>Monitor occurrence frequency, seed production and vegetative food sources for selected waterfowl food plants.</u> | |
| **Comment 28—Jerry Busch**<br>Page 4-4, Table 4-1<br>Observations of dabbling ducks at the lake indicate an "edge effect" where dabbling / tipping ducks feed in less than 12 inches of water, characteristically the maximum depth that these birds can reach. If the nearshore habitats at capacity are denuded of vegetation or overgrown, the habitat quality will be substantially lower than a mosaic of open surface water and emergent waterfowl food plants. Baseline monitoring of habitat conditions is essential to provide a basis for "management measures to preserve waterfowl habitat quality." The "trigger" for implementing habitat management measures in this nearshore zone should include any deterioration of emergent marsh habitat lakewide, as both the EIR and the AMP are premised on transferring marsh habitat from drowned areas to viable substrates at higher elevations.<br>**Suggested Revision**<br><u>Monitor availability of near-shore dabbling duck habitat with both open water and reachable food in flooded area or adjacent upland habitat.</u> | The elevation of the shallow water zone (as described in the comment) will vary with the timing and amount of rainfall, weir operations, and water diversions. Thus, changes in available habitat (as described in the comment) would be spread over a range of elevations. The vegetation monitoring that has been added to the AMP will provide information regarding vegetation changes at particular elevations. This monitoring consists of transect-based monitoring with permanently marked transects parallel to elevation contours. |
| **Comment 29—Jerry Busch**<br>Page 4-4, Table 4-1<br>As discussed above, seed production and vegetative food sources for waterfowl are critial components of habitat quality. The action triggers need to require management actions when these habitat qualities deteriorate.<br>**Suggested Revision**<br><u>Seed production of preferred waterfowl food plants decreases below pre-project productivity.</u><br><br><u>Waterfowl preferred food plant cover or occurrence frequency less than 2017-2022 cover or frequency</u> | Action triggers for reductions in the acreage of seasonal wetland and for substantial reductions in the cover of waterfowl food plants have been added to the AMP. |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| **Comment/Suggested Revision** | **Response to Comment** |
| **Comment 30—Jerry Busch**<br>Page 4-4, Table 4-1<br>Invertebrates are important protein sources for waterfowl and an established component of waterfowl habitat quality in reference lierature. Baseline montoring of waterfowl habitat quality would not be complete without including the invertebrate preybase.<br>**Suggested Revision**<br><u>"Using standard invertebrate sampling methods, monitor diversity and abundance of invertebrates selected by waterfowl, including both macroinvertebrates (such as midge larvae, flies, water boatmen, worms) and microinvertebrates (such as rotifers, copepods)."</u> | Although aquatic macroinvertebrates are an important component of waterfowl diets, aquatic invertebrates are not routinely monitored in areas managed to provide waterfowl habitat. In part this is because this monitoring is costly and also there are only a limited number of contractors available with the skills necessary to perform this work. Also, aquatic macroinvertebrates are a large, taxonomically diverse group of organisms that differ in their response to changing conditions, and as a result, a wide variety of vegetation, soils, and hydrology may produce comparable amounts of invertebrate food for waterfowl[1]<br>In sum, because macroinvertebrates would be costly to monitor, monitoring data would be difficult to interpret and apply to management, and macroinvertebrate food resources may be relatively non-responsive to management actions, an objective and associated monitoring for aquatic macroinvertebrates has not been added to the AMP. However, a general characterization of the aquatic macroinvertebrate communities of the major vegetation types at College Lake could be informative for management if it determines that there are some important distinctions between these macro invertebrate communities. Therefore, a study of College Lake's aquatic macroinvertebrates has been included in the list of targeted actions. |
| **Comment 31—Jerry Busch**<br>Page 4-4, Table 4-1<br>The action triggers for invertebrate should reflect not only potential habitat deterioration at the Lake but also levels that fall below typical parameters for seasonal (palustrine) freshwater wetlands in California.<br>**Suggested Revision** | Please see response to Comment 30 above. |

[1] See Anderson, J. T. and L. M. Smith. 2000. Invertebrate Response to Moist-Soil Management of Playa Wetlands. Ecological Applications 10(2): 550–558; Davis, C. A. and J. R. Bidwell. 2008. Response of Aquatic Invertebrates to Vegetation Management and Agriculture. Wetlands 28 (2): 793–805; and Tapp, J. E., and E. B. Webb. 2015. Aquatic Invertebrate Food Base for Waterbirds at Wetland Reserve Program Easements in the Lower Mississippi Alluvial Valley. Wetlands 35:183–192.

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| **Comment/Suggested Revision** | **Response to Comment** |
| <u>Invertebrate species selected by waterfowl decrease in diversity or abundance or occur below levels typical for emergent seasonal (palustrine) wetlands.</u> | |
| **Comment 32—Jerry Busch**<br>Page 4-4, Table 4-1<br>In accordance with the action trigger for maintaining invertebrate habitat quality, management actions should include invertebrate habitat enhancement.<br>**Suggested Revision**<br><u>Habitat enhancement to promote invertebrate diversity or abundance. Consider planting vegetation supporting invertebrates.</u> | Please see response to Comment 30 above. |
| **Comment 33—Jerry Busch**<br>Page 4-4, Table 4-1<br>The DAMP states, "Adjust timing or frequency of vegetation management to enhance habitat quality." This needs to be revised to include adjustment of the METHOD of vegetation managment, as a very wide variety of vegetation managment methods are available for adaptive management implementation to meet AMP objectives.<br>**Suggested Revision**<br>Adjust timing, or frequency or method of vegetation management to enhance habitat quality | The description of potential management actions for this objective has been expanded and now includes adjusting the techniques used to manage vegetation. |
| **Comment 34—Jerry Busch**<br>Page 4-4, Table 4-1<br>The DAMP states, "Take additional vegetation management actions to enhance habitat quality." The AMP will be updated over the course of implementation to include specific management actions, but should be expanded in the initial draft to include some basic managment actions under consideration, including planting waterfowl food plants, encouraging or subsidizing planting of winter crops or leaving crop residue in cultivated substrates, placement of fill to expand shallow nearshore habitat, or intermittant disking of selected seasonal marsh locations to maintain waterfowl habitat quality and to discourage low-value vegetation (e.g. cocklebur or Polygonum amphibium).<br>**Suggested Revision**<br>Take additional vegetation management actions to enhance habitat quality. Consider planting waterfowl food plants, encouraging / subsidizing planting of winter crops or maintaining crop residue in cultivated substrates, | The description of potential management actions for this objective has been expanded and now includes use of cover crops and seeding treatments. |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| **Comment/Suggested Revision** | **Response to Comment** |
| placement of fill to expand shallow nearshore habitat, or intermittant disking of selected seasonal marsh locations to maintain waterfowl habitat quality and to discourage low-value vegetation (e.g. cocklebur or Polygonum amphibium). | |
| **Comment 35—Jerry Busch**<br>Page 4-4, Table 4-1<br>Regarding the DAMP objective to "Sustain seasonal wetland and native vegetation." If the seasonal vegetation of the Lake declines in area or quality, measures are requred to maintian habitat quality. In additon to the measures described, which are all well-conceived and supportable, add a management measure to facilitate the drawing down of lake water levels quickly enough to allow wetland vegetation to establish and set seed.<br>**Suggested Revision**<br>Add: "Draw down lake water levels as rapidly as possible while meeting irrigation blend-water demand." | Potential management actions for this objective do include modifying weir operations and diversions. Modifying drawdown rate has been added as an example of such changes. |
| **Comment 36—Jerry Busch**<br>Page 4-4, Table 4-1<br>Buffer habitats adjacent to the inundation area, and ecotones between the seasonal marsh and adjacent grasslands are extremely important to wildlife that utilizes the inundation area indirectly through exploitation of wildlife that is seasonally associated with the flooded area, but that moves into the uplands during winter. Such wildlife include the prey base for the basin's raptors, importantly comprised of songbirds, reptiles, amphibians, and small mammals. Although the PVWMA has not proposed to acquire leases or fee ownership of any surrounding upland habtats at present, the AMP will not disregard the importance these upland habitats nor the opportunities to influence their quality and mangement, particularly uplands that are currently in public ownership or owned by sympathetic landowners. The management objectives and measures should address upland habitat quality and management.<br>**Suggested Revision**<br><u>"Encourage management of public -- and where possible, private -- lands adjacent to the Lake to improve native habitats such as grassland, oak woodland, mixed hardwood or redwood forest."</u> | AMP objectives to control invasive plants and promote native plants and culturally significant plants would also apply to the uplands adjoining College Lake. However, vegetation management by neighboring land owners is not under the control of PV Water, and largely outside PV Water's influence. Therefore, an objective specific to the surrounding uplands has not been added to the AMP. |

| **TABLE J-1<br>AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| **Comment/Suggested Revision** | **Response to Comment** |
| **Comment 37—Jerry Busch**<br>Page 4-4, Table 4-1<br>As discussed above, the Lake provides high quality habitat to raptors. The bird monitoring data includes raptor breeding and nesting adjacent to the lake. The presence of breeding sites is, for several species, an indicator of overall raptor habitat quality withinand adjacent to the lake.<br>**Suggested Revision**<br>Add a formal objective: "Raptors – maintain current breeding populations." | An objective regarding raptors has not been added to the AMP because PV Water has limited influence on use of the College Lake area by raptors. Raptors are primarily nesting at the periphery of the Project area and thus their nests may be affected both by activities on the lakebed and on surrounding lands. Similarly, raptors forage over large areas at a considerable distance from their nests, areas that extend far from College Lake. Nonetheless, as part of the monitoring of waterfowl and other birds and of avoidance and minimization measures incorporated into the Project's O&M and the AMP (see Appendix A, "Avoidance and Minimization Measures," PV Water will be monitoring nesting birds, including raptors, and taking actions to avoid and minimize impacts to their nesting. |
| **Comment 38—Jerry Busch**<br>Page 4-4, Table 4-1<br>To implement the above objective, formalize the following metric already being implemented: "Count breeding pairs within 0.25 miles of Lake." Because the Santa Cruz Bird Club is also monitoring breeding populations of raptors in the Lake area, Community Science can be mobilized to support this monitoring.<br>**Suggested Revision**<br><u>"Count breeding pairs within 0.25 miles of Lake."</u> | Please see response to Comment 37 above. |
| **Comment 39—Jerry Busch**<br>Page 4-4, Table 4-1<br>Add an action trigger for the foregoing metric.<br>**Suggested Revision**<br><u>Decrease in number or diversity of breeding pairs.</u> | Please see response to Comment 37 above. |
| **Comment 40—Jerry Busch**<br>Page 4-4, Table 4-1<br>Add a management action or actions for the objective.<br>**Suggested Revision**<br><u>Take management actions addressing the causes of nesting decline.</u> | Please see response to Comment 37 above. |

| **TABLE J-1<br>AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| **Comment/Suggested Revision** | **Response to Comment** |
| **Comment 41—Jerry Busch**<br>Page 4-4, Table 4-1<br>Regarding the objective "Farming—Promote farming within the College Lake basin:" the EIR indicates maintaining a baseline level of agriculture at a minimum median level of cultivation one out of every five years. The AMP should make clear that farming should be promoted as consistent with other manadated objectives, and shoudl not target a level of farming exceeding the level evaluated in the EIR, as doing so promotes a excessive level of conflict with other objectives.<br>**Suggested Revision**<br>"Farming—Promote farming<br>within the College Lake basin as consistent with othe objectives." | All objectives are "as consistent with other objectives," and actions taken to attain AMP objectives cannot conflict with other AMP objectives. A sentence in Section 4.1, "Objectives," has been revised to make this clear. Also, the farming objective has been revised to conform to the EIR text. |
| **Comment 42—Jerry Busch**<br>Page 4-4, Table 4-1<br>The DAMP describes an action trigger for district involvement in promoting agriculture (any drop below current level) that would exceed the EIR and promote conflicts with other mandated objectives. This trigger needs to be revised to resolve this conflict and find consistency with the enviromental impact review.<br>**Suggested Revision**<br>"Area between 59 and 63 feet in elevation is cultivated less than 1 out of every 5 years in normal or dry years." | The relevant wording of the Project's Mitigation Measure LU-1a: Promote Farming is "If acquiring land outright, enter into lease arrangements for the land to be cultivated or otherwise productively used for agricultural purposes at least once every five years, hydrologic conditions permitting." The AMP has been revised so that the action trigger for this objective has been revised to have wording similar to and consistent with Mitigation Measure LU-1a. |
| **Comment 43—Jerry Busch**<br>Page 4-4, Table 4-1<br>As indicated by the AMPC's tribal representative, the Cultural Resources objective could be expanded to include maintaining plants and wildlife important to indigenous culture due utilization for a food source, shelter construction, industry, medicine or ceremony / spiritual practice.<br>**Suggested Revision**<br>"Maintain and encourage plants and wildlife important to indigenous culture due utilization for a food source, | The cultural resources objective has been expanded to include sustaining plants of cultural significance to the Amah Mutsun Tribe. |

| TABLE J-1<br>AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS | |
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| shelter construction, industry, medicine or ceremony / spiritual practice." | |
| **Comment 44—Jerry Busch**<br>Page 4-4, Table 4-1<br>Pursuant to the above objective, add a metric to monitor culturally important plants and wildlife.<br>**Suggested Revision**<br>Describe culturally important plants and wildlife typical of the habitat during pre-European settlement and monitor occurence. | An appendix has been added to the AMP with a list of plants observed growing at College Lake, and in this appendix plants with cultural significance to the Amah Mutsun Tribe are noted. Also, a paragraph of text regarding culturally significant plants and animals has been added to the AMP. |
| **Comment 45—Jerry Busch**<br>Page 4-4, Table 4-1<br>Add a trigger and management action or actions for the above objective addressing culturally important plants and wildlife.<br>**Suggested Revision**<br><u>Trigger: Diversity or abundance of culturally significant plants and wildlife occur below levels characteristic of the site prior to European settlement or typical for emergent seasonal (palustrine) wetlands.</u><br><br><u>Action: Plant or otherwise encourage productivity and diversity of culturally important plants and wildlife.</u> | Sustaining culturally significant plants at College Lake has been added to the cultural resources objective. However, the triggers are not related to pre-contact vegetation for two reasons:<br>(1) the diversity and species composition of that vegetation is not known, and<br>(2) College Lake has been highly altered since contact (e.g., its vegetation is now primarily agricultural land and seasonal wetlands, neither of which were the primary components of the vegetation before the lake was "reclaimed" in the early twentieth century), and while the Project will restore conditions to a state more similar to pre-contact conditions, the system will still be in an altered state.<br>So, the trigger related to culturally significant plants is that where enhancement, revegetation, and restoration treatments are implemented, if a decrease in culturally significant plants results, management actions will be triggered. The related actions are any of the vegetation-related actions in the AMP that could rectify the situation. |
| **Comment 46—Jerry Busch**<br>Page 4-4, Table 4-1<br>Regarding the objectives to "—Preserve water storage capacity within College Lake" and to "Minimize conditions that can contribute to algal blooms, including cyanobacteria blooms." Add to the Management Actions a proposal to purchase or lease seasonally inundated and existing marshlands land north of Paulsen Road wherein to establish emergent vegetation to filter sediment and contaminants from agricultural fields. Such biofiltration can reduce up to 90% of suspended solids and | The potential management actions for this objective have been revised and include considering sediment detention basins and other systems for managing the location of sediment deposition. The AMP has not been revised to explicitly identify leasing or purchasing land outside the Project area as an action for the attainment of any of the AMP's objectives. |

