CHAPTER 4
ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION
INTRODUCTION

4.0.1 PROJECT LOCATION AND SETTING

This chapter provides a project-level analysis of the physical environmental effects of implementing the Newell Creek Dam Inlet/Outlet Replacement Project (Project). Each topical section in this chapter describes the environmental setting, assesses impacts, and identifies mitigation measures for significant impacts.

The following sections evaluate the environmental impacts of the proposed Project:

4.1 Impacts Not Found to Be Significant

4.2 Air Quality & Greenhouse Gas Emissions

4.3 Biological Resources

4.4 Cultural Resources and Tribal Cultural Resources

4.5 Forest Resources

4.6 Geology and Soils

4.7 Hazards and Hazardous Materials

4.8 Hydrology and Water Quality

4.9 Noise

4.10 Transportation and Traffic

4.0.2 SCOPE OF ANALYSES

4.0.2.1 Section Organization

Each section in Chapter 4 generally follows the same format and consists of the following subsections:

Environmental Setting

This section describes the existing physical environment and applicable laws and regulations relevant to a discussion of impacts in the topic category. The Environmental Setting sections provide a general overview of the existing conditions throughout the City related to the topic being addressed. Local, State, and federal regulations also are identified and discussed, when relevant.

Environmental Impacts and Mitigation Measures

The Environmental Impacts and Mitigation Measures section identifies thresholds of significance used to evaluate whether an impact is considered significant, based on standards identified in or criteria derived from the California Environmental Quality Act (CEQA) and State CEQA Guidelines. In some cases, agency policies and regulations or professional judgment are used to further define CEQA standards of significance.

This section first identifies issues for which no impacts have been identified. The section then evaluates and analyzes significant or potentially significant project impacts, states the level of significance prior to mitigation, and proposes mitigation measures (in bold) that can reduce such impacts. A statement regarding the level of significance of each impact after mitigation follows the mitigation measures for that impact. For impacts found to be less than significant, mitigation measures are not required, but where relevant, the EIR recommends project modifications or appropriate conditions of approval.

Cumulative Impacts

Cumulative impacts are discussed in each environmental resource section following the description of the Project-specific impacts and identified mitigation measures. The cumulative impact analysis considers the effects of the proposed Project together with other past, present, or reasonably foreseeable future projects proposed in the local vicinity and region. The cumulative impact analysis is based on the same setting, regulatory framework, and significance thresholds presented in each resource topic section. Additional mitigation measures may be identified if the analysis determines that the Proposed Project's contribution to an adverse cumulative impact would be cumulatively considerable and, therefore, significant. Section 4.0.3 below describes the assumptions and methodology for assessing cumulative impacts.

4.0.2.2 Significance Determinations

In accordance with the California Environmental Quality Act (CEQA), specifically, Public Resources Code Section 21068, a "significant effect on the environment" means a substantial, or potentially substantial, adverse change in the environment. The significance thresholds used for each environmental resource topic are presented in each section of Chapter 4 following the setting and before the discussion of impacts. For the impact analyses, one of the following significance determinations will be made:

- **No Impact (NI)**. This determination is made if there is no potential that the Proposed Project could affect the resource at issue.
- **Less than Significant (LS)**. This determination applies if there is a potential for some limited impact on a resource, but the impact is not significant in accordance with the significance criterion.

- **Less than Significant with Mitigation (LSM).** This determination applies if there is the potential for a substantial adverse effect in accordance with the significance criterion, but mitigation is available to reduce the impact to a less-than-significant level.
- **Significant Unavoidable (SU).** This determination applies to impacts that are significant, but for which there appears to be no feasible mitigation available to substantially reduce the impact.

4.0.3 CUMULATIVE IMPACTS

4.0.3.1 State CEQA Guidelines Requirements

The State CEQA Guidelines section 15130(a) requires that an EIR discuss cumulative impacts of a project "when the project's incremental effect is cumulatively considerable." As defined in Section 15355, a cumulative impact consists of an impact that is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts. As defined in section 15065(a)(3), "cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects. Where a lead agency is examining a project with an incremental effect that is not "cumulatively considerable," the lead agency need not consider the effect significant.

CEQA requires an evaluation of cumulative impacts when they are significant. When the combined cumulative impact associated with the project's incremental effect and the effects of other projects is not significant, the EIR shall briefly indicate why the cumulative impact is not significant and is not discussed in further detail in the EIR. Furthermore, according to the California State CEQA Guidelines section 15130 (a)(1), there is no need to evaluate cumulative impacts to which the project does not contribute.

An EIR may determine that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus not significant when, for example, a project funds its fair share of a mitigation measure designed to alleviate the cumulative impact. An EIR shall examine reasonable, feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects.

The discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide detail as great as that provided for the impacts that are attributable to the project alone. The discussion should be guided by standards of practicality and reasonableness, and should focus on the cumulative impact to which the identified project contributes.

CEQA section 21094(e)(1) states that if a lead agency determines that a cumulative effect has been adequately addressed in a prior environmental impact report, that cumulative effect is not

required to be examined in a later EIR. The section further indicates that cumulative effects are adequately addressed if the cumulative effect has been mitigated or avoided as a result of the prior EIR and adopted findings or can be mitigated or avoided by site-specific revisions, imposition of conditions or other means in connection with the approval of the later project (subsection (e)(4)).

4.0.3.2 Cumulative Projects and Scope of Analysis

Discussion of cumulative impacts may consider either a list of past, present, and probable future projects producing cumulative impacts or a summary of growth projections contained in an adopted plan that evaluates conditions contributing to cumulative impacts, such as those contained in a General Plan. Projects that are relevant to the cumulative analysis include projects that could:

- Contribute incremental environmental effects on the same resources as, and would have similar impacts to, those discussed in this EIR applicable to the proposed Project;
- Be located within the defined geographic scope for the cumulative effect. The defined geographic scope is dependent on the environmental resource affected; and/or
- Contribute impacts that coincide with proposed Project impacts during construction (short-term) or operation (long-term). Construction of the Proposed Project would last approximately 24 months, occurring between mid-2021 and February 2023; see Chapter 3, Project Description, Table 3-3 for a summary of construction sequences and duration.

Based on the above factors, cumulative projects considered for the analysis include: other Santa Cruz Water Department planned capital improvement projects and construction and/or development projects approved or proposed within the County in the San Lorenzo Valley or city of Scotts Valley or improvement projects on nearby state facilities. Cumulative projects in San Lorenzo Valley or the city of Scotts Valley would be those that would contribute to construction-related traffic impacts or impacts to resources impacted by the Project. Cumulative projects are discussed below, and summarized in Table 4-1 at the end of this section for projects that meet the factors described above.

Santa Cruz Water Department Projects

Capital Improvement Program Projects

The Santa Cruz Water Department (SCWD) Capital Improvement Program (CIP) includes plans and funding for numerous capital improvements projects, including rehabilitation or replacement projects, upgrades and improvements projects, water supply reliability studies, and water main replacements. SCWD is implementing the City Council adopted recommendations of the Water Supply Advisory Committee for supplemental water supply.

Planned CIP projects within potential cumulative impact areas with the proposed Project include those listed below. The Newell Creek Bridge, Newell Creek Pipeline, Felton Diversion, and Graham Hill Water Treatment Plant improvement projects are geographically closest to the proposed Project site. The Coast Pump Station, Felton Diversion, and Riverbank Filtration projects are located at the San Lorenzo River.

- Newell Creek Access Road Bridge Rehabilitation Project
- Newell Creek Pipeline (NCP) Improvements
- Graham Hill Water Treatment Plant (GHWTP) Improvements
- Coast Pump Station Pipeline Repairs
- Coast Pump Station/San Lorenzo River Diversion Rehabilitation
- Felton Diversion to GHWTP
- Riverbank Filtration
- North Coast Pipelines
- North Coast Majors and Laguna Creek Diversions

The SCWD also has some minor improvements planned at the Loch Lomond Recreation Area and replacement of aerators in the Loch Lomond Reservoir (Reservoir), which would be completed prior to initiation of the proposed Project.

Habitat Conservation Plans

Since 2001, City Water Department staff have been developing two Habitat Conservation Plans (HCPs), one with the California Department of Fish and Wildlife (CDFW) and the National Marine Fisheries Service (NMFS), and one with United States Fish and Wildlife Service (USFWS), for California Endangered Species Act and Federal Endangered Species Act compliance for Water Department operations that may affect special-status species. For the HCP being developed with CDFW and NMFS, the final draft HCP chapters and permit applications are expected to be submitted to CDFW and NMFS by late winter/spring 2019. Initiation of environmental review for the HCP and associated permits is expected to commence in early fiscal year 2020 with the goal of permit process completion by late 2021 or early 2022. For the HCP being developed with USFWS, a final draft of the HCP has been submitted to USFWS, and environmental review is expected to commence in early 2019.

Santa Cruz Water Rights Project

The SCWD is also proposing changes to its existing water rights through the Santa Cruz Water Rights Project (SCWRP) to address key issues needed to improve the City's water system flexibility while enhancing stream flows for local anadromous fisheries, particularly for Central California Coast coho salmon, a federally listed endangered species, and Central California Coast steelhead, a federally listed threatened species. An Initial Study and Notice of Preparation for an

EIR were issued for the project on October 15, 2018. The EIR is anticipated to be completed by late 2019. The SCWRP includes

- Modifying City water rights to include minimum bypass flows as negotiated with state and federal resource agencies to protect fisheries (Agreed Flows);
- Conforming and expanding the Places of Use (POUs) of City water rights to include Soquel Creek Water District, Scotts Valley Water District, San Lorenzo Valley Water District, and Central Water District;
- Modifying certain City water rights to include direct diversion as an allowable method of diversion and including existing City diversion points as added points of diversion to certain City water rights;
- Granting an extension of time of 25 years to beneficially utilize water allowed under certain City water rights permits.

Once the City's water rights are modified, the following additional foreseeable activities may occur:

- Implementing improvements to address fish passage at the City's Felton Diversion, which may include replacement of existing screens, installation of a traveling brush system, and construction of a continuous outmigration bypass route.
- Developing or improving interties between City of Santa Cruz and Soquel Creek Water District, Scotts Valley Water District, San Lorenzo Valley Water District, and/or Central Water District.

Other Projects

The only recent cumulative project in the San Lorenzo Valley is the Felton Library project that was approved in October 2017. Some trail improvements are proposed at Quail Hollow County Park. Several proposed projects in the city of Scotts Valley could result in construction periods that overlap with the proposed project. A 32-unit residential project adjacent project adjacent to Graham Road was recently approved in the City of Santa Cruz (1930 Ocean Street Extension).

Table 4-1: Cumulative Projects

	Project Name (Proponent or Proponent and Lead Agency)*	Project Description	Potential Cumulative Impact Topics	Estimated Construction Schedule
City of Santa Cruz Water Department				
1	Loch Lomond Projects	LLRA Planned Improvements Aerator Replacement	None	2019
2	Newell Creek Road Bridge Pier Scour Repair	Placement of quarried rock riprap at the base of the Newell Creek Access Road Bridge to prevent further scour.	• Biological Resources • Hydrology-Water Quality	2019
3	Newell Creek Pipeline Rehab/Replacement	Study, design and construction of replacement pipeline or segments in 3-4 phases from Newell Creek Road bridge to GHWTP	• Construction Noise • Construction Traffic	2020-2026
4	Graham Hill Road Water Treatment Upgrades	Improvements to rehabilitate aging structures and equipment, upgrade systems to current regulatory standards, enhance system reliability and achieve consistent treatment of high turbidity water.	• Construction Traffic	2021-2024
5	Coast Pump Station Line Repairs	Rehabilitation or replacement of existing pipeline	• Biological Resources • Hydrology-Water Quality	2019
6	Coast Pump Station and Tait Diversion Project	Diversion and pump station improvements	• Biological Resources Hydrology-Water Quality	2024-2025
7	Felton Diversion to GHWTP and Loch Lomond Study	Hydraulic study of existing pipeline and potential connection to GHWTP	None	2019
8	North Coast Pipelines	Replacement of segments of pipeline	• Biological Resources • Construction Traffic	2020-2026
9	North Coast Diversions	Improvements to Laguna Creek and Majors Creek diversions	• Biological Resources • Hydrology-Water Quality	2022
10	Riverbank Filtration Study	Study of potential expansion of this diversion technique at Tait Street Diversion and at Felton Diversion through Riverbank Filtration	• Biological Resources • Hydrology-Water Quality	2021-2024
11	Water Rights Project	To adjust and perfect water rights to enable the City to alter its place-of-use and maximize the volume of water it takes, as is allowable, while protecting instream flows for fish	• Biological Resources • Hydrology-Water Quality • Construction Traffic	Unknown
12	Aquifer Storage and Recovery	Potential future construction of pipelines to Soquel Water District and Scotts Valley for possible conveyance of excess surface waters for groundwater storage and future recovery and distribution	• Biological Resources • Hydrology-Water Quality • Construction Traffic	2025

TABLE CONTINUED ON NEXT PAGE

Table 4-1: Cumulative Projects

	Project Name (Proponent or Proponent and Lead Agency)*	Project Description	Potential Cumulative Impact Topics	Estimated Construction Schedule
13	Habitat Conservation Plans (HCPs)	Preparation of HCPs for potential incidental take of listed species	None	2020
County of Santa Cruz Water Department				
14	Felton Library Project	Construct an approximate 9,700 square foot library building	None	2018-2020
15	Quail Hollow Ranch County Park Master Plan Amendment	Master Plan amendment for new trails, habitat restoration and signage	None	Unknown
City of Scotts Valley Planning Department				
16	Bay Photo Apartments	Conversion of an existing 92-space parking lot into a multi-family development. The proposed project consists of two buildings totaling 19 apartment units, and associated parking and site improvements.	• Construction Traffic	Unknown; project revisions pending
17	Dunslee Way Planned Development	Construction of a 5,000-square-foot commercial building and 25 residential townhouses on a vacant parcel at the corner of Scotts Valley Drive and Dunslee Way.	• Construction Traffic	Project approved in December 2016
18	The Terrace at Scotts Valley	Construction of 19 townhomes on the southeast side of Scotts Valley Drive near the Mt. Hermon Road intersection.	None	Construction commenced in May 2018
City of Santa Cruz				
19	Ocean Street Extension Residential Project	General Plan Amendment, Zoning Amendment, 32-unit residential condominium/apartment project	• Construction Traffic	Unknown

4.1 IMPACTS NOT FOUND TO BE SIGNIFICANT

CEQA Guidelines Section 15128 requires that an EIR contain a statement briefly indicating the reasons that various possible significant effects of a project were determined not to be significant and were therefore not discussed in detail in the EIR. For this EIR, issues related to aesthetics, agriculture, mineral resources, population and housing, public services and recreation, and utilities and service systems were found not to be significant, as discussed below.

4.1.1 Aesthetics

With regard to potential visual impacts, Appendix G of the CEQA Guidelines considers whether a project would have an adverse effect on a scenic vista, damage scenic resources, degrade existing visual character or quality, or create a new source of light or glare.

Scenic Vistas. No designated scenic vistas are located near the project site. The project site is surrounded by mountainous terrain and dense forested vegetation which obscure public views of the site. The project site is not publicly accessible and does not offer publicly available scenic views. Therefore, the project would have no impact on scenic vistas.

Scenic Resources. No scenic highways are located near the project site. There are no scenic resources on the project site that are visible to the public. Tree removal would occur at the toe of the dam to accommodate a new construction platform and at the eight proposed staging areas; however, the areas would not be publicly visible. As described above, mountainous terrain and surrounding forest obscure views of the project site from publicly accessible areas. Thus, no impact to scenic resources would occur.

Visual Character. The project would not change existing operations at the Newell Creek Dam. Project-related improvements would consist primarily of replacements of below-ground infrastructure, including inlet/outlet works and pipeline. Above-ground improvements would include construction of an approximately 200-square-foot inlet control house on the dam crest, the new outlet structure and spillway plunge pool culvert crossing at the toe of the dam, and improvements along the dam's access roads. Approximately one-half acre at the toe of the dam would be cleared and graded to create the construction platform staging area and site for the new outlet structure and tunnel portal. While this would result in an alteration of a landform, the area is small and not visible from any public locations. The new control houses would be similar in character to the existing control building and would not substantially change the visual character of the site. Similarly, improvements to existing access roads would be similar to the existing visual character and would be consistent with the existing use of the project site as a dam. Some construction staging areas would be used for permanent disposal of excavated soils. These areas would be compacted, contained and revegetated. None of the project areas are visible from off-site public locations. As such, the project would not degrade existing visual character or quality of the site and no impact would occur.

Light and Glare. The project would continue existing operations on the project site and would not create a new source of light or glare. Moreover, views of the project site are not available from off site. Thus, no impact related to light and glare would occur.

4.1.2 Agriculture

With regard to potential impacts to agriculture, Appendix G of the CEQA Guidelines asks whether a project would directly or indirectly result in the conversion of agricultural lands to non-agricultural use, or conflict with existing zoning for agricultural use or with a Williamson Act contract. No farmland or grazing land is located on or near the project site. The project site is not zoned for agricultural use. The project site is mapped as Other Land and Water by the California Department of Conservation, and the surrounding lands are also mapped as Other Land and Water (California Department of Conservation 2016). Additionally, the project site is not within a Williamson Act contract (California Department of Conservation 2015). Therefore, the project would not have any impact on agricultural resources. Forestry resources are discussed in Section 4.5 of this EIR.

4.1.3 Land Use and Planning

With regard to potential land use and planning impacts, the CEQA Appendix G Guidelines focus on whether a proposed project would physically divide an established community; conflict with an applicable land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect; or conflict with an applicable habitat conservation plan (HCP) or natural community conservation plan (NCCP). The proposed Project consists of infrastructure improvements to an existing dam in a rural mountain area. The Project does not include any elements that would result in physical division of an established community.

The Project is located within unincorporated Santa Cruz County, and the Santa Cruz County General Plan land use designations for the site are Lake, Reservoir, Lagoon (O-L) and Resource Conservation (O-C). The project site is zoned Timber Production (TP) which allows growing and harvesting of timber and other forest products, agriculture, and one single-family dwelling per existing parcel of record. However, the City is exempt from County zoning ordinance and building code requirements pursuant to state law. California Government Code section 53091(d) and (e), which provides that facilities for the production, generation, storage, treatment, or transmission of water supplies are exempt from local zoning and building ordinances. Furthermore, the Project would not result in a change or expansion of the existing use.

Implementation of the project would support the City's continued ability to deliver drinking water to its customers from the existing Loch Lomond Reservoir. There are no policies in the City's General Plan applicable to the Project. Therefore, the Project would not result in conflicts with existing policies or regulations.

While the City is in the process of developing HCPs for City operations, they have not yet been completed or adopted. At this time, no HCPs or NCCPs encompass the project site.

Given the above, the project would have no impacts related to land use and planning.

4.1.4 Mineral Resources

The CEQA Appendix G Guidelines consider that a project would have potential impacts on mineral resources if it would result in the loss of availability of a known mineral resource or locally important mineral resource recovery site. The California Geological Survey is responsible for classifying land into Mineral Resource Zones (MRZs) under the Surface Mining Control and Reclamation Act. The mineral lands classification of the project site is MRZ-4. Areas classified MRZ-4 are areas where available information is inadequate for assignment to any other MRZ category (California Department of Conservation 1987). The MRZ-4 classification does not imply that there is little likelihood for the presence of mineral resources, but rather there is a lack of knowledge regarding mineral occurrence (California Department of Conservation 1999). Nevertheless, there are no known available mineral resources or locally important mineral resource recovery sites delineated in the project area. Thus, the project would have no impact on known or locally important mineral resources.

4.1.5 Population and Housing

The CEQA Appendix G Guidelines related to potential population and housing impacts ask whether a project would either directly or indirectly induce substantial population growth, or displace substantial numbers of existing housing or people. The proposed project would consist of replacement of existing infrastructure and associated improvements at the existing Newell Creek Dam. No residential land uses are located on the project site and the project would not include any new residential land uses or displace existing housing or people. The project would not generate new employment, extend roads or other infrastructure, or procure additional water supplies which could result in indirect population growth. As such, the project would have no impact on population and housing.

4.1.6 Public Services and Recreation

Fire, Police, Schools, and Other Public Facilities. With regard to potential public services impacts, the CEQA Appendix G Guidelines focus on whether a proposed project would result in substantial adverse physical impacts associated with the provision of, or need for, new or physically altered governmental facilities, including fire protection, police protection, schools, parks, and other public facilities, in order to meet acceptable performance objectives. The project would not include any new land uses that would generate new demand for public services. As described above in Section 4.1.4, no new residences or businesses are proposed; therefore, the project would not

result in an increase in population or employees on site. Therefore, the project would have no impact on public services.

Parks and Recreational Facilities. With regard to potential park or recreation impacts, the CEQA Appendix G Guidelines focus on whether a project would include new or expanded recreational facilities that may have a significant effect on the environment, or whether a project would increase the use of existing recreational facilities such that deterioration of the facilities would be accelerated. The project would not involve the construction of parks or recreational facilities and would not create a need for the expansion or addition of recreational facilities. The project would not include any new residences or businesses; therefore, no increase in population that would generate increased demand for or use of parks and recreational facilities would occur as a result of the project. Therefore, the project would have no impact on parks and recreational facilities.

4.1.7 Utilities and Service Systems

The CEQA Appendix G Guidelines consider potential impacts to utilities to be significant if a project would exceed wastewater treatment requirements; require or result in construction of new water, wastewater, or stormwater facilities or expansion of existing facilities; have insufficient water supplies or wastewater treatment capacity to serve the project; have insufficient landfill capacity to accommodate the project's solid waste disposal needs; or violate regulations related to solid waste. The project would involve replacement and improvements to existing water supply facilities and infrastructure. The proposed project would not increase demand for utilities and service systems, including wastewater treatment or stormwater facilities.

Construction activities would generate solid waste. Excavation during project construction would generate spoils, the majority of which would be reused on the project site as fill material. It is estimated that approximately 8,900 cubic yards of spoils may require off-site disposal. Spoils that could not be accommodated on the project site would either be used as fill for other construction projects in the area or would be hauled to a landfill. Since the City is the owner of the property and Project sponsor, any offsite disposal would be at the City's Resource Recovery Facility (landfill), located approximately 20 miles from the Project site. Based on the most recent facility capacity evaluation in August 2010, the City of Santa Cruz Resource Recovery Facility had a remaining capacity of approximately seven million cubic yards and an estimated closure date of January 2058 (CalRecycle 2018). Given this, the City's landfill would have adequate capacity to serve the project and impacts would be less than significant.

4.1.8 References

California Department of Conservation. 1987. *Mineral Land Classification: Aggregate Materials in the San Francisco-Monterey Bay Area*. Special Report 146, Part IV. Accessed September 6, 2018 at ftp://ftp.consrv.ca.gov/pub/dmg/pubs/sr/SR_146-4/SR_146-4_Text.pdf.

California Department of Conservation. 1999. *Guidelines for Classification and Designation of Mineral Lands*. Accessed September 6, 2018 at http://www.conservation.ca.gov/smgb/guidelines/documents/classdesig.pdf.

California Department of Conservation. 2015. Santa Cruz County Williamson Act FY 2015/2016. Division of Land Resource Protection. Accessed September 5, 2018 at ftp://ftp.consrv.ca.gov/pub/dlrp/wa/SantaCruz_15_16_WA.pdf.

California Department of Conservation. 2016. California Important Farmland Finder. Web Map Application. Accessed September 5, 2018 at https://maps.conservation.ca.gov/dlrp/ciff/.

CalRecycle. 2018. SWIS Facility Detail: City of Santa Cruz Resource Recovery Center (44-AA-0001). Accessed September 12, 2018 at https://www2.calrecycle.ca.gov/SWFacilities/Directory/44-AA-0001/Detail/.

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4.2 AIR QUALITY AND GREENHOUSE GAS EMISSIONS

This section analyzes impacts of the proposed Newell Creek Dam Inlet/Outlet Replacement Project (Project) related to Project air emissions, including greenhouse gas (GHG) emissions, based on air quality modeling conducted as part of the preparation of this EIR. The results of the air modeling are summarized in this section, and are included in Appendix D. The section describes federal, state, and local regulations related to air quality and applicable to the Project. Existing conditions in the study area are described.

4.2.1 Environmental Setting

Regulatory Setting

Air quality within the Monterey Bay region is addressed through the efforts of various federal, state, regional, and local government agencies. These agencies, as discussed below, work jointly, as well as individually, to improve air quality through legislation, regulations, planning, policy making, education, and a variety of programs.

Criteria Air Pollutants

Criteria air pollutants are defined as pollutants for which the United States Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) have established ambient air quality standards, or criteria, for outdoor concentrations to protect public health. The standards identify levels of "criteria pollutants" that are regarded as the maximum levels of ambient (background) air pollutants considered to have an adequate margin of safety necessary to protect the public health and welfare. The standards are designed to protect the most sensitive people from illness or discomfort. Criteria pollutants include ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), coarse particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and lead. In California, sulfates (SO_4), hydrogen sulfide (H_2S), vinyl chloride, and visibility-reducing particles are also regulated as criteria air pollutants. An area is designated as "in attainment" when it is in compliance with the federal and/or state standards as further discussed below.

Federal. The federal Clean Air Act (FCAA), passed in 1970 and last amended in 1990, forms the basis for the national air pollution control effort. The EPA is responsible for implementing most aspects of the FCAA, including setting National Ambient Air Quality Standards (NAAQS) for criteria air pollutants; setting hazardous air pollutant standards; approving state attainment plans; setting motor vehicle emissions standards; issuing stationary source emissions standards and permits; and establishing acid rain control measures, stratospheric O_3 protection measures, and enforcement provisions.

The NAAQS describe acceptable air quality conditions designed to protect the health and welfare of citizens of the nation. The NAAQS (other than for O_3, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and those based on annual averages or arithmetic mean) are not to be exceeded more than once per year. NAAQS for O_3, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ are based on statistical calculations over 1- to 3-year periods, depending on the pollutant. The FCAA requires the EPA to reassess the NAAQS at least every five years to determine whether adopted standards are adequate to protect public health based on current scientific evidence. States with areas that exceed the NAAQS must prepare a state implementation plan that demonstrates how those areas will attain the standards within mandated time frames.

State. The FCAA delegates the regulation of air pollution control and the enforcement of the NAAQS to the states. The CARB, a department of the California Environmental Protection Agency (CalEPA), oversees air quality planning and control throughout California. Its responsibility lies with ensuring compliance with the California Clean Air Act (CCAA) and its amendments, as well as responding to the FCAA requirements and regulating emissions from motor vehicles sold in California. It also sets fuel specifications to further reduce vehicular emissions. CARB establishes the California Ambient Air Quality Standards (CAAQs), pursuant to the CCAA, which are generally more restrictive than the NAAQS. These standards apply to the same criteria pollutants as the FCAA and also include SO_4, H_2S, visibility reducing particles, and vinyl chloride.

The CAAQs describe adverse conditions; pollution levels must be below these standards before an air basin can attain the standard. Air quality is considered "in attainment" if pollutant levels are continuously below the CAAQs and violate the standards no more than once each year. The CAAQs for O_3, CO, SO_2 (1-hour and 24-hour), NO_2, PM_{10}, $PM_{2.5}$, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded.

Regional. Regulatory oversight for air quality in the North Central Coast Air Basin (NCCAB) in which the City of Santa Cruz is located, rests at the regional level with the Monterey Bay Air Resources District (MBARD), formerly the Monterey Bay Unified Air Pollution Control District (MBUAPCD),[1] the CARB at the state level, and the EPA Region IX office at the federal level. The MBARD is one of 35 air districts established to protect air quality in California. The NCCAB is comprised of Santa Cruz, Monterey, and San Benito Counties. The MBARD has primary responsibility for local air quality by controlling air pollution from stationary sources of air pollution. The District has adopted a number of rules affecting both stationary and area-wide sources of emissions for the purpose of achieving the state and federal ambient air quality standard (AAQS) for O_3.

The CCAA requires each nonattainment district in the state to adopt a plan showing how the CAAQS for O_3 would be met with subsequent updates every three years. The MBARD adopted its first Air Quality Management Plan (AQMP) in 1991. The most recently adopted plan is the *2012-2015 AQMP* (Monterey Bay Air Resources District, March 2017).

[1] The District has changed its name to the Monterey Bay Air Resources District (MBARD). In this report, references to agency publications or guidance that predate the official name change use MBUAPCD.

Toxic Air Pollutants

A substance is considered toxic if it has the potential to cause adverse health effects in humans, including increasing the risk of cancer upon exposure or acute and/or chronic non-cancer health effects. A toxic substance released into the air is considered a toxic air contaminant (TAC). TACs are identified by federal and state agencies based on a review of available scientific evidence. Examples include certain aromatic and chlorinated hydrocarbons, certain metals, and asbestos. TACs are generated by a number of sources, including stationary sources such as dry cleaners, gas stations, combustion sources, and laboratories; mobile sources such as automobiles; and area sources such as landfills. Adverse health effects associated with exposure to TACs may include carcinogenic (i.e., cancer-causing) and noncarcinogenic effects. Noncarcinogenic effects typically affect one or more target organ systems and may be experienced from short-term (acute) or long-term (chronic) exposure to a given TAC.

Federal. At the federal level, TACs are identified as Hazardous Air Pollutants (HAPs). The 1977 FCAA amendments required the EPA to identify National Emission Standards for Hazardous Air Pollutants (NESHAPS) to protect public health and welfare. HAPs include certain volatile organic chemicals, pesticides, herbicides, and radionuclides that present a tangible hazard based on scientific studies of exposure to humans and other mammals. Under the 1990 FCAA Amendments, which expanded the control program for HAPs, 189 substances and chemical families were identified as HAPs.

State. The state Air Toxics Program was established in 1983. The California TAC list identifies more than 700 pollutants, of which carcinogenic and non-carcinogenic toxicity criteria have been established for a subset of these pollutants pursuant to the California Health and Safety Code. The state list includes the federal HAPs. The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588) seeks to identify and evaluate risk from air toxics sources; however, AB 2588 does not regulate air toxics emissions. TAC emissions from individual facilities are quantified and prioritized. "High-priority" facilities are required to perform a health risk assessment, and if specific thresholds are exceeded, are required to communicate the results to the public in the form of notices and public meetings.

Diesel particulate matter (DPM) was identified as a TAC by the state of California in 1998. The CARB developed a comprehensive strategy to control DPM emissions. In 2000, CARB approved a Diesel Risk Reduction Plan to reduce diesel emissions from new and existing diesel-fueled vehicles and engines. The regulation is anticipated to result in an 80 percent decrease in statewide diesel health risk by 2020 compared with to the diesel risk in 2000 (CARB 2000). Additional regulations apply to new trucks and diesel fuel, including the On-Road Heavy Duty Diesel Vehicle (In-Use) Regulation, the On-Road Heavy Duty (New) Vehicle Program, and the In Use Off-Road Diesel Vehicle Regulation, and the New Off-Road Compression-Ignition (Diesel) Engines and Equipment program. All of these regulations and programs have timetables by

which manufacturers must comply and existing operators must upgrade their diesel powered equipment.

Regional. Air quality control agencies, including the MBARD, must incorporate air toxics control measures into their regulatory programs or adopt equally stringent control measures as rules within six months of adoption by CARB. The MBARD also regulates TACs from new or modified sources under Rule 1000, a Board-approved protocol that applies to any source which requires a permit to construct or operate pursuant to MBARD regulations and has the potential to emit carcinogenic or noncarcinogenic TACs. The MBARD's Rule 1000 also requires sources of carcinogenic TACs to install best control technology and reduce cancer risk to less than one incident per 100,000 population. Sources of noncarcinogenic TACs must apply reasonable control technology. The MBARD also implements Rule 1003, Air Toxic Emissions Inventory and Risk Assessments, which establishes and implements the Air Toxics Hot Spots Act. Rule 1003 also requires that any increased cancer risk resulting from an existing facility's emissions is less than one incident per 100,000 population (Monterey Bay Unified Air Pollution Control District, February 2008).

Study Area

Regional Setting and Climate

The Project study area is located in an unincorporated area of Santa Cruz County within the San Lorenzo Valley, which is located within the NCCAB. The NCCAB, which is just south of the San Francisco Bay Area Air Basin, covers an area of 5,159 square miles and consists of the counties of Santa Cruz, San Benito, and Monterey. Topography and meteorology heavily influence air quality. The northwest sector of the basin is dominated by the Santa Cruz Mountains, which exert a strong influence on atmospheric circulation, which results in generally good air quality. Small inland valleys such as Scotts Valley with low mountains on two sides have poorer circulation than at Santa Cruz on the coastal plain (Monterey Bay Unified Air Pollution Control District, February 2008).

The semi-permanent high pressure cell in the eastern Pacific is the basic controlling factor in the climate of the NCCAB. In the summer, the high pressure cell is dominant and causes persistent west and northwest winds over the entire California coast. Air descends in the Pacific High, forming a stable temperature inversion of hot air over a cool coastal layer of air. The onshore air currents pass over cool ocean waters to bring fog and relatively cool air into the coastal valleys. The warmer air aloft acts as a lid to inhibit vertical air movement (Monterey Bay Unified Air Pollution Control District, February 2008).

Sensitive Receptors

The MBARD's *CEQA Guidelines* (Guidelines) defines a sensitive receptor generically as any residence including private homes, condominiums, apartments, and living quarters; educational

facilities such as preschools and kindergarten through grade twelve (K-12) schools; daycare centers; and health care facilities such as hospitals or retirement and nursing homes. Sensitive receptors include long-term care hospitals, hospices, prisons, and dormitories or similar live-in housing. The MBARD's Guidelines indicate that identification of sensitive receptors in the vicinity of a project site should be determined as part of the CEQA review with an analysis of whether a project would expose sensitive receptors to significant amounts of pollution. Rural residential land uses exist in the vicinity of the Project, with the nearest occupied residence being approximately 1,900 feet from the crest of the dam.

Effects of Air Pollutants

Criteria air pollutants are defined as pollutants for which the federal and state governments have established AAQS, or criteria, for outdoor concentrations to protect public health. The federal and state standards have been set, with an adequate margin of safety, at levels above which concentrations could be harmful to human health and welfare. Effects of the pollutants of primary concern are discussed in the following paragraphs.

Ozone, the primary constituent of smog, is not directly emitted but is formed in the atmosphere over several hours from combinations of various precursors in the presence of sunlight. Nitrogen oxides (NO_x) and reactive organic gases (ROGs, also termed volatile organic compounds or VOCs) are considered to be the primary compounds, or precursors, contributing to the formation of ozone. Ozone is viewed as both a secondary pollutant and a regional pollutant. The primary sources of ROG within the planning area are on- and off-road motor vehicles, cleaning and surface coatings, solvent evaporation, landfills, petroleum production and marketing, and prescribed burning. The primary sources of NOx in the NCCAB are on- and off-road motor vehicles and stationary source fuel combustion (Monterey Bay Air Resources District, March 2017). Short-term exposure to O_3 results in injury and damage to the lung, decreases in pulmonary function, and impairment of immune mechanisms (Monterey Bay Unified Air Pollution Control District, February 2008).

Coarse particulates refer to particulate matter less than 10 microns in diameter (PM_{10}). In 1997, EPA adopted a fine particulate matter standard of 2.5 microns or less in diameter ($PM_{2.5}$), and CARB adopted an annual $PM_{2.5}$ standard in 2002. PM_{10} and $PM_{2.5}$ are respirable particulate matter that are classified as primary or secondary depending on their origin. Primary particles are unchanged after being directly emitted (e.g., road dust) and are the most commonly analyzed and modeled form of PM_{10}. Because it is emitted directly and has limited dispersion characteristics, this type of PM_{10} is considered a localized pollutant. In addition, secondary PM_{10} can be formed in the atmosphere through atmospheric chemical and photochemical reactions.

PM_{10} and $PM_{2.5}$ are respirable particulate matter and because of their small size, they can be inhaled deep into the lungs and are therefore a health concern. Key health effects categories associated with PM include: premature mortality; aggravation of respiratory and cardiovascular

disease; changes in lung function and increased respiratory symptoms; and altered respiratory defense mechanisms (Monterey Bay Unified Air Pollution Control District, February 2008).

Carbon monoxide (CO) is an odorless, colorless gas that is emitted by mobile and stationary sources as a result of incomplete combustion of hydrocarbons or other carbon-based fuels. Because it is directly emitted from combustion engines, CO can have adverse localized impacts, primarily in areas of heavy traffic congestion. Because it is emitted directly and has limited dispersion characteristics, CO is considered a localized pollutant (Monterey Bay Unified Air Pollution Control District, February 2008).

When CO combines with hemoglobin in the blood, the oxygen-carrying capacity of the blood is reduced and the release of oxygen is inhibited or slowed. This condition puts the following at risk: patients with angina, persons with other cardiovascular diseases, chronic obstructive lung disease, or asthma; persons with anemia, and fetuses. At higher levels, CO also affects the central nervous system. Symptoms of exposure may include headaches, dizziness, sleepiness, nausea, vomiting, confusion, and disorientation (Monterey Bay Unified Air Pollution Control District, February 2008). At high concentrations, CO can reduce the oxygen-carrying capacity of the blood and cause unconsciousness and death.

Existing Air Quality Conditions

Ambient Air Quality Standards

As indicated above, AAQS are set to establish levels of air quality that must be maintained to protect the public from the adverse effects of air pollution. State standards are established to protect public health, including the most sensitive members of the population. National standards include a primary standard to protect public health and a secondary standard to protect the public welfare including property, vegetation, and visibility. As indicated above, the federal and state governments have established AAQS for six criteria pollutants: ozone, CO, NO_2, SO_2, PM_{10}, PM_{25}, and lead. State standards also include SO_4, H_2S, visibility reducing particles, and vinyl chloride.

Local Ambient Air Quality and Attainment Status

Ambient air quality is monitored at nine stations within the NCCAB. The network includes seven stations operated by the MBARD and one station operated by the National Park Service at the Pinnacles National Monument. The monitoring stations operated by the MBARD are part of the State and Local Air Monitoring Systems (SLAMS) network, and are located in Santa Cruz, Scotts Valley, Felton, Hollister, Carmel Valley, Salinas, King City, and the Pinnacles National Monument. The MBARD also carries out wood smoke monitoring as needed, including seasonal monitoring of wood stove use in areas like the San Lorenzo Valley area in Santa Cruz County, large controlled burns such as those conducted at Fort Ord and some of those conducted for agricultural management, and for catastrophic events such as large structural fires and wildfires.

Designations in relation to state standards are made by the CARB, while designations in relation to national standards are made by the EPA. State designations are updated annually, while the national designations are updated either when the standards change or when an area requests re-designation due to changes in air quality. Designations are made according to air basin, and in some cases designations are made at the county level. Designations are made for each criteria pollutant according to the categories listed below. Nonattainment designations are of most concern because they indicate that unhealthy levels of the pollutant exist in the area, which typically triggers a need to develop a plan to achieve the applicable standards.

- **Attainment** – Air quality in the area meets the standard.
- **Nonattainment Transitional** – Air quality is approaching the standard (State only).
- **Nonattainment** – Air quality in the area fails to meet the applicable standard.
- **Unclassified** – Insufficient data to designate area, or designations have yet to be made.