**TABLE J-1**

**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS**

| **Comment/Suggested Revision** | **Response to Comment** |
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| associated ag runoff contaminants, while serving the added benefit of maintaining waterfowl habitat quality.<br><br>**Suggested Revision**<br><br><u>"Lease / purchase or lease seasonally inundated land north of Paulsen Road to establish emergent vegetation for filtering sediment and contaminants from agricultural fields.</u> | |
| **Comment 47—Jerry Busch**<br><br>Section 4.3 and Section 6.2.1<br><br>The AMP should include a discussion of the process for ensuring that management objectives have been met, particularly when management actions are triggered. The reporting procedure should provide accountability for management actions or inactions by incorporating the following information for projectives:<br>-- Status update for each objective.<br>-- Presentation of monitoring data for each trigger and management action. Evaluation of metric success in providing significant, actionable monitoring data.<br>-- Evaluation of data and management actions outcomes in achieving AMP objectives.<br>-- Recommendations for modificatios to metrics.<br>-- Recommendations for new actions, continuing actions or inaction for each objective.<br><br>**Suggested Revision**<br><br>Add the following objective to Table 4-2: "Meet all project objectives through AMP implementation over the duration of project operation."<br><br>Under metrics for this action, add: "Continue data collection for each metric until objective attained and management actions either completed or determined to be unnecessary."<br><br>Under management actions, add: "Implement each triggered management action until objectives met and management action no longer triggered." | The intent of any AMP, including this plan for the College Lake Project, is to meet all of the objectives. However, AMPs are developed because of uncertainties, and therefore objectives may not be met for periods of time, and during the course of adaptive management, metrics, action triggers, potential actions, and objectives may be revised, or added or removed. In other words, while the O&M of the Project is to be adaptively managed for its duration, part of that adaptive management may include changes to objectives, metrics, and the types of actions taken. For this reason, the objectives of the AMP were not revised as suggested by the comment. However, Section 6.2.1, "Adaptive Management Reporting," has been revised to state that all monitoring reports for that year and the results of completed target studies will be attached to the memorandum. |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| **Comment/Suggested Revision** | **Response to Comment** |
| **Comment 48—Jerry Busch**<br>Page —<br>A budget plan should be prepared for each objective, delineating the estimate annual cost of each. During baseline data phase, the budget shall itemize the collection, analysis and reporting of metrics. During management action phase, an itemized workplan and budget shall be prepared for implementing, evaluating and reporting the management action. This is essential to plan nand guide work, allow budgeting by the water board and provide public accountability.<br>**Suggested Revision**<br>— | A budget has not been added to the AMP primarily because many adaptive management actions will be implemented by adjusting O&M that is part of the Project and being implemented to fulfill the objectives of the overall project, not just the objectives of the AMP. Also, O&M actions will often be modified or taken for the sake of not just one but multiple AMP objectives. Therefore, allocating portions of Project O&M costs to individual objectives or the AMP as a whole is problematic. Monitoring, however, is arguably more closely related to AMP implementation than the Project's overall objectives. PV Water has been funding and conducting monitoring of hydrology, water quality, and wildlife for both permitting requirements and development of the Project and the AMP since 2014. PV Water will continue to fund this monitoring, and additional monitoring, as identified in the AMP, for the duration of the Project. |
| **Comment 49—Jerry Busch**<br>Page 2-4, Section 2.1<br>In discussing the physiographic and ecological history of the Lake, it may be worthwhile to note that, like other fault-line lakes in the region, such as Tynan, Drew and Freedom lakes, the water body at the subject site, even prior to the insitution of summer drawdown and other management measures more than 100 years ago, experienced seasonal fluctuations in water level that probably resulted in a diversity of emergent vegetation and associated wildlife, particularly along the shoreline. Pre-European agricultural cultivation would not have removed shore vegetation or associated buffer zone habitats, and the pre-disturbance ecotones between these wetlands and adjoining uplands would have contributed significantly to biotic diversity. The region would have supported hundreds of acres of emergent, palustrine wetlands in Elkhorn and Watsonville Slough that are now either converted to salt marsh, as in the case of Elkhorn, or submerged, in the case of Watsonville Slough. Climate change and sea level rise will continue to exacerbate these changes. The emergence of the subject Lake as a key Coastal migratory resting and refueling site has come in the context of the loss of more than 90% of the freshwater wetlands in Coastal California, rendering such wetlands ever more valuable in their increasing scarcity and impaired function. Created and managed wetlands now have a critical role, both statewide and regionally, in | The AMP has been revised to include a brief (2-sentence) description of the pre-alteration hydrology, and that the lake would have varied in size seasonally and from year to year. However, a detailed description of pre-alteration conditions was not added because these conditions are not known in any detail, the descriptions of resources in the AMP are brief and intended to provide some context but are not intended to be exhaustive, and management of the Project's O&M will be more oriented towards conserving the resource values of the lake's current highly altered condition than to restoring historical resource values. |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| sustaining watefowl, wading bird, shorebird, raptor and related wildlife populations.<br>**Suggested Revision**<br>— | |
| **Comment 50—Sierra Club**<br>**Woody vegetation control**<br>One of the important functions of the DAMP will be to guide management of woody vegetation. Although willow growth could be detrimental to waterfowl dependent on open water, excessive measures for woody vegetation control could be equally harmful. Table 4-1, entitled "Summary of Proposed Management Objectives, Metrics, and Triggers," establishes an objective to "Sustain seasonal wetland and native vegetation," which would be met by initial disking or localized hand removal of woody vegetation, followed by monitoring of woody plants (location, estimated area, abundance, height) and future action to "retreat or revegetate as needed." This sensible approach reflects the essence of Adaptive Management: an initial management measure (disking or hand removal), with monitoring and follow-up actions as needed to sustain wetland vegetation.<br>These appropriate measures of Table 4-1 are contradicted by those of Table 2-2, "Summary Description of Anticipated Maintenance Activities" and Table 2-3, "Anticipated Changes to Inundation Periods and Land Cover at College Lake," which anticipate that disking or mowing would be implemented every 1-2 years (Table 2-2) or annually (Table 2-3). Annual disking or mowing would eliminate emergent vegetation for waterfowl, not sustain it. Tables 2-2 and 2-3 are inconsistent with the management approach and many objectives and measures described in Table 4-1 and elsewhere in the DAMP. At minimum, both tables should include a note that they were prepared for the DEIR prior to the AMP Committee, water rights permit approval and other recent | The comment refers to Table 3-2 and Table 3-3. The notes to these tables attribute their content to the Project's EIR, and in the case of the Table 3-2, the Project's permit applications and biological assessments.<br>Text in Table 2-2 and elsewhere in Section 3.2 has been revised to state that uncultivated areas of the lakebed that are not already in woody riparian vegetation *may be* disked, tilled, ripped or mowed every 1–2 years *if necessary* to prevent new establishment of woody plants that could trap sediment, or restrict flow or drainage. The intent is not to pre-emptively treat large areas of the lake bed, which would entail unnecessary impacts and costs, but rather to treat areas of the lakebed where riparian woody riparian plants have established. Other treatment techniques may be implemented in addition to or instead of disking as described in Table 4-1<br>Table 3-3 has been retained because it summarizes the anticipated changes, and the uncertainty associated with them, that have guided development of the AMP. For example, the table describes the anticipated changes in seasonal wetlands: that they will increase in area because of a decrease in area of farmed wetlands, but that at lower elevations the structure of the wetland vegetation (its total cover of the ground), and potentially its species composition, is expected to change; thus, the area, total vegetation cover, and species composition of seasonal wetlands will be monitored.<br>Chapter 3 of the AMP has been expanded, however, to include a description of the uncertainties associated with the response of organisms to the changes in |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| project developments and do not necessarily reflect the most up-to-date approaches. Table 2-2 should be updated to be consistent with Table 4-1. Table 2-3 should be deleted entirely (this table is inappropriate in the AMP because it is a non-adaptive and speculative exercise within a document committed to concrete outcomes based on active monitoring and management). | hydrology associated with the project. This added text is now the primary content of this section (supported by the table).<br><br>Note: because areas of seasonal wetland exist that have not been annually disked, tilled, or mown, and because with operation of the Project, portions of the lakebed will be submerged during when willow and cottonwood seeds are being dispersed (preventing those woody plants from establishing in those areas), at portions of the lakebed should be free of woody plant establishment in most years. |
| **Comment 51—Sierra Club**<br><br>The DAMP includes additional areas of concern. As you know, the pending conditions of the PVWMA water rights permit, as stipulated by your agency, require the AMP to include the following:<br>• Systematic studies of fish, wildlife and vegetation<br>• Measures to preserve waterfowl habitat quality<br>• No diversion unless the rights holder is implementing the plan | Description of the systematic studies of fish, wildlife, and vegetation that would be conducted have been added to the AMP in Section 5, "Monitoring and Targeted Studies," and more detailed methodologies are described in full in the appendices.<br><br>The AMP includes an objective to "Preserve waterfowl habitat quality in the proposed water storage area," and measures (potential management actions) for this objective have been added to the AMP.<br><br>Text has been added to Section 1.2, "Adaptive Management Plan Development," stating that the development and subsequent implementation of the AMP is required by the Project's water right permit. |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| **Comment 52—Sierra Club**<br><br>**Waterfowl Monitoring**<br>The DAMP does not currently propose any detailed, systematic metrics to monitor waterfowl, other than to “monitor median daily abundance of waterfowl guilds during December–March.” This entails counting waterfowl at intervals, then finding the median range or average number of birds counted per day. This approach would not necessarily reveal the effects of project operation on the lake, because the trends in waterfowl numbers there would be difficult to separate from general trends in waterfowl populations regionally and statewide. For example, waterfowl numbers at the lake may decline one year due to excessive runoff and muddy water, and increase in another year due to regional drought. Or populations may start out high in a dry year, then decrease as the season progresses—a fluctuation that could be overlooked by the sampling method unless enough counts were taken to establish daily averages for each month. The effect of project operation could be lost in the background “noise” of natural waterfowl population changes.<br>The Sierra Club recommends that, in addition to compiling average daily population counts, the AMP should monitor waterfowl numbers by field within the lake basin. Monitoring changes between fields controls for the influence of external factors. Field-based counts can be aggregated into basin-wide counts, and can also provide significant data about the response of waterfowl to changes in habitat quality between fields, including project operation and habitat management. For example, if emergent vegetation and seed production is wholly eliminated in several fields but improved in other fields, the data could indicate that management measures to maintain seed production should be implemented, even though overall waterfowl numbers remain constant. Field-specific data can also highlight the effects of changes in water level, rainfall patterns and changes in turbidity. The waterfowl monitoring has already been designed and set up as field-based, the fields are already diagramed and marked with buoys and other markers, and the cost of field-based study is similar to simple basinwide monitoring. | Please see response to Comment 26. |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| **Comment 53—Sierra Club**<br><br>The Sierra Club supports the DAMP metric to monitor the acreage of seasonal wetlands. A decline in seasonal wetland area would be considered synonymous with a decline in waterfowl habitat quality, because a reduction in food availability can adversely affect breeding success later on. However, it is also important to collect data about plant composition, cover, seed production and elevation distribution, in order to evaluate trends in marsh vegetation and habitat value to waterfowl. Also, a fine-grained approach is essential to monitor the habitat response to management actions such as disking, weeding, planting waterfowl food, or changes in drawdown date or water levels from year to year.<br><br>The metric methodologies submitted for the November meeting need to be sufficiently complete, with only minor adjustments, to receive the endorsement of the AMP committee. If the forthcoming vegetation monitoring metrics are not sufficiently well-developed, or not considered adequate, an additional meeting of the AMP could be reasonably required for AMPC approval.<br><br>Because habitat quality is a key component of monitoring waterfowl habitat utilization required by the Basin Management Plan EIR, the following action triggers should also be considered:<br>• Seed production of preferred waterfowl food plants – maintain at or above pre-project productivity.<br>• Waterfowl preferred food plant cover or occurrence – maintain at or above 2017–2022 cover or species frequency.<br>• Invertebrate species selected by waterfowl – no decrease in diversity or abundance. | Monitoring of the cover of preferred waterfowl food plants has been added to the AMP and declines in their cover has been added as a trigger for management action. See the revised Table 4-1, Section 5.1.1.6, “Vegetation,” and the new Appendix F, “Seasonal Wetland Monitoring Methodology.” A qualitative assessment of seed production by preferred waterfowl food plants also has been added to the vegetation monitoring to aid interpretation of vegetation data and its use in guiding management actions.<br><br>Regarding monitoring of invertebrate diversity or abundance and their use as an action trigger see Comment 30. |

| **Table J-1**<br>**Ad Hoc Adaptive Management Plan Committee Member Comments** | |
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| **Comment 54—Sierra Club**<br><br>**Farming Consistent with Other Objectives**<br>Although PV Water is committed to encouraging a level of farming in the upper contours (59–63-foot elevation band) of the lake basin, this does not need to conflict significantly with preserving waterfowl habitat quality. The EIR specified farming to occur at least one out of every five years, a level of farming consistent with maintaining open waterfowl habitat around the shoreline. The AMP management trigger, however, would require action whenever agricultural activity fell below the annual farming that occurred in 2014–2021. Because annual cultivation of the elevation band would be inconsistent with sustaining seasonal vegetation, the threshold should be scaled back to encourage farming one out of every five years. | The action trigger for the farming objective has been revised to have wording similar to and consistent with Mitigation Measure LU-1a: Promote Farming, which states that "If acquiring land outright, enter into lease arrangements for the land to be cultivated or otherwise productively used for agricultural purposes at least once every five years, hydrologic conditions permitting."<br><br>Note: All objectives are "as consistent with other objectives," and actions taken to attain AMP objectives cannot conflict with other AMP objectives. A sentence in Section 4.1, "Objectives," has been revised to make this clear. |
| **Comment 55—Sierra Club**<br><br>**Tribal Interests**<br><br>As consistent with comments by the AMPC's tribal representative, the Cultural Resources objective could be expanded to include maintaining and fostering plants and wildlife utilized by indigenous people for food, shelter construction, industry, medicine or ceremony/spiritual practice, potentially including tribal harvesting and use. Protection of known cultural sites potentially affected by project construction and operation should be implemented. | The cultural resources objective has been expanded to include sustaining plants of cultural significance to the Amah Mutsun Tribe. See also the responses to Comments 43, 44, and 45.<br><br>Protection of known culturally significant (archaeological) sites is required by the Project's mitigation measure CUL-1i; the AMP includes metrics, action triggers, and management actions for protecting known significant archaeological sites; and PV Water has coordinated with representatives of the Amah Mutsun Tribe regarding culturally significant sites. |
| **Comment 56—Sierra Club**<br><br>**Long-Term Workplan**<br>To provide accountability and predictability, a workplan and budget should be prepared for the AMP, providing an annual budget for implementing monitoring, analysis and reporting. During baseline data phase, the budget should itemize the collection, analysis and reporting of metrics. During management action phase, an itemized workplan and budget must be prepared for implementing, evaluating and reporting the management action. This is essential to plan and guide work, allow budgeting by the water board and provide public accountability.<br><br>The absence of a budget and workplan, will result in the PVWMA Board of Directors providing piecemeal review of each expenditure on the AMP, which effectively denies the public the opportunity to review and comment on AMP expenditures. | Neither a workplan nor an implementing budget have been added to the AMP for several reasons. First, most planned and potential operations and maintenance activities will be described in the Operations and Maintenance Plan and the Compliance Plan that will be prepared by PV Water (See AMP Section 1.2.2.2, Related Management Plans). These two plans will contain most if not all the content of a work plan, and will be appended to the AMP upon their completion.<br><br>Second, distinguishing the cost of adaptive management from the cost of permit compliance and the other components of operations and maintenance costs is problematic. Some monitoring included in the AMP, however, is not required by permits. PV Water has been funding and conducting monitoring of hydrology, water quality, and wildlife for both permitting requirements and development of the Project and the AMP since 2014. PV Water will continue to fund this monitoring, and additional monitoring, as identified in |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| | the AMP, through PV Water's operations budget for the duration of the Project. |
| **Comments on November 2021 Draft of the Adaptive Management Plan** | |
| **Comment 57—Sierra Club**<br><br>**Vegetation Monitoring**. The most critical revision needed in the AMP is to expand vegetation sampling to all elevations. The current sampling protocol limits vegetation sampling to lands above 59 feet, although vegetation surveys submitted to date indicate that most waterfowl food production occurs at elevations below 55 feet. The proposed methodology would miss the adverse effect of project operation on waterfowl habitat and fail to trigger necessary management actions to preserve waterfowl habitat quality.<br><br>Consultant John Hunter recognized this concern at the November 10 meeting of the Adaptive Management Plan Committee (AMPC), where he stated his intention to discuss with staff a revision to the sampling methodology to include sampling transects at elevations below 59 feet. The Sierra Club requests this discussion to be included in the meeting summary. The Sierra Club also requests that, prior to submitting the final draft of the AMP to the Pajaro Valley Water Management Agency (PVWMA/PV Water) Board of Directors, the vegetation monitoring be revised as follows:<br><br>"Permanently marked transects will be used to monitor changes in the cover and species composition of seasonal wetland vegetation at elevations of 51–63 feet NAVD88. The purpose of this monitoring is to document changes in species composition of seasonal wetland | The AMP has been revised to extend the lower elevation limit of monitoring from 59 to 51 feet NAVD88 as suggested. |

| TABLE J-1<br>AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS | |
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| vegetation because of its importance for wildlife, particularly waterfowl." | |
| **Comment 58—Sierra Club**<br><br>**AMP Committee Oversight**. Chapter 6 of the AMP establishes the process for reviewing and reporting monitoring biotic data, evaluating action triggers and taking actions. Although the AMP process correctly involves the AMPC in revising the AMP annually, Section 6.2.1 of the Draft AMP would exclude the Committee from supervising management actions other than to receive notification.<br><br>This omission improperly relieves PV Water of AMPC review and oversight of critical decisions affecting the preservation of waterfowl habitat quality, culturally important resources, wetland vegetation and other Lake resources. The AMP is required to be implemented over the life of the project, and public accountability must likewise cover the entire implementation period. Excluding the Committee from participating in management action decisions not only violates accountability but forgoes the benefit of Committee expertise, knowledge, participation in plan development, ties with community and tribal affiliations in critical management decisions.<br><br>The Adaptive Management Plan Committee Committee's oversight of AMP implementation was established by the AMPC's first action as a body, which was to amend the draft bylaws to require that after the initial four meetings, the AMPC will "meet again at the end of the initial adaptive management planning process and thereafter at minimum annually." The scope of the Committee cannot be reduced to limit its function to amending the AMP. It must continue to exercise the full scope of its mission to evaluate and adapt monitoring methods, action triggers and management actions. This is the very reason for the Adoptive Management Plan Committee's existence: to evaluate, modify and *adapt* management actions to accomplish all of the AMP objectives.<br><br>The Sierra Club therefore proposes that sections 6.1 and 6.2 be revised as follows:<br><br>**6.1 ~~PV Water Evaluations~~ AMP Implementation and Modification** | The comment proposes that the scope of annual reporting process be expanded to encompass planning and that the Ad Hoc AMP Committee be involved in the planning of project operations and maintenance. The process would still be based on an annual meeting during which PV Water staff and Committee members would discuss exceedance of action triggers and management actions to be taken in response, i.e., primarily after the annual discussion.<br><br>This process was not incorporated into the AMP for two reasons. First, O&M is ongoing and thus most actions cannot be delayed until an annual meeting, and related workload planning, scheduling, and contracting would be made more difficult. Second, the Committee is an ad hoc not a standing committee, convened for four meetings, whereas implementation of the AMP will span many years. Therefore, the text has been revised so that a draft of the annual adaptive management report will be presented to the Projects and Facilities Operations Committee, a standing committee, for their review, with an invitation to the meeting being extended to the members of the former Ad Hoc AMP Committee. |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| Staff will annually review summaries of monitoring data, PV Water O&M activities, and evaluate practices. Based on this review, monitoring and management practices will be presented to and discussed with the Committee in May of each year, and decisions to change practices for the subsequent year will be made if necessary. This evaluation may be supported by technical experts, regulatory agencies, land owners or other stakeholders in addition to the Committee.<br><br>**6.2.1 Adaptive Management Reporting**<br>Each year a memorandum will be produced that summarizes monitoring and O&M conducted by PV Water, and reviewed with the Committee. Agency staff and the Committee will discuss if action triggers were exceeded, and if so, what management actions ~~were~~ should be taken or planned in response. If urgent management actions were taken prior to this discussion, Agency staff will provide a summary of the action trigger, management action and reason for urgency, and the Committee will review this summary and discuss with staff whether additional or modified actions are indicated. This memorandum also will document any changes in monitoring and O&M practices implemented for other reasons (e.g., changes in regulations or technology), new information that may affect O&M, and revisions to the AMP, if any. Following the meeting, PV Water will issue a summary of the meeting and the final determinations on whether triggers were exceeded, and what management actions are to be taken. Monitoring results will be an important basis not only for adaptive management decisions, but also for revising the AMP. Annual monitoring reports and reports on targeted studies completed that year will be attachments to the memorandum. Annual memoranda will be publicly available. | |

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| **Comment 59—Sierra Club**<br><br>**Workplan and Budget**. To ensure public accountability and fiscal responsibility, it is essential for the PVWMA to establish a workplan and budget for the AMP. Without a budget and workplan, neither the PV Water Board of Directors, PVWMA staff nor the public will know what elements of the AMP will be implemented, the level of investment in AMP monitoring or management, or the details of implementing the required element of the AMP. Without a budget, not only does the public not know what work is planned, but the Board has no systematic context for evaluating expenditures on the AMP. Instead, the Board would need to approve each aspect of a continuing series of piecemeal expenditures that would be impossible to manage cohesively. A budget declares the agency's financial investment in the monitoring and data analysis, and defines the level of commitment to and management actions. A workplan and budget is the vehicle by which the Board of Directors approves the AMP implementation for any given fiscal year. A basic workplan with a budget for monitoring is essential to reaffirm the commitment of the PVWMA to the first round of monitoring under the AMP to begin next year. If the AMP budget comes from multiple areas of the overall agency budget, this can be noted.<br><br>Because the proposed monitoring studies are described in the AMP, the budget and workplan for these should also be stated. The workplan and budget should be updated annually to reflect additional monitoring or management actions identified. The Sierra Club therefore requests that the agency develop an annual operating budget and workplan for implementing the adopted AMP. | Please see the response to Comment 56. |
| **Comment 60—Sierra Club**<br><br>**AMP REVISIONS TO DATE**<br>The revisions to the Draft AMP made to date will improve the effectiveness of monitoring, triggers and management actions in mitigating potential effects of the PVWMA irrigation project. The following significant modifications have been made to the document:<br>• [Bullet 1] The objective for waterfowl was revised to "Preserve waterfowl habitat quality in the proposed water storage area." This revision, consistent with your agency's commitments as established through the water rights permit process, ensures that PV Water will take actions as necessary to ensure not only that waterfowl populations remain stable, but that waterfowl access to food and other components of habitat quality is maintained.<br>• [Bullet 2] Plant transect monitoring was added to the AMP to record plant species distribution, seed production and cover including vegetation height. This will enable managers to evaluate the effect of project | This comment's bulleted list both recognizes important revisions that have been incorporated into the AMP and suggests additional revisions. Each item on the list is responded to below.<br>• Bullets 1–5 do not suggest an additional revision to the AMP, and so are not discussed further.<br>• Bullet 6 suggests that waterfowl monitoring data be collected by lake branch (arm) and that waterfowl data be evaluated by lake branch in addition to being evaluated for the lake as a whole. Comparable revisions have been made to the AMP to collect waterfowl data by lake branch and to add to the action triggers changes in abundance or species richness in each arm of the lake in addition to changes in the lake as a whole.<br>• Bullet 7 does not suggest an additional revision to the AMP, and so is not discussed further.<br>• Bullet 8 suggests adding tribal access to the cultural resources objective. This revision was not made. Although including support for tribal access was |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
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| operation on waterfowl food plants, food availability, dabbling duck feeding areas and other elements of waterfowl habitat quality.<br>• [Bullet 3] Reductions in waterfowl food plants or seasonal wetland vegetation will now trigger management actions to restore waterfowl food plants and other marsh vegetation.<br>• [Bullet 4] Appropriate woody vegetation control methods will be adapted to remove riparian vegetation outside the existing willow forest without unnecessarily damaging non-target marsh vegetation.<br>• [Bullet 5] Plants with tribal significance were identified. The vegetation transects will allow managers to track the effects of project operation on these significant plants and to monitor annual changes in these plant resources over time. The information will potentially facilitate the design and implementation of management actions to promote and utilize these plant resources as appropriate.<br>• [Bullet 6] The AMP Consultant, lead bird monitor and management agreed at the November 10 meeting that bird surveys could be revised to include recording the branches of the wetland where birds are observed. This important change will enable monitors to detect treatment effects and changes from project activities in specific areas of the lake and help managers design effective vegetation management actions. Counting birds by branch still allows summary on a basin-wide basis. The Sierra Club looks forward to this important revision being included in the meeting summary and in the final text of the AMP document submitted to the PVWMA Board of Directors for approval. The metric for waterfowl preservation on Table 4–1 should read "Annual median of daily abundance and species richness of waterfowl guilds (diving and dabbling ducks) during December–March<u>, both by lake branch and cumulatively</u>.<br>• [Bullet 7] The action trigger for agriculture was revised to coincide with the Integrated Project Environmental Impact Report, requiring action after five years of no agricultural activity in the upper contours of the basin during average to very dry years. This revision renders the agricultural objective more consistent with preserving waterfowl habitat quality, should waterfowl food plants become established in this elevation band.<br>• [Bullet 8] The Cultural Resources objective should be expanded to facilitate utilization of plants and wildlife important to indigenous culture. We suggest the following revision: "…sustain plants of cultural significance to the Amah Mutsun Tribe <u>and provide tribal access for resource utilization as feasible</u>."<br>• [Bullet 9] The AMP Committee discussed, and the consultant supported, the need for language in the AMP to describe the desired outcome of management actions. Explicit definition of a successful management | considered during AMP development as well as other public access (e.g., for educational use), such public access has not been added to the objectives because of concerns regarding public safety and the potential to result in unauthorized use of neighboring properties.<br>• Bullet 9 requests the addition of an explicit statement that management actions would continue to be implemented until the trigger for management no longer applies was requested. Such a revision has been added to Section 4.3, "Triggers and Management Actions."<br>• Bullet 10 notes the importance of clear direction for evaluating the success of vegetation treatments and for the duration of treatment monitoring. It also suggests a specific standard and monitoring duration. The November 2021 draft of the AMP already contained explicit guidance for monitoring duration, and more detailed criteria for evaluating success than in the suggested revision. These criteria, however, were incorrectly stated in Table 4-1, so that failure to achieve success criteria would not trigger management actions and success would trigger management actions. Because of this systematic error, the criteria were not clear. These errors have been corrected so that now Table 4-1 contains clear, quantitative triggers for management actions. |

**TABLE J-1**

**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS**

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| action is essential to include in the AMP to provide a guideline for management action design, implementation and conclusion. Committee Vice Chair Jerry Busch recommended adding the specific statement to the AMP that "Management actions shall be implemented until the trigger for management no longer applies." This verbiage has the dual effect of guiding management and allowing revision or deletion of action triggers.<br>• [Bullet 10] Similarly, monitoring the efficacy of vegetation treatments is essential to verify that AMP objectives are met, particularly objectives to preserve waterfowl habitat quality and to sustain seasonal wetland and native vegetation. A clear guidance would state that "Vegetation treatment areas will be monitored as needed to ensure successful (>25% cover) and stable plant establishment."<br>The Sierra Club looks forward to these last important revisions—to establish standards for implementing management actions and completing vegetation monitoring—being added to the meeting summary and to the final text of the AMP document sent to the PVWMA Board of Directors. | |
| **Comment 61—John Diffenbaugh**<br><br>As a landowner and 'stake holder' member of the AMP, my interest is in being part of a group that manages the Lake environment as it evolves under the overall management by the PV Water for the purposes of water storage/distribution. I think that it would be a good idea and helpful to the Agency if a group with the responsibility for Adaptive Management is appointed to review the findings of the monitoring on an annual basis and make recommendations for strategies and adjustments of practices, within the scope of the mission to supply water to the Coastal Distribution system. This group could operate in an advisory capacity to the Board, operating in concert with the PV Water Board. I doubt that the Board will have the time to 'get into the weeds' which will be necessary. That Staff of PV Water would also benefit from having the perspective of other interested and experienced people. I see this as a big collaboration and am asking that a group of similar make-up to the group creating the AMP document (although not so large) would be an asset going forward. Please register this comment and let me know how things go. | The implementation and reporting process described in the AMP has not been revised to include a separate committee to review monitoring data and make recommendations for strategies and adjustments of practices. However, the text of Chapter 6, "Reporting and Plan Updates," has been revised so that a draft of the annual adaptive management report will be presented to the Projects and Facilities Operations Committee for their review, with an invitation to the meeting being extended to the members of the former Ad Hoc AMP Committee. This revised process is intended serve a role comparable to that of the separate adaptive management committee described in the comment. |

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| **Comment/Suggested Revision** | **Response to Comment** |
| **Comment 62—Sierra Club**<br><br>**Oversight and accountability**<br><br>It is essential to maintain the Ad-Hoc AMP Committee's oversight, expertise and community involvement for the duration of AMP implementation. The AMP Committee's first action was to adopt bylaws mandating that the AMP Committee meet at least annually, and the Sierra Club recommends honoring the adopted bylaws by making the AMP Committee a standing committee meeting at least annually.<br><br>The current draft AMP proposes an alternative process: to invite former members of the Ad-Hoc AMP Committee to a meeting of the Projects and Facility Operations Committee every year to review the draft annual report on AMP implementation. If your Board were to adopt this less optimal approach, the Sierra Club requests that the final annual report include a summary and discussion of AMP Committee members' recommendations, per the underlined text below:<br><br>[Page 6-1]<br><br>Prior to its finalization, the annual report will be presented to the Projects and Facilities Operations Committee for its review with an invitation to the meeting being extended to the members of the former Ad Hoc AMP Committee. <u>The final report will discuss the members' recommendations and incorporate as appropriate.</u> | The text has been revised as suggested. |
| **Comment 63—Sierra Club**<br><br>**Oversight and accountability**<br>As an adaptive plan, the AMP will be reviewed and updated every five years. It is essential that the staff of PV Water utilize the local knowledge and technical expertise of the AMP Committee in addition to consultant suggestions. The Sierra Club requests that PV Water convene a new Ad-Hoc AMP Committee after the first three to five years of project operation, and every five years thereafter. This committee will conduct the required five-year reviews and recommend changes to objectives, monitoring, triggers or management actions as necessary to address monitoring results or outcomes of management actions, or to reflect recent technology, regulations, funding or other factors. Three years after the project onset may well be sufficient to detect significant changes to vegetation, and possibly to waterfowl. When such changes are detected, prompt action may be needed. | Comment noted. The five-year update described in the AMP is the production of a new version of the AMP document that incorporates revisions made in the five preceding annual reports. The updated document is produced for easy of reference. The five-year update is not an additional review and revision process. No revision has been made to the text in response to this comment. |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
|---|---|
| **Comment/Suggested Revision** | **Response to Comment** |
| **Comment 64—Sierra Club**<br>**Oversight and accountability**<br>Regarding the annual report's content, we ask that both the monitoring results AND methods be provided so that reviewers can confirm the validity of the survey results. Please insert and delete the text as indicated below:<br>[Page 6-1]<br>Each year a report will be produced that summarizes monitoring <u>methodology and results, along with operations and maintenance</u> ~~O&M~~ conducted by PV Water, if action triggers were exceeded, and if so, what management actions were taken or planned in response. | The following revision has been made that is comparable to the suggested revision:<br>Each year a report will be produced that summarizes monitoring <u>methodology and results, along with operations and maintenance</u> ~~O&M~~ conducted by PV Water, <u>and that states</u> if action triggers were exceeded, and if so, what management actions were taken or planned in response. |
| **Comment 65—Sierra Club**<br>**Oversight and accountability**<br>To provide clarity and accountability for AMP implementation, PV Water needs to establish an implementation blueprint, timeline and estimated budget, just as was done for the water project as a whole. The larger project is more complex than the AMP, so the task of creating a budget and timeline should be within staff's capacity. The first four to five years of AMP implementation will constitute monitoring and data analysis, primarily, and should be straightforward to budget. | Please see response to Comment 56. |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
|---|---|
| **Comment/Suggested Revision** | **Response to Comment** |
| **Comment 66—Sierra Club**<br>**Monitoring**<br>At the fourth meeting of the AMP Committee, a consensus was reached by committee members, consultants and staff that waterfowl monitoring would be conducted by lake branch. Table 4-1 (pages 4–5) of the AMP was updated to reflect this, but footnote 20 (page 5-5) erroneously refers to "two" branches. The bird monitoring study divided the Lake into five branches: Orchard, Pump, Berry, Church and Bus. Please update footnote 20 as follows:<br>[Page 5-5]<br>[20] Beginning in 2022, data will be recorded so as to distinguish waterfowl use of the ~~two~~ five branches (arms) of the lake. | The following revision has been made that is comparable to the suggested revision:<br>[20] Beginning in 2022, data will be recorded so as to distinguish waterfowl use of ~~the two~~ five subdivisions covering the branches (arms) and center fields of the lake. |
| **Comment 67—Sierra Club**<br>**Monitoring**<br>To monitor changes in plant cover and seed production, plant transects would be established in "two or three fields," according to the draft AMP. The number of fields should be adjusted to match the bird survey so that the effects of vegetation changes on waterfowl utilization can be evaluated.<br>Recommended revision to Appendix "Seasonal Wetland Monitoring Methodology," paragraph 2:<br>[Page 5-4]<br>In ~~two or three~~ five fields, six 100-meter-long, permanently marked, transects will be randomly located (~~12–18~~ 30 transects total)[19]. | The text has been revised as follows:<br>In ~~two or three~~ five fields, ~~six~~ five 100-meter-long, permanently marked, transects will be randomly located (~~12–18~~ 25 transects total)[1].<br>[This revision also has been made to similar text in Appendix F.] |

**TABLE J-1**

**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS**

| Comment/Suggested Revision | Response to Comment |
|---|---|
| **Comment 68—Sierra Club**<br><br>**Monitoring**<br>The proposed transect study includes sampling plant cover at 1-meter intervals (100 "points" per transect). The homogeneity of existing plant distribution indicates that a 3-meter or 5-meter interval may provide equivalent results. The Sierra Club recommends that the data be evaluated to determine whether 3- or 5-meter intervals are equivalent, as the level of effort could be reduced by 65% to 80%. Recommended revision:<br><br>[Appendix F, Page F-1]<br><br>Each year in October, species cover will be recorded at 1-meter intervals along the transect by holding a rod perpendicular to the transect line and recording each plant species that has a leaf or stem touching the pole (i.e., data are recorded for 100 "points" along each transect).[2]<br><br>[2] Use a larger sampling interval if equivalent result obtained. | The text has been revised as follows:<br><br>Each year in October, species cover will be recorded at ~~1~~ 2-meter intervals along the transect by holding a rod perpendicular to the transect line and recording each plant species that has a leaf or stem touching the pole (i.e., data are recorded for 100 "points" along each transect).<br><br>[This revision applies a longer interval between data collection points as suggested, and thus eliminates the need to consider making the change in the future.] |
| **Comment 69—Sierra Club**<br><br>**Monitoring**<br>The Appendix "Seasonal Wetland Monitoring Methodology" specifies that plant monitoring data will be evaluated for changes over time and differences based on elevation ("Methodology," page 2). However, Table 4 -1 in the draft AMP additionally requires "evaluation of potential relationships of change in vegetation to hydrology (e.g., duration of inundation) and operations and maintenance activities, particularly inundation period and vegetation management." The monitoring methodology should include these additional analyses, so that the AMP remains internally consistent. Because the purpose of the plant monitoring is partly to monitor effects on waterfowl populations, changes in plant cover and distribution should be compared to waterfowl data as well. Recommended revision:<br><br>[Appendix F, Page F-1]<br><br>Year-to-year changes in cover along transects can also be plotted against elevation to explore if these changes differ among elevations (e.g., increasing cover of bare ground at the lowest elevations), and compared with vegetation management activities and the duration and seasonal timing of inundation. Food plant productivity will be plotted against waterfowl density by Lake branch. | The following revision has been made that is comparable to the suggested revision:<br><br>Year-to-year changes in cover along transects can also be plotted against elevation to explore the effects of duration and seasonal timing of inundation ~~if these changes differ among elevations~~ (e.g., increasing cover of bare ground at the lowest elevations), and changes can be compared among fields to explore the effects of vegetation management activities (e.g., reduced waterfowl food plant cover in a single field). |

| **TABLE J-1**<br>**AD HOC ADAPTIVE MANAGEMENT PLAN COMMITTEE MEMBER COMMENTS** | |
|---|---|
| **Comment/Suggested Revision** | **Response to Comment** |
| **Comment 70—Sierra Club**<br>**Monitoring**<br>Management actions in support of preserving waterfowl habitat quality also depend significantly on the results of bird monitoring. The results of bird monitoring need to be compared with vegetation data, hydrologic data and maintenance activities to determine the most appropriate management actions to take, if any. The AMP should be revised to specify comparison of waterfowl data with vegetation and physical factors. The Sierra Club recommends that the following text be inserted between paragraphs five and six of section 5.1.1.7 Waterfowl and Other Birds:<br>[Page 5-5]<br><u>Waterfowl density, overall abundance and species richness will be compared to food plant productivity, water quality (i.e. turbidity) and the duration and seasonal timing of inundation by Lake branch.</u> | The text has been revised as follows:<br><u>To support implementation of management actions, waterfowl, hydrology, and vegetation monitoring data would be evaluated for relationships between waterfowl abundance or species richness and inundation (timing and duration) or vegetation (seasonal wetland acreage and waterfowl food plant cover).</u><br>[This revision states when and why this evaluation would be done, which would not necessarily be every year.] |
| **Comment 71—Sierra Club**<br>**Monitoring**<br>It may be appropriate to reduce or eliminate waterfowl monitoring if no effect of project operations is observed. However, this review should occur ten years after operations begin—not only to allow adequate time for valid statistical trends in waterfowl numbers to emerge (operation-related as distinct from background “noise”) but also because this decision should coincide with a five-year review by the AMP Committee.<br>[Page 5-5]<br>If ~~eight~~ <u>ten</u> years after Project operations have begun, abundance and species richness of waterfowl guilds (diving and dabbling ducks) remains comparable to or becomes greater than that documented by pre-project monitoring, the frequency of this monitoring may be reduced, or the monitoring discontinued. | The text has been revised as suggested. |

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October 26, 2021

Mr. Brian Lockwood
Manager, Pajaro Valley Water Management Agency
36 Brennan St.
Watsonville, CA 95076

**Re: Sierra Club Comments—PVWMA Draft Adaptive Management Plan**

Dear Mr. Lockwood,

Thank you for the work done to date on the Draft Adaptive Management Plan (DAMP) for the basin wetlands. The DAMP includes objectives, triggers and actions that will help to ensure that the adverse effects of the PVWMA irrigation project on biodiversity and biological productivity of the lake will be moderated by habitat preservation and management.