Table 4.2-1 summarizes the attainment status for criteria pollutants in the NCCAB. In summary, the NCCAB is designated as a nonattainment area for the state O_3 and PM_{10} standards. The NCCAB is designated as unclassified or attainment for all other state and federal standards (California Air Resources Board, October 2017; U.S. Environmental Protection Agency, June 2018).

CO emissions are generated by motor vehicles from traffic. Congested intersections with a large volume of traffic have the greatest potential to cause high-localized concentrations of carbon monoxide. Air pollutant monitoring data indicate that CO levels have been at healthy levels (i.e., below state and federal standards) for years, reflecting improvements in tailpipe emissions controls. As a result, the region has been designated as attainment/unclassified for the standard. Ambient air quality monitoring at a station in Santa Cruz measured CO concentrations and found that highest measured level over any eight-hour averaging period during the last three years is less than 1.0 parts per million (ppm), compared to the ambient air quality standard of 9.0 ppm (City of Santa Cruz, April 2012, DEIR volume).

Odors

Odors represent emissions of one or more pollutants that are a nuisance to healthy persons and may trigger asthma episodes in people with sensitive airways. Pollutants associated with objectionable odors include sulfur compounds and methane. Typical sources of odors include landfills, rendering plants, chemical plants, agricultural uses, wastewater treatment plants, and refineries. Odors are a complex problem that can be caused by minute quantities of substances (Monterey Bay Unified Air Pollution Control District, February 2008). Because people have mixed reactions to odors, the nuisance level of an odor varies. There are no known sources of objectionable odors in the vicinity of the proposed Project.

TABLE 4.2-1: North Central Coast Air Basin Attainment Classification

Pollutant	Averaging Time	Designation/Classification
Federal Standards		
O_3	8 hours	Unclassifiable/Attainment
NO_2	1 hour, annual arithmetic mean	Unclassifiable/Attainment
CO	1 hour; 8 hours	Unclassifiable/Attainment
SO_2	24 hours; annual arithmetic mean	Unclassifiable/Attainment
PM_{10}	24 hours	Unclassifiable/Attainment
$PM_{2.5}$	24 hours; annual arithmetic mean	Unclassifiable/Attainment
Lead	Quarter; 3-month average	Unclassifiable/Attainment
State Standards		
O_3	1 hour; 8 hours	Nonattainment (Transitional)[a]
NO_2	1 hour; annual arithmetic mean	Attainment
CO	1 hour; 8 hours	Monterey Co. – Attainment
		San Benito Co. – Unclassified
		Santa Cruz Co. – Unclassified
SO_2	1 hour; 24 hours	Attainment
PM_{10}	24 hours; annual arithmetic mean	Nonattainment
$PM_{2.5}$	Annual arithmetic mean	Attainment
Lead[b]	30-day average	Attainment
SO_4	24 hours	Attainment
H_2S	1 hour	Unclassified
Vinyl chloride[b]	24 hours	No designation
Visibility-reducing particles	8 hours (10:00 a.m.–6:00 p.m.)	Unclassified

Sources: CARB 2017a; EPA 2018.

Notes: CO = carbon monoxide; H_2S = hydrogen sulfide; NO_2 = nitrogen dioxide; O_3 = ozone; PM_{10} = coarse particulate matter; $PM_{2.5}$ = fine particulate matter; SO_2 = sulfur dioxide; SO_4 = sulfates

[a] Nonattainment-transitional is a subcategory of the nonattainment designation category for state standards that indicates that the area is nearing attainment.

[b] CARB has identified lead and vinyl chloride as TACs with no threshold level of exposure for adverse health effects determined.

Air Basin Plans

Air Quality Management Plan

The 1991 AQMP for the Monterey Bay Area was the first plan prepared in response to the CCAA of 1988 that established specific planning requirements to meet the O_3 standard. The Act requires that the AQMP be updated every three years. The most recent update is the *2012-2015 AQMP*, which was adopted in March 2017, and is an update to the elements included in the 2012 AQMP. The primary elements updated from the 2012 AQMP include the air quality trends analysis, emission inventory, and mobile source programs.

The NCCAB is a nonattainment area for the CAAQS for both O_3 and PM_{10}. The AQMP addresses only attainment of the O_3 CAAQS. Attainment of the PM_{10} CAAQS is addressed in the MBARD's Particulate Plan, which was adopted in December 2005 and is summarized further below. Maintenance of the 8-hour NAAQS for O_3 is addressed in the District's "Federal Maintenance Plan for the Monterey Bay Region," which was adopted in March 2007 and also is summarized below.

A review of the air monitoring data for 2013-2015 indicates that there were fewer exceedance days compared to previous periods (Monterey Bay Air Resources District, March 2017). The long-term trend shows progress has been made toward achieving O_3 standards. The number of exceedance days has continued to decline during the past 10 years despite population increases (Ibid.).

The MBARD's *2012-2015 AQMP* identifies a continued trend of declining O_3 emissions in the NCCAB primarily related to lower vehicle miles traveled. Therefore, the MBARD determined progress was continuing to be made toward attaining the 8-hour O_3 standard during the three-year period reviewed (Monterey Bay Air Resources District, March 2017).

Federal Maintenance Plan

The "Federal Maintenance Plan" (May 2007) presents the strategy for maintaining the NAAQS for O_3 in the NCCAB. It is an update to the 1994 Federal Maintenance Plan, which was prepared for maintaining the 1-hour NAAQS for O_3 that since has been revoked and is superseded by the current 8-hour O_3 standard. Effective June 15, 2004, the U.S. EPA designated the NCCAB as an attainment area for the 8-hour NAAQS for O_3. The plan includes an emission inventory for the years 1990 to 2030 for VOC and NO_X, the two primary O_3 precursor gases, as explained above. A contingency plan is included to ensure that any future violation of the standard is promptly corrected (Monterey Bay Unified Air Pollution Control District, May 2007).

Particulate Matter Plan

The purpose of the "Particulate Matter Plan" (December 2005) is to fulfill the requirements of Senate Bill 655, which was approved by the California Legislature in 2003 with the objective of reducing public exposure to particulate matter. The legislation requires CARB, in conjunction with local air pollution control districts, to adopt a list of the most readily available, feasible, and cost-effective control measures that could be implemented by air pollution control districts to reduce ambient levels of particulate matter in their air basins (Monterey Bay Unified Air Pollution Control District, December 2005). The Plan's proposed activities include control measures for fugitive dust, public education, administrative functions, and continued enhancements to the MBARD's Smoke Management and emission reduction incentive programs.

Climate Change

Climate change refers to any significant change in measures of climate, such as average temperature, precipitation, or wind patterns over a period of time. Climate change may result from natural factors, natural processes, and human activities that change the composition of the atmosphere and alter the surface and features of the land. Significant changes in global climate patterns recently have been associated with global warming, an average increase in the temperature of the atmosphere near the Earth's surface, attributed to accumulation of GHG emissions in the atmosphere. GHGs trap heat in the atmosphere, which in turn heats the surface of the Earth. Some GHGs occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities. Climate change models predict changes in temperature, precipitation patterns, water availability, and rising sea levels, and these altered conditions can have impacts on natural and human systems in California that can affect California's public health, habitats, ocean and coastal resources, water supplies, agriculture, forestry, and energy use.

Greenhouse Gas Emissions

GHGs include, but are not limited to, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), O_3, fluorinated gases (hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6) and nitrogen trifluoride (NF_3)), chlorofluorocarbons (CFCs), and hydrochlorofluorocarbons (HCFCs), in addition to water vapor.[2] Some GHGs, such as CO_2, CH_4, and N_2O, occur naturally and are emitted to the atmosphere through natural processes and human activities. Of these gases, CO_2 and CH_4 are emitted in the greatest quantities from human activities. Some industrial gases are also GHGs that have a much greater heat-absorption potential than CO_2, include fluorinated gases, such as HFCs, PFCs, and SF_6, which are associated with certain industrial products and processes.

Per the U.S. EPA *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2016* (U.S. Environmental Protection Agency, April 2018), total U.S. GHG emissions were approximately 6,511.3 million metric tons (MMT) CO_2e[3] in 2016. The primary GHG emitted by human activities in the United States was CO_2, which represented approximately 81.6% of total GHG emissions (5,310.9 MMT CO_2e). The largest source of CO_2, and of overall GHG emissions, was fossil-fuel combustion, which accounted for approximately 93.5% of CO_2 emissions in 2016 (4,966.0 MMT CO_2e). Relative to 1990, gross United States GHG emissions in 2016 are higher by 2.4%, down from a high of 15.7% above 1990 levels in 2007. GHG emissions decreased from 2015 to 2016 by 1.9% (126.8 MMT CO_2e), and, overall, net emissions in 2016 were 11.1% below 2005 levels (Ibid.).

[2] California Health and Safety Code 38505 identifies seven GHGs that CARB is responsible to monitor and regulate to reduce emissions: CO_2, CH_4, N_2O, SF_6, HFCs, PFCs, and NF_3.

[3] The Intergovernmental Panel on Climate Change (IPCC) developed the Global Warming Potential (GWP) concept to compare the ability of each greenhouse gas to trap heat in the atmosphere relative to another gas. The reference gas used is CO_2, and GWP weighted emissions are measured in teragrams (or million metric tons) of CO_2 equivalent (Tg CO_2e). A million metric tons of CO_2 equivalent also is referenced as $MMTCO_2e$ (City of Santa Cruz, April 2012, DEIR volume).

According to California's 2000–2016 GHG emissions inventory (2018 edition), California emitted 429.40 MMT CO_2e in 2016, including emissions resulting from out-of-state electrical generation (California Air Resources Board, June 2018). The sources of GHG emissions in California include transportation, industrial uses, electric power production from both in-state and out-of-state sources, commercial and residential uses, agriculture, high global warming potential (GWP) substances, and recycling and waste. Between 2000 and 2016, per capita GHG emissions in California have dropped from a peak of 14.0 MT per person in 2001 to 10.8 MT per person in 2016, representing a 23% decrease. In addition, total GHG emissions in 2016 were approximately 12 MMT CO_2e less than 2015 emissions. The declining trend in GHG emissions, coupled with programs that will continue to provide additional GHG reductions going forward, demonstrates that California will continue to reduce emissions below the 2020 target of 431 MT CO_2e (Ibid.).

California Regulations and Plans

The State of California passed the Global Warming Solutions Act of 2006 (AB 32), which requires reduction of GHG emissions generated within California. The Governor's Executive Order S-3-05 and AB 32 (Health and Safety Code, Section 38501 et seq.) both seek to achieve 1990 emissions levels by the year 2020. Executive Order (EO) S-3-05 further requires that California's GHG emissions be 80 percent below 1990 levels by the year 2050. Senate Bill (SB) 32 requires the CARB to ensure that statewide GHG emissions are reduced to 40 percent below 1990 levels by 2030.

In 2007 the CARB approved a statewide limit on the GHG emissions level for year 2020 consistent with the determined 1990 baseline (427 MMT CO_2e). In 2008, the CARB adopted the *Climate Change Scoping Plan: A Framework for Change* (*Scoping Plan*) in accordance with Health and Safety Code Section 38561. The *Scoping Plan* establishes an overall framework for the measures that will be adopted to reduce California's GHG emissions for various emission sources/sectors to 1990 levels by 2020. CARB determined that achieving the 1990 emissions level in 2020 would require a reduction in GHG emissions of approximately 28.5 percent from the otherwise projected 2020 emissions level; i.e., those emissions that would occur in 2020, absent GHG-reducing laws and regulations (referred to as "Business-As-Usual" [BAU]).

The Scoping Plan identified 18 emissions-reduction measures that address cap-and-trade programs, vehicle gas standards, energy efficiency, low carbon fuel standards, renewable energy, regional transportation-related greenhouse gas targets, vehicle efficiency measures, goods movement, solar roofs program, industrial emissions, high speed rail, green building strategy, recycling, sustainable forests, water, and air. The key elements of the Scoping Plan include the following:

1. Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
2. Achieving a statewide renewable energy mix of 33 percent;

3. Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system and caps sources contributing 85 percent of California's GHG emissions;
4. Establishing targets for transportation-related GHG emissions for regions throughout California, and pursuing policies and incentives to achieve those targets;
5. Adopting and implementing measures pursuant to existing state laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard (LCFS 17 Cal. Code Regs. Section 95480 et seq.); and
6. Creating targeted fees, including a public goods charge on water use, fees on high GWP gases, and a fee to fund the administrative costs of the State of California's long-term commitment to AB 32 implementation.

In the 2011 Final Supplement to the *Scoping Plan's* Functional Equivalent Document, the CARB revised its estimates of the projected 2020 emissions level in light of the economic recession and the availability of updated information about GHG reduction regulations. Based on the new economic data, the CARB determined that achieving the 1990 emissions level by 2020 would require a reduction in GHG emissions of 21.7 percent (down from 28.5 percent) from the BAU conditions. When the 2020 emissions level projection was updated to account for newly implemented regulatory measures, including Pavley I (model years 2009–2016) and the Renewable Portfolio Standard (12 to 20 percent), the CARB determined that achieving the 1990 emissions level in 2020 would require a reduction in GHG emissions of 16 percent (down from 28.5 percent) from the BAU conditions.

In 2014, the CARB adopted the *First Update to the Climate Change Scoping Plan: Building on the Framework* (*First Update*). The stated purpose is to "highlight California's success to date in reducing its GHG emissions and lay the foundation for establishing a broad framework for continued emission reductions beyond 2020, on the path to 80 percent below 1990 levels by 2050." The *First Update* found that California is on track to meet the 2020 emissions reduction mandate established by AB 32, and noted that California could reduce emissions further by 2030 to levels squarely in line with those needed to stay on track to reduce emissions to 80 percent below 1990 levels by 2050 if the state realizes the expected benefits of existing policy goals.

In conjunction with the *First Update*, the CARB identified "six key focus areas comprising major components of the state's economy to evaluate and describe the larger transformative actions that will be needed to meet the state's more expansive emission reduction needs by 2050." Those six areas are: 1) energy; 2) transportation (vehicles/equipment, sustainable communities, housing, fuels, and infrastructure); 3) agriculture; 4) water; 5) waste management; and, 6) natural and working lands. The *First Update* identifies key recommended actions for each sector that will facilitate achievement of EO S-3-05's 2050 reduction goal. Based on the CARB's research efforts presented in the *First Update*, it has a "strong sense of the mix of technologies needed to reduce emissions through 2050." Those technologies include energy demand reduction through

efficiency and activity changes; large-scale electrification of on-road vehicles, buildings and industrial machinery; decarbonizing electricity and fuel supplies; and, the rapid market penetration of efficient and clean energy technologies.

As part of the *First Update*, the CARB recalculated the state's 1990 emissions level using more recent GWPs identified by the Intergovernmental Panel on Climate Change. Using the recalculated 1990 emissions level (431 MMT CO_2e) and the revised 2020 emissions level projection identified in the 2011 Final Supplement, the CARB determined that achieving the 1990 emissions level by 2020 would require a reduction in GHG emissions of approximately 15 percent (instead of 28.5 percent or 16 percent) from the BAU conditions. The update also recommends that a statewide mid-term target and mid-term and long-term sector targets be established toward meeting the 2050 goal established by EO S-3-05 (i.e., reduce California's GHG emissions to 80 percent below 1990 levels), although no specific recommendations are made. The declining trend in GHG emissions, coupled with programs that will continue to provide additional GHG reductions going forward, demonstrates that California is on track to meet the 2020 target of 431 MMT CO_2e (California Air Resources Board, May 2014).

In November 2017, CARB adopted *California's 2017 Climate Change Scoping Plan Update (2017 Scoping Plan)* (California Air Resources Board, November 2017). The *2017 Scoping Plan* builds on the successful framework established in the initial *Scoping Plan* and *First Update*, while identifying new, technologically feasible and cost-effective strategies that will serve as the framework to achieve the 2030 GHG target and define the state's climate change priorities to 2030 and beyond. The strategies' "known commitments" include implementing renewable energy and energy efficiency, increased stringency of the Low Carbon Fuel Standard, measures identified in the Mobile Source and Freight Strategies, and measures identified in the proposed Short-Lived Climate Pollutant Plan. To fill the gap in additional reductions needed to achieve the 2030 target, it recommends continuing the Cap-and-Trade Program.

For local governments, the *2017 Scoping Plan* replaced the initial Scoping Plan's 15% reduction goal with a recommendation to aim for a community-wide goal of no more than 6 MT CO_2e per capita by 2030 and no more than 2 MT CO_2e per capita by 2050, which are consistent with the state's long-term goals. These goals are appropriate for the plan level (city, county, subregional, or regional level, as appropriate), but not for specific individual projects because they include all emissions sectors in the State. The *2017 Scoping Plan* recognized the benefits of local government GHG planning (e.g., through climate action plans (CAPs)) and provide more information regarding tools the CARB is working on to support those efforts. It also recognizes the CEQA streamlining provisions for project level review where there is a legally adequate CAP.

The Scoping Plan recommends strategies for implementation at the statewide level to meet the goals of AB 32, SB 32 and EO S-3-05 and establishes an overall framework for the measures that will be adopted to reduce California's GHG emissions. A project is considered consistent with the statutes if it meets the general policies in reducing GHG emissions in order to facilitate the achievement of the state's goals and does not impede attainment of those goals. As discussed in

several cases, a given project need not be in perfect conformity with each and every planning policy or goals to be consistent. A project would be consistent, if it will further the objectives and not obstruct their attainment.

Local Climate Action Plans

City of Santa Cruz. In October 2012, the City adopted a *Climate Action Plan* (CAP) that outlines the actions the City will take over the next 10 years to reduce GHGs by 30 percent and to implement the policies and actions identified in the *General Plan 2030*. The CAP addresses citywide GHG reduction strategies. The CAP provides City emissions inventories, identifies an emissions reduction target for the year 2020, and includes measures to reduce energy use, reduce vehicle trips, implement water conservation programs, reduce emissions from waste collection, increase use of solar systems, and develop public partnerships to aide sustainable practices. Measures are outlined for the following sectors: municipal, residential, commercial, and community programs. None of the recommended measures are applicable to the proposed Project.

County of Santa Cruz. The County of Santa Cruz Board of Supervisors approved the Climate Action Strategy (CAS) on February 26, 2013. The CAS reports the results of the GHG emissions inventory for Santa Cruz County, proposes targets for GHG reduction, outlines strategies and implementing actions to achieve the targets, and provides a vulnerability assessment and strategies for adapting to the types of impacts that are likely to occur in Santa Cruz County. Eight "climate adaptation goals" are articulated as a guide for evaluating adaptation strategies. Specific adaptation strategies are proposed that include new actions as well as acknowledgement of existing plans and programs, which, while not explicitly about climate change, address the salient issues. There are no goals, strategies or recommendations applicable to the proposed Project.

4.2.2 Impacts and Mitigation Measures

Thresholds of Significance

In accordance with the State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies, and/or guidelines; and agency and professional standards, a project impact would be considered significant if the project would:

AIR-1 Conflict with or obstruct implementation of the air quality management plan;

AIR-2 Violate any air quality standards or contribute substantially to an existing or projected air quality violation;

AIR-3 Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);

AIR-4 Expose sensitive receptors (i.e., residents, schools, hospitals) to substantial pollutant concentrations;

AIR-5 Create objectionable odors in substantial concentrations, affecting a substantial number of people, which could result in injury, nuisance, or annoyance to a considerable number of persons, or would endanger the comfort, health, or safety of the public;

AIR-6 Generate GHGs, either directly or indirectly, that may have a significant impact on the environment; or

AIR-7 Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

The MBARD has established thresholds of significance for criteria air pollutants of concern for construction and operations (Monterey Bay Unified Air Pollution Control District, February 2008). For construction, the threshold is 82 pounds per day of PM_{10} (due to construction with minimal earthmoving on 8.1 or more acres per day or grading/excavation site on 2.2 or more acres per day for PM_{10}). For operations, a project would result in a significant impact if it results in the generation of emissions of or in excess of 137 pounds per day for ROG or NO_x, 550 pounds per day of carbon monoxide, 150 pounds per day of sulfur oxides (SO_x), and 82 pounds per day of PM_{10} from on-site sources, pursuant to impact criteria for significance developed by the MBARD (Ibid.). Notably, as of June 2005, the NCCAB met all federal AAQS. As a result, it is no longer subject to federal conformity requirements (Ibid.).

In regards to GHGs, the State CEQA Guidelines do not prescribe specific methodologies for performing a GHG emissions assessment, establish specific thresholds of significance, or mandate specific mitigation measures. Rather, the CEQA Guidelines emphasize the lead agency's discretion to determine the appropriate methodologies and thresholds of significance that are consistent with the manner in which other impact areas are handled in CEQA. Global climate change is a cumulative impact; a project participates in this potential impact through its incremental contribution combined with the cumulative increase of all other sources of GHGs. There are currently no established thresholds for assessing whether the GHG emissions of a project in the NCCAB would be considered a cumulatively considerable contribution to global climate change, except the MBARD has an adopted guideline for stationary source projects in which a project would not have not a significant GHG emissions impact if the project emits less than 10,000 MT/year CO_2e or complies with regulations or requirements adopted to implement a statewide, regional or local plan for the reduction or mitigation of GHG emissions (Monterey Bay Air Resources District, February 2016).

Analytical Method

The proposed Project would entirely replace the Newell Creek Dam (NCD) existing inlet/outlet works in a new location at the Loch Lomond Reservoir (Reservoir) and includes other associated

improvements See Chapter 3, Project Description, for a summary of the Project components, construction schedule, equipment, and phasing.

Construction would involve several phases over an approximate 24-month period. Construction equipment estimates, including daily use during each project phase/sequence, were provided by the City's consulting engineer. The type and amount of equipment used in each construction phase, as well as other construction assumptions, are summarized in Appendix B.

As currently proposed, construction would occur on weekdays with a typical 10-hour work shift. Construction activities would typically occur during normal weekday work hours, generally between the hours of 7 AM and 7 PM with potential work on Saturdays. The City has indicated that there may be occasional work during evening/nighttime periods.

There may be an "accelerated" construction schedule in which some work activities/sequences are scheduled during consecutive evening/nighttime periods to complete a particular phase in a shorter amount of time. Under this scenario, a 16-hour work day is anticipated with two work shifts. The tunnel excavation construction may include 24-hour construction with three 8-hour shifts. If an accelerated construction schedule were to be implemented, there could be a brief overlap of construction workers arriving to and leaving the site. However, the amount of equipment would remain the same, although the duration of use per day would be extended. Construction assumptions with an accelerated schedule are included in Appendix B.

Since the public review period for the Draft EIR, the City and its consulting engineers have clarified that there may situations in which "controlled detonation" would be necessary for portions of the tunnel excavation; see description in Chapter 3, Project Description. It is anticipated that controlled detonation would be considered as an alternative to supplement roadheader excavation where particularly hard rock is encountered or where the equipment is not effective or productive. Controlled detonation is expected to be required in this manner approximately three to six times during the seven to eight months the tunnel is being excavated, but requirements may vary based upon conditions encountered. When utilized, controlled detonation would typically occur twice per day (morning and evening) for a number of consecutive days, with each blast event lasting about 13 seconds.

The air quality analysis used the California Emissions Estimator Model (CalEEMod), which is currently being recommended by the MBARD. The CalEEMod Version 2016.3.2 was used to estimate potential project-generated criterial pollutant and GHG emissions associated with off-road equipment and on-road vehicles. CalEEMod was also used to estimate fugitive dust from earthwork activities. Additionally, the Sacramento Metropolitan Air Quality Management District (SMAQMD) Harborcraft, Dredge, and Barge Emission Factor Calculator (July 2017) was used to estimate exhaust emissions generated by the flat bottom crew boat and the push boat to be used for in-water transportation. Model outputs and assumptions are included in Appendix D.

Regarding operations and maintenance (O & M), activities would include routine inspection and maintenance and are expected to be on the same order of magnitude as the existing facility. As such, operational emissions would be negligible and were not quantified for the Project.

The analysis of the loss of carbon sequestration due to removal of trees uses data derived from the Carbon Online Estimator (COLE) (Van Deusen and Heath 2016). Based on United States Forest Service's Forest Inventory and Analysis (FIA) plot data, COLE calculates carbon stocks (metric tons of carbon per hectare) by forest type for specific geographic areas selected by the user. For this analysis, data from all FIA plots within a 25 kilometer radius of the proposed Project site. Individual forest types represented in the COLE report were matched to forest types included in the proposed Project study area. In instances where forest types did not have a direct match with those included in the COLE report, substitutions or adjustments were made and were based on the forest type descriptions included in Section 4.3 (Biological Resources).

Total non-soil carbon values (sum of carbon contained in forest land biomass consisting of live trees, standing dead trees, understory vegetation, down dead wood, and forest floor litter) from the COLE report for the represented forest types were then calculated and summed to determine carbon content values (metric tons of carbon per hectare) by forest type. These carbon values were then converted to metric tons (MT) CO_2e per hectare based on the following formula:

$$MT\ CO_2e = carbon\ (metric\ tons) * 3.67$$

The 3.67 value included in the conversion formula represents the weight of carbon dioxide (44) divided by the atomic mass of carbon (12) (44/12 = 3.67). The MT CO_2e per hectare value was then converted to MT CO_2e per acre by dividing by 2.471044 (number of acres per hectare). Finally, the MT CO_2e per acre value was multiplied by the impacted forest land acreage totals (presented in Table 4.5-2 in Section 4.5, Forest Resources) to determine proposed Project sequestered carbon impacts.

Impacts and Mitigation Measures

Areas of No Project Impact

AIR-1 *Conflicts with Air Quality Management Plan*. As described in the MBUACPD CEQA Guidelines (2008), project emissions that are not accounted for in the AQMP's emission inventory are considered a significant cumulative impact to regional air quality. However, for construction of a project, exhaust emissions are accounted for in the AQMP emissions inventory (Frisbey, MBARD, personal communication, 2018). As determined in Impact 4.2-1, the proposed Project would result in emissions during short-term construction that would not exceed the MBARD thresholds of significance. Regarding long-term O & M, activities and emissions would be similar to the existing facility. As such, the Project would not conflict with or obstruct implementation of the AQMP.

AIR-7 *Conflicts with GHG Emission Reduction Plans*. With regards to GHG reduction plans, the Scoping Plan, approved by CARB on December 12, 2008, provides a framework for actions to reduce California's GHG emissions and requires CARB and other state agencies to adopt regulations and other initiatives to reduce GHGs. As such, the Scoping Plan is not directly applicable to specific projects. In the Final Statement of Reasons for the Amendments to the CEQA Guidelines, the California Natural Resources Agency (CNRA) observed that "[t]he [Scoping Plan] may not be appropriate for use in determining the significance of individual projects because it is conceptual at this stage and relies on the future development of regulations to implement the strategies identified in the Scoping Plan" (California Natural Resources Agency, 2009). Under the Scoping Plan, however, there are several state regulatory measures aimed at the identification and reduction of GHG emissions. CARB and other state agencies have adopted many of the measures identified in the Scoping Plan. Most of these measures focus on area source emissions (e.g., energy usage, high-GWP GHGs in consumer products) and changes to the vehicle fleet (i.e., hybrid, electric, and more fuel-efficient vehicles) and associated fuels (e.g., LCFS), among others. The Scoping Plan recommends strategies for implementation at the statewide level to meet the goals of AB 32 and establishes an overall framework for the measures that will be adopted to reduce California's GHG emissions. The Project would comply with all applicable regulations adopted in furtherance of the Scoping Plan to the extent required by law.

Regarding consistency with SB 32 (goal of reducing GHG emissions to 40 percent below 1990 levels by 2030) and EO S-3-05 (goal of reducing GHG emissions to 80 percent below 1990 levels by 2050), there are no established protocols or thresholds of significance for that future-year analysis. However, CARB has expressed optimism with regard to both the 2030 and 2050 goals. It states in the *First Update to the Climate Change Scoping Plan* that "California is on track to meet the near-term 2020 GHG emissions limit and is well positioned to maintain and continue reductions beyond 2020 as required by AB 32" (CARB, 2014). With regard to the 2050 target for reducing GHG emissions to 80% below 1990 levels, the *First Update to the Climate Change Scoping Plan* states the following (California Air Resources Board, May 2014):

> "This level of reduction is achievable in California. In fact, if California realizes the expected benefits of existing policy goals (such as 12,000 megawatts of renewable distributed generation by 2020, net zero energy homes after 2020, existing building retrofits under Assembly Bill 758, and others) it could reduce emissions by 2030 to levels squarely in line with those needed in the developed world and to stay on track to reduce emissions to 80% below 1990 levels by 2050. Additional measures, including locally driven measures and those

> necessary to meet federal air quality standards in 2032, could lead to even greater emission reductions."

In other words, CARB believes that the state is on a trajectory to meet the 2030 and 2050 GHG reduction targets set forth in AB 32, SB 32, and EO S-3-05. This is confirmed in *California's 2017 Climate Change Scoping Plan* (*2017 Scoping Plan*), which states, "This Plan draws from the experiences in developing and implementing previous plans to present a path to reaching California's 2030 GHG reduction target. The Plan is a package of economically viable and technologically feasible actions to not just keep California on track to achieve its 2030 target, but stay on track for a low- to zero-carbon economy by involving every part of the state" (California Air Resources Board, November 2017). The *2017 Scoping Plan* also states that although "the Scoping Plan charts the path to achieving the 2030 GHG emissions reduction target, we also need momentum to propel us to the 2050 statewide GHG target (80 percent below 1990 levels). In developing this Scoping Plan, we considered what policies are needed to meet our mid-term and long-term goals" (California Air Resources Board, November 2017).

The Project would not interfere with implementation of any of the above-described GHG reduction goals for 2030 or 2050 because the Project would not exceed the recommended thresholds established based on the goal of AB 32 to reduce statewide GHG emissions to 1990 levels by 2020, as discussed in Impact AIR-6. This provides support for the conclusion that the Project would not impede the state's trajectory toward the above-described statewide GHG reduction goals for 2030 or 2050.

The proposed Project would entirely replace the NCD existing aging inlet/outlet works at the Reservoir, which is the City's primary surface water storage facility for the City's water supply system. Based on this type of project, and since O & M activities would be on the same order of magnitude as the existing facility, the City's Climate Action Plan goals and measures would not apply the Project. Based on the preceding considerations, the proposed Project would not result in conflicts with an applicable plan, policy or regulation adopted for the purpose of reducing GHG emissions.

Impact AIR-2: Criteria Pollutant Emissions. The proposed Project would result in emissions of criteria pollutants, but would not exceed adopted thresholds of significance, violate any air quality standard or contribute substantially to an existing or projected air quality violation. This is a *less-than-significan*t impact.

Construction Emissions

The Project would result in construction-related emissions that could affect air quality by increasing O_3 precursor and particulate matter emissions for an area that already exceeds

CAAQS for these pollutants. Construction activities include excavation, grading, vehicle trips (including workers, deliveries, and soil hauling), and vehicle travel on paved and unpaved surfaces. Vehicle and equipment exhaust would generate pollutant emissions.

Construction of the proposed Project would result in generation of particulate emissions from entrained dust, off-road equipment, and vehicle emissions. Entrained dust results from the exposure of earth surfaces to wind from the direct disturbance and movement of soil, resulting in PM_{10} and $PM_{2.5}$ emissions. Particulate matter emissions can vary daily, depending on various factors, such as the level of activity, type of construction activity taking place, type of equipment in operation, and weather conditions. Internal combustion engines used by construction equipment, vendor and haul trucks, and worker vehicles would result in emissions of O_3 precursors (i.e., ROG and NO_x), CO, PM_{10}, and $PM_{2.5}$. Based on MBARD CEQA Guidelines (2008), ROG and NO_x exhaust emissions from these typical construction activities generally would not result in a significant impact because their emissions are already accounted for in the emissions inventories of the state- and federally-required air plans, and they would not have a significant impact on the attainment and maintenance of the O_3 AAQS.

For construction activities, the MBARD CEQA Guidelines recommends assessing impact significance based on comparing direct emissions of PM_{10} to a threshold of 82 pounds per day (Monterey Bay Unified Air Pollution Control District, February 2008). Maximum daily unmitigated emissions of PM_{10} associated with fugitive dust and exhaust (from on-road vehicles, off-road equipment, and boat operation) for each year of construction are depicted in Table 4.2-2. Emissions of ROG, NO_x, CO, SO_x, and $PM_{2.5}$ are also depicted for disclosure.

TABLE 4.2-2: Maximum Daily Project Construction Emissions

Year	ROG	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
	(pounds per day)					
2021	12.23	126.17	76.41	0.22	18.13	11.46
2022	8.09	64.03	64.33	0.20	3.40	2.73
2023	1.66	12.53	11.46	0.04	1.18	0.62
Maximum Daily	**12.23**	**126.17**	**76.41**	**0.22**	**18.13**	**11.46**
Emission threshold [1]	**N/A**	**N/A**	**N/A**	**N/A**	**82**	**N/A**
Threshold exceeded?	**No**	**No**	**No**	**No**	**No**	**No**

[1] Monterey Bay Unified Air Pollution Control District, February 2008.

Notes: Fugitive dust, on-road vehicle, and off-road equipment emissions were modeled with CalEEMod 2016.3.2, with the maximum of summer or winter values from CalEEMod included above. Crew and push boat emissions would occur in year 2021 (during the Dredge and Drill Shaft phase and the Construct Intake and Air Vent phase) and were modeled with the SMAQMD Harborcraft, Dredge, and Barge Emission Factor Calculator and were added to the CalEEMod values to determine the maximum daily emissions. Totals may not sum exactly due to rounding.

ROG = reactive organic gases; NO_x = oxides of nitrogen; CO = carbon monoxide; SO_x = sulfur oxides; PM_{10} = coarse particulate matter; $PM_{2.5}$ = fine particulate matter.

See Appendix D for detailed results.

As indicated in Table 4.2-2, unmitigated emissions of PM_{10} associated with project construction would not exceed the applicable MBARD threshold. Maximum daily unmitigated emissions associated with an accelerated schedule are presented in Table 4.2-3, and of PM_{10} associated with project construction under an accelerated construction schedule also would not exceed the applicable MBARD threshold. Therefore, in either construction scenario, Project construction emissions would not exceed thresholds and the impact would be less than significant.

TABLE 4.2-3: Maximum Daily Project Construction Emissions Accelerated Construction Schedule Scenario

Year	ROG	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
	(pounds per day)					
2021	21.66	221.08	123.16	0.34	34.62	21.74
2022	6.11	57.72	53.40	0.14	3.32	2.36
Maximum Daily	**21.66**	**221.08**	**123.16**	**0.34**	**34.62**	**21.74**
Emission threshold [1]	**N/A**	**N/A**	**N/A**	**N/A**	**82**	**N/A**
Threshold exceeded?	**No**	**No**	**No**	**No**	**No**	**No**

[1] Monterey Bay Unified Air Pollution Control District, February 2008.
Notes: Fugitive dust, on-road vehicle, and off-road equipment emissions were modeled with CalEEMod 2016.3.2, with the maximum of summer or winter values from CalEEMod included above. Crew and push boat emissions would occur in year 2021 (during the Dredge and Drill Shaft phase and the Construct Intake and Air Vent phase) and were modeled with the SMAQMD Harborcraft, Dredge, and Barge Emission Factor Calculator and were added to the CalEEMod values to determine the maximum daily emissions. Totals may not sum exactly due to rounding.
ROG = reactive organic gases; NO_x = oxides of nitrogen; CO = carbon monoxide; SO_x = sulfur oxides; PM_{10} = coarse particulate matter; $PM_{2.5}$ = fine particulate matter.
See Appendix D for detailed results.

There may be times in which controlled detonation would be needed to excavate short sections with particularly hard rock where a roadheader would have insufficient power. Use of blasting materials would result in the emission of criteria air pollutants and greenhouse gases. However, based on the usage of blasting as an as-needed alternative to mechanical excavation where mechanical means are not effective/productive, blasting activities would be minimal (potentially three to six times during the seven to eight months of tunnel excavation) and would result in the corresponding reduction of mechanical equipment (such as reduced hours of operation of the roadheader) and associated emissions for the excavation. Therefore, controlled detonation activities would not result in a substantial increase in either criteria air pollutant or greenhouse gas emissions.

Operational Emissions

Regarding long-term operations and maintenance (O & M), activities would include routine inspection and maintenance and are expected to be on the same order of magnitude as the existing facility. As such, the potential increase in emissions from Project operations would be negligible and would be less than significant.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact AIR-3: Cumulative Criteria Pollutant Emissions. The proposed Project would not result in cumulatively considerable net increase of any criteria air pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard. This is a *less-than-significan*t impact.

The NCCAB is designated as a nonattainment area for the state O_3 and PM_{10} standards. According to the MBARD CEQA Guidelines (2008), a project's cumulative impact on regional air quality is based on whether or not the project is consistent with the AQMP. As discussed previously, the Project would be consistent with the AQMP. Furthermore, as determined in Impact 4.1-1, the Project would result in less than significant levels of PM_{10}. Based on the preceding considerations, the Project would not result in a cumulatively considerable net increase of any criteria air pollutant for which the NCCAB is nonattainment.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact AIR-4: Expose Sensitive Receptors to Substantial Pollutant Concentrations. The proposed Project would result in short-term emissions of TACs, but would not result in exposure of sensitive receptors to substantial pollutant concentrations. This is a *less-than-significan*t impact.

In addition to impacts from criteria pollutants, project impacts may include emissions of pollutants identified by the state and federal government as TACs or HAPs. State law has established the framework for California's TAC identification and control program, which is generally more stringent than the federal program and aimed at TACs that are a problem in California. The state has formally identified more than 200 substances as TACs, including the federal HAPs, and is adopting appropriate control measures for sources of these TACs.

The greatest potential for TAC emissions during construction would be DPM emissions from heavy equipment operations, crew and push boats, and heavy-duty trucks during construction of the Project. The following measures are required by state law to reduce DPM emissions:

- Fleet owners of mobile construction equipment are subject to the CARB Regulation for In-Use Off-road Diesel Vehicles (Title 13 California Code of Regulations, Chapter 9, Section 2449), the purpose of which is to reduce DPM and criteria pollutant emissions from in-use (existing) off-road diesel-fueled vehicles.
- All commercial diesel vehicles are subject to Title 13, Section 2485 of the California Code of Regulations, limiting engine idling time. Idling of heavy-duty diesel construction

equipment and trucks during loading and unloading shall be limited to 5 minutes; electric auxiliary power units should be used whenever possible.

The closest sensitive receptor is an existing residence located a substantial distance from the Project, approximately 1,900 feet from the either the toe or crest of the dam, although truck trips would occur on roads within residential neighborhoods. As shown in Table 4.1-2, maximum daily particulate matter (PM_{10}) emissions generated by construction equipment operation, trucks, and boats (exhaust particulate matter, or DPM), combined with fugitive dust generated by equipment operation and vehicle travel, would be well below the MBARD significance thresholds. Moreover, total construction of the Project would be short-term, lasting approximately 24 months, after which project-related TAC emissions, e.g., diesel emissions, would cease. No residual TAC emissions and corresponding cancer risk are anticipated after construction, and no long-term sources of TAC emissions are anticipated during operation of the Project. Thus, the Project would not result in a long-term source of TAC emissions and the exposure of sensitive receptors to project-related TAC emissions would be less than significant.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact AIR-5: Odors. The proposed Project would not create objectionable odors that would affect a substantial number of people (2e). This is a *less-than-significan*t impact.

The occurrence and severity of potential odor impacts depends on numerous factors. The nature, frequency, and intensity of the source; the wind speeds and direction; and the sensitivity of receiving location each contribute to the intensity of the impact. Although offensive odors seldom cause physical harm, they can be annoying and cause distress among the public and generate citizen complaints.

The MBARD has identified typical land uses that generate odors as landfills, rendering plants, chemical plants, agricultural uses, wastewater treatment plants, and refineries (Monterey Bay Unified Air Pollution Control District, February 2008). The Project would not result in the development of any of these land uses and would not result in a long-term source of odors. Potential odors produced during construction would be attributable to concentrations of unburned hydrocarbons from tailpipes of construction vehicles, equipment, and boats. In general, odors are highest near the source, but disperse quickly resulting in a reduced offsite exposure. Any odors associated with project construction activities would be temporary and would cease upon completion of construction. Therefore, impacts associated with the Project would be less than significant.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact AIR-6: Greenhouse Gas (GHG) Emissions. The proposed Project would result in GHG emissions, although in amounts not considered significant. Therefore, this is a *less-than-significan*t impact.

The project site is located within the NCCAB under the jurisdiction of the MBARD, which to date, has not adopted significance criteria or thresholds for land use projects. However, in February 2013, a staff report to the District Board indicated that the staff's current recommendation is to further review a GHG threshold of 2,000 MT CO_2e per year for land-use projects or compliance with an adopted GHG Reduction Plan/Climate Action Plan (Monterey Bay Unified Air Pollution Control District, February 2013). This recommendation was made after considering AB 32 goals and scoping plan measures that would reduce regional emissions and MBARD staff's review of thresholds adopted or considered in other air districts throughout the state. The threshold was considered based on projects that would contribute 75-90 percent of future GHG emissions. Other air districts in the State have adopted a threshold of 1,100 MT CO_2e per year for land-use projects, including the Bay Area Air Quality Management District (BAAQMD), SMAQMD, and San Luis Obispo County Air Pollution Control District (SLOCAPCD) (Association of Environmental Professionals 2016). Notably, the SLOCAPCD recommends that total GHG emissions from project construction be amortized over the life of the project and added to the annual operational emissions for comparison to the quantitative bright-line threshold (San Luis Obispo County Air Pollution Control District, March 2012).

Construction-related GHG emissions from off-road equipment and on-road vehicles were estimated using CalEEMod. Additionally, the SMAQMD Harborcraft, Dredge, and Barge Emission Factor Calculator (July 2017) was used to estimate GHG emissions generated by the crew boat and the push boat. Annual GHG emissions are summarized in Table 4.2-4, with complete model outputs and assumptions included in Appendix D. Regarding long-term O & M, activities would include routine inspection and maintenance and are expected to be on the same order of magnitude as the existing facility. As such, the potential increase in GHG emissions from project operations would be negligible and were not quantified.

Neither the City of Santa Cruz nor the MBARD have adopted GHG emission significance thresholds. Since the Project's long-term operations would be similar to the existing facility, the Project would result in an increase in GHG emissions primarily from construction activities. The Project's amortized GHG emissions from construction (about 95 MT per CO_2e year) would not exceed the significance threshold for development Projects of 1,100 MT CO_2e per year used in neighboring air districts or the 2,000 MT of CO_2e per year threshold that had been under consideration by the MBARD. Therefore, the Project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment and this would represent a cumulatively less than significant GHG impact.

TABLE 4.2-4: Estimated Project Construction Greenhouse Gas Emissions

Year	MT CO_2	MT CH_4	MT N_2O	MT CO_2e
2021	1,913.51	0.40	<0.01	1924.02
2022	866.19	0.20	0	871.12
2023	38.04	0.01	0	38.28
Total	2,817.74	0.61	<0.01	2,833.42
Total 30-Year Amortized Construction GHG Emissions				**94.45**

Notes: Off-road equipment and on-road vehicle GHG emissions were modeled with CalEEMod 2016.3.2. Crew and push boat emissions would occur in year 2021 (during the Dredge and Drill Shaft phase and the Construct Intake and Air Vent phase) and were modeled with the SMAQMD Harborcraft, Dredge, and Barge Emission Factor Calculator and were added to the CalEEMod values for that year. The annual emission totals may not sum exactly due to rounding.

MT CO_2 – metric tons carbon dioxide; MT CH_4 – metric tons methane; MT N_2O – metric tons nitrous oxide; MT CO_2e – metric tons carbon dioxide equivalent

See Appendix D for detailed results.

Annual GHG emissions with an accelerated construction schedule are summarized in Table 4.2-5, with complete model outputs and assumptions included in Appendix D. The Project's amortized GHG emissions from construction (about 90 MT per CO_2e year) would not exceed the significance threshold for development Projects of 1,100 MT CO_2e per year used in neighboring air districts or the 2,000 MT of CO_2e per year threshold that had been under consideration by the MBARD. Therefore, the Project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment and this would represent a cumulatively less than significant GHG impact.

TABLE 4.2-5: Estimated Project Construction Greenhouse Gas Emissions Accelerated Construction Schedule Scenario

Year	MT CO_2	MT CH_4	MT N_2O	MT CO_2e
2021	2,349.37	0.46	0.00	2,361.89
2022	327.25	0.08	0.00	329.18
Total	2,676.63	0.54	0.00	2,691.06
Total 30-Year Amortized Construction GHG Emissions				**89.70**

Notes: Off-road equipment and on-road vehicle GHG emissions were modeled with CalEEMod 2016.3.2. Crew and push boat emissions would occur in year 2021 (during the Dredge and Drill Shaft phase and the Construct Intake and Air Vent phase) and were modeled with the SMAQMD Harborcraft, Dredge, and Barge Emission Factor Calculator and were added to the CalEEMod values for that year. The annual emission totals may not sum exactly due to rounding.

MT CO_2 – metric tons carbon dioxide; MT CH_4 – metric tons methane; MT N_2O – metric tons nitrous oxide; MT CO_2e – metric tons carbon dioxide equivalent

See Appendix D for detailed results

A one-time loss of sequestered carbon resulting from tree removal for construction staging areas also was calculated. The analysis also assumes that sequestered carbon from removed vegetation will be returned to the atmosphere; that is, the wood from the removed trees and vegetation

would not be re-used in another form that would retain carbon. Sequestered carbon impacts resulting from impacts to forest land are summarized in Table 4.2-6. Amortized over 30 years, the proposed Project would result in 183.39 MT CO_2e emissions annually from release of sequestered carbon to the atmosphere. When considering construction emissions (94.45 MT CO_2e per year), the proposed Project would not exceed the significance threshold for development Projects of 1,100 MT CO2e per year used in neighboring air districts or the 2,000 MT of CO2e per year threshold that had been under consideration by the MBARD.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Table 4.5-6: Sequestered Carbon Impacted by Proposed Project

Forestland Vegetation Community	Impacted Acreage	MT CO_2e
Redwood Forest	0.73	432.27
Bigleaf Maple Forest	0.02	7.10
Arroyo Willow-Bigleaf Maple Groves	0.13	46.16
Red Alder–Bigleaf Maple Groves	0.31	110.08
Redwood-Douglas Fir Forest	0.30	153.99
Redwood – Madrone Woodland	0.19	95.72
Douglas Fir Forest	8.58	3,727.34
Douglas Fir–Knobcone Pine Forest	2.02	877.53
Coast Live Oak – Madrone Woodland	0.17	51.61
Total	**12.45**	**5,501.80**

4.2.3 Cumulative Impacts

The geographic area for consideration of cumulative impacts would be the North Central Coast Air Basin in which the project site is located. According to MBUAPCD CEQA Guidelines, "A consistency analysis and determination serve as the project's analysis of cumulative impacts on regional air quality. Project emissions which are not consistent with the AQMP (Air Quality Management Plan) are not accommodated in the AQMP and will have a significant cumulative impact unless offset." As discussed, the project was found to be consistent with the AQMP based on use of the District's methodology, and as discussed in Impact AIR-4, the Project's contribution to cumulative air emissions would not be cumulatively considerable. GHG emissions and effects on global climate change extend beyond the local air basin and is a world-wide issue. Based on the analyses for Impact AIR-6, the project's contribution to global GHG emissions is not cumulatively considerable. Therefore, the project's contribution to cumulative criteria pollutant and GHG emissions would not be cumulatively considerable.

4.2.4 References

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4.3 BIOLOGICAL RESOURCES

This section analyzes biological resources impacts of the proposed Newell Creek Dam (NCD) Inlet/Outlet Replacement Project (Project). This section is based on biological evaluations prepared as part of this Environmental Impact Report (EIR), which include: Biological Resources Assessment (October, 2018), California Red-Legged Frog Habitat Assessment (October, 2018), and a Preliminary Jurisdictional Delineation (September, 2018). These studies provide the basis for analyses in this section and are included in Appendices F-1 through F-3.

4.3.1 Environmental Setting

Regulatory Setting

Federal Regulations

Federal Endangered Species Act. The Federal Endangered Species Act (FESA) prohibits the taking, possession, sale or transport of endangered species. Pursuant to the requirements of FESA, a federal agency reviewing a project within its jurisdiction must determine whether any federally listed threatened or endangered species could be present in the study area and determine the extent to which the project will have an effect on such species. In addition, federal agencies are required to determine whether the project is likely to jeopardize the continued existence of any species proposed to be listed under FESA or result in the destruction or adverse modification of critical habitat designated for such species (16 USC 1536[3], [4]). Projects that would result in "take" of any federally-listed threatened or endangered species are required to obtain authorization from NMFS and/or USFWS through either Section 7 (interagency consultation) or section 10(a) (incidental take permit) of FESA, depending on whether there is federal involvement in the project (federal land, federal permitting or federal funding of the project).

Migratory Bird Treaty Act. The Migratory Bird Treaty Act (MBTA) regulates or prohibits taking, killing, possession of, or harm to migratory bird species listed in Title 50 Code of Federal Regulations (CFR) Section 10.13. The MBTA is an international treaty for the conservation and management of bird species that migrate through more than one country, and is enforced in the United States by the USFWS. Hunting of specific migratory game birds is permitted under the regulations listed in Title 50 CFR 20. The MBTA was amended in 1972 to include protection for migratory birds of prey (raptors).

Bald and Golden Eagle Protection Act. The Bald and Golden Eagle Protection Act (BAGEPA) is the primary law protecting both bald and golden eagles. Specifically, BAGEPA prohibits "take" of eagles without a permit and defines take to include "pursue, destroy, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" and prohibits take of individuals, active nests, or eggs. The term "disturb" is further defined by regulation as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, injury to an eagle, a decrease in productivity, or nest abandonment" (50 CFR 22.3).

Federal Regulation of Wetlands and Waters of the U.S. The U.S. Army Corps of Engineers (ACOE) has regulatory authority for activities within wetlands under the Clean Water Act (CWA, 1977, as amended), which serves as the primary federal law protecting the quality of the nation's surface waters. Section 404 of the CWA establishes a program to regulate discharge of dredged or fill material into "waters of the United States," which is administered by the ACOE. The term "waters" includes wetlands and non-wetland water bodies that meet specific criteria as defined in the Code of Federal Regulations. In general, a permit must be obtained from the ACOE under Section 404 of the CWA before fill can be placed in wetlands or non-wetland waters of the U.S. The type of permit depends on the amount of acreage and the purpose of the proposed fill, subject to discretion of the ACOE. Under Section 404, general permits may be issued on a nationwide, regional, or state basis for particular types of activities that will have only minimal adverse impacts. Individual permits are a type of standard permit and are required for projects that are likely to have more than a minimal individual or cumulative impact on aquatic resources. The ACOE implements the federal policy embodied in Executive Order 11990, which is intended to result in no net loss of wetland values or function.

The Regional Water Quality Control Board (RWQCB) and larger State Water Resources Control Board also administer Section 401 of the CWA, which grants states the authority to certify federal permits for discharges to waters under state jurisdiction for the purposes of ensuring that state water quality standards are upheld. A Section 401 Water Quality Certification is required from the RWQCB whenever a permit from the ACOE is issued.

Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. Sections 1801−1884) of 1976, as amended in 1996 and reauthorized in 2007, is intended to protect fisheries resources and fishing activities within 200 miles of shore. The amended law, also known as the Sustainable Fisheries Act (Public Law 104-297), requires all federal agencies to consult with the Secretary of Commerce on proposed projects authorized, funded, or undertaken by that agency that may adversely affect Essential Fish Habitat (EFH). The main purpose of the EFH provisions is to avoid loss of fisheries due to disturbance and degradation of the fisheries habitat.

State Regulations

California Endangered Species Act. Under the California Endangered Species Act (CESA), the California Fish and Game Commission (CFGC) has the responsibility of listing or delisting threatened or endangered species in California. CDFW maintains a list of these species and related occurrence records in the CNDDB, as well as a Special Animals List, which includes Species of Special Concern in California, as described further below.

CESA prohibits the take of state-listed animals and plants in most cases, but CDFW may issue incidental take permits under special conditions. Pursuant to the requirements of CESA, a State agency reviewing a project within its jurisdiction must determine whether any state-listed

endangered or threatened species could be present in the study area and determine whether the project would have a potentially significant impact on such species.

Species of Special Concern, Fully Protected Species and Other State Code Provisions. In addition to lists of designated Endangered, Threatened, and Rare plant and animal species, the CDFW maintains a Special Animals List, which includes Species of Special Concern (SSC). A SSC is a species, subspecies, or distinct population of an animal native to California that currently satisfies one or more of the following (not necessarily mutually exclusive) criteria:

- is extirpated from the State or, in the case of birds, in its primary seasonal or breeding role;
- is listed as Federally-, but not State-, threatened or endangered;
- meets the State definition of threatened or endangered but has not formally been listed;
- is experiencing, or formerly experienced, serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status;
- has naturally small populations exhibiting high susceptibility to risk from any factor(s), that if realized, could lead to declines that would qualify it for State threatened or endangered status.

Although these species have no legal status under the CESA, these species would be considered sensitive under CEQA and CDFW recommends considering these species during analysis of proposed project impacts to protect declining populations, and to avoid the need to list them as threatened or endangered in the future. These species may "be considered rare or endangered [under CEQA] if the species can be shown to meet the criteria".

Additionally, the CFGC contains lists of vertebrate species designated as "Fully Protected" (California Fish & Game Code 3511 [birds], 4700 [mammals], 5050 [reptiles and amphibians], and 5515 [fish]. According to Sections 3511 and 4700 of the CFGC, which regulate birds and mammals, respectively, a "Fully Protected" species may not be taken or possessed without a permit from the Fish and Game Commission. Incidental take is not authorized under CFGC Section 2081 for species designated as Fully Protected, except for collecting these species for necessary scientific research and relocation of certain species for the protection of livestock.

Native Plant Protection. The Native Plant Protection Act of 1977 (NPPA) and implementing regulations pursuant to Section 1900 et seq. of the Fish and Game Code designate rare and endangered plants, and provide specific protection measures for identified populations. It is administered by the CDFG. The NPPA was enacted to "preserve, protect and enhance endangered or rare native plants of this state." The NPPA defines a plant as endangered when its prospects of survival and reproduction are in immediate jeopardy from one or more causes. A rare plant is defined as a plant species that, though not presently threatened with extinction, occurs in such small numbers throughout its range that it may become endangered if its present environment worsens. The NPPA prohibits the take or sale of rare and endangered species in California, except for some exemptions provided by the law.

The California Native Plant Society (CNPS) maintains an inventory of rare and endangered vascular plants of California. CNPS has established a ranking system (California Rare Plant Ranks; CRPR) to describe the rarity and endangerment status of California flora. The CRPR system classifies plant species from presumed extinct species, CRPR 1A, to limited distribution species that are currently on a watch list, CRPR 4. In general, CRPR 1B species (plants rare, threatened, or endangered in California and elsewhere) or CRPR 2 species (plants rare, threatened, or endangered in California, but more common elsewhere) are considered and evaluated under CEQA. CRPR 3 species (plants about which more information is needed) or CRPR 4 species (plants of limited distribution--a watch list) may, but generally do not, qualify for consideration under CEQA.

Fish and Game Code Sections 3503, 3511, 3513, 4150. Fish and Game Code Section 3503 states that it is unlawful to take, possess, or needlessly destroy the nests or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. Fish and Game Code Section 3503.5 protects all birds-of-prey (raptors) and their eggs and nests. Section 3511 states fully protected birds or parts thereof may not be taken or possessed at any time. Section 3513 states that it is unlawful to take or possess any migratory non-game bird as designated in the Migratory Bird Treaty Act. All nongame mammals, including bats, are protected by California Fish and Game Code 4150.

CDFW Lake and Streambed Alteration Agreement. Under Sections 1600-1616 of the California Fish and Game Code, the CDFW regulates activities that would alter the flow, bed, channel, or bank of streams and lakes. The limits of CDFW's jurisdiction are defined in the code as the "… bed, channel or bank of any river, stream, or lake designated by the department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit ..." (Section 1601). In practice, the CDFW usually marks its jurisdictional limit at the top of the stream or bank, or at the outer edge of the riparian vegetation, whichever is wider.

CDFW Wetlands Protection Regulations. In some circumstances, CDFW regulates activities that affect wetlands. The authority to do so is derived from state legislation including Sections 1600-1616 of the Fish and Game Code (lake and streambed alteration agreements), CESA (protection of state listed species and their habitats - which could include wetlands), and the Keene-Nejedly California Wetlands Preservation Act of 1976 (states a need for an affirmative and sustained public policy program directed at wetlands preservation, restoration, and enhancement). In general, the CDFW asserts authority over wetlands within the state either through review and comment on ACOE Section 404 permits, review and comment on CEQA documents, preservation of state listed species, or through lake and streambed alteration agreements.

Porter-Cologne Water Quality Control Act. The Porter-Cologne Water Quality Control Act established the SWRCB and RWQCB as the principal state agencies responsible for the protection of water quality in California. The Porter-Cologne Water Quality Control Act provides that "All discharges of waste into the waters of the State are privileges, not rights." Waters of the State are defined in Section 13050(e) of the Porter-Cologne Water Quality Control Act as "…any surface

water or groundwater, including saline waters, within the boundaries of the state." All dischargers are subject to regulation under the Porter Cologne Water Quality Control Act, including both point and nonpoint source dischargers. The Central Coast RWQCB has the authority to implement water quality protection standards through the issuance of permits for discharges to waters at locations within its jurisdiction. As noted above, the Central Coast RWQCB is the appointed authority for Section 401 compliance in the Project area.

Local Regulations

The Project site is located within an unincorporated area of Santa Cruz County. Chapter 16 of the County Code includes regulations regarding riparian habitat. However, under the provisions of the California Government Code (section 53090 et seq.), the Project is exempt from County zoning and building regulations. This is because the Government Code exempts construction of facilities for the production, generation, storage, treatment or transmission of water or for the production or generation of electrical energy. Therefore, the proposed Project is not subject to County policies or regulations.

The City is preparing two Habitat Conservation Plans (HCP) for City activities, improvements or projects with the potential to "take" species listed under the Federal Endangered Species Act (ESA) in order to obtain federal permits (Section 10 "incidental take" authorization) for continued City-wide operations and maintenance needs. The City has coordinated and met with USFWS and NMFS on HCP-related issues. The HCPs have not yet been released for public review or approved by the agencies.

The USFWS HCP is nearly completed and covers six animal and four plant species including: Ohlone tiger beetle (federally endangered), Mount Hermon June beetle (federally endangered), Tidewater goby (federally endangered), Pacific lamprey (not listed under EPA), California red-legged frog (federally threatened), Western pond turtle (federal species of concern), Ben Lomond spineflower (federally endangered), Robust spineflower (federally endangered), Santa Cruz tarplant (federally threatened), and San Francisco popcorn flower (state endangered). Covered activities in this HCP currently include the construction of the north coast pipeline and rehabilitation of diversion structures, operation of existing department facilities, and O&M of existing water diversions and transmission lines and their associated features (City of Santa Cruz, June 2018).

The second HCP has not yet been completed, but will cover potential incidental take of steelhead (federally threatened) and coho salmon (federally and state endangered). The activities covered under this HCP will include water diversions, reservoir operations, fish ladder and screen maintenance, pipeline O&M, and municipal facility O&M (including flood control maintenance) (City of Santa Cruz, June 2018).

Regional Setting

In addition to site surveys conducted as part of the technical biological studies, information regarding the composition of these communities in the study area was obtained from the

Watershed Resources Management Plan Existing Conditions Report (Swanson Hydrology and Geomorphology, 2001) that includes the City-owned Newell Creek Tract within which the proposed project is located. Of note, and according to this Plan, the Newell Creek Tract of the City's watershed lands was extensively logged in the late 1800s and early 1900s. Timber harvest activities resumed in 1968 and continued for the ensuing thirty years. The timber forest was segmented into multiple timber harvest areas with each logged on a rotating basis averaging once every 12-15 years. Logging removed roughly 20 to 30 percent of second growth conifers in each cut. As a result of the logging, no stands of old-growth forest, or stands in the late seral stages of growth, occur within the Newell Creek Tract. All forest and woodland tree communities within the study area, and as described below, are currently characterized as second growth communities.

The San Lorenzo River watershed including Newell Creek drains approximately 138 square miles. Newell Creek is a tributary to the San Lorenzo River; the confluence is near Ben Lomond, approximately 1.7 miles downstream of the NCD.

Project Site Setting

Terrestrial Vegetation Communities and Land Cover Types

Fourteen vegetation communities or land cover types were observed and mapped during the field survey using the classifications described in A Manual of California Vegetation (MCV) by Sawyer and Keeler-Wolf (2009), as well as several aquatic land cover. The majority of the study area is comprised of Douglas fir (*Pseudotsuga menzieseii*) forest and other forest types. Existing vegetation communities are summarized on Table 4.3-1. The location and general extent of each of these communities within the study area are depicted on Figure 4.3-1. A total of 89 species of plants, consisting of 64 native species (72%) and 25 non-native species (28%), was recorded in the study area. A number of aquatic resources (wetlands and non-wetland waters), including a portion of Loch Lomond Reservoir, are also present in the study area.

California Annual Grassland. California annual grassland in the study area is generally confined to the south-facing slope of the dam face but can also be found in small patches in other areas throughout the study area. This vegetation community is dominated by non-native annual grasses such as wild oat (*Avena fatua*), soft chess (*Bromus hordeaceus*), and rip-gut brome (*Bromus diandrus*). In addition to the non-native grasses, a native grass, red fescue (*Festuca rubra*), is also present. Annual forbs such as bicolor lupine (*Lupinus bicolor*), English plantain (*Plantago lanceolata*), and spring vetch (*Vicia sativa*) are also interspersed with the grasses of this land cover type.

Arroyo Willow-Bigleaf Maple Groves (*Salix lasiolepis - Acer macrophyllum* Shrubland Alliance). This vegetation community is a tall shrub/low tree canopy composed of codominant arroyo willow (*Salix lasiolepis*) and bigleaf maple (*Acer macrophyllum*) trees. This vegetation community occurs along the margins of Loch Lomond Reservoir to the northwest of NCD. Arroyo willow is a riparian tree or arborescent shrub that easily colonizes along stream banks and benches, slope seeps, and

along drainages. It is valuable species for bank and slope stabilization. The herbaceous layer is variable and dependent on the coverage and density of the canopy and lower shrubs.

TABLE 4.3-1: Summary of Vegetation Communities in Project Study Area

Vegetation Community / Aquatic Feature	Acreage
California Annual Grassland	5.53
Arroyo Willow-Bigleaf Maple Groves	0.96
Coyote Brush Scrub	2.33
French Broom	0.55
Mixed Chaparral	1.56
Redwood Forest	0.73
Bigleaf Maple Forest	0.35
Red Alder–Bigleaf Maple Groves	2.07
Redwood-Douglas Fir Forest	2.45
Redwood – Madrone Woodland	3.95
Douglas Fir Forest	29.71
Douglas Fir–Knobcone Pine Forest	3.66
Coast Live Oak – Madrone Woodland	3.51
Developed/Ruderal	6.03
Grand Total	**85.32**

Coyote Brush Scrub (*Baccharis pilularis* Shrubland Alliance). Coyote brush (*Baccharis pilularis*) is the dominant shrub in this vegetation community. Coyote brush scrub occurs on a northwest-facing slope along the access road to NCD. Other shrub species observed in this community include pink honeysuckle (*Lonicera hispidula*), bush monkeyflower (*Diplacus aurantiacus*), and wedge leaf ceanothus (*Ceanothus cuneatus*). Scattered coast live oak trees (*Quercus agrifolia*) are also interspersed in this shrubland. The herbaceous understory of this vegetation community contains annual grasses and forbs consistent with those found in the California annual grassland community described above.

French Broom (*Genista monspessulana* and Others Shrubland Semi-Natural Alliance). Patches of French broom (*Genista monspessulana*) occur in scattered locations throughout the study area, with the highest concentrations along the ecotone of woodland and grassland adjacent to the face of NCD and along the margins of Loch Lomond Reservoir. This community is dominated by French broom , a non-native, invasive species introduced from Europe. French broom grows vigorously in disturbed areas and can significantly reduce the plant diversity of an area through its aggressive and competitive growth habits. French broom creates a dense shrub canopy and herbaceous vegetation is generally sparse to absent in the understory.

Mixed Chaparral. Mixed chaparral occurs on a bluff northwest of NCD. This habitat type is dominated by several species of manzanita (*Arctostaphylos* spp.), wedge leaf ceanothus, and wart leaf ceanothus (*Ceanothus papillosus*).

Redwood Forest (*Sequoia sempervirens* Forest Alliance). A small grove of second growth redwood (*Sequoia sempervirens*) trees is present along the NCD access road. This stand is dominated by redwood trees that form a dense and thick canopy. Due to the presence of a redwood leaf litter/duff layer, growth of understory vegetation is limited. Another small redwood grove is located within the southern portion of Staging Area 5. This grove has some large trees that are greater than 30 inches in diameter, a dense canopy, and very little understory vegetation. Some benches and a small wooden platform have been placed in the grove; these features are associated with the city-owned residence located nearby.

Bigleaf Maple Forest (*Acer macrophyllum* Forest Alliance). Small groves of bigleaf maple forest occur throughout the southern portion of the study area, primarily along the margins of the NCD face and on north-facing slopes adjacent to Newell Creek. Bigleaf maple is the dominant species in the tree canopy of this vegetation community. Other trees observed in this community include California bay (*Umbellularia californica*), redwood, and madrone (*Arbutus menziesii*). Understory plants include snowberry (*Symphoricarpos mollis*), toyon (*Heteromeles arbutifolia*), and poison oak (*Toxicodendron diversilobum*).

Red Alder–Bigleaf Maple Groves (*Alnus rubra - Acer macrophyllum* Forest Alliance). Bigleaf maple forest within the study area intergrades with red alder (*Alnus rubra*) groves to form a mature riparian corridor along Newell Creek, the seepage channel, and along the margins of the spillway plunge pool. Understory plants typical of this community include species adapted to mesic conditions such as California polypody (*Polypodium californicum*), California blackberry (*Rubus ursinus)*, maidenhair fern (*Adiantum jordanii*), hazelnut (*Corylus cornuta*), five-finger fern (*Adiantum aleuticum*), chain fern (*Woodwardia fimbriata*), thimbleberry (*Rubus parviflorus*), creek dogwood (*Cornus glabrata*), sword fern (*Polystichum californicum*), and coffee berry (*Frangula californica*).

Redwood-Douglas Fir Forest (*Sequoia sempervirens - Pseudotsuga menzieseii* Forest Alliance) . Redwood trees are intermixed with Douglas fir in the western portion of the study area. The canopy is relatively continuous and dense, with some areas of two-tiered canopy. Mixtures of redwood and Douglas fir usually occurs in protected upland slopes up to approximately 3,200 feet (976 m) elevation. The longitudinal extent of the Redwood – Douglas fir forest type is associated with a constant temperature and moisture regime that defines the Redwood fog belt.

Redwood – Madrone Woodland (*Sequoia sempervirens - Arbutus menziesii* woodland Alliance) . This community extends in a north-south band on the west side of Loch Lomond Reservoir. The vegetation community is characterized by redwood trees and a nearly continuous lower canopy composed of madrone. Understory shrub and herbaceous species are sparse to intermittent.

Douglas Fir Forest (*Pseudotsuga menzieseii* Forest Alliance). Douglas fir forest dominates much of the eastern slopes of the study area. This community is characterized by Douglas fir intermixed with other tree species including madrone, redwood, and knobcone pine (*Pinus attenuata*). This forest type typically occurs on drier slopes and/or higher elevation areas than redwood forest. The moderately dense tree canopy of this community creates conditions for an understory of plant species requiring partial sun/shade. As such, the understory is often more diverse than that of redwood forest, with common occurrences of young trees of tanoak (*Notholithocarpus densiflorus*), madrone, redwood and Douglas fir. Other understory species include bracken fern (*Pteridium aquilinum var. pubescens*), Douglas iris (*Iris douglasiana*), and yerba buena (*Satureja douglasii*).

Douglas Fir–Knobcone Pine Forest (*Pseudotsuga menzieseii – Pinus attenuata* Forest Alliance) . The Douglas fir trees in the northwestern portion of the study area (north of NCD) are codominant in the tree canopy with knobcone pine. This forest type primarily occurs in areas of the watershed where soils are shallow. Knobcone pine is the most widespread closed-cone pine in California; the species is most common in the coast range from the Santa Lucia Mountains north through the Klamath range (Lanner, 1999).

Coast Live Oak – Madrone Woodland (*Quercus agrifolia – Arbutus menziesii* woodland Alliance) . The southern portion of the study area, especially north-facing slopes adjacent to NCD support a mixed coast live oak and madrone woodland community. Both species are co-dominant in the tree canopy. The coast live oak – madrone woodland community occurs in areas having deeper soil profiles that are rich in organic matter, and have a thick duff layer. Common understory shrub species are poison oak, California blackberry, blue blossom ceanothus (*Ceanothus thyrsiflorus*), coffeeberry, blue witch (*Solonum umbelliferum*), and huckleberry (*Vaccinium ovatum*). In some areas, the woodland intergrades with more mesic redwood forest, where fewer madrone, Douglas fir, and tanoak trees occur.

Developed/Ruderal. This land cover type consists of the access road along the crest of Newell Creek Dam and the established dirt, gravel and paved access roads leading to and from the dam and the boat launch areas, the bridge over Newell Creek below the dam (Newell Creek Road bridge), as well as the structures and facilities associated with regulating dam flows and the boat launch area. Vegetation is generally absent from this land cover type in the study area.

Aquatic Resources

Aquatic resources, consisting of two types of wetlands and five types of non-wetland waters, were identified in the study area during the formal jurisdictional delineation conducted in April and September 2018 (Dudek 2018). These aquatic resources consist of seasonal wetlands and seeps, as well as perennial drainages, ephemeral drainages, a roadside swale, spillway plunge pool, and reservoir. These aquatic resources are summarized below and described in more detail in the Jurisdictional Delineation Report in Appendix F-2. Aquatic habitats are shown on Figure 4.3-2.

Seasonal Wetlands. Two seasonal wetlands were observed in the southern portion of the study area during the field survey. One of the seasonal wetlands is located at the base of a rock wall adjacent to the spillway plunge pool where water appears to pond in a natural depression as the levels of the pool recede during dry months. This area is characterized by Harford's sedge (*Carex harfordii*) and miner's lettuce (*Claytonia perfoliata*). A second seasonal wetland feature is located in an upland area adjacent to the western shoreline of the Reservoir north of the dam. This wetland is located in a natural depression above an old logging roadcut where rainwater runoff from the surrounding hills appears to pond for sufficient time to create hydric soils and support hydrophytic vegetation. Dominant vegetation in this wetland feature includes Baltic rush (*Juncus balticus*) and clustered sedge (*Carex densa*).

Seeps. Two small seep areas were observed in the study area. One feature is located adjacent to the existing outlet pipe at the base of the NCD and the other is located at the base of a hillslope adjacent to Newell Creek. The seep at the base of NCD and adjacent to the outlet structure appears to contain standing water for much of the year and is dominated by hydrophytic species such as watercress (*Nasturtium officinale*), stinging nettle (*Urtica dioica*), and redroot flatsedge (*Cyperus eragrostis*). The other seep is located just north of the low water crossing at the confluence of a tributary to Newell Creek and Newell Creek itself. This area contains a layer of bedrock below the soil that likely aids in retention of water in the surface soils and the creation of hydric soil conditions. Hydrophytic vegetation such as field sedge (*Juncus effusus*), horsetail (*Equisetum hyemale*), and redroot flatsedge.

Perennial Drainages. Newell Creek, a perennial drainage, is tributary to the San Lorenzo River; the confluence is near Ben Lomond, approximately 1.7 miles downstream of NCD. Downstream of the Reservoir and spillway plunge pool, Newell Creek is relatively undisturbed for approximately 0.8 mile; it is then bordered by residential development for the next 0.9 mile to the confluence with the San Lorenzo River. Flows downstream of the Reservoir are influenced by Reservoir inflow and storage conditions. Standard Reservoir operations generally include a year-round minimum release requirement of 1 cubic foot per second (cfs) below NCD (Berry, pers. comm. 2018). This release maintains water flow into the seepage channel, spillway plunge pool, and the channel of Newell Creek. The bed of Newell Creek is comprised of large boulders and cobbles, and evidence of an OHWM includes debris wracking, undercut banks, and changes in vegetation and sediment texture. Newell Creek above and below the Reservoir holds water on a year-round basis.

A second perennial drainage, the seepage channel, conveys water from the outlet structure to the spillway plunge pool and maintains water on a year-round basis due to the continuous minimum 1 cfs release from the Reservoir. This channel has an average width of five feet and is relatively shallow. The substrates in the channel are a mixture of cobbles and gravel and the OHWM is evidenced by the change in vegetation and sediment texture in the channel.

Ephemeral Drainages. Four ephemeral drainages occur within the southern portion of the study area. All four features are tributary to Newell Creek, and convey water from the surrounding hillslopes either directly or indirectly to Newell Creek. All of these features exhibit evidence of an

OHWM, based on shelving, watermarks on boulders, debris wracking, or changes in sediment texture or vegetation cover, however, none of the four drainages exhibited signs of continuous flow.

Roadside Swale. One roadside swale parallels the NCD access roadway. This feature is located downstream of, and is an extension of, one of the ephemeral drainages described above. This swale also appears to drain water from the hillslopes northeast of the NCD access roadway and conveys flows southward to where the swale crosses under the access roadway via a culvert. This swale is largely vegetated and does not contain evidence of an OHWM.

Spillway Plunge Pool. The spillway plunge pool at the base of the NCD spillway contains water on a year-round basis and is directly tributary to Newell Creek. This feature has a defined bed and bank, as well as an associated riparian fringe dominated by red alder and bigleaf maple.

Reservoir. Loch Lomond Reservoir was created by the installation of NCD on Newell Creek. Reservoir outflows include a continuous minimum 1 cfs release to maintain fish habitat in Newell Creek downstream. Outflows also occur via the concrete spillway at the southern end of the Reservoir where water drains into the spillway plunge pool and then to Newell Creek during times of high flow. The Reservoir has a defined bed and bank and contains a mature, if sporadic, riparian fringe comprised of bigleaf maple and arroyo willow. Some areas of the Reservoir are fringed by stands of French broom.

Wildlife Overview

A number of wildlife species are expected to be associated with these vegetation communities (special-status species are addressed in Section 4.3 below). A total of 36 wildlife species were observed during the biological field assessment. Of these, 28 were birds, four were mammals, two were reptiles, and two were amphibians. A list of wildlife species observed in the study area is found in Appendix F-1.

Although Loch Lomond Reservoir supports a variety of non-native game fish, it does not support or provide passage for coho salmon (*Oncorhynchus kisutch*), steelhead (*Oncorhynchus mykiss irideus*), or any other state or federally-protected fish species. The reservoir supports a warm water fishery primarily composed of introduced game species including largemouth bass (*Micropterus salmoides*), green sunfish (*Lepomis cyanellus*), channel catfish (*Ictalurus punctatus*), and bluegill (*Lepomis macrochirus*) (City of Santa Cruz, 2013). In addition, one other non-native species, golden shiner (*Notemigonus crysoleucas*) and three native species, Sacramento sucker (*Catostomus occidentalis),* prickly sculpin (*Cottus asper*) and rainbow trout (*Oncorhynchus mykiss*) are known to occur in the reservoir, though golden shiner and Sacramento sucker have not been observed since 1992. CDFW has planted hatchery-raised rainbow trout in Loch Lomond as part of an annual stocking program, with stocking occurring in Loch Lomond as recently as June of 2018 (CDFW, 2018). Therefore, all rainbow trout currently within the reservoir are assumed to be hatchery-raised fish.

Bluegill, green sunfish and *O. mykiss* have been documented in the spillway plunge pool below NCD (City of Santa Cruz, 2013).

Special-status Species

Special-status plant and wildlife species determined to potentially occur in the study area or in the study area vicinity, based on the preliminary review discussed above, on the suitability of habitat to support the species, and on the results of the field assessment, are discussed below. Tables summarizing the potential occurrence of special-status plant and wildlife species are included in Appendicx F-1.

Plants

Based on the results of the CNDDB, CNPS and IPaC database searches, a total of 55 special-status plant species occur in the Project region (Appendix B). Of these, 54 were eliminated from consideration due to the lack of appropriate habitats (e.g., coastal dunes, coastal bluff scrub, freshwater/brackish marshes, etc.), absence of suitable edaphic conditions (e.g., alkaline or serpentine soils), extent of habitat degradation, or location of the study area outside of the species known range. The remaining special-status plant species, Woodland woolythreads (*Monolopia gracilens*) is considered to have moderate potential to occur within the study area and is described in more detail below.

Woodland woolythreads (Monolopia gracilens). Woodland woolythreads is not a federally or state listed species, but is included on the CNPS list as a CRPR 1B.2 plant, meaning it is rare or endangered in California or elsewhere (CNPS, 2018). It is an annual herb that occurs in broadleaved upland forest (openings), chaparral (openings), cismontane woodland, North Coast coniferous forest (openings), and valley and foothill grassland on serpentine soils. It generally blooms from March to July at elevations ranging from 325-3,935 feet above mean sea level (AMSL).

Openings in the Coast Live Oak-Madrone Woodland, Redwood-Madrone Woodland, Mixed Chaparral, and coniferous forest types within the study area may provide potentially suitable habitat for this species. The nearest documented occurrence was observed in 1995 approximately 0.8 mile southeast of the study area (CDFW 2018). Although the field surveys of the study area were not exhaustive, all of the Project work areas and staging areas were searched for special-status plants that would be identifiable in April, including woodland woolythreads. This species was not observed within any of the proposed work areas or staging areas during the April 2018 field surveys. Nevertheless, this species is considered to have moderate potential to occur in suitable habitats outside of the defined work areas and staging areas, based on the presence of suitable woodland, coniferous forest and chaparral communities.