This letter highlights Sierra Club concerns regarding the current draft of the Adaptive Management Plan, its consistency with stipulated terms of the State water rights permit and implementation of a plan that will effectively preserve waterfowl habitat quality and other plant and wildlife resources of wetlands affected by water project operation. The Sierra Club representative on the Committee, Jerry Busch, reports to the Executive and Conservation committees on the progress and potential challenges of the AMP Committee. Observations are also contributed by other Sierra Club Executive Committee members who have attended AMPC meetings.

## Woody vegetation control

One of the important functions of the DAMP will be to guide management of woody vegetation. Although willow growth could be detrimental to waterfowl dependent on open water, excessive measures for woody vegetation control could be equally harmful. Table 4-1, entitled "Summary of Proposed Management Objectives, Metrics, and Triggers," establishes an objective to "Sustain seasonal wetland and native vegetation," which would be met by initial disking or localized hand removal of woody vegetation, followed by monitoring of woody plants (location, estimated area, abundance, height) and future action to "retreat or revegetate as needed." This sensible approach reflects the essence of Adaptive Management: an initial management measure (disking or hand removal), with monitoring and follow-up actions as needed to sustain wetland vegetation.

These appropriate measures of Table 4-1 are contradicted by those of Table 2-2, "Summary Description of Anticipated Maintenance Activities" and Table 2-3, "Anticipated Changes to Inundation Periods and Land Cover at College Lake," which anticipate that disking or mowing would be implemented every 1-2 years (Table 2-2) or annually (Table 2-3). Annual disking or mowing would eliminate emergent vegetation for waterfowl, not sustain it. Tables 2-2 and 2-3 are inconsistent with the management approach and many objectives and measures described in Table 4-1 and elsewhere in the DAMP. At minimum, both tables should include a note that they were prepared for the DEIR prior to the AMP Committee, water rights permit approval and other recent project developments and do not necessarily reflect the most up-to-date approaches. Table 2-2 should be updated to be consistent with Table 4-1. Table 2-3 should be deleted entirely (this table is inappropriate in the AMP because it is a non-adaptive and speculative exercise within a document committed to concrete outcomes based on active monitoring and management).

The DAMP includes additional areas of concern. As you know, the pending conditions of the PVWMA water rights permit, as stipulated by your agency, require the AMP to include the following:

- Systematic studies of fish, wildlife and vegetation
- Measures to preserve waterfowl habitat quality
- No diversion unless the rights holder is implementing the plan

## Waterfowl Monitoring

The DAMP does not currently propose any detailed, systematic metrics to monitor waterfowl, other than to "monitor median daily abundance of waterfowl guilds during December–March." This entails counting waterfowl at intervals, then finding the median range or average number of birds counted per day. This approach would not necessarily reveal the effects of project operation on the lake, because the trends in waterfowl numbers there would be difficult to separate from general trends in waterfowl populations regionally and statewide. For example, waterfowl numbers at the lake may decline one year due to excessive runoff and muddy water, and increase in another year due to regional drought. Or populations may start out high in a dry year, then decrease as the season progresses—a fluctuation that could be overlooked by the sampling method unless enough counts were taken to establish daily averages for each month. The effect of project operation could be lost in the background "noise" of natural waterfowl population changes.

The Sierra Club recommends that, in addition to compiling average daily population counts, the AMP should monitor waterfowl numbers by field within the lake basin. Monitoring changes between fields controls for the influence of external factors. Field-based counts can be aggregated into basin-wide counts, and can also provide significant data about the response of waterfowl to changes in habitat quality between fields, including project operation and habitat management. For example, if emergent vegetation and seed production is wholly eliminated in several fields but improved in other fields, the data could indicate that management measures to maintain seed production should be implemented, even though overall waterfowl numbers remain constant. Field-specific data can also highlight the effects of changes in water level, rainfall patterns and changes in turbidity. The waterfowl monitoring has already been designed and set up as field-based, the fields are already diagramed and marked with buoys and other markers, and the cost of field-based study is similar to simple basin-wide monitoring.

## Monitoring Wetland Vegetation

The Sierra Club supports the DAMP metric to monitor the acreage of seasonal wetlands. A decline in seasonal wetland area would be considered synonymous with a decline in waterfowl habitat quality, because a reduction in food availability can adversely affect breeding success later on. However, it is also important to collect data about plant composition, cover, seed production and elevation distribution, in order to evaluate trends in marsh vegetation and habitat value to waterfowl. Also, a fine-grained approach is essential to monitor the habitat response to management actions such as disking, weeding, planting waterfowl food, or changes in drawdown date or water levels from year to year.

The metric methodologies submitted for the November meeting need to be sufficiently complete, with only minor adjustments, to receive the endorsement of the AMP committee. If the forthcoming vegetation monitoring metrics are not sufficiently well-developed, or not considered adequate, an additional meeting of the AMP could be reasonably required for AMPC approval.

Because habitat quality is a key component of monitoring waterfowl habitat utilization required by the Basin Management Plan EIR, the following action triggers should also be considered:

- Seed production of preferred waterfowl food plants – maintain at or above pre-project productivity.

- Waterfowl preferred food plant cover or occurrence – maintain at or above 2017–2022 cover or species frequency.

- Invertebrate species selected by waterfowl – no decrease in diversity or abundance.

### Farming Consistent with Other Objectives

Although PV Water is committed to encouraging a level of farming in the upper contours (59–63-foot elevation band) of the lake basin, this does not need to conflict significantly with preserving waterfowl habitat quality. The EIR specified farming to occur at least one out of every five years, a level of farming consistent with maintaining open waterfowl habitat around the shoreline. The AMP management trigger, however, would require action whenever agricultural activity fell below the annual farming that occurred in 2014–2021. Because annual cultivation of the elevation band would be inconsistent with sustaining seasonal vegetation, the threshold should be scaled back to encourage farming one out of every five years.

### Tribal Interests

As consistent with comments by the AMPC's tribal representative, the Cultural Resources objective could be expanded to include maintaining and fostering plants and wildlife utilized by indigenous people for food, shelter construction, industry, medicine or ceremony/spiritual practice, potentially including tribal harvesting and use. Protection of known cultural sites potentially affected by project construction and operation should be implemented.

### Long-Term Workplan

To provide accountability and predictability, a workplan and budget should be prepared for the AMP, providing an annual budget for implementing monitoring, analysis and reporting. During baseline data phase, the budget should itemize the collection, analysis and reporting of metrics. During management action phase, an itemized workplan and budget must be prepared for implementing, evaluating and reporting the management action. This is essential to plan and guide work, allow budgeting by the water board and provide public accountability.

The absence of a budget and workplan, will result in the PVWMA Board of Directors providing piecemeal review of each expenditure on the AMP, which effectively denies the public the opportunity to review and comment on AMP expenditures.

**Conclusion**

The Draft AMP lays the groundwork for an effective adaptive management program. Modification of the woody vegetation management guidelines to provide internal consistency and highlight implementation of an adaptive management approach will ensure that the AMP meets the goal of sustaining seasonal vegetation for waterfowl habitat. A systematic approach to waterfowl monitoring is required by the stipulated terms of the water rights permit, and necessary to produce significant results regarding the impacts of project operation and habitat management actions. Vegetation monitoring should be field-based and include transects or quadrat-based ground sampling to reinforce the waterfowl monitoring, evaluate the efficacy of management actions and track changes in waterfowl habitat quality, as required by the stipulated terms. Seed production and invertebrate diversity—key components of waterfowl habitat quality—should be monitored to comply with the water rights terms. The farming triggers should be revised to render them consistent with sustaining seasonal vegetation and waterfowl habitat, by modifying the acceptable threshold for farming in the 59–63-foot elevation range to a minimum of once per five years, consistent with the project EIR. Tribal interests in cultural sites and resources should be honored.

To provide AMP project accountability and predictability, and to ensure adequate funding, an AMP implementation workplan and budget should be prepared and submitted to the AMPC for review and recommendations. Neither the public nor the PVWMA Board of Directors should be put in the position of attempting to monitor and provide oversight to an AMP program that is implemented on a piecemeal basis without full public disclosure. Such a process would not only be improper for public accountability, it would be cumbersome and inefficient for the agency itself.

Implementation of foregoing measures is necessary not only to comply with the stipulated terms of the water rights permit, but to ensure that the AMP process is effective and transparent. The AMP must effectively include measures to preserve waterfowl habitat quality. In doing so, the adaptive plan would not only support a wide range of wetland species, habitats and ecological relationships, but could provide a solid foundation and inspiration for public engagement, community science and celebration of this remarkable resource. The Sierra Club would enthusiastically support such a plan and work to ensure its success.

Respectfully, Micah Posner

Micah Posner

Micah Posner
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December 2, 2021

Mr. Brian Lockwood
Manager, Pajaro Valley Water Management Agency
36 Brennan St.
Watsonville, CA 95076

**Re: Sierra Club Comments—Updated PVWMA Draft Adaptive Management Plan**

Dear Mr. Lockwood,

Thank you for the opportunity to comment on the revised Draft AMP dated November, 2021. **The Sierra Club recommends additional revisions to ensure that the environmental effects of project operation are adequately assessed by monitoring**. Specifically, the mandated objective of preserving waterfowl habitat quality will not be met unless adequate monitoring and adaptive management actions are implemented.

Additionally, the Sierra Club requests revisions to ensure that the Adaptive Management Plan (AMP) process is implemented over the life of the project with public involvement and accountability, as required by the water rights permit from the California State Department of Water Resources.

Finally, the Sierra Club thanks the Pajaro Valley Water Management Agency for the significant changes made to date. These changes are also discussed below.

**REQUESTED REVISIONS**

**Vegetation Monitoring**. The most critical revision needed in the AMP is to expand vegetation sampling to all elevations. The current sampling protocol limits vegetation sampling to lands above 59 feet, although vegetation surveys submitted to date indicate that most waterfowl food production occurs at elevations below 55 feet. The proposed methodology would miss the adverse effect of project operation on waterfowl habitat and fail to trigger necessary management actions to preserve waterfowl habitat quality.

Consultant John Hunter recognized this concern at the November 10 meeting of the Adaptive Management Plan Committee (AMPC), where he stated his intention to discuss with staff a revision to the sampling methodology to include sampling transects at elevations below 59 feet. The Sierra Club requests this discussion to be included in the meeting summary. The Sierra Club also requests that, prior to submitting the final draft of the AMP to the Pajaro Valley Water Management Agency (PVWMA/PV Water) Board of Directors, the vegetation monitoring be revised as follows:

> "Permanently marked transects will be used to monitor changes in the cover and species composition of seasonal wetland vegetation at elevations of ~~59~~ 51–63 feet NAVD88. The purpose of this monitoring is to document changes in species composition of seasonal wetland vegetation because of its importance for wildlife, particularly waterfowl."

**AMP Committee Oversight**. Chapter 6 of the AMP establishes the process for reviewing and reporting monitoring biotic data, evaluating action triggers and taking actions. Although the AMP process correctly involves the AMPC in revising the AMP annually, Section 6.2.1 of the Draft AMP would exclude the Committee from supervising management actions other than to receive notification.

This omission improperly relieves PV Water of AMPC review and oversight of critical decisions affecting the preservation of waterfowl habitat quality, culturally important resources, wetland vegetation and other Lake resources. The AMP is required to be implemented over the life of the project, and public accountability must likewise cover the entire implementation period. Excluding the Committee from participating in management action decisions not only violates accountability but forgoes the benefit of Committee expertise, knowledge, participation in plan development, ties with community and tribal affiliations in critical management decisions.

The Adaptive Management Plan Committee Committee's oversight of AMP implementation was established by the AMPC's first action as a body, which was to amend the draft bylaws to require that after the initial four meetings, the AMPC will "meet again at the end of the initial adaptive management planning process and thereafter at minimum annually." The scope of the Committee cannot be reduced to limit its function to amending the AMP. It must continue to exercise the full scope of its mission to evaluate and adapt monitoring methods, action triggers and management actions. This is the very reason for the Adoptive Management Plan Committee's existence: to evaluate, modify and *adapt* management actions to accomplish all of the AMP objectives.

The Sierra Club therefore proposes that sections 6.1 and 6.2 be revised as follows:

> **6.1 ~~PV Water Evaluations~~ AMP Implementation and Modification**
> Staff will annually review summaries of monitoring data, PV Water O&M activities, and evaluate practices. Based on this review, monitoring and management practices will be presented to and discussed with the Committee in May of each year, and decisions to change practices for the subsequent year will be made if necessary. This evaluation may be supported by technical experts, regulatory agencies, land owners, or other stakeholders in addition to the Committee.
>
> **6.2.1 Adaptive Management Reporting**
> Each year a memorandum will be produced that summarizes monitoring and O&M conducted by PV Water, and reviewed with the Committee. Agency staff and the Committee will discuss if action triggers were exceeded, and if so, what management actions ~~were~~ should be taken or planned in response. If urgent management actions were taken prior to this discussion, Agency staff will provide a summary of the action trigger, management action and reason for urgency, and the Committee will review this summary and discuss with staff whether additional or modified actions are indicated. This memorandum also will document any changes in monitoring and O&M practices implemented for other reasons (e.g., changes in regulations or technology), new information that may affect O&M, and revisions to the AMP, if

any. Following the meeting, PV Water will issue a summary of the meeting and the final determinations on whether triggers were exceeded, and what management actions are to be taken. Monitoring results will be an important basis not only for adaptive management decisions, but also for revising the AMP. Annual monitoring reports and reports on targeted studies completed that year will be attachments to the memorandum. Annual memoranda will be publicly available.

**Workplan and Budget**. To ensure public accountability and fiscal responsibility, it is essential for the PVWMA to establish a workplan and budget for the AMP. Without a budget and workplan, neither the PV Water Board of Directors, PVWMA staff nor the public will know what elements of the AMP will be implemented, the level of investment in AMP monitoring or management, or the details of implementing the required element of the AMP. Without a budget, not only does the public not know what work is planned, but the Board has no systematic context for evaluating expenditures on the AMP. Instead, the Board would need to approve each aspect of a continuing series of piecemeal expenditures that would be impossible to manage cohesively. A budget declares the agency's financial investment in the monitoring and data analysis, and defines the level of commitment to and management actions. A workplan and budget is the vehicle by which the Board of Directors approves the AMP implementation for any given fiscal year. A basic workplan with a budget for monitoring is essential to reaffirm the commitment of the PVWMA to the first round of monitoring under the AMP to begin next year. If the AMP budget comes from multiple areas of the overall agency budget, this can be noted.

Because the proposed monitoring studies are described in the AMP, the budget and workplan for these should also be stated. The workplan and budget should be updated annually to reflect additional monitoring or management actions identified. The Sierra Club therefore requests that the agency develop an annual operating budget and workplan for implementing the adopted AMP.

**AMP REVISIONS TO DATE**

The revisions to the Draft AMP made to date will improve the effectiveness of monitoring, triggers and management actions in mitigating potential effects of the PVWMA irrigation project. The following significant modifications have been made to the document:

- The objective for waterfowl was revised to "Preserve waterfowl habitat quality in the proposed water storage area." This revision, consistent with your agency's commitments as established through the water rights permit process, ensures that PV Water will take actions as necessary to ensure not only that waterfowl populations remain stable, but that waterfowl access to food and other components of habitat quality is maintained.

- Plant transect monitoring was added to the AMP to record plant species distribution, seed production and cover including vegetation height. This will enable managers to evaluate the effect of project operation on waterfowl food plants, food availability, dabbling duck feeding areas and other elements of waterfowl habitat quality.

- Reductions in waterfowl food plants or seasonal wetland vegetation will now trigger management actions to restore waterfowl food plants and other marsh vegetation.

- Appropriate woody vegetation control methods will be adapted to remove riparian vegetation outside the existing willow forest without unnecessarily damaging non-target marsh vegetation.

- Plants with tribal significance were identified. The vegetation transects will allow managers to track the effects of project operation on these significant plants and to monitor annual changes in these plant resources over time. The information will potentially facilitate the design and implementation of management actions to promote and utilize these plant resources as appropriate.

- The AMP Consultant, lead bird monitor and management agreed at the November 10 meeting that bird surveys could be revised to include recording the branches of the wetland where birds are observed. This important change will enable monitors to detect treatment effects and changes from project activities in specific areas of the lake and help managers design effective vegetation management actions. Counting birds by branch still allows summary on a basin-wide basis. The Sierra Club looks forward to this important revision being included in the meeting summary and in the final text of the AMP document submitted to the PVWMA Board of Directors for approval. The metric for waterfowl preservation on Table 4–1 should read "Annual median of daily abundance and species richness of waterfowl guilds (diving and dabbling ducks) during December–March, <u>both by lake branch and cumulatively</u>.

- The action trigger for agriculture was revised to coincide with the Integrated Project Environmental Impact Report, requiring action after five years of no agricultural activity in the upper contours of the basin during average to very dry years. This revision renders the agricultural objective more consistent with preserving waterfowl habitat quality, should waterfowl food plants become established in this elevation band.

- The Cultural Resources objective should be expanded to facilitate utilization of plants and wildlife important to indigenous culture. We suggest the following revision: "…sustain plants of cultural significance to the Amah Mutsun Tribe and <u>provide tribal access for resource utilization as feasible</u>."

- The AMP Committee discussed, and the consultant supported, the need for language in the AMP to describe the desired outcome of management actions. Explicit definition of a successful management action is essential to include in the AMP to provide a guideline for management action design, implementation and conclusion. Committee Vice Chair Jerry Busch recommended adding the specific statement to the AMP that "<u>Management actions shall be implemented until the trigger for management no longer applies</u>." This verbiage has the dual effect of guiding management and allowing revision or deletion of action triggers.