Wildlife

Results of the CNDDB and IPaC database searches indicate that 36 special-status wildlife species occur in the Project region (see Appendix F-1). Of these, 25 species were eliminated from

consideration due to the absence of suitable habitat (e.g., native grassland, coastal scrub, estuarine conditions, etc.) or because the study area is outside of the known range of the species and are not discussed any further. The remaining 11 special-status wildlife species, described in more detail below, were either observed, considered to have some potential to occur within or adjacent to the study area, or are known to occur in close proximity to the study area. Some species, though not expected to occur within the study area, are also discussed below because of their regulatory status as state- or federally-listed Threatened or Endangered species and/or the presence of designated Critical Habitat within the region.

Coho salmon and Steelhead (*Oncorhynchus kisutch* and *Oncorhynchus mykiss irideus*). Newell Creek from the confluence of the San Lorenzo River up to Newell Creek Dam is designated critical habitat for both steelhead (Central California Coast Distinct Population Segment [DPS]) and coho salmon (Central California Coast Evolutionarily Significant Unit [ESU]) and essential fish habitat for coho salmon. Steelhead is federally listed as a threatened species. Coho salmon is federally and state listed as an endangered species.

A focused habitat and fish population study conducted on Newell Creek by Hagar Environmental Science (HES, 2007) found that the uppermost reach of Newell Creek (the reach extending approximately 0.3 mile downstream of NCD) supports a very sparse population of *O. mykiss*. Due to the presence of a significant downstream passage barrier (described below) and the apparently low levels of production and/or low reproductive success, it is most likely that the *O. mykiss* present in this reach and in the spillway plunge pool are a resident (non-anadromous) population or possibly hatchery-raised individuals that accessed the pool and immediate area via the spillway from the reservoir.

Spawning and rearing habitat is present for both steelhead and coho salmon in the San Lorenzo River and in the lower reaches of Newell Creek. However, the San Lorenzo River and watershed have experienced a major decline in coho salmon abundance since the late 1980s, and current fish surveys have found very few coho within the system. Trapping conducted at the Felton Diversion Dam by the Monterey Bay Salmon and Trout Project found that the number of coho adults peaked at 183 during 1989-1990 and during most years and locations few coho individuals have been captured (Entrix, 2004). No juvenile coho salmon were captured during electrofishing surveys conducted throughout the San Lorenzo River watershed (including both mainstem and tributary locations) between 1994 and 2002 and only occasional juvenile or young-of-year coho have been observed in the system since. Due to the decline in the coho salmon population in the San Lorenzo River and its tributaries, including Newell Creek, it is unlikely coho salmon are present in Newell Creek (NMFS, 2012).

In addition, a previous study conducted in 2017 (HES, et al., 2017) determined that the upper reaches of Newell Creek extending to the dam are not accessible to coho salmon, and are likely not accessible to steelhead, due to a natural bedrock shelf feature that exists in the stream channel approximately 0.7 mile downstream of the dam. The study's model predicted that a steelhead individual, in peak condition, may only be able to pass the barrier during periods of high flow that

are approximately 200-325 cubic feet per second (cfs) or greater. However, flows in Newell Creek that exceed 200 cfs are isolated and rare events; daily average flows during the steelhead migration season (December through April) would be in the hypothetically suitable flow range for passage between 0.6% and 1.7% of the time (Balance Hydrologics, 2008). Furthermore, habitat conditions between the bedrock feature and the dam are of low quality for steelhead. During habitat surveys conducted in 2007, it was found that the bedrock dominated reach (where the feature is located) and the upstream reach below the dam had markedly less instream cover and less potential spawning area than did the lower reach below the bedrock feature (HES, 2007). Therefore, the study concluded that the bedrock shelf feature is the effective limit of anadromy for both steelhead and coho salmon in Newell Creek. A team of biologists representing NOAA Fisheries, CDFW, and the City of Santa Cruz conducted a site visit to the bedrock feature on April 11, 2017, and despite difference of opinions about the level of flow that might be needed for passage, confirmed this assessment (HES, et al., 2017).Despite the low quality of habitat upstream of the barrier and rare or severely limited access by steelhead past the barrier, it is possible under certain conditions that anadromous *O. mykiss* could occur within the study area, but the frequency of potential migration conditions is too low to support a consistent anadromous run (HES, 2017). Coho salmon are not expected to occur in the study area due to their limited populations numbers in the greater San Lorenzo River watershed, the barriers in Newell Creek, and the low quality habitat within Newell Creek for coho.

California Red-legged Frog. California red-legged frog (*Rana draytonii*; CRLF) is federally listed as threatened and is a California Species of Special Concern. Historical occurrences CRLF occur in a tributary of Zayante (2002) and within Bull (2004) Creeks, with the closest being approximately 3.5 miles east and 4.0 miles south of the study area, respectively. No documented historical occurrences of this species exist within the Newell Creek Tract.

The spillway plunge pool contains *O. mykiss* and non-native fish species, some of which prey on amphibians and amphibian egg masses. Additionally, during the winter/spring when the reservoir typically spills, the pool may lack suitable calm water areas used for egg deposition. Various fish species are also assumed to occur within the upper stretches of Newell Creek below the plunge pool and in the seepage channel upstream of the plunge pool. Newell Creek receives high flows in the winter and spring (during the CRLF breeding period) when the reservoir typically spills, and because the creek lacks side channels and other calm water areas utilized by CRLF, these high water flows would preclude CRLF from being able to lay egg masses. Additionally, much of Newell Creek has a fairly dense canopy cover (averaging 85% in the 300-meter reach downstream of the spillway plunge pool) with limited basking habitat. Consequently, no breeding habitat occurs for CRLF within the plunge pool and within Newell Creek in the study area. The seepage channel from the Reservoir to the plunge pool and Newell Creek does not provide suitable breeding habitat for CRLF due primarily to the shallow water depth and lack of refugia within the channel.

The four ephemeral drainages assessed within the study area do not provide suitable breeding habitat due primarily to the ephemeral nature of the drainages (lack of perennial water), to high outflows that can occur in the winter and early spring during the CRLF breeding period, and to the

lack of sufficiently deep, calm water pools within these relatively narrow channels. The two seasonal wetlands assessed do not provide suitable breeding habitat due to the shallow water depth (several inches) for egg deposition and the absence of pooled water. The two seeps do not provide suitable breeding habitat due to the lack of surface water in one seep and the shallow water depth in the other seep (8 inches or less) and due to the small size of both these features.
In addition, the California Red-legged Frog Habitat Assessment conducted by Dudek (2018) included an assessment of surrounding habitat areas up to one mile from the study area; no suitable breeding habitat within this surrounding area was identified.

In 2001, focused CRLF surveys were conducted at the reservoir, Newell Creek, and other City watershed lands in the Project vicinity, with negative results for all surveys (City of Santa Cruz Water Department 2013). Even though the survey results are 17 years old and CRLF could have moved into the area since that time, the lack of breeding habitats within the study area and within at least 1 mile of the site, the marginal quality of spring and summer refugia within the study area, and the significant distance to the nearest occurrence record substantially reduces the potential for occurrence within the study area. Additional protocol-level surveys were conducted in 2013 in association with the proposed hydroelectric project for Newell Creek dam which also had negative results (Biotic Resources Group 2013).

Although several of the ephemeral drainages within the study area represent potentially suitable spring/summer refugia habitat for dispersing individuals, there is no known population source/suitable breeding habitat in close proximity to the study area, so the potential for dispersing CRLF to occur in these refugia habitats is considered extremely remote. Consequently, due to a lack of suitable breeding habitat in the study area (and within one mile of the study area), the substantial distance to the nearest breeding record occurrence, negative findings of focused surveys previously conducted for the species, and findings of the 2018 habitat assessment, CRLF is not expected to occur in any of the aquatic features within the study area (Dudek, October 2018b).

Foothill Yellow-legged Frog. The foothill yellow-legged frog (*Rana boylii*) is a California candidate species for listing as threatened and California Species of Special Concern. This species is known from the Santa Cruz region, with the closest records of this species being approximately 6.0 miles northeast of the study area in the Los Gatos Creek watershed, and approximately 8.0 miles east of the study area in Soquel Creek in the Soquel Demonstration State Forest. Small numbers of foothill yellow-legged frogs were reported from the Aptos Creek watershed in 1998, and small to moderate populations were reported from 1992-2008 in the Soquel Creek drainage (CNDDB, 2016). No previous documented occurrences of this species exist within the Newell Creek watershed.

This species is characteristically found close to water in association with perennial streams and ephemeral creeks with boulder, cobble, and gravel substrates that retain perennial pools through the end of summer. In general, the species appears to prefer low to moderate gradient (0 to 4%) streams, particularly for breeding; however, juvenile and adult frogs may also utilize moderate to steep gradient (4 to ≥10%) creeks during the summer and early fall.

Foothill yellow-legged frog is associated with a variety of aquatic habitat types, including pools, riffles, runs, cascade pools, and step-pools, depending on life stage and the time of year. Breeding typically occurs in shallow edgewater areas along low gradient cobble and small boulder dominated point or lateral bars, in side channels, pool tail-outs, and side pools along river margins. During the summer and fall, adult frogs appear to prefer stream channels that provide exposed basking sites and cool shady areas immediately adjacent to the water's edge. Perennial streams appear to be the preferred summer habitat of adults; however, ephemeral streams with perennial pools also provide suitable habitat (Seltenrich and Pool, 2002).

During the June 2018 habitat assessment conducted for California red-legged frog, one sub-adult foothill yellow-legged frog was observed in standing water (approximately 8 inches in depth) associated with a seep at the base of NCD adjacent to the existing outlet structure. The observation is unusual since this species prefers stream habitats with cobble and gravel substrates and exposed banks for basking. Furthermore, based on the habitat assessment that was conducted during this survey, no breeding habitat for foothill yellow-legged frog was identified within the study area. Therefore, given the lack of suitable breeding habitat and absence of exposed banks and appropriate substrates in Newell Creek within the study area, the occurrence, of foothill yellow-legged frog at the seep is considered an incidental occurrence of a dispersing individual from suitable breeding habitat within Newell Creek downstream of the study area. This species was not addressed in the 2013 biological report prepared for the Newell Creek Dam Hydroelectric Project (Biotic Resources Group 2013) and was considered unlikely to occur based on information contained in the Draft Watershed Lands Management Plan that addressed special-status species for the Newell Creek tract and other City-owned tracts (City of Santa Cruz, 2013).

Marbled Murrelet. Marbled murrelet (*Brachyramphus marmoratus*) is a federally listed threatened species and state listed endangered species. It forages in coastal waters and bays, and breeds inland on mountains near the coast. They are sometimes found on lakes near the coast. Marbled murrelets nest on mountainsides on islands or well inland in mature forest habitat (CDFW, 2018). The three separate areas where marbled murrelets currently are found in California correspond to the three largest remaining blocks of old-growth coastal conifer forests. These populations are largely separated by areas of second-growth forest not used by marbled murrelets (USFWS 1997). On the basis of forest surveys and locations of grounded juveniles, breeding habitat consists of mature and old-growth coniferous forests, or forests with old-growth components, including but not limited to large trees with large limbs and multilayered canopies (Hammer and Nelson, 1995). Because adults do not build nests and depend on availability of large platforms, abundance of large platforms with moss or other thick substrate, such as piles of needles collected on limb near tree bole are key habitat components; absence of these factors may limit this species' distribution and habitat use. Designated Critical Habitat for marbled murrelet occurs approximately 1.5 miles southwest of the Project study area within Henry Cowell Redwoods State Park (USFWS, 2018).

Although an individual marbled murrelet was observed flying over the study area during the field survey, the Newell Creek Tract (inclusive of the proposed Project site and study area) has been extensively logged since the turn of the century, and particularly in the last 30-plus years,

although timber harvesting on City-owned lands cease about 20 years ago (see Section 4.5, Forest Resources). Because no old growth forest habitat with suitable nesting platform substrate occurs within the study area, this species is not expected to nest within the study area. Of note, this species was not identified as occurring or potentially occurring in the Newell Creek Tract based on previous studies on City watershed lands (Swanson Hydrology & Geomorphology, 2001) or in the biological report prepared for the Newell Creek Dam Hydroelectric Project (Biotic Resources Group, 2013).

Consequently, while this species may fly over or near the study area incidentally, because of the lack of suitable nesting habitat, this species is not expected to nest within the study area.

Bald Eagle. Bald eagle (*Haliaeetus leucocephalus*) is a state listed threatened species and is also a California Fully Protected species. The species occur near large bodies of open water such as lakes, marshes, estuaries, seacoasts and rivers, where fish are abundant. Bald eagles usually nest within one mile of water in tall trees with open branch work bordering lakes or large rivers (CDFW 2018). Bald eagles have been observed at Loch Lomond Reservoir (Berry, pers. comm. 2018), and suitable nesting and foraging habitat is available for this species within the study area, primarily associated with the Reservoir. Consequently, this species could occur within the study area.

Santa Cruz Black Salamander. Santa Cruz black salamander (*Aneides niger)*, a state Species of Special Concern, is a terrestrial species that inhabits mixed deciduous woodland, coniferous forests, and coastal grasslands. It is found under rocks near streams, in talus, under damp logs, and other objects (CDFW 2000). Santa Cruz black salamander is a lungless salamander (*Plethodontidae*), that 'breathes' through its skin and mouth lining. Thus they require damp-moist environments on land and can only move above ground during periods of high humidity. Unlike some other salamanders, they lay their eggs in moist locations on land in summer months (July-August), and do not have swimming larvae with gills. Rather, their young fully develop in the egg, then hatch into small terrestrial salamanders. In general, this species remains underground during periods of dry weather, but can be active near streams or in other damp locations year-round. Newell Creek and the adjacent drainage provides suitable habitat for Santa Cruz black salamander, and there are documented historical occurrences of this species in the vicinity of Ben Lomond southwest of the study area (from the 1930s and 1960s) and a more recent record (from 2012) from Henry Cowell Redwoods State Park farther south (CNDDB 2018). Therefore, this species is considered to have moderate potential of occurring within the study area, particularly along Newell Creek or in other areas with moist microclimates and suitable refugia.

California Giant Salamander. California giant salamander (*Dicamptodon ensatus*), a state Species of Special Concern, is a nocturnal species that inhabits coastal forests with ample moisture and clean, cold, permanent or mostly permanent streams or seeps. Larvae are aquatic; they use calm nearshore habitat with cover such as rock crevices and leaf litter or other debris. The larvae develop and live in aquatic habitats for up to two to three years depending on aquatic conditions. Metamorphosed juveniles move out of streams during periods of rain or high humidity. Both juveniles and adults require damp-moist environments on land and tend to only move above

ground during wet periods. Larval diet consists of invertebrates, smaller amphibians, or even small fish hatchlings. Adults are sit-and-wait predators and will eat just about anything that they can crush with their jaws including invertebrates (slugs), small rodents, lizards, or other amphibians. In spring, adults will find a stream location with suitable cover for breeding and egg deposition. In the similar species, Coastal giant salamander (*Dicamptondon tenebrosus)*, females do not breed every year because they invest a lot of resources into guarding their eggs through hatching (November-December).

Newell Creek, the seepage channel, seeps and surrounding upland areas associated with these drainages provide suitable habitat for California giant salamander, and this species has been observed in in the study area. Four California giant salamander larvae were observed during field surveys in September 2018 near the existing outlet structure in a location with standing water that was approximately four inches in depth.

Western Pond Turtle. Western pond turtle (*Emys marmorata*), a state Species of Special Concern, uses both aquatic and terrestrial habitats. They are found in rivers, lakes, streams, ponds, wetlands, ephemeral creeks, reservoirs, agricultural ditches, estuaries, and brackish waters. Adults tend to favor deeper, slow moving water, whereas hatchlings search for slow and shallow water that is slightly warmer. Terrestrial habitats are used for wintering and nesting and usually consist of burrows in leaves and soil (CDFW, 2018). Western pond turtle nesting typically occurs from March through July depending on local conditions (CDFW, 2000).

A study performed by Alterra Environmental Inc. (2009) within and adjacent to Loch Lomond Reservoir found several western pond turtles in the reservoir during trapping events, and also observed several turtle nests in the northern portion of the bank of the reservoir. Generally, the water temperature in the spillway plunge pool below the spillway is too cold for this species, and the pool lacks sufficient basking areas; however, a western pond turtle was observed in the spillway plunge pool in 2008. The study concluded there is a small population of western pond turtles that use Loch Lomond Reservoir and the surrounding areas for overwintering and nesting, and that this species could also be found in the spillway plunge pool and Newell Creek which provide some suitable habitat for this species (Alterra Environmental, 2009). However, they also found that recruitment is low within the Reservoir, and that western pond turtles typically avoid areas where there are high levels of human activity.

Based on documented observations described above, western pond turtle is known to occur within Loch Lomond Reservoir and possibly in the spillway plunge pool below the dam and within some areas of Newell Creek downstream.

San Francisco Dusky-footed Woodrat. San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*), a state Species of Special Concern, is found in forest and shrubland communities throughout the San Francisco Bay area (Hall 1981). They are well known for their large terrestrial stick houses (middens), some of which can persist for twenty or more years. Because the dusky-footed woodrat (*Neotoma fuscipes*) and San Francisco dusky-footed woodrat cannot be

distinguished phenotypically, and the proposed Project is within the range of the San Francisco dusky-footed woodrat, presence of San Francisco dusky-footed woodrat is assumed. One woodrat midden was observed on the southern edge of Staging Area 6 and suitable habitat is present in nearly every vegetation community in the study area. Woodrat middens are typically placed on the ground against or straddling a log or exposed roots of a standing tree, and are often located in dense brush. Nests are also placed in the crotches and cavities of trees and in hollow logs. Evergreen or live oaks and other thick-leaved trees and shrubs are important habitat components for dusky-footed woodrats. Suitable breeding and foraging habitat for dusky-footed woodrat occurs within the study area, and one large stick nest, indicative of woodrat activity (species undetermined), was observed on the southern edge of Staging Area 6 during the 2018 field survey. Therefore, this species is considered to have moderate potential to occur within the study area.

Pallid bat. Pallid bat (*Antrozous pallidus*), a state Species of Special Concern, is present in a variety of habitat types throughout California, except within the highest elevations of the Sierra Nevada. The pallid bat utilizes rocky outcrops, cliffs, crevices in buildings and bridges, and occasionally in hollow trees within which to breed and roost. The species is most common in open, dry habitats with rocky areas for roosting, and is highly sensitive to disturbance at or near roost sites. While the Reservoir and other open areas within the study area serve as potential foraging habitat, there is low potential for roosting/breeding due to the general lack of suitable roost habitat.

Townsend's Big-eared Bat. Townsend's big-eared bat (*Corynorhinus townsendii*), a state Species of Special Concern, is also found throughout California except in the highest elevations of the Sierra Nevada. It typically prefers roosting in human-made structures such as mines, tunnels, and buildings that provide cave-like habitat conditions. Similar to pallid bat, this species is highly sensitive to disturbance and could potentially utilize the reservoir and other open areas within the study area as foraging habitat; however, there is low potential for roosting/breeding due to the general lack of suitable roost habitat.

Sensitive Habitat Areas

Sensitive habitats and natural vegetation communities include riparian corridors, wetlands, habitats for state and/or federally protected species and other special-status species, areas of high biological diversity, areas providing important wildlife habitat, and/or unusual or regionally-restricted habitat types. Sensitive natural vegetation communities are evaluated by CDFW and are assigned global (G-rank) and state (S-rank) ranks based on rarity of, and threats to, these vegetation communities over their entire distributions (G-rank) and within California (S-rank). Natural communities with S-ranks of S1-S3 are considered Sensitive Natural Communities which are typically addressed in the CEQA environmental review process. The five levels of S-ranks are defined as follows:

> **S1 = Critically Imperiled.** Critically imperiled in California because of extreme rarity (often 5 or fewer populations) or because of factor(s) such as very steep declines making it especially vulnerable to extirpation.

S2 = Imperiled. Imperiled in California because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation.

S3 = Vulnerable. Vulnerable in California due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 = Apparently Secure. Uncommon but not rare in California; some cause for long-term concern due to declines or other factors.

S5 = Secure. Common, widespread, and abundant in the state.

Four sensitive habitats, all ranked S3, occur in the study area and include riparian (red alder-bigleaf maple community along Newell Creek), bigleaf maple stands, coast live oak – madrone woodland, and wetland habitats (seeps and seasonal wetlands). Sensitive habitats and primary Project components are depicted on Figures 4.3-3A and 4.3-3B.

Although redwood groves are also identified as a sensitive community by CDFW, the two stands of redwood trees present in proposed Staging Area 5 are small, isolated, composed of second-growth trees, and occur in upland areas with very few associated understory species. Furthermore, neither stand of redwood trees would be considered unique or a regionally-restricted habitat type in this portion of Santa Cruz County. Therefore, this particular community does not meet the criteria for ranking as a Sensitive Natural Community and is not considered sensitive in the context of this Project.

Wildlife Breeding and Movement Corridors

Nesting Birds

All individual native birds, including common raptors (special-status raptors are discussed separately above), are protected by the federal Migratory Bird Treaty Act. In California, active nests and eggs are also protected by provisions in the Fish and Game Code of California; an additional provision in the Fish and Game Code also protects individual raptors. A number of bird species were observed during the field assessment (Appendix D) and could potentially nest within the study area.

The nesting raptor survey conducted by Dudek resulted in observations of a pair of red-shouldered hawks (*Buteo lineatus*), two red-tailed hawks (*Buteo jamaicensis*), and one osprey (*Pandion haliaetus*). No active or inactive raptor nests were observed. Based on observations made during the survey, it was determined that the red-shouldered hawk pair are likely nesting on the east side of the reservoir. This species will typically use the same nest over multiple years so there is potential that this particular pair could continue the nest within/adjacent to the Project area in the future. The study area overall provides suitable nesting and foraging habitat for this species.

The two red-tailed hawk observations were of soaring individuals made at separate times and locations within and adjacent to the study area; the observer was unable to determine if the observation was of the same individual or two separate individuals. Suitable nesting habitat is concentrated on the ridge west of Newell Creek, where taller trees provide views over adjoining habitat and access for larger birds of prey. Taller trees within or adjacent to the Project area could potentially provide suitable nest habitat, but these locations are away from suitable foraging habitat. The densely wooded habitat within the study area is not suitable foraging habitat for this species.

The single osprey that was observed near the dam was likely foraging over the reservoir, though no active foraging behavior was observed at the time. No suitable osprey nest trees, or evidence of osprey nesting, were observed in the study area. However, osprey have historically nested within the City's Newell Creek watershed land tract.

Suitable nesting habitat occurs within and adjacent to the Project area for Cooper's hawk (*Accipiter cooperi*), but no observations of this species were made during the site survey. Suitable nesting and foraging habitat for several common owl species, including western screech-owl (*Megascops kennicottii*), great horned owl (*Bubo virginianus*), and northern saw-whet owl (*Aegolius acadicus*), also occurs within and adjacent to the study area.

Wildlife Corridors

Wildlife corridors are landscape features, usually linear in shape, that facilitate the movement of animals (or plants) over time between two or more patches of otherwise disjunct habitat. Corridors can be small and even man made (e.g., highway underpasses, culverts, bridges), narrow linear habitat areas (e.g., riparian strips, hedgerows), or wider landscape-level extensions of habitat that ultimately connect even larger core habitat areas. Depending on the size and extent, wildlife corridors can be used during animal migration, foraging events, and juvenile dispersal, and ultimately serve to facilitate genetic exchange between core populations, provide avenues for plant seed dispersal, enable increased biodiversity and maintenance of ecosystem integrity within habitat patches, and help offset the negative impacts of habitat fragmentation (Hilty et al. 2006).

Although the study area has a non-linear configuration, the study area has value as a potential habitat linkage between areas of adjacent forest habitats. Newell Creek flows through the southern portion of the Project area and is tributary to the San Lorenzo River. The creek corridor is likely used by a number of common and special-status wildlife species as cover and foraging habitat, dispersal habitat, and as a linkage for movements between adjacent similar habitats.

4.3.2 Impacts and Mitigation Measures

Thresholds of Significance

In accordance with the California Environmental Quality Act (CEQA); State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies, and/or guidelines; and agency and professional standards; a project impact would be considered significant if the project would:

BIO-1 Have a substantial adverse effect, either directly or through habitat modifications on; or substantially reduce the number or restrict the range of any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;

BIO-2 Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or US Fish and Wildlife Service;

BIO-3 Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;

BIO-4 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;

BIO-5 Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance;

BIO-6 Conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other approved local, regional, or state habitat conservation plan;

BIO-7 Substantially reduce the habitat of a fish or wildlife species;

BIO-8 Cause a fish or wildlife population to drop below self-sustaining levels; or

BIO-9 Threaten to eliminate a plant or animal community.

Analytical Method

The impact analyses are based on biological assessments conducted for this EIR, which consisted of database and literature reviews and field reconnaissance-level biological surveys conducted in April, June, and September 2018. Field work also included habitat assessment for some species, wetland delineations, and general nesting bird survey. A formal habitat assessment was conducted in June 2018 for the federally-threatened CRLF. See the biological resource reports and assessments in Appendices F-1 through F-4.

Impacts and Mitigation Measures

Areas of No Project Impact

BIO-4 *Impacts to Wildlife Corridors*. The study area is not recognized as an important regional wildlife corridor by any state agency or jurisdiction and is not considered critical to the ecological functioning of adjoining watersheds and open space areas. However, Newell Creek serves as a natural riparian corridor that provides cover and food resources for many different wildlife species, and is likely used by several common and special-status species when moving between similar habitats in the region. During construction, activities could block or otherwise hinder wildlife movement along Newell Creek or temporarily affect the ability of wildlife to access other habitat areas upstream or downstream of the study area. However, this impact would be temporary and would not substantially or permanently affect the function of the creek as a movement corridor and habitat linkage. Therefore, no significant impacts pursuant to CEQA are expected to occur.

BIO-6 *Conflicts with Habitat Conservation Plan, Natural Community Conservation Plan (NCCP), or Other Approved Habitat Conservation Plans*. The proposed Project would not conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other approved local, regional, or state habitat conservation plan as none currently exist that include the Project area.

BIO-7 *Substantially Reduce Fish or Wildlife Species Habitat*. The proposed Project does not have the potential to substantially reduce the habitat of fish or wildlife species. The Project would not result in permanent changes to fish habitat in Loch Lomond Reservoir or in Newell Creek downstream of Newell Creek Dam that would appreciably reduce existing habitat or degrade aquatic conditions for fish species that may be present in these locations. The Project does have the potential to impact other aquatic or terrestrial wildlife species, including special-status species, as a result of ground disturbance associated with Project staging and construction activities. Project-related ground disturbance, including tree and vegetation removal, would reduce the amount of habitat available to amphibians, reptiles, nesting birds and mammals, including roosting bats. This impact would not be substantial since the amount of ground disturbance and vegetation removal would be a small fraction of the total habitat available in the watershed. Therefore, the Project would not substantially reduce the habitat of a fish or wildlife species.

BIO-9 *Threaten to eliminate a plant or animal community.* The proposed Project would not threaten to eliminate a plant or animal community. The Project would involve the removal of vegetation that could result in potential impacts on individual plant and animal species, which can be mitigated to a less-than-significant level. None of the proposed Project components, either individually or collectively, will cause the

elimination of entire plant or animal communities. Although some sensitive habitats (vegetation communities) will be removed by construction of the proposed Project, mitigation measures will be implemented to avoid and minimize impacts to areas where these communities will be retained. In addition, development of a site-specific revegetation and restoration plan will detail the site-specific measures to offset impacts to sensitive habitats.

Project Impact Analyses

Impact BIO-1A: Special-status Species – Federally-listed Species. The Project could result in direct impacts to federally-listed steelhead, if any individuals are present, and indirect impacts to habitat for steelhead and federally- and state-listed coho salmon species. This is a *potentially significant* impact.

The proposed Project improvements could result in direct impacts to steelhead if present, in the upper reach of Newell Creek within the Project study area. The proposed Project improvements would not result in direct impacts to coho salmon because they are not expected to occur within the study area. Installation of a portion of the replaced segment of the NCP and a culvert crossing at the spillway plunge pool would cross an approximately 65-foot segment of Newell Creek, which is designated critical habitat for steelhead and coho salmon. Approximately 1,000-2,000 square feet within the creek channel would be temporarily disturbed and filled with placement of these facilities. The spillway plunge pool and the downstream segment of Newell Creek would be dewatered and diverted during construction of the bridge crossing and NCP. If steelhead are present in either Newell Creek or the spillway plunge pool, dewatering and rescue and relocation activities could require handling of steelhead. While highly unlikely, individual fish could be injured or killed during the rescue and relocation process. Any direct impacts to steelhead would be considered a potentially significant impact.

Construction activities could also result in indirect impacts to downstream water quality and habitat. Project construction activities that involve disturbance to the Reservoir and Newell Creek, including in-reservoir dredging and construction of the new inlet structure, as well as installation of the Newell Creek Pipeline and the culvert bridge crossing across Newell Creek could result in potential adverse water quality effects downstream (e.g., elevated turbidity levels, discharges of fine sediments, etc.). Grading to create the "construction platform" at the toe of the dam also could result in erosion and sedimentation into the creek if BMPs are not followed. Such water quality effects could result in indirect adverse impacts to coho salmon and steelhead or degradation of suitable spawning and rearing habitat for these species in the lower reaches of Newell Creek. Any indirect impacts to coho salmon or steelhead would be considered potentially significant under CEQA.

During construction activities in Newell Creek, the existing beneficial flow release and dam seepage would be released into Newell Creek. Groundwater from the tunnel excavation would be captured and treated to remove suspended solids, oil, grease, and other contaminants introduced by or resulting from construction operations. Discharge of this "dewatered" water from the tunneling

excavation would be discharged in the spillway plunge pool or ephemeral drainage/Newell Creek at the toe of the dam or alternately within the Reservoir within the area contained by the silt curtains. All water discharges would be subject to approval of a National Pollutant Discharge Elimination System (NPDES) Waste Discharge permi permit. The water treatment system would be designed and selected to satisfactorily treat all discharged water including groundwater inflows and water resulting from the construction process. Treatment would reduce potential contaminants in the discharged water to the levels specified in the applicable permits, NPDES Waste Discharge Requirements Order, and applicable discharge water quality requirements.

Temporary Construction-Related Effects. The Project involves the construction of some Project components within or adjacent to the Reservoir and Newell Creek that would have the potential to temporarily disturb sediments and soils and adversely affect water quality in the Reservoir and Newell Creek. These include:

- A new inlet structure in the reservoir,
- New inlet/outlet conduit tunnel, including grading to create the "construction platform",
- A new culvert crossing over the spillway plunge pool, and
- Replacement of a portion of the NCP across Newell Creek.

Project construction activities that involve disturbance to Newell Creek, the seepage channel, or spillway plunge pool could result potential water quality effects downstream (e.g., elevated turbidity levels, discharges of fine sediments, increased temperature, etc.). Such water quality effects could result in indirect adverse impacts to coho salmon and steelhead or degradation of suitable spawning and rearing habitat for these species in the lower reaches of Newell Creek. Any indirect impacts to coho salmon or steelhead would be considered a potentially significant impact.

Construction-related erosion or disturbance of sediments and soils may occur which could temporarily increase downstream turbidity and sedimentation if soils were transported downstream via creek flow or stormwater runoff. The preliminary construction schedule included in the Project 50% design report indicates potential construction of the NCP replacement pipe, including the segment across Newell Creek, during early spring.

The abundance, distribution, and survival of fish has been linked to turbidity and silt deposition. Prolonged exposure to high levels of suspended sediment could create a loss of visual capability, disrupting normal feeding behavior and leading to reduced growth rates. Such exposure could also result in a thickening of the gills, potentially causing the loss of respiratory function; in clogging and abrasion of gills; and in increased stress levels, which in turn could reduce tolerance to disease and toxicants (Waters, 1995). Turbidity could also result in increased water temperature and decreased dissolved oxygen (DO) levels, especially in low-velocity pools, which can cause stressed respiration. Important food sources for salmonids, such as macroinvertebrates, could also be adversely affected by degradation of habitat quality (water quality and substrate conditions) caused by increased turbidity, decreased DO content, and an increased level of pollutants. Avoidance of adverse habitat

conditions is the most common fish response to increases in turbidity and sedimentation by moving away from unsuitable conditions, unless there are no other options. Therefore, increased turbidity attributed to construction activities could preclude fish from occupying potentially suitable spawning and rearing habitat areas downstream of the study area.

Long-Term Effects. Current operations and maintenance (O&M) activities at the dam include releasing a minimum of 1 cfs of beneficial flow to Newell Creek, operational testing of the hydraulic system and shutoff valves, and monitoring seepage from the dam. Continuous flow releases and monthly seepage monitoring would continue during and after construction of the new inlet/outlet works. O&M for the new intakes and the inlet/outlet conduit system include inspections of the intakes and interiors of the conduit, operational testing of the hydraulic system and shutoff valves, removal of calcium deposits from pipeline joints, and general corrosion control and maintenance particularly for metal surfaces that are not stainless steel or other corrosion resistant materials. Non-routine maintenance includes replacement of valves, hydraulic fluid, and/or pipe segments.

No long-term effects to steelhead or coho salmon are anticipated from the proposed Project. Newell Creek would continue to receive base flows as required, and would continue to provide cold water into the San Lorenzo watershed downstream of the Project area. Routine maintenance activities are not expected to result in water quality degradation or habitat disturbance.

Mitigation Measures

Implementation of proposed Project Best Management Practices (BMPs) to protect water quality (see Section 3.8 in Chapter 3, Project Description), and the following mitigation measures would reduce the impact to a less-than-significant level.

MITIGATION BIO-1A-1: All in-stream construction activities shall be limited to the low-flow period between June 15 through November 1, except by extension approved by CDFW and NOAA Fisheries.

MITIGATION BIO-1A-2: If native fish or native aquatic vertebrates are present when cofferdams, water bypass structures, and silt barriers are to be installed, a native fish and aquatic vertebrate rescue and relocation plan shall be prepared, approved by CDFW and NOAA Fisheries, and implemented by a qualified biologist during dewatering of the spillway plunge pool and Newell Creek to ensure that significant numbers of native fish and aquatic vertebrates are not stranded.

Impact BIO-1B: Special-Status Species – State-Listed Species. The Project could result in impacts to foothill yellow-legged frog, a candidate for state listing, if any individuals are present at the construction sites. This is a *potentially significant* impact.

An individual foothill yellow-legged frog was observed near the seepage channel at the toe of the dam during the biological surveys. The frog is not expected to breed or regularly occur within the study area due to the lack of suitable aquatic habitat for breeding and absence of other habitat characteristics that this species requires. However, dispersing individuals could temporarily occur within suitable refugia habitat along Newell Creek, the seepage channel, seeps, and spillway plunge pool within the study area. Work activities in Newell Creek associated with the installation of the NCP, new culvert bridge crossing downstream of the spillway plunge pool, and establishment of the construction platform work area, could result in adverse impacts on individuals of this species, if present during Project construction. Impacts on this species would be considered potentially significant under CEQA and would potentially trigger the need for an Incidental Take Permit pursuant to Section 2081 of the California Fish and Game Code.

Mitigation Measures

Implementation of Mitigation Measure BIO-1B would reduce the impact to a less-than-significant level.

MITIGATION BIO-1B-1: Seasonal surveys based on guidance provided by the CDFW, including survey methods outlined in CDFW's "Considerations for Conserving the Foothill Yellow-Legged Frog." (May 2018) shall be initiated at least one year prior to construction.

Not more than 48 hours prior to commencement of construction activities occurring between March 1 and September 30 in or adjacent to Newell Creek associated with the installation of the NCP, new culvert bridge crossing downstream of the spillway plunge pool, and establishment of the construction platform work area at the toe of NCD, a qualified biologist, or trained designee (as approved by CDFW), shall conduct a pre-construction survey for foothill yellow-legged frog. The survey shall be conducted within suitable habitat that could be directly or indirectly impacted by construction activities associated with the Project components and at the locations described above. The surveys shall be conducted pursuant to currently accepted methods/protocols for this species as determined by CDFW.

If no individual foothill yellow-legged frogs are observed during the pre-construction surveys, monitoring and inspection of suitable habitat shall occur each day during construction activities implemented during March 1 – September 30, unless otherwise approved by CDFW, to ensure that no individual foothill yellow-legged frogs have moved into the work areas in the time since the focused pre-construction survey was completed.

If foothill yellow-legged frogs are detected during the pre-construction survey or during the monitoring and inspections during construction, CDFW shall be consulted to determine the appropriate course of action to avoid take of the species. Such actions could include avoidance of the occupied area until it is determined that the individual is no longer present in the habitat area to be disturbed; establishment of exclusion fencing or similar measures; increased frequency or duration of inspections and monitoring; and/or relocation of any individual frogs that could be adversely affected by the Project.

Impact BIO-1C: Special-status Species – State Species of Special Concern. The Project could result in impacts to animals that are identified as state Species of Special Concern that could be present at the sites during construction. This is a *potentially significant* impact.

Construction of some Project components could result in impacts to animals discussed below that are identified as California Species of Special Concern and are known to occur or have potential to occur on or adjacent to the Project study area.

Western Pond Turtle. Construction of the proposed Project has the potential to impact Western pond turtle, if present in the Project area in Loch Lomond Reservoir, the spillway plunge pool, or downstream in Newell Creek. Impacts to Western pond turtle would be considered potentially significant under CEQA. Construction activities in Loch Lomond Reservoir associated with the installation of the new inlet/outlet structure and temporary boat launch along the shoreline, as well as the establishment of staging areas and improvements to access roads adjacent to the Reservoir could result in direct impacts through injury or harm to individual pond turtles, eggs or nests. However, because pond turtles are secretive and averse to human activity and disturbance, it is anticipated that any individual pond turtles that are present in the vicinity of the in Reservoir work area will move out of and away from the work area to other undisturbed portions of the reservoir as work activities are initiated. In addition to the potential impacts noted above, grading and excavation work associated with the installation of the new NCP and culvert bridge crossing downstream of the spillway plunge pool or other activities that result in alteration of aquatic or upland habitats could also cause impacts to this species. Noise, construction traffic, ground vibration, and increased activity could also contribute to impacts on this species.

Santa Cruz Black Salamander. Ground disturbing activities in damp upland areas near Newell Creek, the seepage channel, ephemeral drainages, and seeps at the base of NCD could result in impacts to this species if present. The following Project components could have effects on individuals or habitat for Santa Cruz black salamander: the establishment of the construction platform at the base of NCD; installation of the new NCP across Newell Creek; and construction of the culvert bridge crossing downstream of the spillway plunge pool.

California Giant Salamander. Newell Creek, the seepage channel, seeps and surrounding upland areas associated with these aquatic features provide suitable habitat for California giant salamander. Construction and other ground disturbing activities associated with the establishment of the construction platform at the base of NCD, installation of the new NCP across Newell Creek, and construction of the culvert bridge crossing downstream of the spillway plunge pool could have impacts on individuals and habitat for this species.

San Francisco Dusky-Footed Woodrat. Suitable habitat for this species is present in nearly every vegetation community in the study area. Construction activities that involve ground disturbance or removal of vegetation, especially those activities necessary for establishment of Project work areas and staging areas, could result in impacts to San Francisco dusky-footed woodrat.

Special-status Bat Species. The potential for pallid bat and Townsend's big-eared bat to breed and/or roost within the study area is considered low based on the general lack of suitable roosting habitat observed during the reconnaissance-level survey conducted in 2018. However, a thorough survey for any potential roost habitat within the study area has not been conducted and, as such, the potential for either of these species to roost within the study area during Project construction activities cannot be entirely ruled out. Direct impacts on active maternity roosts or on daytime roost sites that would result in direct harm/injury to roosting bats would be considered potentially significant under CEQA.