- Similarly, monitoring the efficacy of vegetation treatments is essential to verify that AMP objectives are met, particularly objectives to preserve waterfowl habitat quality and to sustain seasonal wetland and native vegetation. A clear guidance would state that "<u>Vegetation treatment areas will be monitored as needed to ensure successful (>25% cover) and stable plant establishment</u>."

The Sierra Club looks forward to these last important revisions—to establish standards for implementing management actions and completing vegetation monitoring—being added to the meeting summary and to the final text of the AMP document sent to the PVWMA Board of Directors.

Renaming the Lake/wetland was proposed by one committee member and supported by several others at the November 10 meeting. Although the renaming process may not be a focal point of plan adaption and implementation, sensitivity concerning the current name should be observed in project documents and supported by the PVWMA Board. Considering the significant contributions of the AMPC's tribal member, the contributions of tribal representatives in providing cultural resource information, and the overall focus of the AMP on preserving sensitive cultural sites and resources, the Sierra Club requests that the current name not appear on the cover of the final AMP.

Thank you again for the Draft AMP improvements to date, and for your consideration of these final revisions.

Respectfully,

Micah Posner

Micah Posner, Chairperson
Sierra Club Executive Committee
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January 10, 2022

Pajaro Valley Water Management Agency (PVWMA) Board of Directors
36 Brennan St.
Watsonville, CA 95076

**Re: Sierra Club Comments—Board Review Draft Adaptive Management Plan**

Honorable Directors,

Thank you for the opportunity to comment on the Board Review Draft Adaptive Management Plan. The Sierra Club appreciates the work done by Agency staff and consultants in drafting an adaptive plan to effectively address the potential adverse impacts of irrigation water impoundment on plants, waterfowl and other wildlife of this regionally important Pajaro Valley wetland.

**The Sierra Club recommends additional revisions to ensure that:**

1) **the project continues to benefit from AMP Committee oversight and expertise, and**

2) **that the project's environmental effects are addressed by monitoring and management measures. The AMP will not meet the State's water permit condition to preserve waterfowl habitat quality unless adequate monitoring and adaptive management actions are implemented.**

## REQUESTED REVISIONS

### Oversight and accountability

It is essential to maintain the Ad-Hoc AMP Committee's oversight, expertise and community involvement for the duration of AMP implementation. The AMP Committee's first action was to adopt bylaws mandating that the AMP Committee meet at least annually, and the Sierra Club recommends honoring the adopted bylaws by making the AMP Committee a standing committee meeting at least annually.

The current draft AMP proposes an alternative process: to invite former members of the Ad-Hoc AMP Committee to a meeting of the Projects and Facility Operations Committee every year to review the draft annual report on AMP implementation. If your Board were to adopt this less optimal approach, the Sierra Club requests that the final annual report include a summary and discussion of AMP Committee members' recommendations, per the underlined text below:

> Prior to its finalization, the annual report will be presented to the Projects and Facilities Operations Committee for its review with an invitation to the meeting being extended to the members of the former Ad Hoc AMP Committee. <u>The final report will discuss the members' recommendations and incorporate as appropriate</u>.

As an adaptive plan, the AMP will be reviewed and updated every five years. It is essential that the staff of PV Water utilize the local knowledge and technical expertise of the AMP Committee in addition to consultant suggestions. The Sierra Club requests that PV Water convene a new Ad-Hoc AMP Committee after the first three to five years of project operation, and every five years thereafter. This committee will conduct the required five-year reviews and recommend changes to objectives, monitoring, triggers or management actions as necessary to address monitoring results or outcomes of management actions, or to reflect recent technology, regulations, funding or other factors. Three years after the project onset may well be sufficient to detect significant changes to vegetation, and possibly to waterfowl. When such changes are detected, prompt action may be needed.

Regarding the annual report's content, we ask that both the monitoring results AND methods be provided so that reviewers can confirm the validity of the survey results. Please insert and delete the text as indicated below:

> Each year a report will be produced that summarizes monitoring <u>methodology and results, along with operations and maintenance</u> ~~O&M~~ conducted by PV Water, if action triggers were exceeded, and if so, what management actions were taken or planned in response.

To provide clarity and accountability for AMP implementation, PV Water needs to establish an implementation blueprint, timeline and estimated budget, just as was done for the water project as a whole. The larger project is more complex than the AMP, so the task of creating a budget and timeline should be within staff's capacity. The first four to five years of AMP implementation will constitute monitoring and data analysis, primarily, and should be straightforward to budget.

**Monitoring**

At the fourth meeting of the AMP Committee, a consensus was reached by committee members, consultants and staff that waterfowl monitoring would be conducted by lake branch. Table 4-1 (pages 4–5) of the AMP was updated to reflect this, but footnote 20 (page 5-5) erroneously refers to "two" branches. The bird monitoring study divided the Lake into five branches: Orchard, Pump, Berry, Church and Bus. Please update footnote 20 as follows:

> [20] Beginning in 2022, data will be recorded so as to distinguish waterfowl use of the ~~two~~ <u>five</u> branches (arms) of the lake.

To monitor changes in plant cover and seed production, plant transects would be established in "two or three fields," according to the draft AMP. The number of fields should be adjusted to match the bird survey so that the effects of vegetation changes on waterfowl utilization can be evaluated. Recommended revision to Appendix "Seasonal Wetland Monitoring Methodology," paragraph 2:

In ~~two or three~~ five fields, six 100-meter-long, permanently marked, transects will be randomly located (~~12–18~~ 30 transects total)[1].

The proposed transect study includes sampling plant cover at 1-meter intervals (100 "points" per transect). The homogeneity of existing plant distribution indicates that a 3-meter or 5-meter interval may provide equivalent results. The Sierra Club recommends that the data be evaluated to determine whether 3- or 5-meter intervals are equivalent, as the level of effort could be reduced by 65% to 80%. Recommended revision:

Each year in October, species cover will be recorded at 1-meter intervals along the transect by holding a rod perpendicular to the transect line and recording each plant species that has a leaf or stem touching the pole (i.e., data are recorded for 100 "points" along each transect).[2]

[2] Use a larger sampling interval if equivalent result obtained.

The Appendix "Seasonal Wetland Monitoring Methodology" specifies that plant monitoring data will be evaluated for changes over time and differences based on elevation ("Methodology," page 2). However, Table 4-1 in the draft AMP additionally requires "evaluation of potential relationships of change in vegetation to hydrology (e.g., duration of inundation) and operations and maintenance activities, particularly inundation period and vegetation management." The monitoring methodology should include these additional analyses, so that the AMP remains internally consistent. Because the purpose of the plant monitoring is partly to monitor effects on waterfowl populations, changes in plant cover and distribution should be compared to waterfowl data as well. Recommended revision:

Year-to-year changes in cover along transects can also be plotted against elevation to explore if these changes differ among elevations (e.g., increasing cover of bare ground at the lowest elevations)~~.~~, and compared with vegetation management activities and the duration and seasonal timing of inundation. Food plant productivity will be plotted against waterfowl density by Lake branch.

Management actions in support of preserving waterfowl habitat quality also depend significantly on the results of bird monitoring. The results of bird monitoring need to be compared with vegetation data, hydrologic data and maintenance activities to determine the most appropriate management actions to take, if any. The AMP should be revised to specify comparison of waterfowl data with vegetation and physical factors. The Sierra Club recommends that the following text be inserted between paragraphs five and six of section 5.1.1.7 Waterfowl and Other Birds:

Waterfowl density, overall abundance and species richness will be compared to food plant productivity, water quality (i.e. turbidity) and the duration and seasonal timing of inundation by Lake branch.

It may be appropriate to reduce or eliminate waterfowl monitoring if no effect of project operations is observed. However, this review should occur ten years after operations begin—not only to allow adequate time for valid statistical trends in waterfowl numbers to emerge (operation-related as distinct from background “noise”) but also because this decision should coincide with a five-year review by the AMP Committee.

> If ~~eight~~ ten years after Project operations have begun, abundance and species richness of waterfowl guilds (diving and dabbling ducks) remains comparable to or becomes greater than that documented by pre-project monitoring, the frequency of this monitoring may be reduced, or the monitoring discontinued.

Thank you again for the thoughtful and responsive draft document prepared to date and for the opportunity to submit additional comments.

Respectfully,

Micah Posner, Chairperson
Sierra Club Executive Committee
Santa Cruz County Group

# APPENDIX APN

## Assessor Parcel Numbers Associated with the College Lake Integrated Resources Management Project

This appendix lists the Assessor Parcel Numbers of privately owned properties that are wholly or partially within the footprint of the proposed water storage area for College Lake or other proposed facilities (e.g., weir structure, College Lake pipeline, water treatment plant).

## Parcels Potentially Affected By The College Lake Integrated Resources Management Project

| | | | |
|---|---|---|---|
| **COLLEGE LAKE STORAGE AREA[a]** | | | |
| 051-012-25 | 051-101-13 | 051-101-54 | 051-441-24 |
| 051-031-28 | 051-101-15 | 051-101-59 | 051-441-27 |
| 051-041-45 | 051-101-03 | 051-101-78 | 051-441-28 |
| 051-042-01 | 051-101-18 | 051-441-02 | 051-651-01 |
| 051-101-07 | 051-101-19 | 051-441-04 | 051-651-04 |
| 051-101-09 | 051-101-20 | 051-441-11 | 051-651-05 |
| 051-101-10 | 051-101-22 | 051-441-12 | |
| 051-101-11 | 051-101-24 | 051-441-20 | |
| 051-101-12 | 051-101-50 | 051-441-22 | |
| **WEIR STRUCTURE** | | | |
| 051-441-24 | 051-441-28 | | |
| **WATER TREATMENT PLANT** | | | |
| 051-101-47 | | | |
| **COLLEGE LAKE PIPELINE[b]** | | | |
| 051-441-24 | 051-441-01 | 051-101-47 | 051-741-07 |
| 051-741-06 | 051-741-05 | 051-741-03 | 051-741-01 |
| 051-221-34 | 051-221-32 | 051-221-30 | 051-221-26 |
| 051-221-33 | 051-221-02 | 017-221-17 | 017-221-16 |
| 052-243-10 | 052-243-18 | 052-243-17 | 052-243-16 |
| 052-243-15 | 052-243-21 | 052-243-20 | 052-371-01 |
| 052-272-01 | 052-581-09 | 052-581-06 | 052-581-07 |

NOTES:

a These are parcels that are wholly or partially within the proposed water storage area.

b With the exception of the listed parcels, the proposed alignment for the College Lake pipeline is within the public right of way in unincorporated Santa Cruz County and the City of Watsonville.

# APPENDIX CMP

## Draft Compensatory Mitigation Plan

This appendix includes the Compensatory Mitigation Plan for the College Lake Integrated Resources Management Project.

# ATTACHMENT I
Compensatory Mitigation Plan

## 1.0 Plan Purpose, Objectives, and Organization

### 1.1 Plan Purpose

The purpose of this compensatory mitigation plan (CMP) is to describe how Pajaro Valley Water Management Agency (PV Water) will fulfill the compensatory mitigation requirements for impacts to waters, wetlands, and trees as a result of implementation of the College Lake Integrated Resource Management Project (College Lake Project or Project). This CMP describes how the Project will fulfill mitigation requirements of permits issued under the Clean Water Act (CWA) Sections 404 and 401, and the California Fish and Game Code (CFGC) Section 1600 Lake and Streambed Alteration Agreement as well as Mitigation Measure BIO-1d.[1]

This plan satisfies the compensatory mitigation requirements detailed in the U.S. Army Corps of Engineers' (USACE's) and the U.S. Environmental Protection Agency's (EPA's) Compensatory Mitigation for Losses of Aquatic Resources, Final Rule (USACE and EPA 2008), and the State Water Board's Procedures.[2] If any inconsistencies exist between this mitigation plan and the aforementioned permits, the permits will control.

### 1.2 Plan Objectives

This plan's objectives for mitigating impacts to jurisdictional waters of the U.S. and State are:

1. Compensate for the direct permanent loss of seasonal wetlands and riparian wetlands by purchase of wetland credits at a 3:1 ratio[3] from a mitigation bank in the Pajaro River watershed.
2. Compensate for direct temporary impacts on seasonal wetlands and riparian wetlands by revegetation and restoration of the temporarily impacted waters.
3. Compensate for tree removals by planting replacement trees at a 10:1 ratio[4] at a different location in the College Lake basin.

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1 Adopted by the PV Water Board of Directors in October 2019 as part of the Mitigation Monitoring and Reporting Program for the College Lake Integrated Resources Management Project.

2 State Wetland Definition and Procedures for Discharge of Dredged or Fill Material to Waters of the State, Subpart J (Compensatory Mitigation for Losses of Aquatic Resources).

3 As required by Mitigation Measures BIO 1-c and BIO 1-d from the 2014 BMP Update PEIR.

4 As required by the 2014 BMP Update PEIR and Central Coast RWQCB requirement for loss of trees greater than 12-inches in diameter.

Achieving these objectives by implementing this compensatory mitigation as described in Section 3, "Off-Site Mitigation for Permanent Impacts to Wetlands," Section 4, "Restoration of Temporarily disturbed Wetlands," and Section 4, "Replacement Tree Plantings," would achieve "no net loss" of wetland functions and values, in accordance with the CWA Section 404 Permit and the CWA Section 401 Water Quality Certification.

## 1.3 Plan Organization

The CMP is organized into seven major sections:

- Section 1.0, "Plan Purpose, Objectives, and Organization," states the purpose and objectives of the CMP and describes the content of each section of the plan.
- Section 2.0, "Project Background," describes existing conditions at the Project site; Project design, operations, maintenance, and adaptive management; and summarizes the Project's impacts on waters of the U.S. and State.
- Section 3.0, "Off-Site Mitigation for Permanent Impacts to Wetlands," describes the compensatory mitigation proposed for permanent loss of wetlands at the Project site.
- Section 4.0, "Restoration of Temporarily Disturbed Wetlands," describes how wetlands temporarily disturbed at the Project site will be restored and the parties responsible for that restoration.
- Section 5.0, "Replacement Tree Plantings," describes the site where replacement trees will be planted and planting methods, and the party responsible for the plantings.
- Section 6.0, "Maintenance, Monitoring, and Reporting," describes the maintenance activities, monitoring, and reporting that will be conducted until wetland restoration and replacement tree plantings are successful and provides the performance standards that will be used to determine success.
- Section 7.0, "References," provides full references for all sources cited.

# 2.0 Project Background

## 2.1 Project Site

The Project site is located in the Pajaro River watershed in unincorporated Santa Cruz County, California, and in the City of Watsonville (**Figure 1**). It includes College Lake and adjacent areas up to a vertical elevation of 70 feet North American Vertical Datum of 1988 (NAVD88), the weir structure and intake pump station site, the water treatment plant location, and the College Lake pipeline alignment.

The Pajaro River watershed is a 1,300-square-mile drainage unit constituting most of San Benito County, and portions of Santa Clara, Santa Cruz, and Monterey counties. The Pajaro River watershed is part of the Central Coast Hydrologic Region that extends from southern San Mateo

County to southern Santa Barbara County (Central Coast Regional Water Quality Control Board [CCRWQCB] 2017).

College Lake is a seasonal lake that forms in a natural topographic depression along the Zayante-Vergeles Fault zone, and that includes a pumps station and weir at its downstream southern outlet that is presently, and for the last 100 years, operated by Reclamation District (RD) 2049. The 12,736-acre College Lake watershed consists of range, rural residential, and crop lands (PV Water 2014, Santa Cruz County Resource Conservation District [SCC RCD] 2014). Green Valley, Banks, and Hughes Creeks join to form Casserly Creek which flows into College Lake from the north. Other small unnamed drainages also enter College Lake; however, the majority of the water in College Lake enters from the north side of the lake through Casserly Creek. College Lake drains into Salsipuedes Creek, which is tributary to the Pajaro River (**Figure 1**).

## 2.2 Existing Conditions

### 2.2.1 Existing Aquatic Resources and Non-Jurisdictional Uplands at the Project Site

This section describes the types of potentially jurisdictional wetlands and other waters of the U.S. and State, and non-jurisdictional uplands documented at College Lake (Environmental Science Associates [ESA] 2021).

#### *Aquatic Resources—Wetlands*

**In-Stream Riverine Wetland**. One in-stream riverine wetland occurs in the study area, below the ordinary high-water mark (OHWM) of Salsipuedes Creek. This 0.10-acre feature is dominated by arroyo willow (*Salix lasiolepis*), broadfruit bur reed (*Sparganium eurycarpum*), panicled bulrush (*Scirpus microcarpus*), Bermuda grass (*Cynadon dactylon*), and curly dock (*Rumex crispus*).

**Riparian Forest**. Riparian forest occurs as a large stand in the northeast quadrant of College Lake and is also present within other portions of College Lake and its tributaries. This broadleaf deciduous forest is dominated by native riparian species including arroyo willow, red willow (*Salix laevigata*), black cottonwood (*Populus trichocarpa*), alder (*Alnus* spp.), western sycamore (*Platanus racemosa*), coast live oak (*Quercus agrifolia*), box elder (*Acer negundo* var. *californicum*), shining willow (*Salix lasiandra* var. *lasiandra*), and dogwood (*Cornus* sp.). Associated understory species include California blackberry (*Rubus ursinus*), nettle (*Urtica* sp.), curly dock, and coyote brush (*Baccharis pilularis*). These understory species are also the dominants of riparian scrub (i.e., shrub and perennial-dominated riparian vegetation). Riparian forest is classified as Palustrine Forested, Broadleaved Deciduous, Seasonally Flooded, according to the Cowardin classification system (Cowardin et al. 1979).


SOURCE: Santa Cruz County, 2020; Esri, 2022; ESA, 2022

College Lake Integrated Resources Management Project - Addendum

**Figure 1**
Regional Location Map

**Seasonal Wetland**. Seasonal wetlands are found along the margins of College Lake and in the northwestern and eastern extensions of the lake (particularly east of the main ditch). These areas support a wide variety of mostly non-native annual and perennial herbaceous species. Some abundant species include fat-hen (*Atriplex prostrata*), modest prickle grass (*Cripsus vaginiflora*) Bermuda grass (*Cynodon dactylon*); Italian ryegrass (*Festuca perennis*), bristly ox- tongue (*Helminthotheca echioides*), white sweetclover (*Melilotus albus*), smartweed (*Persicaria* spp.), curly dock (*Rumex crispus*), and cocklebur (*Xanthium strumarium*). California blackberry and Himalayan blackberry (*Rubus armeniacus*) are also prevalent in some areas that are transitional to riparian scrub. Seasonal wetlands are classified as Palustrine Emergent Wetlands, Seasonally Flooded in the Cowardin classification system (Cowardin et al. 1979). These are areas that become inundated during the winter, dry out by summer, and support facultative (or wetter) herbaceous plants.

**Farmed Wetlands**. Farmed wetlands are agricultural areas on the lakebed of College Lake that support the hydrological conditions of wetlands. This highly managed system presents a unique situation where farm fields provide aquatic habitat during the winter and early spring, seasonal wetland habitat for a brief period as College Lake is drawn down, arable farmland in the summer, and fallow fields in the fall and early winter. Farmed wetlands are routinely ripped, disked, planted, harvested, and subject to the application of herbicides, pesticides, and fertilizers, which prevents the establishment of non-crop perennial plant species and natural habitats. Farmed wetlands are periodically fallowed, at the discretion of the farmer or property owner. In fallow years, these fields support weedy plant species, including: bristly ox-tongue (*Helminthotheca echioides*), cocklebur; swamp pricklegrass (*Crypsis schoenoides*, *C. vaginiflora*), fat-hen (*Atriplex prostrata*), smartweeds, and curly dock. Farmed wetlands are classified as Palustrine Emergent Wetlands, Seasonally Flooded according to the Cowardin classification system (Cowardin et al. 1979).

**Freshwater Emergent Wetland.** A freshwater emergent wetland is present within the larger riparian forest in the northeast section of College Lake. This wetland is a small area that was scraped and leveled by a farmer in the late 1990s and remains wet through the summer. Dominant plants include cattails (*Typha* sp.) and tules (*Schoenoplectus* sp.). Freshwater emergent wetland is classified as Palustrine Emergent Wetlands, Seasonally Flooded in the Cowardin classification system (Cowardin et al. 1979).

### *Aquatic Resources—Other Waters of the U.S. and State*

**Perennial Stream.** One perennial stream is present in the study area: Salsipuedes Creek. The creek bed is predominantly composed of silt and sand with some gravel. The stream banks are relatively steep, and the OHWM is located approximately half way up the bank between the streambed elevation and the top of bank. Emergent vegetation along the stream bank is dominated by broadfruit bur reed. Bank vegetation below OHWM consists of willow saplings, curly dock, Italian ryegrass, Bermuda grass, California blackberry, common horsetail (*Equisetum arvense*), panicled bulrush, and western goldenrod (*Euthamia occidentalis*). Vegetation above OHWM primarily consists of nonnative annual grasses and forbs. This feature is classified as Riverine, Lower Perennial, Unconsolidated Bottom, according to the Cowardin classification system (Cowardin et al. 1979).

**Ditch.** Ditches are permanent, man-made, irrigation or drainage features associated with agricultural production. Within the study area, diches mainly provide a drainage function. Temporary ditches in farm fields (i.e., ditches whose locations change from year to year) are included in the farmed wetland category. Ditches are classified as Riverine, Unknown Perennial in the Cowardin classification system (Cowardin et al. 1979).

### *Non-Jurisdictional Uplands*

Upland areas throughout the study area include grassland, coyote brush scrub, riparian scrub, ruderal, farmland (agriculture), tree groves, and urban areas. These areas are generally located above 64 feet NAVD88 elevation, therefore outside of the saturation and high groundwater table zone of College Lake in a normal year. Uplands are not considered to be potentially jurisdictional because they do not support wetland vegetation, soils, hydrology and functions.

## 2.2.2 Existing Management

### *Water Management*

The majority of the water in College Lake enters from the north side of the lake through Casserly Creek, and is supplemented by inflows from the Green Valley and Hughes Creek subwatersheds (SCC RCD 2014). During wet weather, flow direction in the reach of Salsipuedes Creek between College Lake and Corralitos Creek can reverse due to high flows in Corralitos Creek, and surface water enters the lake from Salsipuedes Creek. Generally, outflow from College Lake drains into Salsipuedes Creek, which is a tributary to the Pajaro River. RD 2049 pumps College Lake dry in the spring to accommodate summer farming of the lakebed. Pumping usually begins in mid-March, depending on the amount of spring rain.[5] Pumping the lake dry generally takes 30 to 40 days, typically resulting in a dry lakebed by May 1st to May 10th.[6] Intermittent pumping into Salsipuedes Creek continues after this date as needed to maintain a dry lakebed.

An existing weir with crest at elevation 60.1 feet NAVD88 associated with the pumps spans the Salsipuedes Creek channel and, under certain conditions, controls the water level in College Lake.[7] When the lake water surface elevation (WSE) is at the existing weir crest elevation, approximately 228 acres of the lake basin is inundated, storing about 1,150 acre-feet of water (SCC RCD 2014). Subsurface tile drains are present within the College Lake basin; during the summer farming period, flow from these drains is collected and pumped into a channel at the center of the College Lake basin. Water in the channel flows to the weir and pumps.

### *Farming*

Once the lake has been pumped and agricultural land within the lakebed is dry enough to accommodate heavy machinery (typically around May 30), tractors turn the soil; it then takes about one month to prepare the land for planting. Most of the crops in College Lake require at least 60 to 90 days to reach maturity; depending on the water year, two crops can be grown.

5 RD 2049 was formed in 1920 and was granted express legal authority under State law (California Water Code Section 50000 et. seq.) to pump water from College Lake to reclaim the land for agricultural production.

6 Peixoto, Dick, Lakeside Organic Gardens, LLC, Letter to Mary Bannister, May 12, 2014.

7 The primary purpose of the existing weir is to prevent pumped water from flowing from Salsipuedes Creek into College Lake.

Growers aim to complete harvesting and other agricultural operations in the lake basin before the fall–winter rains, generally by the end of October, although farming can and has occurred later in the year. Vegetable row crops (including varieties of kale, lettuces, and onions) comprised the largest area under cultivation from 2014 to 2018. Tree and vine crops (e.g., apples, raspberries and blackberries), comprising about 3 acres in total, are grown at higher elevations and extend to just below 64 feet NAVD88. Farmed lands are periodically disked, planted, harvested, treated with herbicides, pesticides, and fertilizers, and periodically left fallow at the discretion of the farmer.

# 2.3 College Lake Integrated Resources Management Project

## 2.3.1 Project Design

The essential function of the Project is to store water in and divert water from College Lake for treatment, transmission, and distribution for agricultural irrigation as part of PV Water's plan to achieve sustainable groundwater resources by reducing demand on groundwater, especially in the coastal area that being impacted by seawater intrusion. The Project includes the following components:

**Weir Structure and Intake Pump Station.** The Project includes a weir structure with an adjustable crest and intake pump station to divert surface water from College Lake. The diversion weir will have an adjustable weir crest that will be operational through a range of 60.1 to 62.5 feet NAVD88. The weir crest elevation could be adjusted with one or more pneumatically actuated gates (e.g., Obermeyer Spillway Gates). The intake pump station will pump raw (untreated) water from an intake just upstream of the weir to the College Lake water treatment plant (WTP) via a 30-inch diameter intake pipeline. The intake pump will be screened in accordance with current National Marine Fisheries Service and California department of Fish and Wildlife (CDFW) guidelines.

A fish passage structure will be located on the west side of the weir and will route fish around the diversion weir during periods when passage over the weir is not possible.

The adjustable weir will be capable of raising the College Lake water level by up to 2.4 feet above the elevation of the existing weir to a water surface elevation of 62.5 feet NAVD88. The storage capacity of College Lake is approximately 1,150 acre feet (AF) at a water surface elevation of 60.1 feet NAVD88 and approximately 1,800 AF at a water surface elevation of 62.5 feet NAVD88.

**Water Treatment Plant.** The WTP will remove sediment and filter and disinfect the water diverted from College Lake. The WTP will contain solids drying beds, ballasted flocculation/sedimentation and disinfection systems, and an effluent water pump station.

**College Lake Pipeline.** The Project will include an approximately 6-mile-long, 30-inch-diameter pipeline from the WTP to the CDS.

## 2.3.2 Project Operation

The Project will be operated to provide fish passage flows, water supply diversions, weir operations, avoidance of creating additional flood risks, and periodic partial or complete dewatering of College Lake during summer or fall. These operations are described below:

**Fish Passage Flows.** The weir structure will accommodate release of fish bypass flows to facilitate fish passage in Salsipuedes Creek for adult steelhead migration and smolt outmigration between the Pajaro River and College Lake. These flows will provide minimum lake levels and minimum flows for fish passage for adult steelhead migration (December 15 through April 30) and smolt outmigration (May 1 through May 31).

**Water Supply Diversions.** Anticipated typical annual water diversion rates for the Project will range between 1,800 and 2,300 AF per year (AFY) and a maximum of 3,000 AFY, depending on precipitation and monthly demand for water. During December 15 to May 31, diversions would be limited to inflows to the lake that exceed fish bypass flows, and then only after lake levels have been attained that allow for adult steelhead migration and smolt outmigration.

**Flood Risk Avoidance.** PV Water will manage the adjustable weir[8] to avoid exacerbating flood risk while retaining water from late season precipitation events for subsequent treatment and distribution to growers in the Pajaro Valley. The weir will be raised to 62.5 feet NAVD88 following the last anticipated significant storm event of the season. In the event a significant storm is predicted to occur after the weir has been raised to 62.5 feet NAVD88, PV Water would initiate a pre-storm lowering of the weir from an elevation of 62.5 to 60.1 feet.

**Periodic Draining.** In addition to fish passage flows, water supply diversions, and flood risk avoidance, PV Water anticipates that some future conditions may warrant partially or completely draining College Lake into Salsipuedes Creek during the summer and fall. These conditions may include equipment maintenance or repair, prevention of water quality issues (e.g., algal blooms), and lakebed management. The Project design includes a 30-inch bypass pipeline from the pump station to the downstream side of the weir structure for this purpose.

## 2.3.3 Project Maintenance

This section describes maintenance of both the Project's facilities and the water storage area (the lakebed). **Table 1** summarizes these maintenance activities. Measures to avoid and minimize environmental impacts will be implemented in conjunction with these activities.

[8] The weir crest could be adjusted from 60.1 feet NAVD88 (the height of the existing weir) to 62.5 feet NAVD88.

**TABLE 1**
**SUMMARY DESCRIPTION OF ANTICIPATED MAINTENANCE ACTIVITIES**

| Activity | Frequency | Anticipated Annual Quantity | Seasonal Timing | Description |
|---|---|---|---|---|
| Weir, pipeline, pump station Inspections | Weekly | — | Year-round | — |
| Weir, pipeline, pump station repair | As needed | 1 | Year-round | Typically, an unscheduled activity conducted when facilities are damaged. Equipment will include light duty trucks, small winches, crane, front end loader, haul truck, chainsaw, and hand tools. |
| Weir repair or maintenance requiring dewatering | As needed | 0.2 (1 in 5 years) | Summer – fall | Channel adjoining weir dewatered for weir maintenance and repair. Equipment will be the same as for repairs that do not require dewatering. |
| Weir maintenance | Annually | 3 | Late summer – early fall | Typical weir maintenance activities will include debris/sediment removal, cleaning, minor erosion control measures (including replacement of fill in eroded areas), and replacement of the weir gate. Equipment will be the same as for weir repairs. |
| Sediment and debris removal | Annually | Up to 11,700 cubic yards of sediment | Late summer – early fall | Sediment deposited in channels will be removed every 1–2 years (from 0–100 % of channel length/year), typically by using excavators and bulldozers to load material onto haul trucks for transport to landfill or other upland location.<br><br>Sediment deposits outside of channels will also be removed in some years. |
| Channel reshaping | Periodic | 1 site | Late summer – early fall | Channel banks “laid back” (bank angle decreased) or other modifications are made to reduce erosion or encourage deposition away from weir and pumps. Equipment may include excavators, bulldozers, and haul trucks. |
| Vegetation management —channels | Annually | 1.4 acres [a] | Late summer – early fall | Aquatic vegetation in channels is removed in association with sediment and debris removal. Removal is mechanical using a drag-line and excavator bucket. Removed aquatic vegetation is loaded into haul trucks and deposited in a landfill or upland location. |
| Vegetation management —lakebed | Annually | 75 acres [b] | Late summer – early fall | Uncultivated areas of the lakebed that are not already in woody riparian vegetation may be disked, tilled, ripped or mowed every 1–2 years if necessary to prevent new establishment of woody plants that could trap sediment, or restrict flow or drainage. |

Source: Table content adapted from Draft College Lake Integrated Resources Management Project Environmental Impact Report (PV Water 2019) and draft permit applications for the Project.

Notes:

[a] Corresponds to acreage of entire existing ditch system

[b] Corresponds to the existing acreage of farmed wetland below an elevation of 59 feet NAVD88 and potentially uncultivated in most years after Project implementation; vegetation management may also be necessary in some areas above 59 feet NAVD-88.

## 2.3.4 Adaptive Management

Operation and maintenance of the College Lake Project will be adaptively managed as described in the College Lake Adaptive Management Plan (AMP), which the PV Water Board of Directors adopted in  January 2022.(PV Water 2022). PV Water developed the AMP with stakeholder input

(Ad Hoc Adaptive Management Plan Committee), and its content is consistent with the related mitigation measures of the Project's environmental impact report (PV Water 2019), and the terms and conditions of permits and approvals. It also incorporates the related invasive animal, steelhead monitoring, and water quality monitoring plans prepared for the Project. The AMP has the following ten objectives that will guide management of Project operations and maintenance:

- **Flooding**—Avoid exacerbating existing flood hazards outside the proposed water storage area.
- **Fish Passage—**Facilitate fish passage between the Pajaro River and College Lake between December 15 and May 31.
- **Water Storage**—Preserve water storage capacity within College Lake.
- **Water Quality**—Minimize conditions that can contribute to algal blooms, including cyanobacteria blooms.
- **Farming**—Promote farming within the College Lake basin between 59 feet and 63 feetNAVD88.
- **Vegetation—** Sustain seasonal wetland and native vegetation
- **Waterfowl**—Preserve waterfowl habitat quality in the proposed water storage area.
- **Invasive Animal Species**—Control invasive animal species pursuant to a plan approved by the appropriate regulatory agencies.
- **Cultural Resources—**Preserve significant archaeological and historical resources and sustain plants of cultural significance to the Amah Mutsun Tribe
- **Research**—Support research, including community science, focused on uncertainties affecting management

For each of these objectives, the plan provides monitoring metrics, action triggers, and potential management actions.

## 2.4 Project Impacts

Construction of the Project will result in temporary and permanent impacts on aquatic resources that are regulated under CWA Section 404 and Section 401. **Table 2** summarizes these impacts. The Project would result in an increase of approximately 0.133 acre of other waters at Salsipuedes Creek due to permanent conversion of existing riparian and seasonal wetland to open water.

**TABLE 2**
**DIRECT IMPACTS TO WATERS OF THE U.S. AND STATE**

| Resource Type | Total Temporary Impacts | Permanent Impact Areas (acres) Ecological Degraded (D) / Permanent Conversion to Open Water (C) | Permanent Loss | Total Permanent Impact (Fill) |
|---|---|---|---|---|
| Ditch/Salsipuedes Creek | 0.025 [b] | 0.092 (D) [a] | 0.000 [c] | 0.092 [a, c] |
| Riparian Forest | 0.022 | 0.037 (C) | 0.005 | 0.042 |
| Seasonal Wetland | 0.390 | 0.096 (C) | 0.053 [d] | 0.149 [d] |
| Farmed Wetland | 0.025 | — | — | — |
| **Total** | 0.462 | 0.092 (D) / 0.133 (C) | 0.058 | 0.283 |

NOTE:

a The net fill is 0.092 acre, 0.092 acre of existing open water within the weir structure and hardscape transition would remain open water, but the channel bottom would be lined with concrete and riprap and thus would be degraded (D).

b The 0.025 acre of existing open water that would be temporarily impacted through dewatering and construction access would be returned to open water with the existing streambed material.

c No net permanent loss of Salsipuedes Creek. The removal of the existing weir from 0.006 acre would offset the 0.006 acre of new fill associated with the fishway, pump station, adjustable weir, and wing wall.

d Seasonal wetland permanent loss total includes the removal of the 0.005 acre of the exiting weir. Without the removal of the weir the total loss would be 0.058 acre.