Mitigation Measures

Implementation of Mitigation Measures BIO-1C-1 through BIO-1C-6 would protect any species found during pre-construction surveys and would reduce Project impacts to a less-than-significant level.

MITIGATION BIO-1C-1. Due to the presence of suitable aquatic and upland habitats for Western pond turtle, Santa Cruz black salamander, and California giant salamander in the Project construction footprint, wildlife exclusion fencing shall be installed to: (1) prevent individuals of these species from accessing the active work and staging areas; and (2) define the boundary of and protect all suitable aquatic and upland habitat areas that will not be directly affected by construction activities. The wildlife exclusion fencing will be established between the identified construction areas and upland and aquatic habitats to be avoided.

The specific locations and placement of fencing will be determined by the City in coordination with a qualified biologist and will be based on the extent of proposed construction activities and field conditions at each work area. The fencing alignment and work areas enclosed by the fencing shall be thoroughly inspected by a qualified

biologist prior to installation by searching under rocks, logs, leaf litter, etc. to find and relocate any individuals of these species in the area. Following completion of fencing installation, the fence alignment will be inspected once daily for the duration of construction activities by a qualified biologist, or trained designee (as approved by CDFW), to confirm the integrity and function of the fencing and ensure wildlife are not becoming entrapped in the fencing.

MITIGATION BIO-1C-2: Western Pond Turtle. Not more than five days prior to the commencement of construction activities in Loch Lomond Reservoir and any ground disturbing activities associated with establishment of Staging Areas 1 and 7, the access road to these staging areas, construction platform at the toe of NCD, and associated work areas in or adjacent to Newell Creek and spillway plunge pool, a qualified biologist shall conduct a focused survey for Western pond turtle, its nests, and/or eggs within these work areas and within 50 feet of the construction/ground disturbance footprint. If no Western pond turtles are observed, construction activities may begin without the need for further surveys or protection measures. If Western pond turtles are observed, then a qualified biologist shall capture the turtles and translocate them to an area of equally suitable habitat away from the construction footprint. Approval from CDFW would be required prior to handling/translocating individuals of this species.

If occupied nests are observed during the pond turtle nesting season (March – July), the nests will be marked and fenced with exclusion fencing in such a manner that emerging young would not be able to move into areas where they could be crushed by vehicles or equipment. If nests cannot be avoided, construction activities within 50 feet of the identified nest location shall be delayed until the qualified biologist determines that the nests are no longer occupied.

MITIGATION BIO-1C-3: Santa Cruz Black Salamander. Not more than 48 hours prior to initial ground disturbing activities, a pre-construction survey for Santa Cruz black salamander shall be conducted within all areas of Santa Cruz black salamander suitable habitat that will be directly or indirectly affected by project construction activities and within 50 feet of such areas. Suitable habitat for this species in the study area consists of damp upland areas near/adjacent to existing aquatic features at the base of NCD including Newell Creek, the spillway plunge pool, seepage channel, ephemeral drainage, and seeps. Monitoring for this species shall also be conducted at least once daily during initial

ground disturbing activities. If any individuals of Santa Cruz black salamander are observed during the pre-construction survey or subsequent monitoring, they shall be moved to the nearest appropriate habitat outside of the construction footprint by a qualified biologist. Approval from CDFW would be required prior to handling/translocating individuals of this species.

MITIGATION BIO-1C-4. California Giant Salamander. Not more than 48 hours prior to initial ground disturbing activities, a pre-construction survey for California giant salamander shall be conducted within all areas of suitable habitat for this species (i.e., Newell Creek, the seepage channel, seeps and surrounding upland areas associated with these aquatic features) that will be directly or indirectly affected by project construction activities and within 50 feet of such areas. Monitoring for this species shall also be conducted at least once daily during initial ground disturbing activities. If any individuals of California giant salamander are observed during surveys, they shall be moved to the nearest appropriate habitat outside of the construction footprint by a qualified biologist. Approval from CDFW would be required prior to handling individuals of this species.

MITIGATION BIO-1C-5. San Francisco Dusky-footed Woodrat. Not more than thirty (30) days prior to commencement of ground disturbing activities at each work area, a qualified biologist shall conduct a pre-construction survey to locate existing San Francisco dusky-footed woodrat nests. Any nests that are identified in the construction footprint or within 20 feet shall be photographed, mapped and flagged or fenced for avoidance. For the protection of San Francisco dusky-footed woodrat individuals that may be present in the construction footprint, complete avoidance of San Francisco dusky-footed woodrat middens/nests is recommended.

If avoidance of identified middens/nests is not feasible, the following measures are recommended prior to the commencement of ground disturbing activities to avoid and reduce impacts on San Francisco dusky-footed woodrat:

a) After obtaining approval of the biologist qualifications from CDFW, a qualified biologist shall dismantle the nest by hand to allow for adult San Francisco dusky-footed woodrat individuals to escape (this work shall be conducted outside of the breeding season for this species which is April through June);

b) If young are observed during the dismantling process, the qualified biologist shall stop work for a minimum of 24 hours to allow the adult woodrats to relocate their young;

c) Once the nest is determined to be vacant, the dismantling process shall be completed and the nest materials shall be collected and moved to another suitable location nearby and outside of the construction footprint to allow for nest reconstruction; and

d) Where feasible, piles of cut vegetation and slash generated by project clearing and grubbing activities shall be left outside of, but near the work area, to provide refuge for woodrats that may become displaced by project activities.

MITIGATION BIO-1C-6. Special-Status Bats. Not more than 15 days prior to the initiation of any construction activities that involve tree trimming or removal, including clearing and grubbing of work areas and staging areas, that could affect potential daytime or maternity roost sites, a focused visual survey shall be completed by a qualified biologist to determine if any potential roost sites are present. Surveys for daytime roosts are required year round while surveys for potential maternity roost sites are only required from April through July.

If active daytime roosts are discovered, disturbance to the roost site shall not occur until it is determined by the biologist that any bats using the roost are no longer present.

If active maternity roosts are discovered that could be directly impacted by tree trimming/removal and/or project construction activities, an appropriate no disturbance buffer will be established by a qualified biologist in coordination with City staff and maintained until it is determined by the biologist that all young have fledged and are no longer dependent upon the roost site for survival. The no disturbance buffer distances will be a minimum of 25 feet, but this distance may be increased or decreased based on site specific conditions, including location and relationship of the roost site to the construction zone, and type of construction activities being conducted.

Impact BIO-1D: **Special-status Plant Species.** Project construction and ground disturbance in proposed staging and work areas could result in impacts to special-status plant species if any are present. This is a *potentially significant* impact.

Destruction of individuals or populations of special-status plants would be considered potentially significant under CEQA. The only species that has potential to occur in the study area, woodland woolythreads, was not observed in any of the Project work areas or staging areas that were defined at the time of the reconnaissance-level field surveys conducted on April 11 and 12, 2018. These surveys were conducted during a period when woodland woolythreads would have been evident and identifiable. Therefore, woodland woolythreads is not considered to be present in Staging Areas 1-4 or Staging Area 8. However, due to changes to, and expansion of, Staging Areas 5-7 in the time since the initial surveys were conducted and based on the presence of a number of communities/habitats that could support this species, any Project activities occurring in these staging areas could impact woodland wooly threads, if present.

Mitigation Measures

Implementation of Mitigation Measure BIO-1D-1 would reduce the impact on special-status plants to a less-than-significant level.

MITIGATION BIO-1D-1: If ground disturbing activities will occur in Staging Areas 5-7 or are proposed outside of these or any of the other (previously surveyed) staging or work areas, protocol-level surveys shall be performed for woodland woolythreads plant species during the blooming period for this species which is typically March to July. If this species is not detected, no further surveys or mitigation would be necessary. If any individuals or populations of woodland woolythreads are detected, the location(s) shall be mapped, and a mitigation plan shall be prepared and implemented that includes, but is not limited to, the following elements and criteria:

a) A description of any areas of habitat occupied by special-status plants to be preserved and/or removed by the Project;

b) Identification and evaluation of the suitability of on-site or off-site areas for preservation, restoration, enhancement or translocation;

c) Analysis of species-specific requirements and considerations and specific criteria for success relative to the Project's impact on this species and restoration, enhancement or translocation.

d) A description of proposed methods of preservation, restoration, enhancement, and/or translocation;

e) A description of specific performance standards, including a required replacement ratio and minimum success standard of 1:1 for impacted individuals or populations;

f) A monitoring and reporting program to ensure mitigation success; and

g) A description of adaptive management and associated remedial measures to be implemented in the event that performance standards are not achieved.

Impact BIO-2: Sensitive Habitats. Project construction and ground disturbing activities in proposed staging and work areas could result in impacts to and loss of sensitive vegetation communities that are present in these areas. This is a *potentially significant impact*.

Project construction activities that result in degradation and/or loss of sensitive vegetation communities, including red alder-bigleaf maple forest (this riparian community is dominant along Newell Creek in the study area), bigleaf maple forest, and coast live oak-madrone woodland would be considered potentially significant under CEQA. Several Project components, including grading and site preparation work associated with Staging Areas 2 and 5, establishment of the construction platform and Staging Area 4 at the base of NCD, installation of the NCP across Newell Creek, and construction of the culvert bridge crossing at the spillway plunge pool, would all involve removal of sensitive vegetation communities. Project construction would result in impacts to approximately 0.60 acre of sensitive vegetation communities as summarized in Table 4.3-2, below, with approximately 18,295 square feet (0.42 acre) of riparian vegetation removed.

Table 4.3-2: Summary of Impacts to Sensitive Habitats

Proposed Construction Activity	Permanent Impact (Acres; habitat type[1])	Total (Acres)
Staging Area 2 Site Preparation	0.01; BMF	0.01
Culvert Bridge Crossing & NCP Installation	0.10; RAB	0.10
Construction Platform – Staging Area 4 Site Preparation	0.31; RAB & 0.01;BMF	0.32
Staging Area 5 Site Preparation	0.17; LOM	0.17
Total	**0.41 RAB; 0,17 LOM; 0,02 BMF**	**0.60**

[1]Habitat types: BMF = Bigleaf maple forest; RAB = Red Alder – Bigleaf maple forest; LOM = Coast live oak – Madrone woodland

Mitigation Measures

Implementation of Mitigation Measures BIO-2-1 and BIO-2-2 would reduce Project impacts on sensitive habitats to a less-than-significant level.

MITIGATION BIO-2-1: When working in or adjacent to the active stream channel (i.e., construction of the culvert bridge crossing and NCP crossing), avoid

disturbance of retained riparian vegetation (Red alder-Bigleaf maple forest), to the maximum extent practicable.

Mitigation BIO-2-2: For unavoidable impacts to the Red alder-bigleaf maple forest (which constitutes the only riparian community in the study area), coast live oak-madrone woodland, and bigleaf maple forest communities, a project-specific revegetation and restoration plan shall be developed and implemented. The plan shall specify the criteria and standards by which the revegetation and restoration actions will compensate for impacts of the proposed Project on these communities and shall at a minimum include discussion of the following:

a) the restoration objectives and type and amount of restoration to be implemented (in-kind at a minimum restoration to impact ratio of 1:1);
b) the location of the proposed restoration site(s) (either on-site or within the San Lorenzo River watershed, if possible);
c) the methods to be employed for restoration implementation;
d) success criteria and a monitoring program to ensure vegetation community restoration success;
e) adaptive management and remedial measures to be implemented in the event that performance stands are not achieved; and
f) a mechanism for long term management and protection of the restoration area.

Impact BIO-3: Jurisdictional Aquatic Resources. The Project could result in impacts to jurisdictional aquatic resources, including wetlands and non-wetland waters of the United States. This is a *potentially significant* impact.

The proposed Project would result in impacts to Loch Lomond Reservoir, the seepage channel, two ephemeral drainages, a roadside swale, two seep wetlands, one seasonal wetland, and Newell Creek. All of these features are considered potentially jurisdictional waters of the U.S. and impacts to these features would be considered potentially significant under CEQA. The construction of the new inlet/outlet structure and associated dredging in the Reservoir, improvements to the reservoir shoreline along the boundary of Staging Area 1 for installation of the temporary boat launch facility, establishment of the construction platform and outlet pad work area and outlet structure at the base of NCD, installation of the NCP across Newell Creek, and construction of the culvert bridge crossing downstream of the spillway plunge pool would result in unavoidable impacts to approximately 1.58 acres of wetlands and non-wetland waters of the U.S. This total consists of 0.06 acre of impacts to wetlands and 1.52 acres of impacts to non-wetland waters of the U.S. Wetland impacts consist of two seep wetlands (Seep-01 and Seep-02). Including permanent fill of the seepage channel (part of the Newell Creek original alignment) and one seasonal wetland (SW-01). Non-wetland waters impacted

include Loch Lomond Reservoir, Newell Creek (PD-01), the seepage channel (PD-02), ephemeral drainages (ED-01, ED-04a and ED-04b), and a roadside swale (RS-01).

Mitigation Measures

Implementation of Mitigation Measures BIO-3-1, BIO-3-2, and BIO-3-3 will reduce Project impacts on jurisdictional aquatic resources to a less-than-significant level.

MITIGATION BIO-3-1: Future refinements to the proposed Project (i.e, as Project components are further developed from the 50% design level to 100% design) shall endeavor to avoid jurisdictional aquatic resources, to the extent practicable, through Project design changes or implementation of alternative construction methodologies.

MITIGATION BIO-3-2: For unavoidable impacts to jurisdictional aquatic resources, a project-specific mitigation plan shall be developed, approved by the ACOE and RWQCB through their respective regulatory permitting processes, and implemented. The mitigation plan shall specify the criteria and standards by which the mitigation will compensate for impacts of the proposed Project and include discussion of the following:

a) the mitigation objectives and type and amount of mitigation to be implemented (in-kind mitigation at a minimum mitigation ratio of 1:1);
b) the location of the proposed mitigation site(s) (within the San Lorenzo River watershed, if possible);
c) the methods to be employed for mitigation implementation (wetland establishment, re-establishment, enhancement, preservation);
d) success criteria and a monitoring program to ensure mitigation success;
e) adaptive management and remedial measures in the event that performance stands are not achieved; and
f) a mechanism for long term management and protection of the mitigation area.

MITIGATION BIO-3-3: Where feasible and appropriate, all jurisdictional aquatic resources not directly affected by construction activities will be avoided and protected by establishing staking, flagging or fencing between the identified construction areas and aquatic resources to be avoided/preserved.

Impact BIO-4: **Nesting Birds.** The Project could result in impacts to nesting birds if vegetation removal and/or construction activities occur during the nesting season. This is a *potentially significant* impact

The Project has potential to impact native birds, including common raptors if construction activities occur during the nesting season. All native birds and common raptors, in California are protected by the federal MBTA and provisions of the California Fish and Game Code. Section 3503.5 of the California Fish and Game Code specifically protects raptors. Ground disturbance or vegetation removal that would result in destruction of active bird nests or disruption of breeding/nesting activity could be a violation of the MBTA and/or California Fish and Game Code, as well as a potentially significant impact under CEQA. The bald eagle is also protected by the BAGEPA and the CESA while the marbled murrelet is regulated under both the ESA and CESA. Impacts to nesting individuals or populations of these species, in addition to being a potentially significant impact under CEQA, could also trigger the need for take authorization under the BAGEPA and CESA for bald eagle, and the ESA and CESA for marbled murrelet.

During the initial reconnaissance–level survey conducted on April 11-12, 2018 and during the focused raptor nest survey conducted on May 10, 2018, no active or inactive raptor nests were observed within the study area; however, several smaller passerine nests were observed throughout the study area. Given the size of the study area and diversity of habitats, nests of various passerine and raptor species could be constructed within the study area during future nesting seasons prior to Project construction.

No active or inactive bald eagle nests (or nests of any other raptors) were observed within the study area during the reconnaissance-level field survey on April 11-12, 2018, or during the focused nesting raptor survey conducted on May 10, 2018.

Mitigation Measures

Implementation of Mitigation Measures BIO-4-1 and BIO-4-2 would function to protect nesting birds and reduce the impact to a less-than-significant level.

MITIGATION BIO-4-1: If ground disturbing activities are to commence during the nesting season (February 1 – August 31), no more than two weeks prior to any ground disturbing activities, including site preparation, staging, removal of vegetation, and clearing and grubbing activities, a nesting bird survey shall be completed by a qualified biologist to determine if any native birds are nesting in or adjacent to the study area (including within a 50-foot buffer for passerine species and a 250-foot buffer for raptors). If any active nests of native birds are observed during surveys, a suitable avoidance buffer from the nests should be determined by a qualified biologist in coordination with City staff, based on species, location, and extent and type of planned construction activity. Impacts to active nests shall be avoided until

the chicks have fledged and the nests are no longer active, as determined by the qualified biologist.

MITIGATION BIO-4-2: Bald Eagle Pre-construction Nest Survey. A focused nest survey shall be conducted by a qualified biologist if construction activities are initiated during the nesting season for bald eagle (February—July for this species in California). The survey shall be conducted not more than 30 days prior to the initiation of construction activities including tree removal, other site preparation or ground disturbing activities adjacent to the Reservoir (e.g., clearing and grubbing/grading for establishment of staging areas), or any in-reservoir work, a focused nest survey shall be conducted by a qualified biologist. Surveys shall be conducted within all suitable nest habitat within the study area and within one half mile (or as otherwise determined appropriate by the qualified biologist) of the study area. If an active nest is located, the biologist, in coordination with City staff, shall determine the level of direct/indirect impacts that would likely occur to the nest and tree if construction activity will occur during the nesting season. The determination shall be made taking into consideration the type/extent of the activity, the location of the nest, and the direct line of sight of the activity from the nest. If no-disturbance buffers are determined to be necessary to protect nesting bald eagles, the buffer distances shall be established based on application of the criteria and standards described in the National Bald Eagle Management Guidelines (USFWS 2007).

If it is determined that no direct impacts to an active nest will occur (i.e., the tree would not be removed, trimmed, etc.), measures to mitigate indirect impacts will be taken depending on if there is visual line of sight to the construction activity

a) If the tree with an active nest is within a visual line of sight of construction activity, then efforts will be made to conduct the construction activity outside the period when the nest is occupied, as determined by the biologist. Construction can begin/continue once it is determined that any young have fledged from the nest and are no longer dependent upon the nest for survival.

b) If the tree with an active nest is outside the direct line of site from the construction area, but construction will occur during the period of time the nest is active, an appropriate no disturbance buffer, taking into consideration factors such as the type/extent of the activity, the age of any young in the nest, tree cover, and topography, shall be established and maintained, until

any young have fledged from the nest and are no longer dependent upon the nest for survival.

c) If it is determined that a tree with an active bald eagle nest will be directly impacted (i.e., removed, trimmed, etc.) or that indirect impacts could result in take (e.g., nest abandonment, nest failure) of eggs or young in the nest, then the CDFW shall be consulted regarding the need for an Incidental Take Permit pursuant to Section 2081 of the California Fish and Game Code, and the United States Fish and Wildlife Service shall be consulted to determine the need for a take permit pursuant to the Bald and Golden Eagle Protection Act.

Impact BIO-8: In-Reservoir Fish and Water Quality. The Project could result in impacts to existing non-native game fish due to adverse effects on water quality from in-reservoir construction activities. This is a *potentially significant* impact

The proposed Project would not cause a fish or wildlife population to drop below self-sustaining levels. Fish habitat would not be altered in a way that would appreciably reduce existing fish habitat or degrade conditions in Loch Lomond Reservoir or in Newell Creek. Some of the proposed work may have the potential to result in water quality impacts to fish habitat, but BMPs and mitigation measures will be implemented to reduce these impacts to less-than-significant levels. The Project may cause impacts to wildlife from ground disturbing construction activities. Individual wildlife species including common and special-status animals have the potential to be killed or harmed as a result, but the incidental loss of one or more individuals of any species that may be in the construction zones would not reduce populations below self-sustaining levels.

As noted above, Loch Lomond Reservoir supports a warm water fishery primarily composed of introduced game species including largemouth bass (*Micropterus salmoides*), green sunfish (*Lepomis cyanellus*), channel catfish (*Ictalurus punctatus*), and bluegill (*Lepomis macrochirus*) (City of Santa Cruz 2013). In addition, one other non-native species, golden shiner (*Notemigonus crysoleucas*) and three native species, Sacramento sucker (*Catostomus occidentalis),* prickly sculpin (*Cottus asper*) and resident rainbow trout (*Oncorhynchus mykiss*) are known from Loch Lomond, though golden shiner and Sacramento sucker have not been observed since 1992.

Dredging and excavation within the Reservoir would result in disturbance to and movement of sediments at the bottom of the Reservoir to establish the new intake foundations. This work would result in localized increased turbidity levels in the areas being dredged and locations where dredged materials would be deposited. In addition, Reservoir sediments were sampled and analyzed in 2017 in which elevated levels of arsenic, cadmium and nickel were detected, which could be re-suspended in the water. The levels were compared to sediment screening

levels for environmental-aquatic life. Maximum containment levels (MCLs), California Toxic Rule, and Basin Plan objectives are typically water quality criteria (not sediment quality criteria) because aqueous forms of contaminates provide a more direct exposure pathway for humans and aquatic life and because conversion from sediment bound to dissolved forms are affected by a variety of biological and abiotic processes.

The biological effects-based concentrations were compared to the current freshwater dredge material sediment quality guidelines that provide sediment thresholds below which effects to aquatic species are unlikely and thresholds above which effects to aquatic species are likely. These criteria are typically based on the potential effects to the most sensitive aquatic species. Potential effects to specific species of concern would need to be evaluated on a case-by-case basis. Biological impacts from potential exposure to arsenic, cadmium and nickel in the Reservoir can be mitigated through the use of silt screens during dredging and disposal to isolate the dredged material (AECOM, July 2018). The reservoir supports a variety of non-native game fish, but does not support any anadromous salmonids or other state or federally-protected fish species. It is anticipated that silt screens would be needed to mitigate impact to water quality.

Disturbance of bottom sediments resulting in increased turbidity levels could result in temporary impacts on individual game fish, if present in the area, due to potential exposure to these elements if not contained and minimized during construction. The planned use of silt curtains would prevent increased turbidity to areas outside the contained area, thus protecting the City's existing intakes during construction and preventing turbidity in downstream beneficial releases.

The initial launch of the barge or other boats from the LLRA could introduce invasive aquatic species from boat surfaces into the Reservoir. However, the Project plans include a Construction Specification that requires decontamination of any vessels, equipment and tools prior to entering the water, which would prevent introduction of invasive species into the Reservoir.

Implementation of Mitigation Measure BIO-8-1 will ensure impacts to fish and wildlife species and populations would be reduced to less than significant levels. Therefore, Project construction would not cause a fish or wildlife population to drop below self-sustaining levels,

Mitigation Measures

Implementation of Project Best Management Practices (BMPs) to protect water quality (see Section 3.8 in Chapter 3, Project Description) and Mitigation Measure BIO-8-1 would protect the fishery resources and water quality in the Reservoir and reduce impacts to a less-than-significant level.

MITIGATION BIO-8-1. A Turbidity Monitoring Plan (Plan) shall be developed, submitted to RWQCB for review and approval, and implemented to guide appropriate management practices and corrective actions to ensure

elevated turbidity levels in Loch Lomond Reservoir do not occur. This Plan would protect water quality in Loch Lomond Reservoir and ensure turbid water and/or water with elevated levels of contaminants are not released into Newell Creek via the continuous 1 CFS beneficial release. The Plan will describe the sampling methods, frequency, and criteria as well as thresholds for corrective action. The Plan will also specify a program for monitoring and reporting to the Central Coast RWQCB.

4.3.3 Cumulative Impacts

The geographic scope for cumulative impact analysis of impacts to biological resources generally would include those projects in proximity to the proposed Project, within the watershed or affecting the same resources. As shown on Table 4-1 in section 4.0.3.2., there are no cumulative projects in the immediate vicinity of the proposed NCD Project, except for some minor improvements at the Loch Lomond Recreational Area and replacement of aerators in the Reservoir. These projects are minor in scope and would not have impacts on special status species or sensitive habitats. A repair to the Newell Creek Access Road Bridge abutment to prevent scour and long-term replacement of the Newell Creek Pipeline from the bridge to the Graham Hill Treatment Plant are located at the southern end of the Project study area.

Within the larger San Lorenzo River watershed, cumulative projects in the City of Santa Cruz Water Department's (SCWD) Capital Improvement Program (CIP) includes replacement of the entire Newell Creek Pipeline (NCP) to the Graham Hill Water Treatment Plant (GHWTP), improvements at the GHWTP, and improvements to the Tait Diversion and Coast Pump Station on San Lorenzo River. These projects are in early planning stages, and specific project siting and design plans have not yet been developed. Replacement of the NCP could be within existing rights-of-way or adjacent areas. The proposed Project would not affect sandhills sensitive habitat and associated special status species (Zayante band-winged grasshopper, Mount Hermon June beetle, Ben Lomond spineflower) that are found along portions of Graham Hill Road and the GHWTP and, therefore, would not contribute to potential cumulative impacts to these species.

Replacement of the NCP and the Newell Creek Road bridge pier repairs could result in localized construction impacts, such as impacts to nesting birds or special status species (woodrats and bats), if any are present at the time of construction. The bridge pier repairs also could result in indirect impacts to special status fiah and amphibian species; although, the project would be designed to include measures to avoid impacts to sensitivite species. Improvements to the Tait Street Diversion and Coast Pump Station could involve limited work adjacent to or within the San Lorenzo River that could directly or indirectly affect special status fish species and/or wetlands or waters of the U.S. Future construction of intertie pipelines with Scotts Valley or San Lorenzo Valley Water District as part of a future aquifer storage and recovery project could have similar localized impacts to sensitive habitats and species, although at this time there are specific plans to determine the routing of a future intertie. These other cumulative projects would be subject to environmental

review and compliance with required mitigation measures if impacts to biological resources are identified. With implementation of the Project mitigation measures and measures required of other cumulative projects, no significant cumulative impacts to biological resources would occur in the San Lorenzo River watershed.

Other capital improvement projects planned by the SCWD include replacement of segments of the North Coast Pipeline and improvements the City's existing Laguna Creek and Majors Creek diversions, which are not located in proximity to the proposed Project or within the same watershed. The Program EIR prepared for these projects indicated that potential impacts would likely include the temporary disturbance of special-status species (i.e., steelhead and CRLF), aquatic habitat at stream crossings and instream construction at the diversions, terrestrial wildlife habitat, and sensitive riparian habitat. The proposed Project would not result in impacts to CRLF, and potential impacts to steelhead and sensitive riparian and aquatic habitats also would be mitigated. The EIR for the North Coast projects concluded that potential impacts to sensitive biological resources resulting from the projects in the North Coast area would require consultation with the responsible agencies and implementation of approved mitigation and avoidance and minimization measures. With implementation of the Project mitigation measures and measures required of other cumulative projects, no significant cumulative impacts to biological resources would be expected. It is also be noted that protection of threatened and endangered species associated with operation and maintenance of North Coast water facilities may be addressed through the implementation of a Habitat Conservation Plan (HCPs) that are under preparation.

None of the other identified cumulative projects would combine with the proposed Project to result in cumulative impacts to biological resources.

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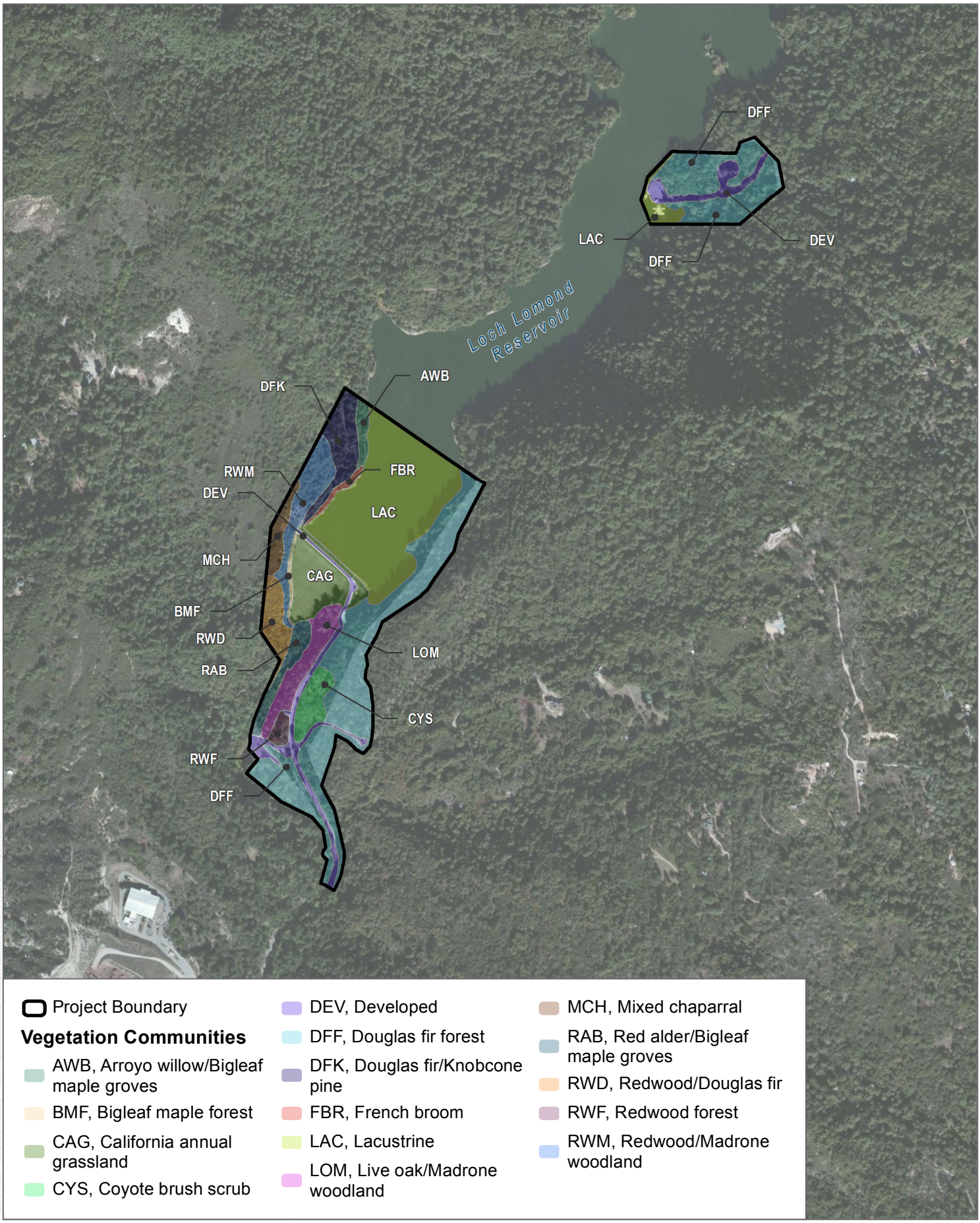


SOURCE: Bing Maps 2018

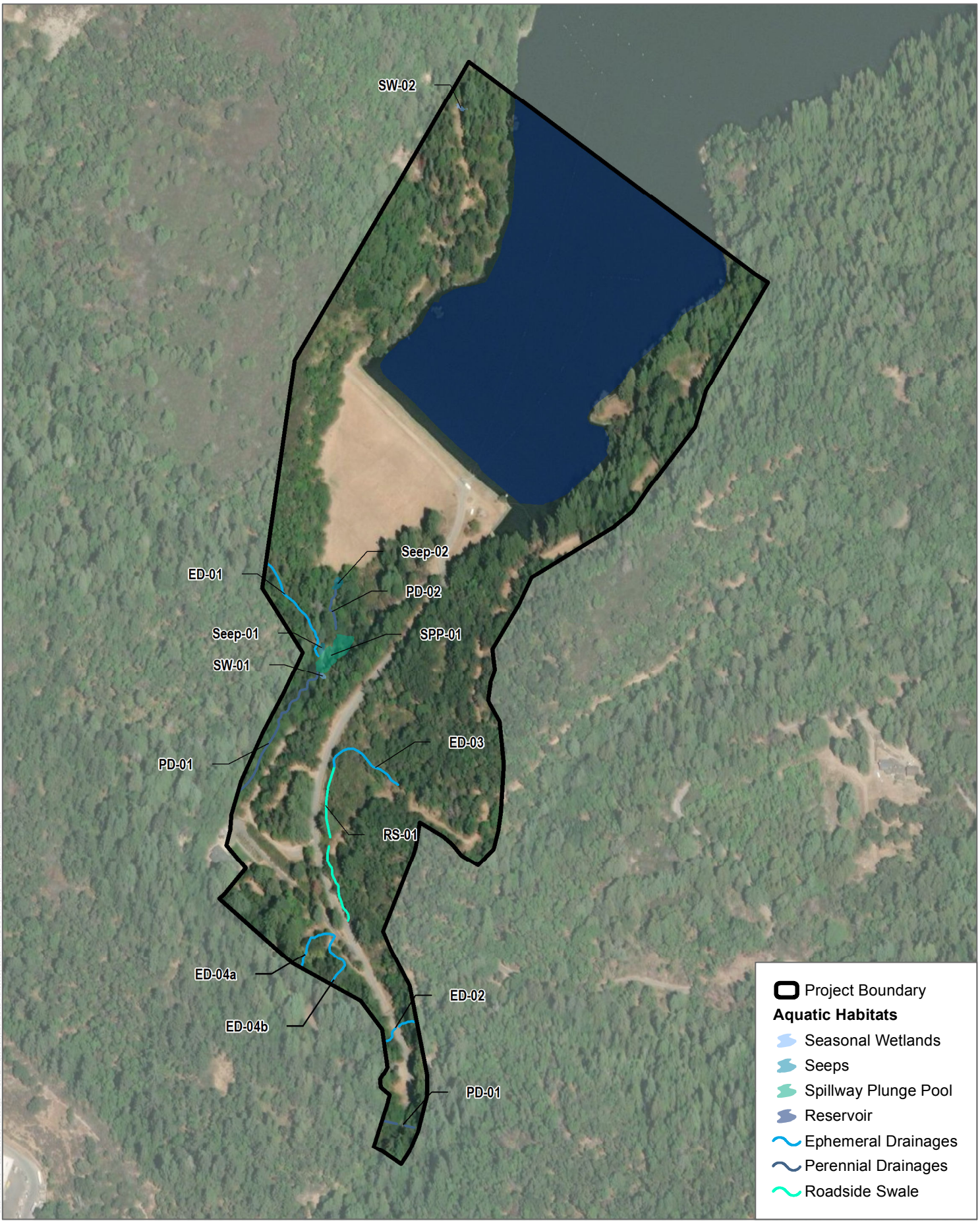
DUDEK

0 500 1,000 Feet

FIGURE 4.3-1

Vegetation Communities and Land Cover Types

Newell Creek Dam Inlet/Outlet Replacement Project



SOURCE: Bing Maps 2018

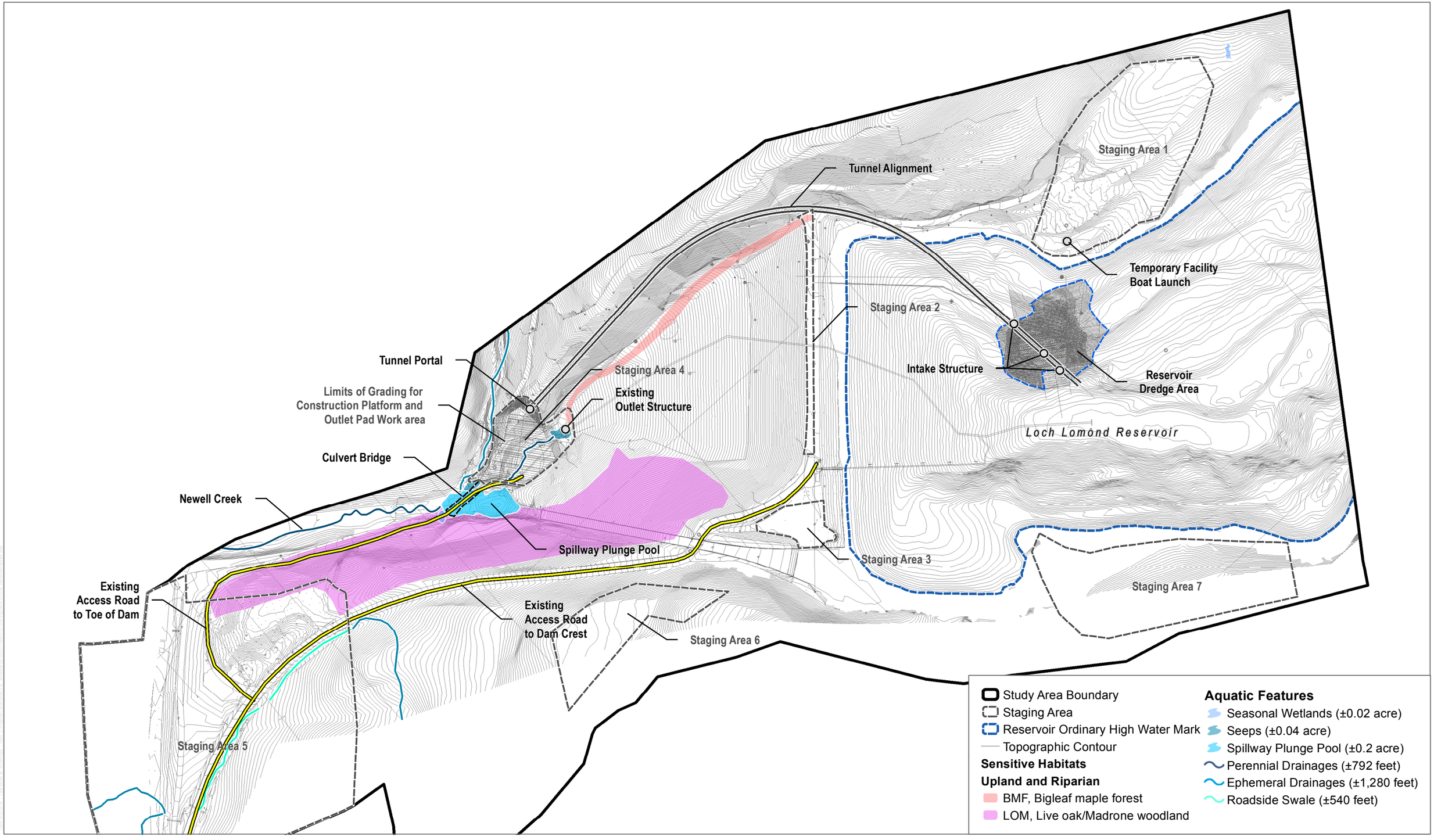
DUDEK

0 225 450 Feet

FIGURE 4.3-2

Aquatic Habitats Evaluated within the Study Area

Newell Creek Dam Inlet/Outlet Replacement Project



SOURCE: USDA 2016; AECOM 2018

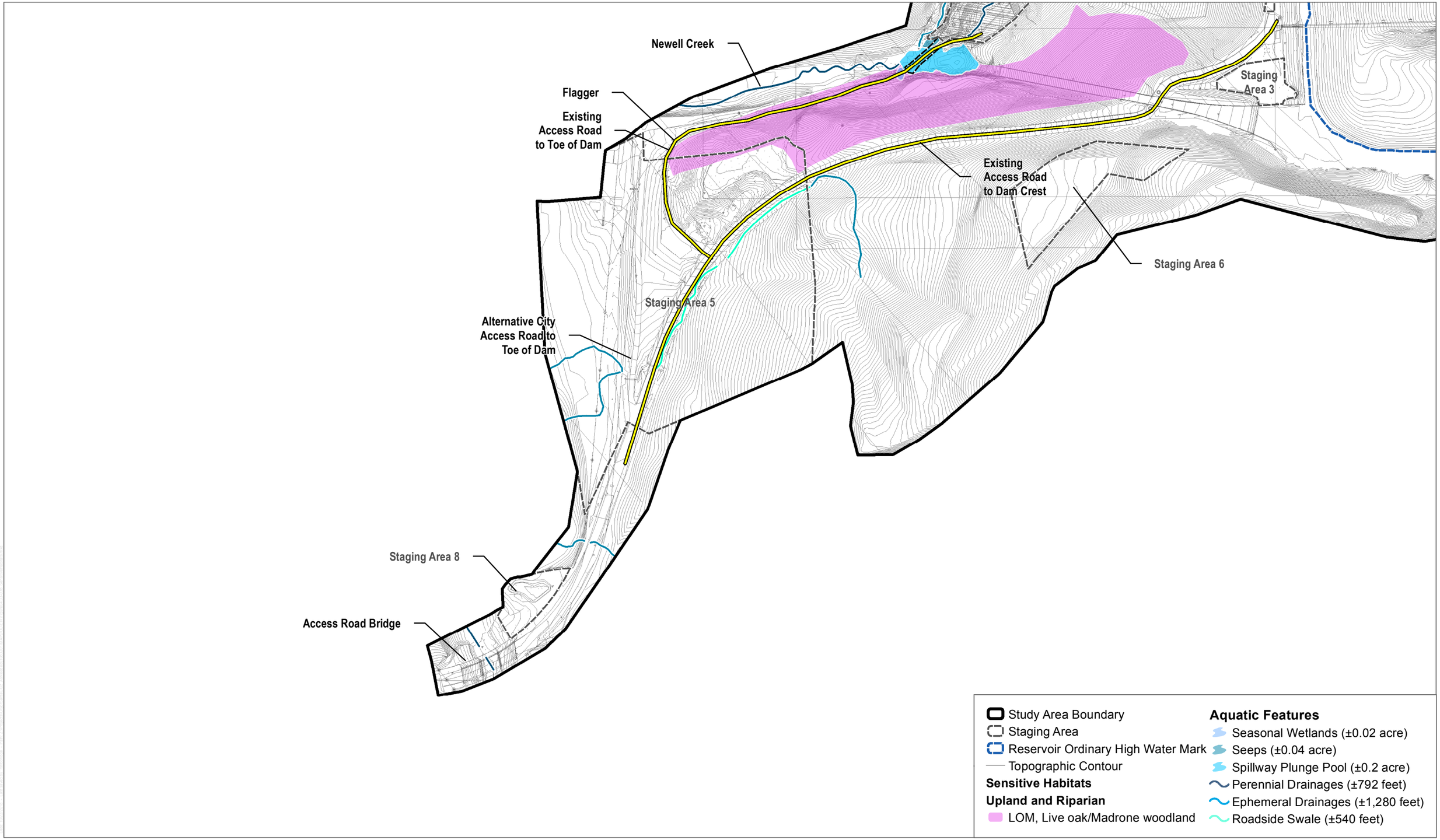
DUDEK

0 100 200 Feet

FIGURE 4.3-3A

Sensitive Habitats

Newell Creek Dam Inlet/Outlet Project



SOURCE: USDA 2016; AECOM 2018

DUDEK

0 100 200 Feet

FIGURE 4.3-3B

Sensitive Habitats

Newell Creek Dam Inlet/Outlet Project

4.4 CULTURAL AND TRIBAL CULTURAL RESOURCES

This section analyzes potential impacts to cultural and tribal cultural resources of the proposed Newell Creek Dam Inlet/Outlet Replacement Project (Project). The section is based on a Cultural Resources Report (September 2018), Historical Resources Evaluation Report (October 2018), and Paleontological Resources Review Memorandum (September 2018) prepared for the Project. These studies provide the basis for the analyses in this section and are included in Appendices G1 through G-3.