SOURCE: ESA, 2021

In addition to these direct impacts resulting from construction of the Project, indirect effects are anticipated to result from operation of the Project. These indirect effects are:

- Changes in structure and species composition of seasonal wetlands at lower elevations
- Conversion of farmed wetlands to seasonal wetlands at lower elevations
- More frequent and longer periods of inundation of farmed wetlands and seasonal wetlands at higher elevations
- Less frequent cultivation of some farmed wetlands
- Conversion of uplands to farmed wetlands or seasonal wetlands

These indirect effects are described in detail in **Table 3** and in sum are anticipated to result in:

- 75.1 acres of existing farmed wetlands converting to seasonal wetland
- 36.3 acres of existing farmed wetlands being less frequently cultivated
- 12.6 acres of additional wetlands being created (0.5 acre of seasonal wetland and 12.1 acres of farmed wetland)

**TABLE 3**
**ANTICIPATED CHANGES TO INUNDATION PERIODS AND HABITATS**

| Maintenance Area | Water Surface Elevation (feet NAVD88) | Existing Inundation Period[a] | With Project Inundation Period (62.5 foot weir)[b] | Existing Habitats (Wetland/Water/Upland) | Acreage | With Project Habitats, anticipated change |
|---|---|---|---|---|---|---|
| Routine Vegetation Maintenance (mowing/disking) (< 59 feet NAVD88) | 50 up to 57 | 4-7 months | 7-11 months | Ditch (Other Water) | 1.3 | No habitat type change. Ditches would be continued to be managed for water conveyance and fish passage. |
| | | | | Farmed Wetland (Wetland)<br>Habitat consists of:<br>1. Open water (November 1 to March 31)<br>2. Seasonal wetland vegetation (April 1 to May 31)<br>3. Agriculture[c] (June 1 to October 31) | 64.2 | Farmed wetland would convert to managed seasonal wetland which would consist of:<br>1. Open water (November 1 to July or August)<br>2. Mudflat with sparse seasonal wetland vegetation (July or August to October 31)<br>No farming would occur at this elevation with the Project. Vegetation management (mowing, disking) would occur annually to maintain open water and mudflat habitat and prevent woody plant encroachment. |
| | | | | Riparian Forest (Wetland) | 20.0 | No habitat type change. Riparian Forest present below 57 feet NAVD88 is expected to persist with its current riparian species composition and abundance in the short term but may shift in species composition and abundance in the future with a dominance of inundation-tolerant species such as Pacific willow (*Salix lasiandra*), and possibly a sparser overstory canopy with freshwater emergent plants in the understory. A small 0.7-acre area of freshwater emergent wetland occurs within the larger riparian forest and would not be actively maintained. |
| | | | | Seasonal Wetland (Wetland) | 81.7 | No habitat type change, though seasonal wetlands that are not currently managed annually through mowing and tilling would be subject to these management practices in the future to prevent woody plant encroachment. The increase in management frequency, combined with the longer inundation period in this elevation range would likely result in sparser vegetation, dominated by annual species. |
| | 57 up to 59 | 4 months | 6-7 months | Ditch (Other Water) | 0.01 | No habitat type change. Ditches would be continued to be managed for water conveyance and fish passage. |
| | | | | Farmed Wetland (Wetland)<br>Habitat consists of:<br>1. Open water (December 1 to March 31)<br>2. Seasonal wetland vegetation (April 1 to May 31)<br>3. Agriculture[c] (June 1 to November 30) | 10.9 | Farmed wetland would convert to managed seasonal wetland, similar to 50 to 57 feet NAVD88. No farming would occur at this elevation with the Project. Vegetation management (mowing, disking) would occur annually to maintain open water, mudflat, and seasonal wetland habitat and prevent woody plant encroachment. |
| | | | | Riparian Forest (Wetland) | 16.2 | No habitat type change, though species composition may change as this forest matures and older trees senesce. A small 0.2 acre area of freshwater emergent wetland occurs within the larger riparian forest and would not be actively maintained. |
| | | | | Seasonal Wetland (Wetland) | 10.8 | No habitat type change. This area would be managed as seasonal open water and wetland through mowing and disking, to prevent woody plant encroachment, similar to existing conditions. |
| Routine Vegetation Maintenance and Farming (59-63 feet NAVD88) | 59 up to 62 | 1-4 months | 2-6 months | Ditch (Other Water) | 0.03 | No habitat type change. Ditches would be continued to be managed for water conveyance and fish passage. |
| | | | | Farmed Wetland (Wetland)<br>Habitat consists of:<br>1. Open water (January 1 to March 31)<br>2. Seasonal wetland vegetation (April 1 to May 31)<br>3. Agriculture[c] (June 1 to December 30) | 25.2 | No habitat type change. Although this elevation range would be inundated for longer durations (especially at the lower end of the range) these areas would continue to be used for seasonal crops in years and locations where at least one crop rotation is feasible. Areas that are not farmed would be managed as seasonal open water and wetland through mowing and disking, to prevent woody plant encroachment, similar to existing conditions. |
| | | | | Riparian Forest (Wetland) | 30.6 | No habitat type change. |
| | | | | Seasonal Wetland (Wetland) | 13.4 | No habitat type change. |
| | 62 up to 63 | 1-6 weeks, not continuous | 2-8 weeks, not continuous | Ditch (Other Water) | 0.04 | No habitat type change. Ditches would be continued to be managed for water conveyance and fish passage. |
| | | | | Farmed Wetland (Wetland) | 4.4 | No habitat type change. Although this elevation range would be inundated for longer durations these areas would continue to be used for seasonal crops in years and locations where at least one crop rotation is feasible. Areas that are not farmed would be managed as seasonal |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | open water and wetland through mowing and disking, to prevent woody plant encroachment, similar to existing conditions. |
| | | | | Riparian Forest (Wetland) | 10.6 | No habitat type change. |
| | | | | Seasonal Wetland (Wetland) | 3.3 | No habitat type change. |
| | | | | Agriculture (Upland) | 3.9 | Farmed wetland. This is not likely to change the land use practices or habitat value.[d] |
| | | | | Annual Grassland (Upland) | 0.1 | Seasonal Wetland. |
| None/No Maintenance Action (>63 feet NAVD88) | 63 up to 64 | 1-6 weeks, not continuous | 2-8 weeks, not continuous | Ditch (Other Water) | 0.1 | No habitat type change. Ditches would be continued to be managed for water conveyance and fish passage. |
| | | | | Farmed Wetland (Wetland) | 2.4 | No habitat type change. Although this elevation range would be inundated for longer durations these areas would continue to be used for seasonal crops in years and locations where at least one crop rotation is feasible. Farmers may continue to manage farmed wetlands for agricultural purposes. |
| | | | | Riparian Forest (Wetland) | 8.1 | No habitat type change. |
| | | | | Seasonal Wetland (Wetland) | 3.1 | No habitat type change. |
| | | | | Agriculture (Upland) | 8.2 | Farmed wetland. This is not likely to change the land use practices or habitat value.[d] |
| | | | | Annual Grassland (Upland) | 0.4 | Seasonal Wetland. |
| | | | | Riparian Scrub (Upland) | 0.01 | No habitat type change |

NOTES:
a Based on observed water surface elevation during 2016.
b Based on the modeled above-average rainfall year (2016). See Appendix HYD and Figures 3.3-7a through 3.3-7d in Section 3.3, Surface Water, Groundwater, and Water Quality in College Lake EIR.
c Agriculture includes a fallow period after harvest during which time fields are bare, tilled soil.
d The anticipated change of agricultural land to farmed wetland would not affect the agricultural land use of this area.

SOURCE: cbec, inc. eco engineering, Inundation Statistics and Monthly Flows, December 18, 2018.

Further, it is worth noting that the primary purpose of adaptively disturbing seasonal wetlands is to prevent the conversion of seasonal wetland to riparian habitat and prevent the spread of Arundo and other invasive species that substantially degrade wetland functions and values. Expansion of riparian habitat would cause a loss of habitat for important wildlife species and guilds at the lake, which would be counter to the goals and objectives of the Project and its operations and management plan. Additionally, the species in existing seasonal wetlands and farmed wetlands consist almost entirely of annual species and so even annual discing and tilling, depending on its seasonal timing would result in effectively no impacts on this vegetation's functions and values as a wetland (and again, the Project would substantially reduce the frequency and area of disturbance compared to existing conditions).

# 3.0 Off-Site Mitigation for Permanent Impacts to Wetlands

The Project will result in permanent loss of approximately 0.058 acre of seasonal wetland and riparian wetland at the weir site. The location of the weir site is displayed in **Figure 1**. The College Lake Project would also cause a localized loss of existing other waters at Salsipuedes Creek (the "ditch" resource type), but would cause an increase overall in the acreage of other waters at Salsipuedes Creek (i.e., 0.133-acre increase) because of conversion of riparian and seasonal wetland to open water. Therefore, PV Water is not proposing mitigation for permanent impacts to other waters.

PV Water proposes to mitigate permanent losses of seasonal and riparian wetland by purchasing wetland credits at the Pajaro River Mitigation Bank at a 3:1 ratio[9] of credits to acreage of permanent loss (**Table 4**). Also, through the College Lake Project, PV Water will facilitate steelhead migration and smolt outmigration between Salsipuedes Creek and College Lake, and is anticipated to reduce disturbance of existing wetlands and increase the acreage of seasonal wetlands, as described in Section 2, "College Lake Integrated Resources Management Project," and Section 2.4, "Project Impacts."

**TABLE 4**
**PROPOSED MITIGATION FOR PERMANENT LOSS OF SEASONAL AND RIPARIAN WETLANDS**

| Resource Type | Permanent Loss (Acres) | Mitigation ratio | Compensatory Mitigation (Acres of Wetland Mitigation Credits) |
|---|---|---|---|
| **Wetlands** | | | |
| Riparian (forest) wetland | 0.005 | 3:1 | 0.015 |
| Seasonal wetland | 0.053 | 3:1 | 0.159 |
| *Total* | *0.058* | — | *0.174* |
| SOURCE: ESA 2021 | | | |

9 As required by Mitigation Measures BIO 1-c and BIO 1-d from the 2014 BMP Update PEIR.

According to USACE guidelines, mitigation bank credits are the preferred method for fulfilling compensatory mitigation requirements. To fulfill mitigation requirements using mitigation bank credits, the proposed bank must meet the following criteria:

- The bank has an approved instrument.
- The bank's service area overlaps with Project impacts.
- The bank has credits for the resource types required.

The Pajaro River Mitigation Bank satisfies these criteria: it has an approved instrument, its service area overlaps with the Project site, and it has wetland mitigation credits The Pajaro River Mitigation Bank was approved in 2007 by the USACE and U.S. Environmental Protection Agency for impacts to wetlands/waters of the U.S. in the Pajaro River basin (Hydrologic Unit Code [HUC] 18060002) (USACE 2022). The type of credits available from this bank are "wetland" mitigation credits. The wetlands at this mitigation bank in San Benito County consist of previously existing natural wetlands and constructed seasonal marsh, semi-permanent emergent marsh, and seasonally open water/mudflat (res 2022, P. Lee, pers. comm. 2022).

During the establishment of the Pajaro River Mitigation Bank, the banker entered into an agreement with the USACE. This agreement describes the performance standards, monitoring and reporting requirements, legal protection, long-term management, and funding assurances for the mitigation bank in perpetuity. Therefore, through the implementation of the contract agreement, the bank owner assumes these responsibilities on behalf of PV Water.

# 4.0 Restoration of Temporarily Disturbed Wetlands

The Project will temporarily impact seasonal wetland and riparian wetland along both banks of Salsipuedes Creek. These areas are displayed on **Figure 2** and will be revegetated as described in the following sections.

## 4.1 Responsible Parties

The on-site replacement and restoration of aquatic features as described in the following sections will be completed by the construction contractor for the College Lake Project. All long-term maintenance of aquatic features retained or restored on site will be the responsibility of PV Water.

## 4.2 Erosion Control

To control erosion during and after wetland creation activities, PV Water and its contractors will implement best management practices as required under Construction General Permit Order 2009-0009-DWQ. Erosion control measures and best management practices, which retain soil and sediment, prevent runoff, control dust, and prevents hazardous materials on the construction site from entering existing aquatic features. These best management practices will be placed, monitored, and maintained throughout all phases of Project implementation. The contractor will develop and implement a stormwater pollution prevention plan during construction to minimize the potential discharge of contaminated runoff into any adjacent wetlands or waterways.

## 4.3 Plant Community Establishment

### 4.3.1 Plant Materials

Native plant communities will be established in the riparian and seasonal wetland areas, and uplands using the plant materials listed in **Table 5**. All plantings shall occur between October 1 (or the onset of the rainy season, if later) and December 31.

Plant materials will conform to the following requirements:

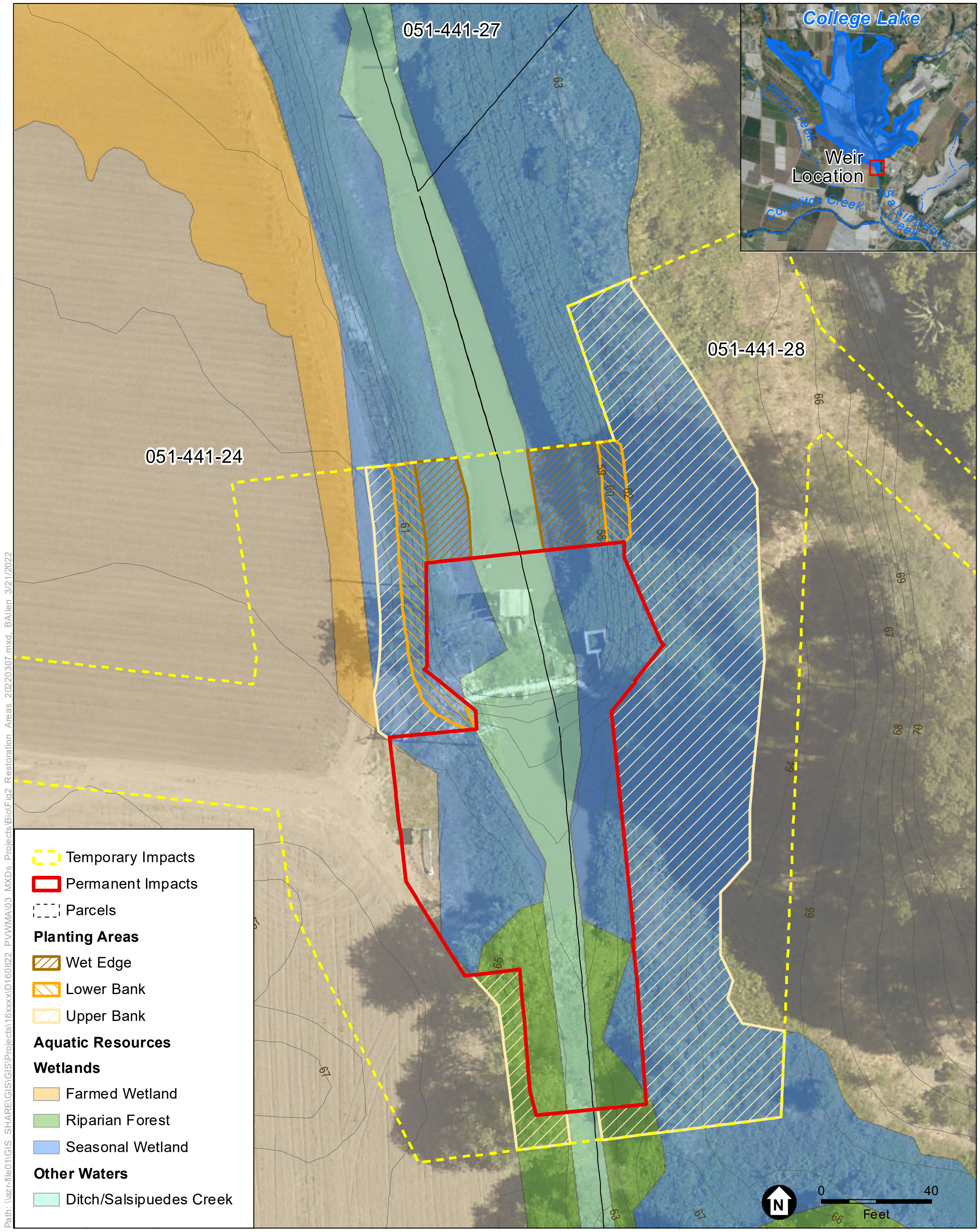
- All plant materials will be sourced locally as practicable: container plants and seed will be of the most local provenance that is commercially available.
- Seed will be free of invasive species based on the package label and the seed analysis report.
- Container plants will be obtained from nurseries implementing Phytophthora from nurseries implementing best management practices (BMPs) for preventing watermolds (*Phytophthora* species) from infecting container stock.

These plant materials will be installed as described in the following sections with herbaceous container plants, installed prior to application of seed.

### 4.3.2 Herbaceous Container Plantings

Container plants and plugs will be planted as follows:

1. Planting holes will be dug twice as wide as the container/plug and to the depth of the container.
2. Plants will be set in place, and the hole will be backfilled with soil that will be firmed in by hand.
3. At each installed plant, a three-inch-high berm of soil will be placed around the perimeter of the planting hole to form a watering basin.
4. Plants will be watered in immediately after installation.




SOURCE: DigitalGlobe, 2016; Carollo Engineers, 2020; ESA, 2020

College Lake Integrated Resources Management Project

**Figure 2**
On-Site Restoration of Temporarily Disturbed Wetlands

ESA

**TABLE 5**
**PLANT SPECIES FOR REVEGETATION OF TEMPORARILY DISTURBED SEASONAL WETLAND AND RIPARIAN UNDERSTORY AT WEIR AND PUMP STATION SITE**

| Common Name | *Scientific Name* | Spacing | Size | Quantity |
|---|---|---|---|---|
| ***Upper Bank*** | | | | |
| Blue wild rye | *Elymus glaucus* | — | PLS (pure live seed) | 12 lbs./acre |
| California brome grass | *Bromus carinatus* | — | PLS | 8 lbs./acre |
| Purple needle grass | *Stipa pulchra* | — | PLS | 4 lbs./acre |
| American vetch | *Vicia americana subspecies. americana* | — | | 1 lbs./acre |
| Coast tarweed | *Madia sativa* | — | | 0.5 lbs./acre |
| ***Lower Bank*** | | | | |
| Creeping wild-rye | *Elymus triticoides* | — | PLS | 12 lbs./acre |
| Meadow barley | *Hordeum brachyantherum* | — | PLS | 8 lbs./acre |
| Whiteroot sedge | *Carex barbarae* | groups of 3, 2 ft. on center | plug | 160 |
| Brown-headed rush | *Juncus phaeocephalus* | groups of 3, 2 ft. on center | plug | 80 units |
| Common rush | *Juncus patens* | groups of 3, 2 ft. on center | plug | 80 units |
| ***Wet Edge*** | | | | |
| Creeping wild-rye | *Elymus triticoides* | - | PLS | 5 lbs./acre |
| Meadow barley | *Hordeum brachyantherum* | - | PLS | 5 lbs./acre |
| Water smartweed | *Persicaria amphibia* | - | PLS | 5 lbs./acre |
| Tall flatsedge | *Cyperus eragrostis* | - | PLS | 5 lbs./acre |

### 4.3.3 Seed Application

Seed mixtures will be applied as follows:

1. The soil surface will be tilled or harrowed to prepare the seed bed prior to seed application.
2. The seed mixture will be spread (broadcasted) evenly by hand, or a mechanical spreader.
3. Broadcasted seed will be worked into the soil (approximately the top quarter inch of soil) by hand raking or by lightly harrowing.
4. Weed-free straw mulch will then be spread onto the soil as a layer approximately a quarter-inch in depth. This layer of mulch will be secured either by being tucked in using a tractor (tractor-walking), a mulching roller, or crimper to a depth of one to two inches or by applying a tackifier.