Under the California Environmental Quality Act (CEQA), the term "cultural resources" encompasses archaeological resources, historic architectural resources, and paleontological resources. Pursuant to Assembly Bill (AB) 52, CEQA also considers a project's potential impacts on tribal cultural resources. Cultural resources are further defined as follows:

- Archaeological resources are objects or structures, often below ground, that relate to previous human use of an area. Archaeological resources are often distinguished by whether they are "prehistoric" or "historic." Prehistoric archaeological resources are connected to people who occupied the land prior to European settlement; historic archaeological resources are connected to the period of continuous European settlement forward (in much of California, this generally starts from the date of the Portolá expedition in the year 1769).
- Historic architectural resources are structures and buildings that may have historical associations with people or events of regional significance. Sometimes, historic architecture is also referred to as the "historic built environment." In Santa Cruz County, historic architectural resources are typically associated with the Spanish, Mexican, and American periods in California's history.
- Paleontological resources are the fossilized remains, traces, or imprints of organisms preserved on or beneath the earth's surface.
- Tribal cultural resources, defined in Section 21074(a) of the Public Resources Code, are sites, features, places, cultural landscapes, sacred places, or objects which are of cultural value to a California Native American tribe.

4.4.1 Environmental Setting

Regulatory Setting

Federal

Federal regulations for cultural resources are primarily governed by Section 106 of the National Historic Preservation Act (NHPA) of 1966, which applies to actions taken by federal agencies. The goal of the Section 106 review process is to offer a measure of protection to sites that are determined eligible for listing on the National Register of Historic Places (NRHP). The criteria for

determining NRHP eligibility are found in Title 36 of the Code of Federal Regulations (CFR) Part 60. Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and affords the federal Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings.

National Register of Historic Places. The NRHP is the United States' official list of districts, sites, buildings, structures, and objects worthy of preservation. Overseen by the National Park Service (NPS) under the U.S. Department of the Interior, the NRHP was authorized under the National Historic Preservation Act (NHPA), as amended. Its listings encompass all National Historic Landmarks and historic areas administered by the NPS.

A historic property is defined as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the NRHP criteria" (36 Code of Federal Regulations (CFR) Sections 800.16(i)(1)).

For a property to be listed in or determined eligible for listing, it must meet at least one of the specified criteria. To be listed in the NRHP, a property must not only be shown to be significant under the NRHP criteria, but it also must have integrity". Integrity is defined in NRHP guidance, *How to Apply the National Register Criteria*, as "the ability of a property to convey its significance. NRHP guidance further asserts that properties be completed at least 50 years ago to be considered for eligibility.

As per the National Register criteria, the associated features of a subject property are assessed individually on the basis of their historic integrity, followed by a determination of it constituting either a contributing or non-contributing resource. The National Park Service defines "contributing" and "non-contributing" as follows:

- Contributing resources are the buildings, objects, sites, and structures that played a role or, more simply, existed at the time the event(s) associated with the proposed National Historic Landmark occurred.
- Non-contributing resources are the buildings, objects, sites, and structures that did not exist at the time the event(s) associated with the proposed National Historic Landmark occurred or have lost integrity from that historic period.

State

California Register of Historical Resources. The California Register of Historical Resources (CRHR) is a guide to cultural resources that must be considered when a government agency undertakes a discretionary action subject to CEQA. The CRHR helps government agencies identify, evaluate, and protect California's historical resources, and indicates which properties are to be protected from substantial adverse change (Pub. Resources Code, Section 5024.1[a]). The CRHR is administered

through the State Office of Historic Preservation (SHPO) that is part of the California State Parks system.

In California, the term "historical resource" includes "any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California" (California Public Resources Code (PRC), Section 5020.1(j)). In 1992, the California legislature established the CRHR "to be used by state and local agencies, private groups, and citizens to identify the state's historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from substantial adverse change" (PRC Section 5024.1(a)).

The criteria for listing resources in the CRHR were expressly developed to be in accordance with previously established criteria developed for listing in the NRHP. According to PRC Section 5024.1(c)(1–4), a resource is considered historically significant if it (i) retains "substantial integrity," and (ii) meets at least one of the specified criteria. Integrity is defined as "the authenticity of a historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance." In addition, the CRHR requires that sufficient time must have passed to allow for scholarly perspective, which is generally 50 years according to SHPO publications. Archaeological resources can sometimes qualify as "historical resources" (CEQA Guidelines, Section 15064.5[c][1]). In addition, Public Resources Code Section 5024 requires consultation with SHPO when a project may impact historical resources located on state-owned land.

Two other programs are administered by the state: California Historical Landmarks and California Points of Interest. California Historical Landmarks are buildings, sites, features, or events that are of statewide significance and have anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other historical value. California Points of Interest are buildings, sites, features, or events that are of local (city or county) significance and have anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other historical value.

California Health and Safety Code. California law protects Native American burials, skeletal remains, and associated grave goods, regardless of their antiquity, and provides for the sensitive treatment and disposition of those remains. Health and Safety Code Section 7050.5 requires that if human remains are discovered in any place other than a dedicated cemetery, no further disturbance or excavation of the site or nearby area reasonably suspected to contain human remains can occur until the County Coroner has examined the remains (California Health and Safety Code Section 7050.5b). PRC Section 5097.98 outlines the process to be followed in the event that remains are discovered. If the coroner determines or has reason to believe the remains are those of a Native American, the coroner must contact the Native American Heritage Commission (NAHC) within 24 hours (California Health and Safety Code Section 7050.5c). The NAHC would notify the most likely descendant (MLD). With the permission of the landowner, the MLD may inspect the site of discovery. The inspection must be completed within 48 hours of

notification of the MLD by the NAHC. The MLD may recommend means of treating or disposing of, with appropriate dignity, the human remains and items associated with Native Americans.

California Public Resources Code. California Public Resources Code Section 5097.5 prohibits excavation or removal of any "vertebrate paleontological site…or any other archaeological, paleontological or historical feature, situated on public lands, except with express permission of the public agency having jurisdiction over such lands." Unauthorized disturbance or removal is a misdemeanor.

Native American Consultation. Assembly Bill (AB) 52 went into effect July 1, 2015, and requires lead agencies to consult with all California Native American tribes that have requested formal consultation at the onset of a project, or when a Notice of Preparation (NOP) is released. AB 52 also established a new class of resources to be evaluated under CEQA: Tribal Cultural Resources.

Local

Santa Cruz County Historic Resources Inventory. Cultural Landmarks in the County of Santa Cruz are termed "Historic Resources" and are under the aegis of the Planning Department. A list of Historic Resources is maintained in the County's Historic Resources Inventory, which identifies those Historic Resources located in the unincorporated areas of the County. "Historic Resource" is defined in Chapter 16:42, Historic Preservation, within Title 16: Environmental and Resource Protection as follows (County Code 16.42.030 (I) [Ord. 5061 § 28, 2009; Ord. 4922 § 1, 2008]):

> … means any structure, object, site, property, or district which has a special historical, archaeological, cultural or aesthetic interest or value as part of the development, heritage, or cultural characteristics of the County, State, or nation, and which either has been referenced in the County General Plan, or has been listed in the historic resources inventory adopted pursuant to SCCC 16.42.050 and has a rating of significance of NR-1, NR-2, NR-3, NR-4, or NR-5.

To be placed on the County Historic Resources Inventory, a property must first be evaluated for its ability to meet one or more of the following criteria (County Code 16.42.050 Historic Resource Designation [Ord. 4922 § 1, 2008]):

(1) The resource is associated with a person of local, state, or national historical significance.

(2) The resource is associated with an historic event or thematic activity of local, state or national importance.

(3) The resource is representative of a distinct architectural style and/or construction method of a particular historic period or way of life, or the resource represents the work of a master builder or architect or possesses high artistic values.

(4) The resource has yielded, or may likely yield, information important to history.

Santa Cruz County Historic Districts, The County of Santa Cruz (County Code 16.42.030 (E) [Ord. 5061 § 28, 2009; Ord. 4922 § 1, 2008]) defines "Historic District" as an area designated as an historic resource and which contains improvements that:

(1) Have character of special historic or aesthetic interest or value; and

(2) Represent one or more periods or styles of architecture typical of one or more eras in the history of the County; and

(3) Cause such area, by reason of these factors, to constitute a geographically definable area possessing a significant concentration or continuity of sites, buildings, structures, or objects that are unified by past events, or aesthetically by plan or physical development.

Cultural - Historical Context

The following overview is summarized from the Cultural Resources Report and Historical Resources Evaluation Report prepared for the Project (see Appendices G-1 and G-2) unless otherwise cited.

Prehistoric Period

Prior to European contact, the Project site was within the territory that was occupied by the Costanoan or Ohlone people. The term Costanoan refers to people who spoke eight separate Penutian-stock language groups, and lived in autonomous tribelet communities between the vicinities of the city of Richmond in the north to Big Sur in the south. The prehistoric era of the greater Central California coast, spans a period of approximately 10,000–12,000 years, and divides into six different periods. Researchers distinguish these periods based on perceived changes in prehistoric settlement patterns, subsistence practices, and technological advances. The Awaswas tribelet occupied the Santa Cruz area at the time of European contact.

Historic Period

Spanish Period (1769-1822). The first European to explore the Central Coast was Sebastián Vizcaíno, who, in 1602, was sent by the Spanish government to map the Californian coastline. It was Vizcaíno who named the area "Puerto de Monterey" after the viceroy of New Spain. The Gaspar de Portolá expedition traveled through the region in 1769 and returned again in 1770 to establish the Monterey Presidio, Spain's first military base in Alta California. Mission Santa Cruz was established in 1791 as the twelfth mission in California. The Spanish missions drastically altered the lifeways of the Native Americans. Spanish missionaries conscripted members of local Native American communities to move to the Mission, where they were indoctrinated as Catholic neophytes. Villa de Branciforte, one of three Spanish civil settlements in California, was established in 1797 on the eastern part of Santa Cruz; the population dwindled by 1817 as people followed new opportunities.

Mexican Period (1822-1848). Mexico gained independence from Spain in 1821 and, in 1834, the Mexican government secularized the mission lands, releasing the Native Americans from control of the mission system. The City of Monterey continued as the capital of Alta California and the

Californios, the Mexicans who settled in the region, were given land grants. These land grants covered over 150,000 acres of present-day Santa Cruz County.

American Period (1848-Present). The United States of America acquired Alta California in 1848 with the signing of the Treaty of Guadalupe Hidalgo, which ended the Mexican-American War. The California Gold Rush of 1848 led to an influx of people seeking gold in the rural counties of California. These included Addison Newell, an early settler of the San Lorenzo Valley who established his ranch along Newell Creek, after whom Newell Creek was named. California became a state in 1850 and Santa Cruz County was designated as one of the original 27 counties in California. Santa Cruz incorporated as a city in 1866 and quickly prospered through logging, lime processing, commercial fishing, and agriculture.

Newell Creek Dam History

San Lorenzo Valley Water District Background. By 1899, Boulder Creek in the San Lorenzo Valley (SLV) was the fifth largest shipper of timber in the country. As the SLV was settled in the mid-1800s, populations in Ben Lomond, Brookdale and Boulder Creek formed their own water systems (San Lorenzo Valley Water District, 2009.). As vacation homes increased in the early 1900s, many small subdivisions in the SLV developed their own water systems. These water systems were designed to serve the needs of Bay Area residents who occupied their vacation homes only a few weeks a year. Nearby springs and creeks supplied these water systems through flumes or pipelines. Santa Cruz County population more than doubled from 1900 to 1940; as more people moved into the valley, the existing water systems became inadequate (San Lorenzo Valley Water District, 2009).

Frequent droughts between 1912 and 1939 convinced Valley leaders to form a water district to better control water, to serve the needs of the valley. After one failed attempt to form a county water district by election in 1939, the San Lorenzo Valley County Water District (SLVWD) was formed by the voters on April 3, 1941. Negative voter returns from the towns of Felton and Scotts Valley left those areas out of the district boundaries, which included Bear Creek, Boulder Creek, Alba, and Ben Lomond school districts, and part of the Sequoia school district (San Lorenzo Valley Water District, 2009.).

After securing unclaimed water rights in Newell Creek and Bear Creek in 1942, the SLVWD developed a master plan that included storage dams on Boulder, Newell, and Bear Creeks, and the upper San Lorenzo River (San Lorenzo Valley Water District, 2009). In 1945, voters failed to approve a bond proposed to pay for the Boulder Creek dam, and when the District again proposed a bond measure to the voters to fund the construction of a dam at Waterman Gap, a citizens group organized to oppose it. The citizens group also opposed the proposed dam at Newell Creek, and another bond measure was defeated in December 1946. The District purchased the 3,400 acre Newell Creek property, but also pursued purchasing additional water supplies (Ibid.). In 1957, the District proposed a bond issue for purchase of Citizen Utilities, and a Newell Creek dam project was approved by the voters. The District continued negotiating with Citizens Utilities, and also approached the City of Santa Cruz about partnering in construction of a dam on Newell Creek. Negotiations with Citizens Utilities failed, but the City of Santa Cruz agreed to partner with the

District in building the Newell Creek dam (San Lorenzo Valley Water District, 2009). In 1959, the District signed an agreement with the City of Santa Cruz, in which the District sold the City its timber and mineral rights to the Newell Creek watershed, in exchange for one-eighth of the water rights from the water stored by Newell Creek Dam (Ibid.).

City of Santa Cruz Water Department Background. The Santa Cruz Water Company was formed in 1888 to increase water supplies for the City by creating a diversion on Laguna Creek and constructing the Cowell Street Reservoir. Two years later, the City started its own water system in 1890. The City's water sources consisted of diversions along Laguna Creek, a pipeline from Laguna Creek to town, and the Cowell Street Reservoir. The City and the Santa Cruz Water Company competed to provide the city's water for a few years, until the City of Santa Cruz purchased the Santa Cruz Water Company in 1916, along with all of its water sources and infrastructure. After this acquisition, the City sought to update its water infrastructure. Although upgrades and additions were added to the several major facilities to increase the quality of municipal water, the overall production output was not widely increased between 1916 and 1930. The Bay Street Reservoir was built in 1924 to replace the Cowell Street Reservoir. The Lorenzo River Pumping Plant filtered the water from the San Lorenzo and treated it with chlorine, making it safer to drink.

In the period following the installation of the Bay Street Reservoir, Santa Cruz sought many short-term fixes in response to repeated droughts and floods. In 1945, the state recognized a water shortage and authorized an investigation of available water resources (California State Water Resources Board, 1953). In 1953, the State Water Resources Board (SWRB) released a report based on investigations in Santa Cruz and Monterey Counties, which inventoried available surface and underground water sources in Santa Cruz County, and projected increased water utilization that exceeded the available water in Pajaro Valley, the Soquel Creek area, and the coastal area around and including Santa Cruz. The report identified requirements for supplemental water for Santa Cruz and areas served by the City of Santa Cruz Water Department; 16 possible alternative water resources including a dam site alternative on Newell Creek were identified. The report noted that "the present water problem is not due to a shortage of total seasonal supply, but rather to lack of facilities for regulating that supply" (Ibid.) due to peak demands during times of minimum stream flows. Deficiencies in seasonal rains would necessitate water rationing by the City; such deficiencies were reported to have occurred in five seasons since 1895, a period of nearly 60 years at the time the report was issued (Ibid.).

In 1954, the City commissioned a report investigating four of the SWRB's suggested reservoir sites at Laguna Creek, San Lorenzo River, Soquel Creek, and Scott Creek. The report cited the City's current water resources as "barely sufficient to keep pace with the demand imposed by a steadily increasing population" (Brown and Caldwell, 1956). These sources in 1956 included Laguna Creek, the original City's water resource since 1890, Liddell Spring, Majors Creek, the San Lorenzo River, and two unnamed wells. Newell Creek Dam was not among the suggested sites in Brown and Caldwell's 1956 water supply report.

After a record-breaking flood in Santa Cruz the winter of 1955, the County formed the Santa Cruz County Flood Control and Water Conservation District in 1955 and hired Creegan & D'Angelo in 1956 to complete an extensive survey identifying dam sites, groundwater sources, and additional steps to improve control of the water supply throughout the county. The report asserted that population growth was a major concern for the water supply in the City because "the City of Santa Cruz has current water requirements which equal the capacity of the existing water supply system during a relatively dry era. Should an exceptionally dry season be experienced, there would be a serious water shortage in the City of Santa Cruz." (Creegan and D'Angelo, 1957). The Creegan & D'Angelo study recommended a dam on Newell Creek.

In 1958, the University of California (UC) Regents announced that they were considering the Cowell Ranch in the City of Santa Cruz as the site of a future University of California Campus. The City would be required to provide services and facilities for the prospective University community, which early figures suggested was to include around 2,500 students. In anticipation of the Water Revenue Bond Election in November 1958 to approve the bonds necessary to construct the Newell Creek Dam, a new water treatment plant, and pipelines to transport the water, the Santa Cruz Sentinel published an article outlining the impact of the proposed bonds. In reference to the speculative University in the City, the closing paragraph of the article states that "University officials know that the present water supply of Santa Cruz is inadequate, even for normal needs. Failure to correct this situation could end all chance of the selection of Santa Cruz as the University site."

On November 5, 1958, the voters of the City of Santa Cruz approved $5.5 million in water revenue bonds necessary for the City to purchase 2,162 acres of land in the Newell Creek watershed from the San Lorenzo Valley Water District and build a dam on the site, construct a pipeline, and improve the water treatment plant.

Construction of Newell Creek Dam. Creegan & D'Angelo designed the earthfill dam and associated improvements. Contractors Williams and Burrows Inc. of Belmont, California, began the construction of the Newell Creek Dam in 1960. Keeping with the predominant trend in the area at the time it was designed, the Newell Creek Dam is a zoned earthen embankment dam that rests on a pervious foundation. Earthen dams have been employed in communities throughout the world for centuries as a method to control and store the flow of waterways, and are the most common variety of dam.

The dam was completed in 1961, and the resulting reservoir was dedicated as Loch Lomond in 1963. Four construction personnel lost their lives in October 1960 during construction, and a brass plaque commemorating these men was commissioned and remains today on the southwest elevation of the Control House. The Loch Lomond Recreation Area was completed in 1965. Upgrades to the Newell Creek Dam were implemented in 1985, including heightening the Newell Creek Dam spillway and installing a permanent aerator system in Loch Lomond.

Archaeological Resources

A cultural records search for the Project site and 0.5-mile radius was conducted through the California Historical Resources Information System (CHRIS) at the Northwest Information Center (NWIC) in January 2018. A search of the Native American Heritage Commission (NAHC) Sacred Lands File was also conducted in January 2018, and no known sacred lands were reported. An intensive pedestrian field survey of the entire Project area of potential effect (APE) was conducted in February and September 2018, which included access roads, pipeline and tunnel alignments, and potential construction staging/spoils disposal areas. Neither the CHRIS records search nor the field survey of the Project APE identified any archaeological or tribal cultural resources within or near the Project site.

Tribal Cultural Resources

State Assembly Bill (AB) 52, effective July 1, 2015, recognizes that California Native American prehistoric, historic, archaeological, cultural, and sacred places are essential elements in tribal cultural traditions, heritages, and identities. The law establishes a new category of resources in the California Environmental Quality Act called "tribal cultural resources" that considers the tribal cultural values in addition to the scientific and archaeological values when determining impacts and mitigation. Public Resources Code section 21074 defines a "tribal cultural resource" as either:

(1) Sites, features, places, cultural landscapes, sacred places and objects with cultural value to a California Nature American tribe that is either listed, or determined to be eligible for listing, on the national, state, or local register of historic resources, or

(2) A resource determined by the lead agency chooses, in its discretion and supported by substantial evidence, to treat as a tribal cultural resource.

The California Public Resources Code section 21084.2 now establishes that "[a] project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment." The Public Resources Code requires a lead agency to consult with any California Native American tribe that requests consultation and is traditionally and culturally affiliated with the geographic area of a proposed project.

To date, the City has not been contacted by Native American tribes requesting notification of projects for the purpose of consultation of tribal cultural resources pursuant to AB 52. However, on behalf of the City of Santa Cruz, Dudek contacted Native American tribes and tribal organizations in response to NAHC recommendations for making contact when the Sacred Lands File search was completed by NAHC. Letters were sent to the tribes and tribal organizations identified by the NAHC to notify them of their opportunity to consult with the City regarding the proposed Project with follow-up calls. Valentin Lopez of the Amah Mutsun Tribal Band requested an electronic version of the letter, which was provided, and not further response was received. Ann Marie Sayers of the Indian Canyon Mutsun Band of Costanoan asked if any archaeological sites were located with the area and was

informed that no recorded sites are located within the Project APE and no new sites were identified during Project surveys; no further comments were made.

Historical Resources

The CHRIS records search described above did not identify any previously recorded historical architectural resources. A qualified architectural historian conducted an intensive pedestrian field survey of the Project site in February 2018, including survey of the Newell Creek Dam crest and foot, spillway, and accompanying features including the bridge, picnic area, ford, valve pit, pipeline, control house, dock, boathouse, equipment room, public restrooms, and boat launch area. The results of the survey were used to evaluate the Newell Creek Dam, Loch Lomond Recreation Area, and associated features for potential historical significance, based on NRHP, CRHR, and County of Santa Cruz criteria. These criteria are described as follows:

- NRHP Criteria:
    A. Associated with events that have made a significant contribution to the broad patterns of our history.
    B. Associated with the lives of significant persons in our past.
    C. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
    D. Have yielded, or may be likely to yield, information important in history or prehistory.
- CRHR Criteria:
    1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
    2. Is associated with the lives of persons important in our past.
    3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
    4. Has yielded, or may be likely to yield, information important in prehistory or history.
- County of Santa Cruz Criteria:
    1. The resource is associated with a person of local, State or national historical significance.
    2. The resource is associated with an historic event or thematic activity of local, State or national importance.

3. The resource is representative of a distinct architectural style and/or construction method of a particular historic period or way of life, or the resource represents the work of a master builder or architect or possesses high artistic values.
4. The resource has yielded, or may likely yield, information important to history.

As explained below, the historical resources evaluation determined that the Newell Creek Dam appears eligible for listing in the NRHP and CRHR under Criterion A/1 at the local level of significance and eligible for local listing under County of Santa Cruz Criterion 2, for its associations with local water development. Therefore, it is considered an historic property under Section 106 of the NHPA and an historical resource under CEQA. See Appendix G-2 for a detailed discussion.

NRHP/CRHR Eligibility Evaluation

The Newell Creek Dam Complex is directly associated with events that have made a significant contribution to the development history of water infrastructure in the City of Santa Cruz Water Department service area. The Newell Creek Dam is significant under NRHP/CRHP Criterion A/1 for its association with water infrastructure, which was essential to maintaining the municipal water supply during periods of seasonal water shortages and droughts. The availability of water played a critical role in the early planning, development, and sustained growth of the City, including a factor in the choice of Santa Cruz as the site for a University of California Campus. When the Newell Creek Dam was in its elemental planning stages in 1957, it was one of six reservoir projects recommended by the project engineers, Creegan & D'Angelo, for the long-term water supply reliability for the City and Santa Cruz County. However, the Newell Creek Dam was the only such project that was realized. Loch Lomond Reservoir (Reservoir) is the resulting impoundment of Newell Creek by the Newell Creek Dam and it is an important supplementary source of drinking water for Santa Cruz City. The period of significance begins in 1958 with approval of $5.5 million in water revenue bonds necessary for the City to purchase land to build the Newell Creek Dam site and ends in 1965 when the Loch Loman Recreation Area was completed..

In summary, the subject property is directly associated with important events that have made a significant contribution to the development of water infrastructure development in Santa Cruz. These important events include concerns over local water shortages in the late 1950s (as documented in state and local water supply reports) leading up to the passage of the Water Revenue Bond in 1958, which approved funding for construction of the Newell Creek Dam in direct response to concerns over water shortages. Archival research also revealed that water shortages in the late 1950s threatened to make Santa Cruz a less than desirable choice for the location of the next University of California campus, noting that failure to correct water shortage issues could end all chance of the selection of Santa Cruz as the University site (SCS 1961b; SCS 1961a; SCS 1958). Construction of the Newell Creek Dam gave the City control over the seasonal fluctuations in water availability and became a critical component to the water infrastructure, which supported the sustained growth of the City after World War II. Therefore, the subject property appears eligible at the local level of significance under NRHP/CRHP Criterion A/1 .

As per the National Register criteria, the associated features of a subject property are assessed individually on the basis of their historic integrity, followed by a determination of it constituting either a contributing or non-contributing resource. The Newell Creek Dam, inlet control house, and the Newell Creek Road bridge were found to be contributing features associated with the Newell Creek Dam Complex.

Archival research on the subject property failed to reveal associations with any persons significant in the history of Santa Cruz, the state, or the nation. The property does not appear to be associated with any person(s) whose contributions demonstrate historic importance at the local, state, or national level. Therefore, the subject property does not appear eligible under NRHP/CRHR Criterion B/2 that associated with significant/important persons in history.

The subject property is a utilitarian, zoned earthfill dam, a common form of dam found throughout California, the United States, and the world. It was designed by Creegan & D'Angelo Civil Engineers in 1958 and constructed by William and Burrows Inc. in 1960. Although Creegan & D'Angelo have contributed a large number of designs to the body of engineered municipal water containment projects in California, the creative merit of their designs is not significant enough to have made an impact on the development of the genre as a whole. Contractors William and Burrows Inc. contributed to the field of architecture by erecting structures of various kinds throughout the San Francisco Bay Area, but overall they did not significantly impact the field of dam design or construction techniques. Archival research suggests that the Newell Creek Dam is typical of its construction type for an earthfill dam, and does not embody any distinctive characteristics of a type, period, or method of construction apart from variances dictated by its specific geographical location. There are little inherent artistic or design values associated with the dam or its associated features, and repeated repairs and routine maintenance have updated materials resulting in loss of integrity. For all of the reasons described herein, the subject property does not appear eligible under NRHP/CRHR Criterion C/3 that is associated with the physical design and construction of a structure.

There is no evidence to indicate that the subject property is likely to yield and additional information important to prehistory or history beyond what is already know, which is the NRHP/CRHP Criterion D/4. The subject property is also not associated with an archaeological site or a known subsurface cultural component. Therefore, the subject property does not appear eligible under NRHP/CRHP Criterion D/4.

County of Santa Cruz Significance Evaluation

For the same reasons already discussed in application of NRHP and CRHR criteria, the Newell Creek Dam appears eligible under Criterion 2 of the County of Santa Cruz criteria, as described in Section 16.42.050(C) of the Title 16 Environment and Resource Protection, Chapter 16.42 Historic Preservation. Criterion 2 pertains to a resource that is associated with an historic event or thematic activity of local, State or national importance. For the same reasons discussed above, archival research did not reveal potential eligibility under the other County criteria.

Integrity

In accordance with the NRHP guidelines, properties that are eligible for listing in the NRHP must be significant under one or more of the criteria and must have sufficient integrity to convey their significance. These rules apply whether the property is considered for individual listing or as a contributing resource within a historic district. In assessing historic integrity, the NRHP recognizes seven aspects or qualities that, in various combinations, define integrity. In order to retain historic integrity "a property will always possess several, and usually most, of the aspects" (NPS 2002).

The CRHR generally follows the integrity guidelines for the NRHP, but it recognizes that it is possible that historical resources that may not retain sufficient integrity to meet the criteria for listing in the NRHP may still be eligible for listing in the CRHR. A resource that has lost its historic character or appearance may still have sufficient integrity for the CRHR if it maintains the potential to yield significant scientific or historical information or specific data.
The seven aspects of integrity are:

- Location – the location where the historic property was constructed or the place where the historic event occurred.
- Design – the combination of elements that create the form, plan, space, structure, and style of a property.
- Setting – the physical environment of a historic property or the character of the place in which the property played its historic role.
- Materials – the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.
- Workmanship – the physical evidence of crafts of a particular culture or people during any given period in history or prehistory.
- Feeling – a property's expression of the aesthetic or historic sense of a particular period of time.
- Association – the direct link between an important historic event or person and a historic property.

The subject property was found to retain sufficient integrity to convey significance in the areas of location, design, setting, feeling, and association. The property retains integrity of location, setting, and feeling, as the vicinity surrounding the Newell Creek Dam has retained its rural presence and character. Although the dam does not feature distinctive artistic characteristics, the integrity of the original design endures as an archetypal earthen embankment dam. The Newell Creek Dam and the resultant Reservoir remains an important source of drinking water storage for the City and therefore maintains its association with the development of water infrastructure in Santa Cruz.

Paleontological Resources

As described in Appendix G-3, the Project site is located in an area where surface-mapped sedimentary deposits are generally Cenozoic (less than 66 million years old) in age and include: the Butano Sandstone (Eocene), Zayante Sandstone (Oligocene), Lompico Sandstone (Miocene), Monterey Formation (Miocene), and Santa Margarita Formation (Miocene). The Monterey Formation (approximately 12 to 15 million years old) is known to yield scientifically significant, Miocene-age marine vertebrates and well-preserved invertebrates throughout California where it occurs, and has high paleontological resource sensitivity.

The southern portion of the Project site, including the dam, is underlain by the Monterey Formation. The northern portion of the Project site, located on the east side of the Reservoir (Reservoir), including the Loch Lomond Recreation Area, is underlain by the Butano Sandstone, Zayante Sandstone, and Monterey Formation.

According to a records search conducted by the University of California, Berkeley Museum of Paleontology (UCMP), paleontological resources have been previously discovered within or near the Project site. Invertebrate fossils documented by the UCMP were collected from the Monterey and Vaqueros formations. The Project area is not in an area of identified significant resources in the County of Santa Cruz General Plan (County of Santa Cruz 1994).

No paleontological resources were discovered during the field survey of the entire project APE in February 2018.

4.4.2 Impacts and Mitigation Measures

Thresholds of Significance

In accordance with CEQA; State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies, and/or guidelines; and agency and professional standards; a project impact would be considered significant if the project would:

CUL-1 Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5;

CUL-2 Cause a substantial adverse change in the significance of an archaeological resource, pursuant to Section 15064.5;

CUL-3 Disturb any human remains, including those interred outside of formal cemeteries;

CUL-4 Cause a substantial adverse change in the significance of a tribal cultural resource that is (i) listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020(k); or (ii) a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1; or

CUL-5 Directly or indirectly destroy a unique paleontological resource, site, or unique geologic feature.

CEQA defines a "*unique archaeological resource*" as an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets one or more of the following criteria:

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information; or
- Has a special and particular quality such as being the oldest of its type or the best available example of its type; or
- Is directly associated with a scientifically recognized important prehistoric or historic event or person (PRC §21083.2(g)).

CEQA (Public Resources Code section 21074) defines a "*tribal cultural resource*" as either of the following:

- Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:
    1. Included or determined to be eligible for inclusion in the California Register of Historical Resources.
    2. Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1.
- A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1.

State CEQA Guidelines Section 15064.5 defines a *historical resource* as:

- A resource listed in, or determined to be eligible for listing in, the California Register;
- A resource listed in a local register of historical resources.
- Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California…Generally, a resource shall be considered by the lead agency to be :historically significant." Generally a resource is considered historically significant if it meets criteria for listing in the California Register of Historical Resources, including:
    1. Is associated with events that made a significant contribution to the broad patterns of California's history and cultural heritage.
    2. Is associated with the lives of people important in our past.
    3. Embodies the distinctive characteristics of a type, period, region, or method of construction, represents the work of an important creative individual, or possesses high artistic values.

4. Has yielded or may be likely to yield information important in prehistory or history; or

- A resource determined to be a historical resource by a project's lead agency.

CEQA Guidelines Section 15064.5 defines a "historical resource." If a cultural resource in question is an archaeological resource, CEQA Guidelines Section 15064.5[c][1]) requires that the lead agency first determine if the resource is a historical resource as defined in Section 15064.5(a). If the resource qualifies as a historical resource, potential adverse impacts must be considered in the same manner as a historical resource. If the archaeological resource does not qualify as a historical resource but does qualify as a "unique archaeological resource," then the archaeological resource is treated in accordance with Public Resources Code Section 21083.2 (see also CEQA Guidelines Section 15069.5[c][3]).

CEQA Guidelines Section 15064.5(b) defines a "*substantial adverse change*" to a historical resource as: "physical demolition, destruction, relocation or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired. The significance of an historical resource is *materially impaired* when a project demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for inclusion in, the California Register of Historical Resources or in registers meeting the definitions in Public Resources Code 5020.1(k) or 5024.1(g).

Analytical Method

The following impact analysis is based on the data base searches, literature reviews, field surveys and other documentation provided in the Cultural Resources Report, Historical Resources Evaluation Report, and Paleontological Resources Review Memorandum prepared for the Project (see Appendices G-1 through G-3).

Impacts and Mitigation Measures

Impact CUL-1: **Historical Resources.** The proposed Project would result in construction of new facilities and improvements that would result in minor physical alteration to the Newell Creek Dam. However, the alterations would not materially impair the historical significance of the dam. Therefore, this is a *less-than-significant* impact.

The proposed Project includes construction of new inlet/outlet facilities, including a new inlet/outlet conduit tunnel on the dam's west abutment, as well as appurtenant improvements, including a new culvert crossing at the spillway plunge pool, replacement of a segment of the Newell Creek Pipeline, new control houses, and utilities. Most of the construction activity would occur within the submerged Reservoir area and at the toe of the dam.

The Project property is considered a historical resource under CEQA due to its eligibility for listing at the local level of significance under NRHP/CRHP Criterion A/1 due association with important events that have made a significant contribution to the broad patterns of water infrastructure development in Santa Cruz.

According to CEQA (section 21084.1), a project that could "cause a substantial adverse change in the significance of an historical resource" may have a significant impact. CEQA Guidelines section 15064.5(b)(1) indicates that a "substantial adverse change in the significance of an historical resource" means "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource *would be materially impaired*." Subsection (2) further indicates that the significance of a historical resource is *materially impaired* when a project "demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance" that justify its inclusion in or eligibility for listing in the CRHR or its inclusion in a local register.

None of the planned improvements would demolish, destroy, or relocate the NCD. Construction of proposed improvements would result in minor physical alterations at the toe of the dam and construction of new small control house on the dam crest, but would not otherwise result in physical alterations to the dam. These alterations would not alter the NCD's association with events and broad patterns of water system infrastructure and water supply planning in the City and county for which the NCD has been deemed potentially eligible for listing as a historical resource in the NRHP, CRHR, and local County register. Therefore, the proposed improvements would not adversely impact the physical characteristics that convey the historical significance of the NCD as none of the improvements would alter the overall historic integrity of the resource. All proposed Project components were found to have a less-than-significant impact on historical resources.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact CUL-2/3: Archaeological Resources and Human Remains. Ground-disturbing activities during construction could result in damage to unknown or previously discovered archaeological resources and/or human remains, although the area is not considered archaeologically sensitive. Therefore, this is considered a *less-than-significant* impact.

The CHRIS records and field survey did not identify any archaeological resources within the Project site or any specific cultural resource sensitivity concerns. The findings of the archaeological study indicated that the proposed Project would have a less-than-significant impact on historical resources as none were identified for archaeological resources. However, it is possible that intact, buried archaeological deposits may be uncovered during ground-disturbing construction activities.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified. However, the Project includes Best Management Practices (BMPs) that address procedures to be followed in the event that unknown archaeological resources are discovered during construction, which are included in Chapter 3, Project Description.

Impact CUL-4: **Tribal Cultural Resources.** Project construction would not result in a substantial adverse impact to a tribal cultural resource. This is considered a *less-than-significant* impact.

No tribal cultural resources meeting the definition in the Public Resources Code have been identified. The CHRIS records search, Native American coordination, and field survey did not identify any archaeological resources within the Project site or any specific cultural resource sensitivity concerns. There are no known resources on the site that would be considered a tribal cultural resource. No California Native American tribe that is traditionally and culturally affiliated with this geographic area has contacted the City and requested notification of projects. No responses have been made to letters sent to Native American tribes to solicit input on information on known resources in the area. Therefore, the Project would not result in an adverse impact to or cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code 21074.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact CUL-5: **Paleontological Resources.** Ground-disturbing activities during construction could result in damage to previously undiscovered, intact paleontological resources below the ground surface. This would be a *potentially significant* impact.

No paleontological resources were identified within the Project site as a result of the pedestrian field survey. However, the institutional records search stated that there are records of previous paleontological resources discoveries either nearby or within the Project area within the same geological formation that is present on the Project site. While the Project area has been heavily disturbed by development for the existing dam and related facilities, intact paleontological resources may be present below the original layer of fill material. Given the proximity of past fossil discoveries in the surrounding area and the potentially fossiliferous Miocene age sedimentary deposits mapped in this area (e.g., Monterey Formation), undisturbed portions of these geological units within the Project site would be considered highly sensitive for supporting paleontological resources. Ground-disturbing activities associated with construction of the proposed Project, such as grading and excavation, have the potential to destroy a unique paleontological resource or site. Without mitigation, the potential damage to paleontological resources during construction would be a potentially significant impact.

Mitigation Measures

Implementation of Mitigation Measure CUL-5-1 would reduce the impact to a less-than-significant level.

MITIGATION MEASURE CUL-5-1: Prior to commencement of any grading activity on-site, the City shall retain a qualified paleontologist to prepare a Paleontological Resources Impact Mitigation Program (PRIMP), consistent with the guidelines of the Society of Vertebrate Paleontology (SVP) (2010) that outlines requirements for: worker environmental awareness training; locations and timing of construction monitoring; procedures for discoveries treatment; and paleontological methods (including sediment sampling for microvertebrate fossils), reporting, and collections management.

The qualified paleontologist shall attend a preconstruction meeting to provide construction worker training regarding procedures in the event of discovery of paleontological resources during construction. Monitoring shall consist of onsite spot-checking once a week for five weeks during the excavation for the staging area, for two days during the first week of the tunnel excavation (to get a sense of the equipment operations), and several intermittent spot-checks thereafter. Monitoring of excavation shall consist of reviewing tunnel spoils but not entering the tunnel.

In the event that significant paleontological resources (e.g., fossils) are unearthed during grading, the paleontological monitor shall coordinate with the Construction Manager or City Staff to temporarily halt and/or divert grading activity within a 50-foot radius to examine the resource. If the find is significant, the City shall require treatment of the find in accordance with the recommendations of the paleontologist, which may include, but are not limited to, specimen recovery and curation or thorough documentation. Once documentation and/or collection of the find is completed, grading may recommence in the area of the find.

4.4.3 Cumulative Impacts

The geographic scope for cumulative impact analysis on cultural resources includes all sites upon which past, present or future activities could affect the same cultural resources as the Proposed Project. As described in the preceding section, the cultural resources potentially affected by the proposed Project would be historical resources. No cumulative projects have been identified in the vicinity of these sites. The proposed Project would not contribute to cumulative impacts related to cultural resources as no cumulative projects have been identified to which the proposed Project would contribute impacts.

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4.6 GEOLOGY AND SOILS

This section analyzes geology and soils conditions in the study area for the proposed Newell Creek Dam Inlet/Outlet Replacement Project (Project). This section is based on a project geotechnical report prepared by AECOM (2018) and review of other relevant studies and reports regarding geology and soils in the Project area.

4.6.1 Environmental Setting

This section describes the existing conditions in the study area and also identifies the resources that could be affected by the proposed Project.

Regulatory Setting

Federal Regulations

There are no federal regulations directly applicable to geology and soils at the Project site. Nonetheless, installation of underground infrastructure/utility lines must comply with national industry standards specific to the type of utility (e.g., National Clay Pipe Institute for sewers, American Water Works Association for water lines), and the discharge of contaminants must be controlled through the National Pollutant Discharge Elimination System (NPDES) permitting program for management of construction and municipal stormwater runoff. These standards contain specifications for installation, design, and maintenance to reflect site-specific geologic and soils conditions.

State Regulations

The California Department of Water Resources, Division of Safety of Dams (DSOD), regulates dams to prevent failure, safeguard life, and protect property. DSOD provides oversight to the design, construction, and maintenance of over 1,200 jurisdictional-sized dams in California. DSOD ensures dam safety by:

- Reviewing and approving dam enlargements, repairs, alterations, and removals to ensure that the dam appurtenant structures are designed to meet minimum requirements.
- Performing independent analyses to understand dam and appurtenant structures performance. These analyses can include structural, hydrologic, hydraulic, and geotechnical evaluations.
- Overseeing construction to ensure work is being done in accordance with the approved plans and specifications.
- Inspecting each dam on an annual basis to ensure it is safe, performing as intended, and is not developing issues. Roughly 1/3 of these inspections include in-depth instrumentation reviews of the dam surveillance network data.

- Periodically reviewing the stability of dams and their major appurtenances in light of improved design approaches and requirements, as well as new findings regarding earthquake hazards and hydrologic estimates in California (California Department of Water Resources, 2018).

The primary state regulations protecting the public from geologic and seismic hazards are contained in the Seismic Hazards Mapping Act, the California Building Code, and the State Earthquake Protection Law. The California State University (CSU) Office of the Chancellor has established additional state requirements.

The state regulations protecting structures from geo-seismic hazards are contained in the California Code of Regulations, Title 24, Part 2 (the California Building Code), which is updated on a triennial basis. These regulations apply to public and private buildings in the state. Until January 1, 2008, the California Building Code was based on the then-current Uniform Building Code and contained additions, amendments, and repeals specific to building conditions and structural requirements of the State of California. The 2016 California Building Code, effective January 1, 2017, is based on the current (2015) International Building Code and enhances the sections dealing with existing structures. Seismic-resistant construction design is required to meet more stringent technical standards than those set by previous versions of the California Building Code.

Construction activities are subject to occupational safety standards for excavation and trenching, as specified in the California Safety and Health Administration regulations (Title 8 of the California Code of Regulations) and in Chapter 33 of the California Building Code. These regulations specify the measures to be used for excavation and trench work where workers could be exposed to unstable soil conditions. The Project would be required to employ these safety measures during excavation and trenching.

Geologic Setting

Regional Geologic Setting

The Project site is located along the western side of the Santa Cruz Mountains in the central portion of the Coast Ranges Physiographic Province of California. The Coast Ranges Province is a series of coastal mountain chains paralleling the pronounced northwest-southeast structural grain of central California geology between Point Arguello, in Santa Barbara County, and the California/Oregon border. The study area and surrounding region are underlain by granitic and metamorphic rocks of the Salinian Block. This suite of basement rocks is separated from contrasting basement rock of the Franciscan Formation to the northeast by the San Andreas fault system (Swanson, et. al., 2002). While the core of the mountain range is dominated by gneiss, schist, limestone, quartzite, and granite, Cretaceous through Holocene sedimentary rocks and lesser amounts of Tertiary volcanic rocks overlie much of the region (AECOM, March 2018).

Site Geology and Stratigraphy

Newell Creek Dam (NCD) impounds Loch Lomond Reservoir (Reservoir) and is dominantly underlain by siltstone that is part of the Miocene age Monterey Formation. The geotechnical investigation completed for the proposed Project included a review of information derived from previous investigations, supplemented by a multi-phased investigation program consisting of geotechnical borings, borehole geophysical surveys, and laboratory testing. Eleven terrestrial (i.e., outside the Reservoir) borings and eight water (i.e., drilled from the Reservoir surface) borings were drilled to explore the rock conditions along the proposed tunnel route and associated inlet/outlet structures. Using rock core samples collected from the borings, the intact rock strength, rock fracturing, and rock mass quality (e.g., deformability) were estimated.

Based on borings and laboratory testing of samples from the borings:

- The rock is relatively weak siltstone with moderate abrasiveness, showing a consistent strike and dip;
- The rock shows moderate to high hydraulic conductivity that varies with depth; and
- The intake structure configuration may be impacted by contrasting dynamic properties between the thick overburden/silt and the underlying rock at the location of proposed inlets within the Reservoir.

Some of the borings drilled in the Reservoir revealed relatively thick layers of sediment or colluvium. A negligible amount of dredged material is present on the west dam abutment, derived from the City's attempt to uncover a buried intake. Borings also revealed materials such as wood pieces and concrete chips, located in different strata of unconsolidated material (AECOM, March 2018).

Based on interpreted rock mass quality and subsurface geologic conditions, the tunnel alignment was divided into three tunnel reaches, beginning at the downstream entry portal and trending northward. Within the first 600-foot reach, with the exception of a short distance near the entry portal where there is unconsolidated overburden material (i.e., gravel, cobbles, and boulders in a silty sand matrix), the tunnel would be installed within "fair" bedrock material, consisting predominantly of the Monterey Formation. The second 300-foot reach consists entirely of bedrock material, comprised of "poor" Monterey siltstone. The third 635-foot reach consists entirely of "fair" Monterey siltstone and sandstone (AECOM, March 2018).

In addition, near-surface reservoir-bottom sediment samples were collected in the vicinity of the new intake structures. Sampling penetrated a maximum of 3 feet of bottom sediments. The sediment was very fine-grained, consisting of clay and silt (A+ Environmental Solutions 2009).

Regional Seismicity and Seismic Hazards

The Project site is located in a seismically active region of California, between two major Holocene-active faults, including the San Andreas fault, located approximately 6.5 miles to the northeast, and the San Gregorio fault, located approximately 10.5 miles to the west (Figure 4.6-1). Historical earthquakes along the San Andreas fault and its branches have caused substantial seismic shaking in Santa Cruz County in historical time. The two largest historical earthquakes to affect the area were the moment magnitude (Mw) 7.9 San Francisco earthquake of April 18, 1906, and the Mw 6.9 Loma Prieta earthquake of October 17, 1989 (corresponding to Richter magnitudes of 8.3 and 7.1, respectively). The San Francisco earthquake caused severe seismic shaking and structural damage to many buildings in the Santa Cruz Mountains. The Loma Prieta earthquake may have caused more intense seismic shaking than the 1906 event in localized areas of the Santa Cruz Mountains, although its regional effects were not as extensive. There were also major earthquakes in northern California along or near the San Andreas Fault in 1838, 1865, and possibly 1890 (City of Santa Cruz, April 2012-DEIR volume).

The most substantial earthquake to have occurred since construction of the dam was the 1989 Loma Prieta earthquake. The epicenter of the earthquake was approximately 12 miles east of the dam, on the Loma Prieta segment of the San Andreas fault system. Seismic instruments were not present on the dam during the earthquake. Based on the nearest two seismometers, located at the University of California Santa Cruz (UCSC) campus and Lenihan Dam, approximately 7 to 8 miles from the Project site, respectively, peak ground accelerations during the Loma Prieta earthquake were approximately 0.5 g (percent of gravity). Longitudinal cracks occurred on the upstream face of the dam as a result of the earthquake. A geotechnical investigation was completed in the vicinity of the cracks, which were repaired under California Department of Water Resources, Division of Safety of Dams oversight (AECOM, March 2018).

Regional Faulting

As previously discussed, Santa Cruz County is located in a portion of California that is crossed by a number of faults. The California Geological Survey (CGS) classifies faults as:

- Holocene-active faults, which are faults that have moved during the past approximate 11,700 years. These faults are capable of surface rupture.
- Pre-Holocene faults, which are faults that have not moved in the past 11,700 years. This class of fault may be capable of surface rupture, but is not regulated under the Alquist-Priolo Special Studies Zones Act of 1972.
- Age-undetermined faults, which are faults where the recency of fault movement has not been determined (California Geological Survey, 2018).

This fault classification is consistent with criteria of the Alquist-Priolo Special Studies Zones Act of 1972. In accordance with this act, structures for human occupancy must not be sited over the trace of Holocene-active faults. Similarly, subdivisions of land that would eventually include structures

for human occupancy would apply to the Alquist-Priolo Special Studies Zones Act. As previously discussed, the Holocene-active San Andreas fault is located 6.5 miles northeast of the Project site and the Holocene-active San Gregorio fault zone is located approximately 10.5 miles west of the site, just offshore. Portions of the Monterey Bay-Tularcitos Fault, located approximately 12 miles south of the Project site, are also considered Holocene-active (City of Santa Cruz, April 2012-DEIR volume). Distances to local faults, maximum expected earthquake magnitudes, and recurrence intervals are shown in Table 4.6-1.

Table 4.6-1. Distances to Local Faults

Fault	Distance from Project Site (miles)	Maximum Expected Earthquake Magnitude (Moment Magnitude)	Approximate Time Between Major Earthquakes (years)
San Gregorio	10.5	7.2	400
Zayante-Vergeles	0.5 (from proposed construction area)	6.8	8,821
Monterey Bay-Tularcitos	12	6.5	2,841
San Andreas	6.5	7.9	210

Source: City of Santa Cruz 2012; CGS 2010; AECOM 2018

The Zayante-Vergeles fault intersects the middle of the Reservoir, less than one mile north of the dam and approximately 0.5 mile north of the new intake structure (Figure 4.6-2). Based on mapping by the California Geological Survey (2010), the portion of this fault that traverses the Reservoir most recently moved 700,000 to 1.6 million years ago. Sands and sandstones of older Tertiary formations lie upstream from the fault and topography in the upper Reservoir is more subdued than in the lower area. This fault may be related to Quaternary faulting across the Pajaro Valley to the southeast (AECOM, March 2018). Portions of the Zayante-Vergeles Fault to the southeast have been mapped as Holocene-active by the California Geological Survey (2010).

The Zayante fault also was considered Holocene-active in a review prepared as part of the City of Santa Cruz General Plan EIR (Nolan Associates 2009, Appendix F-4 of the April 2012-DEIR volume), based on detailed geologic mapping by numerous geologists, as wells as a magnitude 4.0 earthquake in 1998 that occurred along this fault in the Santa Cruz Mountains (USGS, 2000). Nolan Associates (2009) considered this fault active with respect to structural design purposes, indicating the fault is capable of generating a Mw 6.8 earthquake, with a recurrence interval of almost 9,000 years.

Surface Rupture

Surface rupture involves the displacement and cracking of the ground surface along a fault trace. Surface ruptures are visible instances of horizontal or vertical displacement, or a combination of the two, typically confined to a narrow zone along the fault. Surface rupture is more likely to occur in

conjunction with Holocene-active fault segments, where earthquakes are large, or where the location of the movement (earthquake hypocenter) is shallow.

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 regulates development near Holocene-active faults to mitigate the hazard of surface fault rupture. This Act requires the State Geologist to establish regulatory zones (known as Alquist-Priolo Special Study Fault Zones) around the surface traces of Holocene-active faults and to issue appropriate maps. Local agencies must regulate most development projects within the zones. The Alquist-Priolo Special Study Fault Zone located closest to the Project site is associated with the San Andreas fault, located approximately 6.5 miles to the northeast (California Geologic Society, 2015). Therefore, the Project site is not subject to fault rupture.

Landslides and Slope Stability

The dam is primarily underlain by Miocene Monterey Formation siltstone, which strike (i.e., are oriented) parallel to the dam axis and dip approximately 20 degrees in a downstream direction (Figure 4.6-2). Monterey strata in the dam abutments and immediately upstream and downstream of the dam maintain a similar bedding attitude (i.e., orientation). Steep slopes greater than 1:1 (horizontal to vertical) are locally present in the vicinity of the proposed Project facilities. These slopes have the potential to be unstable at slopes greater than 1.5:1 (AECOM, March 2018).

Small surficial landslides have occurred since the dam was constructed, around the edges of the Reservoir in both the Monterey and older Tertiary geologic units (Figure 4.6-2). Most landslide events have been slow rather than rapid movement and slide-induced waves have not been reported on the Reservoir. A large landslide is present on the east side of the Reservoir, upstream of the dam. Debris from this landslide slid into the Reservoir in March 1980. As a result, this landslide is actively monitored by the City. Sloughing and sediment accumulation on the east side of the Reservoir has buried one of the existing sloping water intakes. In addition, a small landslide has been observed near the toe of the dam, adjacent to the end of the spillway. This landslide resulted from failure of existing colluvium underlying fill material (AECOM, March 2018).

Along the west bank of the Reservoir, landslide debris and shear zones were encountered in two borings, indicating the presence of an ancient landslide, with a toe near or just below the Reservoir rim. No evidence of slide movement was observed where this landslide mass crosses an existing access road. Based on a lack of observed movement and evidence that the top of the hill had been removed during construction of the dam, likely removing the driving force for the slide, the landslide appears to be inactive (AECOM, March 2018).

The Newell Creek pipeline is located in an area with steep slopes and active landslides; however, no landslides appear to threaten the pipeline in the Project area. The pipeline previously failed (in 1982) at the creek crossing at the spillway, but no other known damage or movement has been reported along the section of pipeline being replaced as part of the Project, including following the Loma Prieta earthquake (AECOM, March 2018).

Soils

Similar to other nearby areas, the soil stratigraphy generally consists of soils overlying siltstone, predominantly consisting of siltstone gravels, cobbles, and boulders in a silty sandy matrix. At the base of the slope near the spillway pool, an area with silty gravels and some silty sand was observed. Underlying the soil is siltstone, which generally grades from highly weathered near the surface to fresh at depth. In some locations near the downstream portal, no highly weathered or moderately weathered siltstone was observed above the fresh siltstone (AECOM, March 2018).

According to the Natural Resources Conservation Service (USDA, 2018), four native soil types and one anthropogenic soil type are mapped within the Project area (see Figure 4.6-3). The native soils include Maymen-Rock outcrop complex, 50–75percent slopes; Nisene-Aptos complex, 30–50 percent slopes; Nisene-Aptos complex, 50–75 percent slopes; and Lompico-Felton complex, 50–75 percent slopes. The anthropogenic soil type is classified as "Dam" and corresponds to NCD. The Maymen-Rock outcrop complex is characterized by residuum weathered from sandstone and shale, or granite. This complex is a somewhat excessively drained soil consisting of approximately 75 percent Maymen soils and 25 percent rock outcrops. Nisene-Aptos complex soils are derived from approximately 30% Nisene soils and 30% Aptos soils, with the inclusion of other minor soil components. This complex is well drained and is derived from residuum weathered from sandstone and shale or from siltstone. The Lompico-Felton complex contains approximately 45 percent Lompico soils and 40% Felton soils, with minor components included. This complex is well drained and is derived from residuum weathered from siltstone and/or mica schist, sandstone, and shale (USDA, 2018).

4.6.2 Impacts and Mitigation Measures

Thresholds of Significance

The significance criteria used to evaluate project impacts to geology and soils are based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines (14 CCR 15000 et seq.). According to Appendix G of the CEQA Guidelines, a significant impact related to geology and soils may occur if the project would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
    - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area based on other substantial evidence of as known fault. Refer to Division of Mines and Geology Special Publication 42.
    - Strong seismic ground shaking.
    - Seismic-related ground failure, including liquefaction.
    - Landslides.

- Result in substantial soil erosion or the loss of topsoil.
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.
- Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.

With regard to the analysis of impacts related to geology/soils under CEQA, the California Supreme Court ruled in California Building Industry Association (CBIA) v. Bay Area Air Quality Management District (BAAQMD) (2015) 62 Cal.4th 369, that "agencies subject to CEQA are not required to analyze the impact of existing environmental conditions on a project's future users or residents. But when a proposed project risks exacerbating those environmental hazards or conditions that already exist, an agency must analyze the potential impact of such hazards on future residents or users. In those specific instances, it is the project's impact on the environment—and not the environment's impact on the project—that compels an evaluation of how future residents or users could be affected by exacerbated conditions." In fact, the Court found the following sentences of section 15126.2(a) erroneous and unauthorized under CEQA:

> *"[A]n EIR on a subdivision astride an active fault line should identify as a significant effect the seismic hazard to future occupants of the subdivision. The subdivision would have the effect of attracting people to the location and exposing them to the hazards found there."*

Therefore, in accordance with the Court ruling in CBIA v. BAAQMD, CEQA Guidelines (14 CCR 15000 et seq.) (Appendix G), City of Santa Cruz plans, policies, and/or guidelines, and agency and professional standards, a project impact would be considered significant if the Project would:

GEO-1 Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death resulting from rupture of a known earthquake fault, seismic ground shaking, landslides, or seismic related ground failure, including liquefaction, which cannot be mitigated through the use of standard engineering design techniques;

GEO-2 Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide or slope failure/instability; or

GEO-3 Be located on expansive soil, as defined by the 2016 California Building Code, creating substantial direct or indirect risks to life or property caused in whole or in part by the project's exacerbation of the existing environmental conditions.

GEO-4 Result in substantial soil erosion or the loss of topsoil.

GEO-5 Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.

Approach to Analysis

The following analysis considers whether the proposed Project, which is described in Chapter 3, Project Description, would directly or indirectly cause or exacerbate geological/soils hazards. Information regarding the existing regional geology and seismically induced hazards is based on published maps and reports completed by the California Geological Survey and the County of Santa Cruz GIS Department. Specific geologic/soils information for the project site was based on a geotechnical report prepared for the Project (AECOM, March 2018). AECOM performed geotechnical investigations for the Project between September 2016 and January 2018. The geotechnical investigations included drilling, sampling, hydraulic conductivity testing, an underwater seismic reflection (sub-bottom profiling) survey, and geophysical surveys in selected borings. Laboratory testing was performed on soil and rock samples recovered from the borings (AECOM, July 2018).

Construction-related impacts are considered for each component of the Project. Operational-related impacts of the proposed Project are considered in the context of seismic and/or other geological hazards to structures, employees, and visitors, but only in the context of potential exacerbation of existing geological hazards. Adherence to design and construction standards, as required by state and local regulations, would minimize potential exacerbation of existing geologic hazards and therefore ensure maximum practicable protection for users of the control building, bypass pipeline, and associated infrastructure. The potential increased geologic hazards resulting from development under the proposed Project were evaluated with consideration to the mitigating effects of existing safety standards in the California Building Code.

Impacts and Mitigation Measures

Areas of No Project Impact

GEO-5 *Soils-Septic Suitability*. The Project does not propose use of septic systems, and therefore, no impacts would result related to installation of a septic or alternative wastewater system. During construction, temporary portable toilets would be installed for construction workers. Waste from the portable toilets would be transported off-site in vacuum trucks for disposal at the City's wastewater treatment facility.

Project Impact Analyses

Construction related impacts associated with soil erosion (GEO-4), disturbance of Reservoir bottom sediments, and resultant sedimentation of the Reservoir and downstream Newell Creek is addressed in Section 4.8, Hydrology and Water Quality.

Impact GEO-1: Exposure to Seismic Hazards. The Project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death resulting from rupture of a known earthquake fault, seismic ground shaking, landslides, or seismic related ground failure, including liquefaction, which cannot be mitigated through the use of standard engineering design techniques. This is considered a *less than significant* impact.

New Intake Structure. The proposed new intake structure consists of three inlets/outlets (inlets), lower, middle, and upper, that each tie into the conduit in the proposed tunnel via vertical shafts drilled through the Reservoir bed (see Figure 3-7). As discussed in subsection 4.1.1, the Project site is located in a seismically active area, between the Holocene-active San Andreas and San Gregorio faults (see Figure 4.6-1). In addition, the Zayante-Vergeles fault traverses the Reservoir, approximately 0.5 mile north of the proposed intake structure (Figure 4.6-2). Based on mapping by the California Geological Survey (2010), the portion of this fault that traverses the Reservoir most recently moved 700,000 to 1.6 million years ago, indicating it is a pre-Holocene fault. However, portions of the Zayante-Vergeles fault to the southeast have been mapped as Holocene-active by the California Geological Survey (2010). This fault system has not been included within an Alquist-Priolo Fault Zone, which regulate development near Holocene-active faults to mitigate the hazard of surface fault rupture. Therefore, the fault in the vicinity of the Project site is not considered susceptible to surface fault rupture.

However, this fault was considered Holocene-active by not only the California Geological Survey (2010), but also by numerous other geologists, as summarized by the U.S. Geological Survey (2000) and in a geologic review (Nolan Associates, 2009) conducted for the City of Santa Cruz General Plan EIR. This conclusion of the fault being active is based on detailed geologic mapping by numerous geologists and in part, based on a magnitude 4.0 earthquake in 1998 that occurred along this fault in the Santa Cruz Mountains. Nolan Associates (2009) consider this fault as active with respect to structural design purposes, indicating the fault is capable of generating a Mw 6.8 earthquake, with a recurrence interval of almost 9,000 years. A deterministic seismic hazard analysis prepared for the Project site developed design response spectra for a local fault event (Mw 7.0 on the Zayante fault, at a distance of 1.4 kilometers [km]) and for a San Andreas fault event (Mw 8.0 at a distance of 9.9 km). Projected rock outcrop peak ground accelerations and velocities were determined as part of the analysis (AECOM, March 2018). Project facilities, which would not increase the potential for fault rupture and associated earthquakes to occur, would be constructed in accordance with this seismic analysis.

The seismic loading stability of the slope into which the new intake would be constructed was analyzed to determine the minimum level of seismic horizontal ground acceleration that causes instability of the slope (i.e., a factor of safety less than or equal to 1.0). The analysis was used to estimate the seismic induced displacements for both the Zayante and San Andreas fault design earthquakes, as described above. Seismic-induced ground deformations for several potential sliding masses were estimated. Large seismic displacements were computed, corresponding to local instability in the vicinity of the lowest and middle intakes. However, all seismic-related

recommendations and assumptions of the Project geotechnical report (AECOM, March 2018), as may be refined with subsequent geotechnical reports, would be implemented during completion of final Project design and construction. In addition, construction of the intakes would not increase the long-term seismic instability of the slope into which the new intake would be constructed.

In addition, the gravelly/silty soil on the slope is potentially liquefiable, which may cause slope displacements as well. Liquefaction is a phenomenon whereby soil deposits temporarily lose shear strength and collapse. This condition is caused by cyclic loading during earthquake shaking, which generates high pore water pressures within the soil deposits. The soil type most susceptible to liquefaction is loose, cohesionless, granular soil below the water table and within about 50 feet of the ground surface. Liquefaction can result in a loss of foundation support and settlement of overlying structures, ground subsidence and lateral ground movement as a result of lateral spreading, lurch cracking, and differential settlement of affected deposits. The potential for liquefaction on the slope in the vicinity of the proposed intake structure is high (AECOM, March 2018). However, all seismic-related recommendations and assumptions of the Project geotechnical report (AECOM, March 2018), as may be refined with subsequent geotechnical reports, would be implemented during completion of final Project design and construction. In addition, construction of the intakes would not increase the liquefaction potential of the slope into which the new intake would be constructed. As a result, seismic related impacts are considered *less than significant.*

New Conduit Tunnel and Outlet Structure. A maximum 14-foot diameter tunnel would be constructed through the dam's west abutment using conventional tunneling methods. The tunnel would be approximately 1,500 feet long, with two short straight segments near the portal and the terminus and a 600-foot radius curve connecting the two, as shown in Figure 3-9. The tunnel would extend from the tunnel portal in a curved alignment, pass beneath the dam with sufficient bedrock cover of approximately 40 to 50 feet. The tunnel portal would be located on the ridge adjacent to the existing outlet structure. The ridge would be excavated and the area downstream of the outlet structure would be filled in to a matching grade to create a "construction platform", which is described in subsection 3.5.1.

The stability of the slope at the tunnel outlet structure was evaluated under three different loading conditions, including:

- Existing conditions;
- Long-term (post excavation) conditions; and
- Seismic (post excavation) loading conditions.

Based on the existing and long-term conditions slope analyses, the existing slope and post-excavation slopes would be statically relatively stable. The seismic loading slope analysis was used to estimate the seismic-induced displacements for design earthquakes on both the Zayante and San Andreas faults, as described above. Based on initial structure plans, the outlet structure would be placed on native siltstone. Allowable bearing capacity of the native siltstone was estimated based on the strength parameters of the rock. These bearing capacities would be used during final design

of the Project. The slope stability analysis at the tunnel outlet structure indicated that the proposed slope could potentially fail in the absence of proper engineering. Because the Project would result in creation of a new slope that would be potentially prone to seismic induced failure. However, all final design and construction in the new conduit tunnel and outlet structure would be completed in accordance with engineered design plans and California Building Code requirements with respect to slope stability. As a result, impacts would be *less than significant*.

All Other Project Facilities. As previously discussed, a deterministic seismic hazard analysis prepared for the Project site developed design response spectra for a local fault event on the San Andreas and Zayante faults. Rock outcrop peak ground accelerations and velocities were determined as part of the analysis. Project facilities would be constructed in accordance with this seismic analysis, as well as with provisions of the California Building Code, under the supervision of a California Engineering Geologist and California Geotechnical Engineer. In addition, construction and operation of other Project facilities would not increase the potential for fault rupture and associated earthquakes to occur. As a result, impacts in the vicinity of these facilities are considered *less-than-significant.*

See additional information in Impact GEO-2 pertaining to slope stability.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact GEO-2: Slope Stability. The Project would be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide or slope failure/instability. This is a *less-than-significant impact*.

New Intake Structure. The proposed new intake structure consists of three inlets/outlets (inlets) that each tie into the conduit in the proposed tunnel via vertical shafts drilled through the Reservoir bed. The structure would be placed on the right abutment of the dam and would include an air vent that extends up the dam embankment to the dam crest. The three inlets would each be founded on shafts excavated in rock and backfilled with concrete. A reinforced-concrete ring mat would surround, but not be structurally connected to, the backfilled shafts. The ring mat, founded on rock (or on grout founded on rock) would support a steel caisson-type debris barrier to protect the intakes from sloughing of adjacent material into the trough area excavated to bedrock for construction of the intake structure, especially during an earthquake. The foundations for the barriers would be anchored into the foundation rock in order to accommodate potential full height debris loading on a portion or all of the 10-foot height of the barrier (see Figure 3-7).

Along the west bank of the Reservoir, landslide debris and shear zones were encountered in two borings, indicating the presence of an ancient landslide, with a toe near or just below the Reservoir rim. Based on a lack of observed movement and evidence that the top of the hill had been removed during construction of the dam, likely removing the driving force for the slide, the

landslide appears to be inactive. Regardless, it was decided to locate the inlets and the intake air vent outside of the extent of the ancient landslide. Other intake structure configurations that required construction on the ancient landslide, such as a sloping intake, were removed from consideration (AECOM, March 2018).

The stability of the existing slope in the vicinity of the proposed intake structure was evaluated under static long-term conditions and seismic loading conditions (as previously described). Two slope cross-section alignments were evaluated, including from the lower intake and from the middle intake. Both alignments were chosen to capture the steepest portions of the slope and are roughly parallel to each other. Several slip surfaces were evaluated along each alignment under long-term static conditions, indicating some level of instability in the slope. This instability is largely due to the loose nature of the surficial soils and the relatively steep angle of the slope in the Reservoir, and is based on information from borings and bathymetry data.

Approximately 28,000-34,000 cubic yards of Reservoir bottom sediments would be dredged to provide an adequate foundation for the new inlets and connecting piping (air vent). Bedrock is anticipated to be approximately 13 to 30 feet deep. In the event that dredged slopes are made over steep these slopes could fail, resulting in damage to the new intake structure. However, all final design and construction in the new intake structure would be completed in accordance with findings of the Project geotechnical data and reviews, engineered design plans and California Building Code requirements with respect to slope stability. As a result, impacts would be *less than significant*.

New Conduit Tunnel and Outlet Structure. The proposed inlet/outlet conduit tunnel would be excavated by conventional mining equipment and methods, which would be carried out in a series of repeated excavation steps using roadheaders or other mechanical excavators followed by temporary ground support and initial lining. A roadheader is a boom-mounted cutting head, mounted on a crawler that cuts through rock face.

There is a potential for wedge block instability caused by tunneling through jointed rock masses in portions of the tunnel (AECOM, March 2018). Initial support systems would be installed during tunneling to provide support before, during, or immediately after excavation. Support for the portal excavation could include rock bolts and soil nails with shotcrete facing, and soldier pile and lagging with tiebacks or internal struts. Groundwater control measures would be applied proactively to manage with groundwater inflows. For example, pre-excavation grouting could be applied ahead of the excavation in areas where groundwater is anticipated.

A small landslide is present at the toe of the dam. Currently, the area at the toe of the dam in the vicinity of the proposed outlet structure excavation is very limited. Construction vehicles would not be able to turn around in the existing area and there would be almost no room for staging. Therefore, a 20,000 square-foot fill pad would be constructed adjacent to the portal to allow for a turn-around and staging during construction. This fill pad would extend to the edge of the existing

small landslide, buttressing the slide with 6 to 10 feet of fill, which would contribute to the stability of the landslide, but may not completely prevent it from additional failure (AECOM, March 2018).

The tunnel portal/outlet structure construction platform would be constructed by excavating the adjacent ridge to create a pad with a 1.5:1 slope down to the spillway plunge pool. The slope would be protected from erosion and slope failure by rip-rap. The southwest slope of the platform runs along an ephemeral creek. To prevent the creek from flooding the construction platform, a 5-foot-wide berm would be constructed, at a minimum of 5 feet above the base of the creek; (see details D and E on Figure 3-15 in Chapter 3, Project Description). The slope from the top of the berm to the platform face would be constructed at a 2:1 gradient for stability. On the northern edge of the platform fill, a 3:1 slope would be constructed to allow access to the existing outlet structure during the construction period. Once the new outlet works is fully operational and the existing outlet works is decommissioned, the area remaining in between the platform at the dam embankment would be filled in to provide a straight line of access for embankment repair work (see Figure 3-10 in Chapter 3, Project Description). As a result, slope stability impacts associated with construction of this construction platform are considered *less than significant*.

As previously discussed, the stability of the slope at the tunnel outlet structure was evaluated under three different loading conditions. Based on the existing and long-term conditions slope analyses, the existing slope and post-excavation slopes would be statically relatively stable. All final designs and construction in the new conduit tunnel and outlet structure would be completed in accordance with findings of the Project geotechnical studies, engineered project plans and California Building Code requirements with respect to slope stability. As a result, impacts would be *less than significant*.

Pipeline Replacement. An approximate 2,000 linear foot segment of the existing Newell Creek Pipeline would be replaced, between the outlet structure and the first isolation valves. The replacement pipeline would be 30 inches in diameter and would be constructed of ductile iron and polyvinyl chloride (PVC) pipe, with restrained joints, using conventional (open cut) trenching with small excavators and loaders.

The pipeline would traverse locally steep slopes along Newell Creek, resulting in the potential for construction-induced slope failures. Retaining walls may be constructed in some areas along the route to prevent erosion of steep slopes adjacent to the access road. In addition, pipeline construction would be completed in accordance with provisions of the California Building Code, under the supervision of a California Engineering Geologist and California Geotechnical Engineer. Therefore, slope stability related impacts in the vicinity of the proposed pipeline replacement are considered *less-than-significant.*

Access Road Improvements. Newell Creek Road functions as the access road to the dam crest. Access to the toe of the dam is currently provided by a dirt and gravel-surfaced road that branches off of Newell Creek Road, approximately 1,400 feet downstream from the dam crest. A dirt road branches off Newell Creek Road down to the toe of the dam. This dam toe access road crosses a

concrete ford (a broad crested weir) at the spillway plunge pool and continues towards the seepage channel at the toe of the dam. From the dam crest, equipment and materials can be taken along the west abutment via the emergency access road (Haul Road). Road widening and slope stabilization measures would be needed to allow open areas along the Haul Road to be used for staging. Without modification, some of the slopes on the ridge adjacent to the Haul Road could be unstable and cause road blockages or damage during construction. However, all final design and construction associated with access road improvements would be completed in accordance with engineered project plans and California Building Code requirements with respect to slope stability. As a result, impacts would be *less than significant*.

All Other Project Facilities. No slope stability issues have been identified by AECOM (2018) in the vicinity of all other proposed Project facilities. All new construction would be completed in accordance with provisions of the California Building Code, under the supervision of a California Engineering Geologist and California Geotechnical Engineer. Therefore, impacts in the vicinity of these facilities are considered *less-than-significant.*

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact GEO-3: Expansive Soil. The Project would not likely be located on expansive soil, as defined by the 2016 California Building Code, creating substantial direct or indirect risks to life or property caused in whole or in part by the Project's exacerbation of the existing environmental conditions. This is a *less-than-significant impact*.

New Conduit Tunnel and Outlet Structure. Expansive soils tend to swell with seasonal increases in soil moisture in the winter months and shrink as soils become drier in the summer months. Repeated shrinking and swelling of the soil can lead to stress and damage of structures, foundations, fill slopes, and other associated facilities. Expansive soils owe their characteristics to the presence of swelling clay minerals.

Based on interpreted rock mass quality and subsurface geologic conditions by AECOM (2018), the tunnel alignment was divided into three tunnel reaches, beginning at the proposed downstream outlet structure and trending northward. Within the first 600-foot reach, with the exception of a short distance near the entry portal where there is unconsolidated overburden material (i.e., gravel, cobbles, and boulders in a silty sand matrix), the tunnel would be installed within "fair" bedrock material, consisting predominantly of the Monterey Formation. The second 300-foot reach consists entirely of bedrock material, comprised of "poor" Monterey siltstone. The third 635-foot reach consists entirely of "fair" Monterey siltstone and sandstone. Based on the lack of clay-rich soils, the potential for expansive soils is low. In addition, all new construction would be completed in accordance with provisions of the California Building Code, under the supervision of a California

Engineering Geologist and California Geotechnical Engineer. Therefore, impacts associated with expansive soils in the new conduit tunnel and outlet structure are considered *less-than-significant.*

All other Project Facilities. No expansive soil issues have been identified by AECOM (2018) in the vicinity of all other proposed Project facilities. All new construction would be completed in accordance with provisions of the California Building Code, under the supervision of a California Engineering Geologist and California Geotechnical Engineer. Therefore, impacts in the vicinity of these facilities are considered less-than-significant.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

4.6.3 Cumulative Impacts

The geographic context for the analysis of the proposed project's contribution in creating cumulative geologic hazards is generally site-specific, rather than cumulative in nature, because each project site has a different set of geologic considerations that would be subject to uniform site development and construction standards. Furthermore, the proposed Project does not propose construction (including grading/excavation) or design features which could directly or indirectly contribute to an increase in a cumulative geological hazard. All construction work for the proposed Project would occur within site boundaries. As such, the proposed Project would not cumulatively alter geological conditions or features.