## 4.4 Impact Avoidance and Minimization Measures

To protect the existing sensitive resources and conservation values during wetland restoration activities, applicable site-specific avoidance and minimization measures required by resource agency permits and consultation documents will be implemented, including the following:

- Delineated and marked vehicle movement corridors and staging, work, and refueling areas
- Preconstruction surveys for special-status species
- Best Management Practices identified in the stormwater pollution prevention plan
- Environmental training for construction personnel
- Biological and cultural resource monitors on-site during earth-disturbing activities
- Regular construction monitoring and reporting

# 5.0 Replacement Tree Plantings

## 5.1 Responsible Party

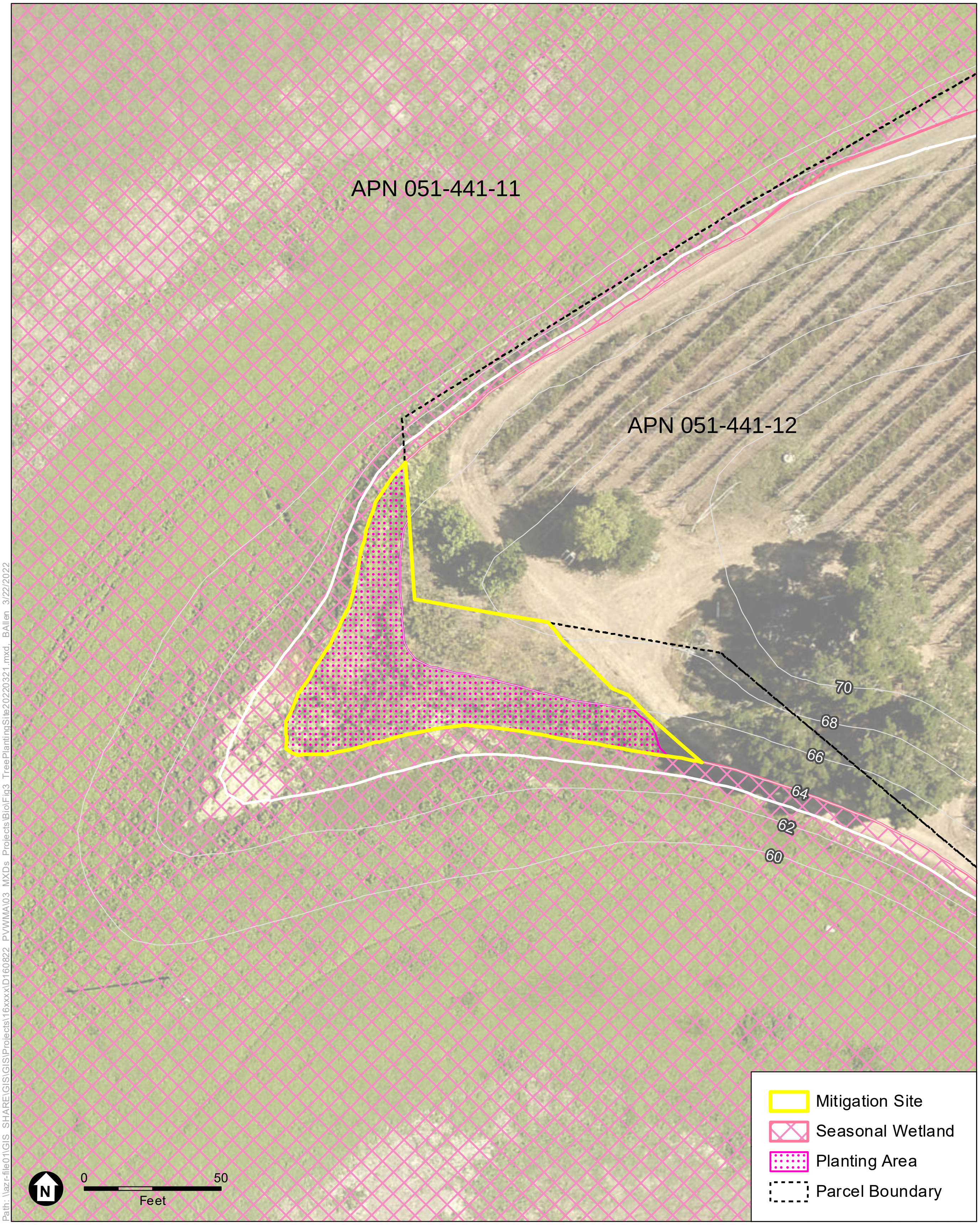
PV Water will be responsible for the planting and survival of trees as replacements for the trees removed to construct the College Lake Project.

## 5.2 Site Selection Criteria

The following site selection criteria were applied:

- Location of the site near Project impacts, and within the College Lake basin
- Separated from potentially incompatible land uses (e.g., development)
- Presence of natural ecological processes that would favor long-term site sustainability (e.g., natural hydrology related to the episodic flooding or shallow groundwater within College Lake)
- Practicability of accomplishing self-sustaining aquatic resource creation and preservation at the compensatory mitigation project site
- PV water ownership (through an easement or fee title)

The Replacement Tree Planting Site satisfies these criteria. This location of the site is shown on Figure 1, and a close-up of the site is displayed on **Figure 3**; it is on the eastern edge of College Lake and borders on the existing seasonal wetlands of the lakebed. Trees planted at this site will be sustained by the same hydrology sustaining the adjoining seasonal wetlands, add to the ecological values of the existing wetlands, provide contiguous habitat for wildlife and waterfowl, and can be managed be PV Water in conjunction with management of the adjoining existing wetlands.




SOURCE: Santa Cruz County, 2020; PVWMA, 2022; ESA, 2022

College Lake Integrated Resources Management Project

**Figure 3**
Replacement Tree Planting Site

ESA

# 5.3 Site Description

## 5.3.1 Topography, Soils, and Hydrology

The Replacement Tree Planting Site consists of a band of upland bordering the eastern edge of College Lake. It is at an elevation of 64–70 feet NAVD88 and has slopes of 2–24 percent. The site's lowest elevations may be transiently inundated by College Lake for less than one week in a typical rainfall year (see Table 3) .

The site is located at the edge of Quaternary terrace deposits which are covered by Watsonville loam, 2–15 percent slopes and Watsonville loam, thick surface, 1–2 percent slopes (Natural Resources Conservation Service [NRCD] 2021). This somewhat poorly drained, hydric, soil is composed of loam to a depth of 18 inches and clay, clay loam and sandy clay loam from 18 to 39 inches.

## 5.3.2 Vegetation

Vegetation at the Replacement Tree Planting Site is annual grassland and row crop agriculture. The existing agricultural vegetation is continuous with and part of the agricultural field along the eastern border of the mitigation site. To the south, west and north, the site is bordered by seasonal wetland on the lakebed of College Lake. However, there are no waters of the U.S. or State within the boundaries of the Replacement Tree Planting Site.

## 5.3.3 Special-Status Species

Numerous special-status species have been documented in the vicinity of College Lake (PV Water 2019). Several of these species may use the Replacement Tree Planting Site:

- Steelhead (*Oncorhynchus mykiss irideus*, Central California Coast Distinct Population Segment) is federally listed as threatened and known to use College Lake; therefore, the mitigation site's lowest elevations may provide rearing habitat for steelhead when transiently inundated.

- California red-legged frog (*Rana draytonii*) is a federally listed threatened species and CDFW species of special concern and although it has not been detected in prior surveys, it may be present at College Lake. If so, it may use annual grassland at the mitigation site for movement.

- Western pond turtle (*Emys marmorata*) is a CDFW species of special concern and although it has not been detected in prior surveys, it may be present at College Lake. If so, it may use annual grassland at the mitigation site for movement, nesting, aestivation, or overwintering.

- White-tailed kite (*Elanus leuocurus*) is a California fully protected species and has been observed foraging and nesting at College Lake. It may forage in the annual grassland and agricultural land at the mitigation site.

- Golden eagle (*Aquila chrysaetos*) is a California fully protected species and has been observed over College Lake. It may forage at College Lake and its surroundings, including the mitigation site.

### 5.3.4 Cultural Resources

The Replacement Tree Planting Site is located in an area of high sensitivity for archaeological resources. Significant archaeological resources have been documented elsewhere on this parcel (APN 051-441-11), but these resources are located more than 200 feet outside of the site's boundaries.

### 5.3.5 Easements

There are no easements on the Replacement Tree Planting Site..

## 5.4 Planting Materials and Methods

### 5.4.1 Plant materials

Live willow "posts" will be planted to provide replacement trees (**Table 6**). These live willow posts will be collected at College Lake and will be planted between October 1 (or the onset of the rainy season, if later) and December 31.

**TABLE 6**
**PLANT MATERIALS FOR REPLACEMENT TREE PLANTINGS**

| Common Name | Scientific Name | Spacing | Material Type | Quantity |
|---|---|---|---|---|
| **Riparian Wetland** | | | | |
| ***Trees and Shrubs*** | | | | |
| Red willow | *Salix laevigata* | 6 ft. on center | live pole/post | 42 |

### 5.4.2 Willow Installation

Willows will be planted from live posts in the planting area displayed on Figure 3, primarily at elevations of 64–65 feet NAVD88. Live posts will be planted as follows:

1. All live posts will be collected locally at College Lake and planted during the dormant season (during October 1 to December 31). Live posts should be at least two inches in diameter and 4 to 5 feet long, with a sharp basal (bottom) end of the post.

2. Live posts should be soaked for 24 hours prior to planting or collected and planted on the same day.

3. A digging bar, auger, or length of rebar will be used to prepare the holes for the posts.

4. Live posts will be driven into the soil to 75 to 80 percent of their total length, leaving one or two buds exposed.

5. Holes will be filled, tamping down the soil to remove air pockets, and a 3-inch-high berm of soil will be placed approximately one foot from the live post to form a watering basin.

6. Each live post will be watered immediately after planting.

7. Weed-free straw mulch will then be spread onto the soil in the watering basin around each live post as a layer approximately three inches in depth.

### 5.5.7 Impact Avoidance and Minimization Measures

To protect the existing sensitive resources and conservation values at the Replacement Tree Planting Site during construction and wetland restoration and creation activities, all applicable site-specific avoidance and minimization measures required by resource agency permits and consultation documents will be implemented. These measures include the following:

- Delineated and marked vehicle movement corridors and staging, work, and refueling areas
- Preactivity surveys for special-status species prior to ground-disturbing activities
- Environmental training for personnel
- Biological and cultural resource monitors on-site during earth-disturbing activities
- Regular monitoring and reporting

# 6.0 Maintenance, Monitoring, and Reporting

Successful restoration of wetlands at the Project site (at the weir) and successful establishment of trees at the Replacement Tree Planting Site are anticipated within five years of construction. Monitoring and maintenance will take place during this five-year period (i.e., the interim management period) as described in the following sections.

## 6.1 Responsible Parties

During the interim management period, PV Water will be responsible for monitoring, reporting, and maintenance activities of seasonal wetland and riparian wetland restored at the weir location. PV Water will be responsible for monitoring, reporting, and maintenance activities at the Replacement Tree Planting Site.

## 6.2 Maintenance Activities

### 6.2.1 General

The Project site at the weir and the Replacement Tree Mitigation Site will be maintained in good condition through implementing necessary maintenance activities, if any, identified by annual site inspections. Inspections will be performed by PV Water personnel who will monitor site conditions for maintenance issues regarding invasive plant species distribution and abundance, erosion problems, and trash accumulation.

Should deficiencies in infrastructure or other site conditions be observed, maintenance activities will be implemented to rectify the situation. Watering basins will be maintained intact and free of competing vegetation, erosion will be controlled as described in Section 4.2, "Erosion Control," plantings will be irrigated and invasive species will be controlled as described below, and the mitigation site will be kept free of trash.

### 6.2.2 Irrigation

Restored wetlands and replacement tree plantings will be irrigated as necessary during the first five years. Water will be provided by a water truck or water buffalo.

Irrigation frequency and duration will be dependent on the weather conditions, observed soil and plant conditions, and years since planting. During the first year, plantings of trees, shrubs, and perennials from containers will be irrigated immediately after installation and thereafter during the dry season (May to October), at one-week to one-month intervals based on plant and soil conditions.

During the first year from seedling emergence till the end of the dry season in October, seeded areas will be irrigated by applying an amount of water sufficient to wet the soil throughout the rooting zone. Water will be applied at a rate that does not cause substantial runoff and erosion (i.e., the application rate will not exceed the soil infiltration rate). Initially, water will be applied at one-week to one-month intervals based on plant and soil conditions, with intervals between applications generally lengthening as plants increase in size.

For both container plantings and seeded areas, irrigation water may also be applied to non-dormant plants during November to April, depending on weather (lack of rainfall) and on soil and plant conditions.

During the second year after installation, irrigation needs will be assessed at one-week to one-month intervals based on plant and soil conditions, and during the third through fifth years, irrigation needs will be assessed at quarterly intervals.

### 6.2.3 Invasive Plant Species Control

The existing upland vegetation on the site consists primarily of non-native species, some of which are invasive species that can establish and spread in seasonal wetlands or riparian wetlands, reducing their habitat values. Therefore, the distribution and abundance of non-native species at the mitigation site will be monitored during implementation of the mitigation work plan and during the interim maintenance period.

Measures to control these species will be implemented as necessary to meet the ecological performance standards. Localized measures to control populations of invasive plant species may include hoeing, hand labor, weed-eating, or chemical removal with aquatic-approved herbicides as necessary

## 6.3 Ecological Performance Standards

Survivorship will be the metric used to determine success of installed trees. Percent cover will be the metric used to determine success of wetland restoration. The success criteria for each year are provided below in **Table 7**. In addition to tree survivorship and plant cover, there will be a performance standard for the cover of native plants in riparian wetland understory and seasonal wetland: that native plant cover in years two through five exceeds pre-Project cover.

**TABLE 7**
**SUCCESS CRITERIA**

| Year | Tree and shrub Survivorship (%) | Restored Wetland Plant Cover (%)[a] |
|---|---|---|
| 1 | 80 | n/a |
| 2 | 80 | 60 |
| 3–5 | 80 | 70 |

Note:

a Total riparian understory cover includes cover of understory shrubs.

## 6.4 Performance Monitoring

Performance monitoring will evaluate habitat development and tree establishment relative to the performance standards, and inform implementation of remediation measures for wetlands and tree plantings not meeting performance standards. In the restored wetlands at the weir site, this monitoring will be conducted for at least five years, and will continue onsite until restored wetlands have met all performance standards. At the Tree Replacement Planting Site, this monitoring will continue until created wetlands have met all performance standards.

A qualified biologist will conduct the monitoring annually in early fall when leaves are still present on trees and shrubs. This timing will allow plant health and vigor to be assessed as well as survivorship.

### 6.4.1 Percent Cover

Line transect methods will be used to monitor percent cover of all wetland restoration areas. At least two transects will be permanently marked in each wetland restoration area at the weir site.

Each year in early fall, species cover will be recorded at 0.25-meter intervals along each transect by holding a pin flag or narrow metal rod perpendicular to the transect line and recording each plant species that has a leaf or stem touching the pole (i.e., cover is recorded at that “point”). The same diameter pin flag/rod will be used during each year of monitoring.

Percent cover will be calculated as the percentage of the total number of points covered by plants.

### 6.4.2 Plant Health and Vigor

The overall health and vigor of each planted tree and perennial (sedges and rushes) will be evaluated each year using the definitions in **Table 8**, below. Annual survivorship of planted trees is the number of individuals that are alive divided by the number of trees that were alive at the end of the previous year (expressed as a percentage).

**TABLE 8**
**HEALTH AND VIGOR RATINGS**

| Ratings | Description |
|---|---|
| Excellent | Plant is vigorously growing and healthy, with no sign of disease or injury |
| Good | Plant is healthy and moderately vigorous; may have limited signs of disease or injury |
| Fair | Plant is surviving but lacks signs of vigorous growth; may have signs of disease or injury |
| Poor | Plant exhibits low vitality, or main stem dead, but basal sprouts emerging; survival is uncertain |
| Dead | Plant shows no signs of growth and is not expected to recover |

### 6.4.3 Photo Monitoring

Four permanent photographic monitoring locations will be established at the wetlands restored at the weir and pump station site to document conditions at restored wetlands. Photographs will be taken annually at these locations and the photographs included in the annual monitoring report.

## 6.5 Remedial Measures

Site inspections and performance monitoring will identify the need for remedial actions. These actions may include the installation of hardware to protect installed plants from grazing, implementation of erosion control measures, adjustments to irrigation and invasive plant control practices, and replacement plantings or reseeding.

## 6.6 Reporting

Annual reports documenting progress towards meeting the success criteria will be submitted to the regulatory agencies by January 31 following each monitoring year. Annual reports will include the following information:

- Maintenance activities conducted during the year, including site inspections and their results
- Summary of monitoring data with methods and complete data sets provided as an attachment.
- Analysis of success (attainment or non-attainment of each performance standard)
- Discussion of general site conditions and changes since the previous report
- Description of any remedial actions needed or undertaken, including invasive plant control efforts, changes in irrigation, and replanting

The first year report will also summarize the as-built information. The 'as-built' information may include plans, drawings, or maps, that accurately depict what was planted and where. The as-built information will include a map identifying photo point locations and the direction the photos were taken.

## 6.7 Completion of On-Site Mitigation Responsibilities

### 6.7.1 Notification

PV Water will submit a final mitigation monitoring report, notifying USACE, CCRWQCB, and CDFW that monitoring has been completed and that the performance standards have been met. Agency confirmation that the PV Water is in substantial compliance with the established performance standards is outlined below.

### 6.7.2 Agency Confirmation

At the end of the final monitoring year for the restored features, which will be at least five years after planting, USACE, CCRWQCB, or CDFW may require a site visit to the features to confirm the completion of the restoration of impacted waters of the U.S. and State or successful establishment of replacement tree plantings.

If a site visit is requested by USACE, CCRWQCB or CDFW, PV Water will request that the agency (ies) provide a written notice within 30 days following the site visit, confirming that PV Water has or has not attained the established performance standards. Should USACE, CCRWQCB, or CDFW conclude that PV Water has not attained the established performance standards, PV Water will request a meeting within 15 days of the date of notification to discuss the performance issues.

If USACE CCRWQCB, or CDFW do not require a site visit, PV Water will request that the agency (ies) provide a written notice within 120 days of the submittal of the final monitoring report confirming that PV Water has attained the established performance standards.

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