Furthermore, potential cumulative impacts on geological, seismic, and soil conditions would be reduced to less than significant on a site-by-site basis by modern construction methods and compliance with California Building Code regulatory requirements that ensure building safety. Additionally, cumulative projects in the surrounding County area would be required to prepare and submit a site-specific geotechnical report for review and approval by the County's Building and Safety section prior to the issuance of grading or building permits. The County's Building and Safety section requires the approval of the final geotechnical report that specifically addresses the conditions at a project site and the proposed building design at the time of final building plan check. As such, the potential for the proposed Project to directly or indirectly cause cumulative geotechnical hazards to affect on-site or off-site areas would be minimal, resulting in a *less than significant* impact.

4.6.4 References

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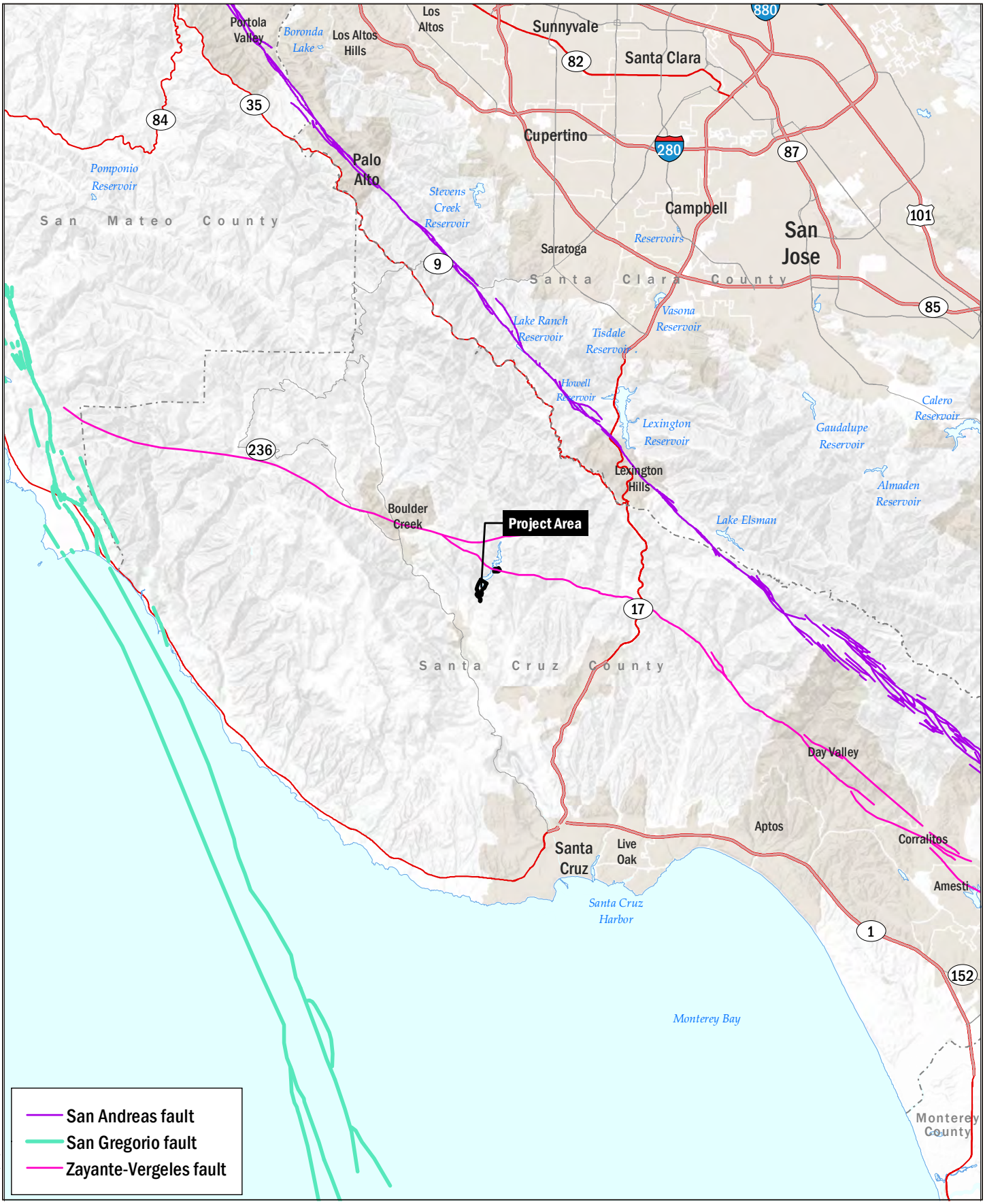


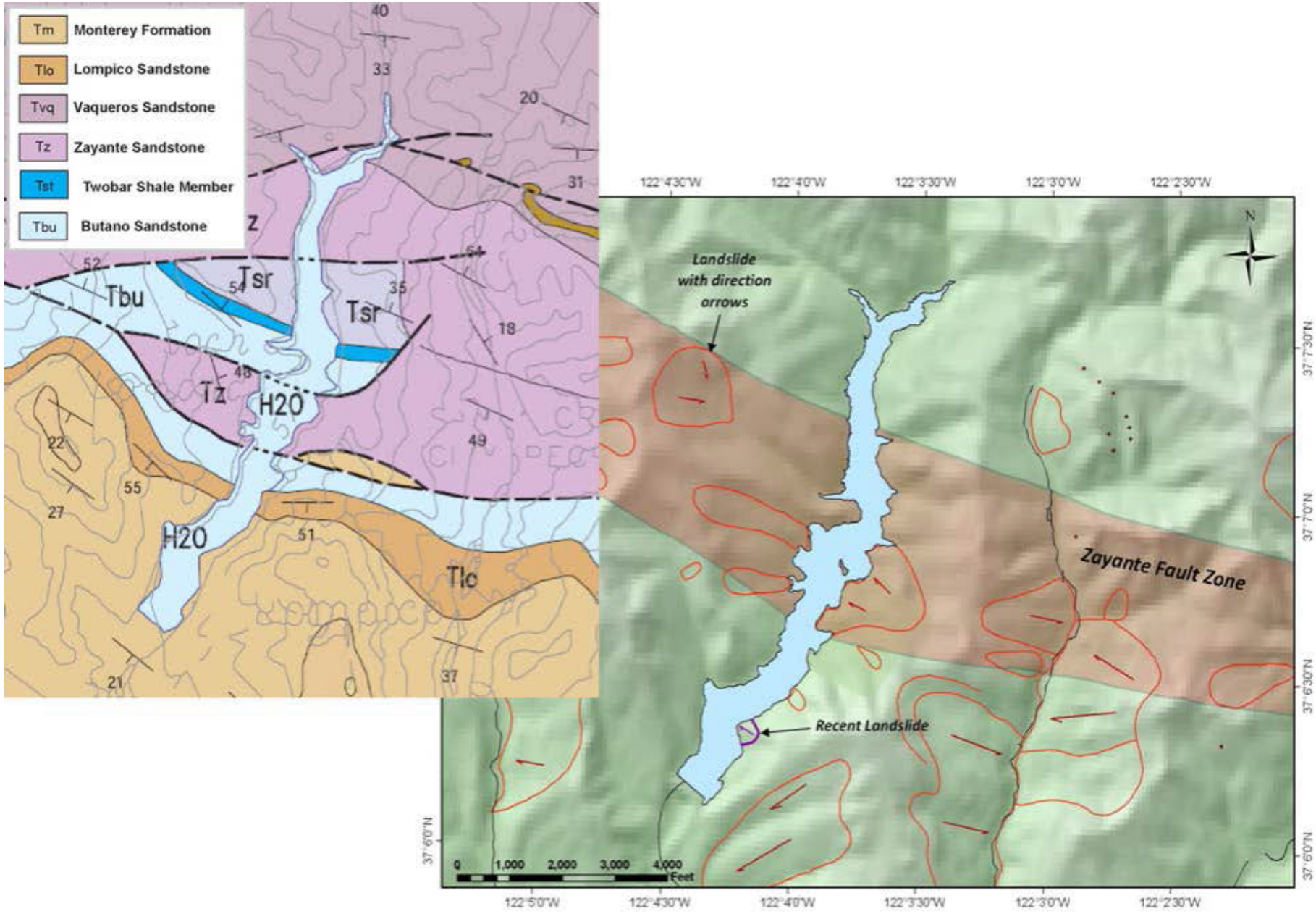
SOURCE: AECOM 2018

FIGURE 4.6-1

Fault Map

Newell Creek Dam Inlet/Outlet Replacement Project

DUDEK



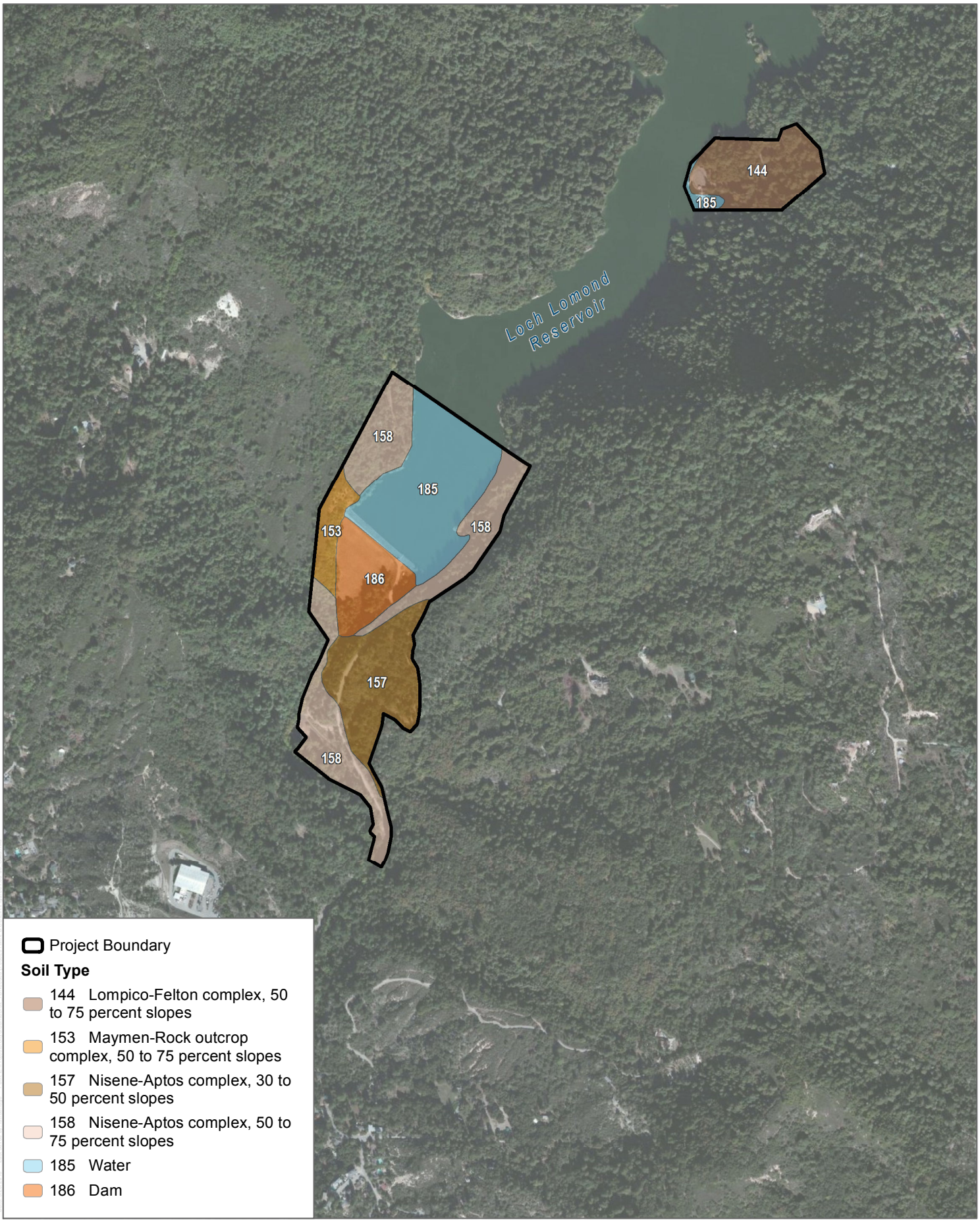
SOURCE: AECOM 2018

FIGURE 4.6-2

Project Area Geology

Newell Creek Dam Inlet/Outlet Replacement Project

DUDEK



SOURCE: Bing Maps 2018; USDA 2017

DUDEK

0 500 1,000 Feet

FIGURE 4.6-3

Project Area Soils

Newell Creek Dam Inlet/Outlet Replacement Project

4.7 HAZARDS AND HAZARDOUS MATERIALS

This section analyzes hazards and hazardous materials in the study area for the proposed Newell Creek Dam (NCD) Inlet/Outlet Replacement Project (Project). The section is based on records of sites on or near the Project site listed in GeoTracker and EnviroStor (online databases maintained by the Regional Water Quality Control Board [RWQCB] and Department of Toxic Substances Control [DTSC], respectively).

4.7.1 Environmental Setting

Regulatory Setting

Hazardous materials and wastes are identified and defined by federal and state regulations for the purpose of protecting public health and the environment. Hazardous materials contain certain chemical, physical, or infectious properties that cause them to be considered hazardous. Hazardous wastes are defined in the Code of Federal Regulations (CFR) Title 40, Volume 25, Parts 260–265 and in the California Code of Regulations (CCR), Title 22 Div. 4.5, Chapter 11, Article 1, Section 66261. Over the years, the laws and regulations have evolved to deal with different aspects of the handling, treatment, storage, and disposal of hazardous substances.

Federal Regulations

Toxic Substances Control Act (1976). The Toxic Substances Control Act of 1976 provides the U.S. Environmental Protection Agency (EPA) with authority to require reporting, record-keeping, and testing requirements, and restrictions relating to chemical substances and/or mixtures. Certain substances are generally excluded from the Toxic Substances Control Act, including food, drugs, cosmetics, and pesticides.

Hazardous Materials Transportation Act. Transportation of hazardous materials is regulated by the U.S. Department of Transportation's Office of Hazardous Materials Safety. The office formulates, issues, and revises hazardous materials regulations under the Federal Hazardous Materials Transportation Law. The hazardous materials regulations cover hazardous materials definitions and classifications, hazard communications, shipper and carrier operations, training and security requirements, and packaging and container specifications. The hazardous materials transportation regulations are codified in 49 CFR Parts 100–185.

The hazardous materials transportation regulations require carriers transporting hazardous materials to receive required training in the handling and transportation of hazardous materials. Training requirements include pre-trip safety inspections, use of vehicle controls and equipment including emergency equipment, procedures for safe operation of the transport vehicle, training on the properties of the hazardous material being transported, and loading and unloading procedures. All drivers must possess a commercial driver's license as required by 49 CFR Part 383. Vehicles transporting hazardous materials must be properly placarded. In addition, the carrier is responsible

for the safe unloading of hazardous materials at the site, and operators must follow specific procedures during unloading to minimize the potential for an accidental release of hazardous materials.

Occupational and Safety Health Act. The Occupational Safety and Health Administration (OSHA) is responsible at the federal level for ensuring worker safety. OSHA sets federal standards for implementing workplace training, exposure limits, and safety procedures for the handling of hazardous substances and hazardous materials (as well as other hazards). OSHA also establishes criteria by which each state can implement its own health and safety program.

Resource Conservation and Recovery Act. The Resource Conservation and Recovery Act (RCRA) gives EPA the authority to control hazardous waste from "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled the EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. The Federal Hazardous and Solid Waste Amendments are the 1984 amendments to RCRA that focused on waste minimization and phasing out land disposal of hazardous waste, as well as corrective action for releases. Some of the other mandates of this law include increased enforcement authority for EPA, more stringent hazardous waste management standards, and a comprehensive UST program.

State Regulations

Certified Unified Program. The California Environmental Protection Agency (CalEPA) implements and enforces a statewide hazardous materials program known as the Certified Unified Program, established by Senate Bill 1802 to consolidate, coordinate, and make consistent the administrative requirements, permits, inspections, and enforcement activities for the following environmental and emergency management programs for hazardous materials:

- Hazardous Materials Release Response Plans and Inventories (Business Plans)
- California Accidental Release Prevention Program
- Underground Storage Tank Program
- Aboveground Petroleum Storage Act Requirements for Spill Prevention, Control, and Countermeasure Plans
- Hazardous Waste Generator and On-Site Hazardous Waste Treatment Programs
- California Uniform Fire Code, Hazardous Materials Management Plans, and Hazardous Material Inventory Statements

CalEPA certifies local government agencies as Certified Unified Program Agencies (CUPA) to implement hazardous waste and materials standards. The Santa Cruz County Environmental Health Services is designated as the local CUPA in Santa Cruz County.

California Hazardous Waste Control Law. California Health and Safety Code Division 20, Chapter 6.5 establishes regulations to protect the public health and the environment by assisting generators of hazardous waste in meeting the responsibility for the safe disposal of hazardous waste. The California Hazardous Waste Control Law is administered by the California Environmental Protection Agency and pertains to administering a state hazardous waste program in lieu of the federal RCRA program, pursuant to Section 3006 of Public Law 94-580, as amended. Although the Hazardous Waste Control Law is generally more stringent than RCRA, until EPA approves the California hazardous waste control program (which is charged with regulating the generation, treatment, storage, and disposal of hazardous waste), both the state and federal laws apply in California. The Hazardous Waste Control Law lists 791 chemicals and approximately 300 common materials that may be hazardous; establishes criteria for identifying, packaging, and labeling hazardous wastes; prescribes management controls; establishes permit requirements for treatment, storage, disposal, and transportation; and identifies some wastes that cannot be disposed of in landfills.

California Accidental Release Prevention Program. Similar to the Federal Risk Management Program, the California Accidental Release Prevention Program includes additional state requirements and an additional list of regulated substances and thresholds. The regulations of the program are contained in CCR Title 19, Division 2, Chapter 4.5. The intent of the California Accidental Release Prevention Program is to provide first responders with basic information necessary to prevent or mitigate damage to public health, safety, and the environment from the release or threatened release of hazardous materials.

California Department of Toxic Substances Control and California Highway Patrol Hazard Transportation Program. The California Department of Toxic Substances Control (DTSC) administers the transportation of hazardous materials throughout the state. Regulations applicable to the transportation of hazardous waste include Title 22, Division 4.5, Chapter 13 and Chapter 29 of the CCR, as well as Division 20, Chapter 6.5, Articles 6.5, 6.6, and 13 of the California Health and Safety Code. The DTSC requires that drivers transporting hazardous wastes obtain a certificate of driver training that shows the driver has met the minimum requirements concerning the transport of hazardous materials, including proper labeling and marking procedures, loading/handling processes, incident reporting and emergency procedures, and appropriate driving and parking rules. The California Highway Patrol also requires shippers and carriers to complete hazardous materials employee training before transporting hazardous materials.

California Health and Safety Code. The handling and storage of hazardous materials is regulated by Division 20, Chapter 6.95 of the California Health and Safety Code. Under Sections 25500–25543.3, facilities handling hazardous materials are required to prepare a Hazardous Materials Business Plan, which contain basic information on the location, type, quantity, and health risks of hazardous materials stored, used, or disposed of in the state.

Chapter 6.95 of the Health and Safety Code establishes minimum statewide standards for Hazardous Materials Business Plans. Each business shall prepare a Hazardous Materials Business Plan if that business uses, handles, or stores a hazardous material (including hazardous waste) or an extremely hazardous material in quantities greater than or equal to the following:

- 500 pounds of a solid substance
- 55 gallons of a liquid
- 200 cubic feet of compressed gas
- A hazardous compressed gas in any amount (highly toxic with a Threshold Limit Value of 10 parts per million or less)
- Extremely hazardous substances in threshold planning quantities

In addition, in the event that a facility stores quantities of specific acutely hazardous materials above the thresholds set forth by California code, facilities are also required to prepare a Risk Management Plan and California Accidental Release Plan. The Risk Management Plan and Accidental Release Plan provide information on the potential impact zone of a worst-case release and require plans and programs designed to minimize the probability of a release and mitigate potential impacts.

California Occupational Safety and Health Administration Hazard Handling Procedures. The California Occupational Safety and Health Administration (Cal/OSHA) is the primary agency responsible for worker safety in the handling and use of chemicals in the work place. Cal/OSHA standards are generally more stringent than federal regulations. The employer is required to monitor worker exposure to listed hazardous substances and notify workers of exposure (8 CCR 337–340). The regulations specify requirements for employee training, availability of safety equipment, accident prevention programs, and hazardous substance exposure warnings.

Local

As previously discussed, Santa Cruz County Environmental Health Services is designated by Cal/EPA as the CUPA within the geographic boundaries of the County and is responsible for enforcing the local ordinance and state laws pertaining to use and storage of hazardous materials, including the issuance and administration of HMMPs. The City's Fire Department works in conjunction with County Environmental Health in responding to reports of hazardous materials spills and accidents, enforcing hazardous materials regulations, and enforcing the City's fire code as it relates to the use and storage of hazardous materials.

Regional Setting

Definition of Hazardous Materials and Hazardous Wastes

As defined in the California Health and Safety Code Section 25501, "hazardous material" means any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a

significant hazard to human health and safety, or to the environment, if released into the workplace or the environment. “Hazardous materials” include, but are not limited to, hazardous substances, hazardous waste, and any material that a handler or the administering agency has a reasonable basis for believing would be injurious to the health and safety of persons, or harmful to the environment if released into the workplace or the environment.

According to California Code of Regulations, Title 22, substances having a characteristic of toxicity, ignitability, corrosivity, or reactivity are considered hazardous waste. Hazardous wastes are hazardous substances that no longer have a practical use, such as material that has been abandoned, discarded, spilled, contaminated, or are being stored prior to proper disposal.

Other types of hazardous materials include radioactive and biohazardous materials. Radioactive materials and wastes contain radioisotopes, which are atoms with unstable nuclei that emit ionizing radiation to increase their stability. Radioactive waste mixed with chemical hazardous waste is referred to as “mixed wastes.” Biohazardous materials and wastes include anything derived from living organisms, which may be contaminated with disease-causing agents, such as bacteria or viruses.

California Code of Regulations, Title 22, Chapter 11, Article 2, Section 66261.10 provides the following definition for hazardous waste:

> [A] waste that exhibits the characteristics may: (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported, or disposed or otherwise managed.

Hazardous wastes are hazardous substances that no longer have a practical use, such as material that has been abandoned, discarded, spilled, or contaminated, or is being stored prior to proper disposal. The California Health and Safety Code Sections 25517 and 25141 define hazardous waste as a waste that because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment, due to factors including, but not limited to, carcinogenicity, acute toxicity, chronic toxicity, bioaccumulative properties, or persistence in the environment, when properly treated, stored, transported, or disposed of, or otherwise managed.

If improperly handled, hazardous materials and wastes can cause public health hazards when released to the soil, groundwater, or air. The four basic exposure pathways through which an individual can be exposed to a chemical agent include inhalation, ingestion, bodily contact, and injection. Exposure can come as a result of an accidental release during transportation, storage, or handling of hazardous materials. Disturbance of subsurface soil during construction can also lead to exposure of workers or the public from stockpiling, handling, or transportation of soils contaminated by hazardous materials from previous spills or leaks.

Regulatory Records Review

Government Code Section 65962.5 requires the California Environmental Protection Agency (Cal-EPA) to compile a list of hazardous waste and substances sites (Cortese List). While the Cortese List is no longer maintained as a single list, the following databases provide information that meet the Cortese List requirements:

1. List of Hazardous Waste and Substances sites from the DTSC Envirostor database (Health and Safety Codes 25220, 25242, 25356, and 116395);
2. List of Leaking Underground Storage Tank (LUST) Sites by County and Fiscal Year from the State Water Resources Control Board (Water Board) GeoTracker database (Health and Safety Code 25295);
3. List of solid waste disposal sites identified by the Water Board with waste constituents above hazardous waste levels outside the waste management unit (Water Code Section 13273 subdivision (e) and California Code of Regulations Title 14 Section 18051));
4. List of "active" Cease and Desist Orders (CDO) and Cleanup and Abatement Orders (CAO) from the Water Board (Water Code Sections 13301 and 13304); and
5. List of hazardous waste facilities subject to corrective action pursuant to Section 25187.5 of the Health and Safety Code, identified by DTSC.

A data base search found no DTSC Envirostor sites are located within the Project area. The nearest LUST site is a gas station in Ben Lomond, approximately 1.3 miles southwest of the Project site. Soil and/or groundwater contamination remediation was completed at this site and the case was closed with respect to further regulatory requirements (RB Case #3006). No solid waste landfills with waste constituents above hazardous waste levels outside the waste management unit are located within 2 miles of the Project site. The nearest permitted landfill is the Ben Lomond Refuse Transfer Station, located approximately 0.9 mile southwest of the Project site, which was a former County landfill. This landfill is closed and is undergoing monitoring (RB Case #3 440300001). No active CDOs or CAOs from the Water Board are located within two miles of the Project site. No DTSC hazardous waste facilities are located within two miles of the Project site. Based on a Geotracker database search, there are similarly no military cleanup sites or oil/gas sites located within two miles of the Project site.

Project Site Conditions

Submerged sediments in Loch Lomond Reservoir (Reservoir) were tested as part of the Inlet/Outlet Gate Replacement Project in 2009 and additional samples were taken from the geotechnical investigation conducted for the proposed Project in the fall of 2017 for metals. The 2017 samples included three reservoir sediment samples. The tested reservoir sediment samples had concentrations above screening levels for certain parameters: arsenic concentrations were above

human health-based screening levels and arsenic and cadmium and nickel were at and above biological effects-based concentrations. One sediment sample contained arsenic concentrations slightly above background levels typical for California (<11 mg/kg). The metals found at threshold levels likely reflect natural background levels in the watershed (AECOM, July 2018).

Similarly, two rock core samples were collected from geotechnical borings completed in fall of 2017 along the proposed tunnel bore route, and analyzed for metals. Bedrock materials in the area are known to contain elevated, naturally occurring metals concentrations. One of the two samples tested contained cadmium concentrations in excess of initial screening levels for California hazardous waste (AECOM, February 2018).

4.7.2 Impacts and Mitigation Measures

Thresholds of Significance

In accordance with the California Environmental Quality Act (CEQA); State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies, and/or guidelines; and agency and professional standards; a project impact would be considered significant if the project would:

HAZMAT-1 Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;

HAZMAT-2 Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;

HAZMAT-3 Be located on a site that is included on a list of hazardous materials sites, compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment; or

HAZMAT-4 Emit hazardous emissions or handle hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.

The State CEQA Guidelines Appendix G also identifies proximity to airports and exposure to wildland fire areas as potential hazards. The Project site is not located within two miles of an airport or private airstrip, and thus is not subject to potential hazards related to proximity to an airport. The nearest public airport is in Watsonville, approximately 35 miles southeast of the Project site, and the nearest private airstrip is located at Bonny Doon Village, approximately 3.5 miles southwest of the Project site.

The proposed Project does not result in development of habitable structures or introduction of residents or employees to the Project area. Therefore, the Project would not exposure people or structures to a significant risk of loss, injury or death involving wildland fires.

Analytical Method

This section evaluates the potential hazards and hazardous materials impacts associated with construction and operation of the proposed Project. Construction-related impacts are considered for each component of the Project. Operational-related impacts of the proposed Project are considered in the context of long-term hazardous materials spills. The impact analysis assumes the proposed Project would be constructed and operated in compliance with the most current policies and regulations related to hazardous materials, as described in Section 4.7.1, Regulatory Setting. Impacts have been evaluated with respect to the thresholds of significance, as described above. In the event adverse environmental impacts would occur subsequent to incorporation of applicable regulations, policies, and Project design features, impacts would be potentially significant and mitigation measures would be provided to reduce impacts to less than significant levels.

Impacts and Mitigation Measures

Areas of No Project Impact

HAZMAT-3 *Location on Hazardous Materials Site*. Based on the data base review, the Project would not be located on, or in the vicinity of, a site that is included on a list of hazardous materials sites, compiled pursuant to Government Code Section 65962.5 (i.e., the Cortese List), including: DTSC Envirostor Database; County LUST sites; solid waste sites; Cease and Desist Orders; Cleanup and Abatement Orders; DTSC Hazardous Waste Facility sites; Military sites; or oil and gas sites. Therefore, the Project would not create a significant hazard to the public or the environment and *no impacts* would occur.

HAZMAT-4 *Location Near Schools*. No schools are located in the vicinity of the Project site. The closest schools are SLVUSD Charter School and Ponderosa High School, located approximately 1.0 mile and 1.2 miles south of the Project site, respectively. Neither construction of the Project nor Project operations upon completion of construction, would result in hazardous emissions or handling hazardous materials, substances or wastes within one-quarter mile of an existing. Therefore, n*o impacts* would occur.

Project Impact Analyses

Impact HAZ-1A: Use and Transport of Hazardous Materials. Project construction and operation would require use and transport of petroleum products and small quantities of hazardous materials, but would not result in a significant hazard to the public or environment. This is considered a *less-than-significant* impact.

The proposed Project does not include industrial or other uses that typically would be expected to use hazardous materials or generate hazardous wastes. During construction, equipment may be used requiring various types of fuel. Project construction-related equipment, including the dredge, support boats, tunnel excavator, front-end loaders, bulldozers, trackhoes/backhoes, and support

vehicles would require periodic maintenance and fueling. Substances required include petroleum products such as gasoline, diesel fuel, oils, lubricants, antifreeze, and cleaners (e.g., solvents, corrosives, and detergents). Similarly, Project operations would require use of hydraulic fluid, lubricants, acids (for corrosion control of pipeline joints and other metal surfaces), paint, and other small quantities of hazardous materials.

Limited amounts of explosives materials may be brought to the site if "controlled detonation" is used as part of the tunnel excavation; see description in Chapter 3. Any controlled detonation operations would be performed in accordance with all applicable regulations. Explosives would be transported, used, controlled, and monitored as prescribed by the most stringent regulations promulgated by Federal, State and County authorities.

Santa Cruz County Environmental Health Services is designated by Cal/EPA as the CUPA within the geographic boundaries of the County and is responsible for enforcing the local ordinance and state laws pertaining to use and storage of hazardous materials, including the issuance and administration of Hazardous Materials Management Plans (HMMPs). Depending on the quantity of solid, liquid, and gaseous hazardous materials, a user would submit either a short or standard form HMMP. A standard HMMP requires more detailed information be provided, including monitoring and inspections. In addition to the HMMP, the health officer may request additional information deemed necessary to protect the public health.

Any hazardous waste generated on site would be transported by a licensed hazardous waste contractor, who would prepare the waste for transport to an authorized hazardous waste disposal site. Project operations would be similar to current operations; therefore, the Project would not result in an increase in routine transport, use, and disposal of hazardous materials and/or wastes generated by routine dam operations. All hazardous materials would be managed in accordance with the California Hazardous Waste Control Law (California Health and Safety Code Division 20, Chapter 6.5) and the Hazardous Waste Control Regulations (22 CCR 4.5). With compliance with these regulations, the transport, use, and disposal of these materials would not pose a significant hazard to the public or the environment. Therefore, a *less-than-significant* impact would occur.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact HAZ-1B: Disposal of Hazardous Waste. Project construction would potentially generate bedrock/soil spoils with metals concentrations in excess of disposal standards for a Class III landfill. This is considered a *potentially significant* impact.

Grading and excavation of the construction platform and 14-foot diameter tunnel would result in approximately 22,600 cubic yards (cy) of spoils that would be permanently placed on site (at identified staging areas) or hauled off site to a suitable user or disposal site. Bedrock materials in the area are known to contain elevated, naturally occurring metals concentrations. Therefore, two

rock core samples were collected from geotechnical borings completed along the proposed tunnel bore route and analyzed for metals. One of the two samples tested contained cadmium concentrations in excess of initial screening levels for California hazardous waste.

Table 3-1 in Chapter 3, Project Description, provides estimated spoil quantities. Eight sites adjacent to NCD and the Reservoir, totaling approximately 15 acres, have been identified as potential construction staging areas. These areas may be used for storage of construction equipment and materials, as well as storage and/or permanent placement of excavated materials. These materials would consist primarily of siltstone rock, which has geologic properties similar to a weak sandstone.

Excavated spoils would be temporarily stored at identified staging areas, as shown on Figures 3-5A and 3-5B. It is estimated that approximately 13,700 cy could be permanently disposed on the Project site within the staging areas 3, 5, and 6, as shown on Figures 3-5A and 3-5B. Additionally, it is anticipated that excavated material from the construction platform would be used as fill for the access road at the dam toe, which would require approximately 800 cy of material. Decommissioning the existing seepage monitoring system would allow the City to dispose of an additional 800 cy or more of material on site and to buttress the dam with additional excess material. Any material used to fill the outlet structure area and buttress the dam would be stored temporarily on site until the end of construction. Any remaining material may be either used on site to ”buttress” the downstream dam face near the toe of the dam or it would be hauled off site to a permanent disposal site. Because the cadmium concentrations in soil are naturally occurring, it is anticipated that the Santa Cruz County Environmental Health Services (the local CUPA) would allow the soil to be permanently reused at the Project site.

It is currently estimated that approximately 8,900 cy of material would require offsite disposal. Options for disposal of spoils that cannot be disposed of on site include finding construction projects in the area that require fill and/or hauling spoils to a landfill. The County of Santa Cruz Department of Public Works operates the Ben Lomond Transfer Station and the Buena Vista Landfill, located 1 mile and 25 miles, respectively, from the Project site. The City of Santa Cruz Resource Recovery Facility is located 22 miles from the site. All of these facilities are Class III municipal waste disposal facilities.

Offsite disposal of excavated bedrock spoils with potentially elevated metals concentrations, such as cadmium, could result in adverse impacts to both the environment and disposal site personnel. As a result, offsite disposal of soil/bedrock spoils is considered a *potentially significant* impact.

Mitigation Measures

Implementation of Mitigation Measures HAZ-1B-1 and HAZ-1B-2 would reduce impacts to a *less-than-significant* level.

MITIGATION HAZ-1B-1 The City shall require testing of representative bedrock/soil spoil samples, to be exported offsite, in accordance with the acceptance criteria of the anticipated disposal facility.

MITIGATION HAZ-1B-2 In the event that offsite disposal of spoils would occur at construction projects in the area, the City shall require testing of representative bedrock/soil spoil samples, to be exported offsite, in accordance with regulatory criteria with respect to reuse on other properties located off the Project site.

Impact HAZ-2A: Upset and Release of Hazardous Materials. Project construction would potentially result in accidental spills of petroleum products and hazardous materials. This is considered a *potentially significant* impact.

Project related equipment, including the dredge, support boats, tunnel excavator, front-end loaders, bulldozers, trackhoes/backhoes, and support vehicles would require periodic maintenance and fueling. Substances required include petroleum products such as gasoline, diesel fuel, oils, lubricants, antifreeze, and cleaners (e.g., solvents, corrosives, and detergents). Although the probability is low, accidental spills or leaks of these fluids could directly enter the Reservoir and/or Newell Creek.

As discussed in Section 4.8, Hydrology and Water Quality, construction activities within the Project area would be required to obtain coverage under the Construction General Permit, which pertains to pollution from grading and project construction. Coverage under the Construction General Permit requires a qualified individual (as defined by the State Water Resources Control Board [SWRCB]) to prepare a Stormwater Pollution Prevention Plan (SWPPP) to address the potential for construction-related activities to contribute to pollutants within the Project's receiving waterways. The SWPPP must describe the type, location, and function of stormwater BMPs to be implemented during construction, and must demonstrate that the combination of BMPs selected is adequate to meet the discharge prohibitions, effluent standards, and receiving water limitations contained in the Construction General Permit. As a result, impacts of small spills would be short-term and less than significant. However, large spills that might enter the Reservoir or Newell Creek waters could have long-term, *significant* impacts on water quality.

Mitigation Measures

Implementation of the Project BMPs and Mitigation Measures HAZ-2A-1, HAZ-2A-2, and HAZ-2A-3 would reduce impacts to a *less-than-significant* level.

MITIGATION HAZ-2A-1 The City shall direct the contractor to wash out concrete trucks in a designated area, either on site or off site, where the material cannot run off into Loch Lomond Reservoir or Newell Creek. This area shall be specified on all applicable construction plans and be in place before any concrete is poured. The City shall direct the contractor to service construction vehicles in a manner that contains fluids, such as lubricants, within an impervious area to avoid spill-related water quality impacts.

MITIGATION HAZ-2A-2 The City shall direct the contractor to inspect and, as necessary, service all equipment before it enters the construction site and regularly thereafter, and before working adjacent to the Loch Lomond Reservoir and Newell Creek, to avoid equipment leak-related water quality impacts. The City shall direct the contractor to repair any leaks or hoses/fittings in poor condition before the equipment begins operating.

MITIGATION HAZ-2A-3 The City shall direct the contractor to prepare a spill contingency/containment plan prior to equipment use on the Project site, including in-reservoir and on the ground construction. The City shall direct the contractor to follow the spill contingency/containment plan, which shall include, but not be limited to:

a) Specific bermed equipment maintenance and refueling areas.
b) Spill containment boom around the dredge.
c) Bermed and lined hazardous materials storage areas on-site that are covered during the rainy season.
d) Hazardous material spill cleanup equipment for onshore areas (e.g., absorbent pads, shovels, and bags to contain contaminated soil) and within the reservoir (e.g., skimmers, socks and boom, absorbent pads, dispersants).
e) Workers trained in the location and use of cleanup equipment.

Impact HAZ-2B: Upset and Release of Hazardous Materials. Project construction would potentially result in health hazards to construction workers, due to exposure to metals in submerged Reservoir sediments, upland bedrock excavations, and upland excavation spoils. This is considered a *potentially significant* impact.

Reservoir sediments were sampled and analyzed in 2017, indicating elevated levels of arsenic, cadmium, and nickel. In addition, one rock core sample collected from a geotechnical boring along the proposed tunnel bore route contained cadmium concentrations in excess of initial screening levels for California hazardous waste. Bedrock materials in the area are known to contain elevated, naturally occurring metals concentrations. One sediment sample contained arsenic concentrations slightly above background levels typical for California.

Dredging and excavation within the Reservoir would result in disturbance to and movement of sediments at the bottom of the Reservoir to establish the new intake foundations. This work would result in localized increased turbidity levels in the areas being dredged and locations where dredged materials would be deposited. Silt curtains (turbidity barriers) would be installed in the Reservoir to contain the work area during construction, thus minimizing dispersal of sediments with elevated

metals concentrations and maintaining good water quality throughout the remainder of the Reservoir and in downstream Newell Creek.

Because sediments would remain wetted within the Reservoir, human health impacts from arsenic due to inhalation exposure would not be expected. However, in the event that sediments are handled when dry, construction personnel would be potentially exposed to elevated concentrations of metals. Similarly, excavations and grading completed in bedrock areas, including stockpiling of excess material, could potentially result in exposure of personnel to human health impacts associated with metals concentrations. Impacts are considered *potentially significant*.

Mitigation Measures

Implementation of the Mitigation Measure HAZ-2B-1 would reduce impacts to a *less-than-significant* level.

MITIGATION HAZ-2B-1 The City shall direct the contractor to consult with an industrial hygienist to determine the appropriate level of personal protective equipment (PPE), if any, would be required for construction personnel during handling of Reservoir bottom sediments and participation in tunneling, excavating, stockpiling, and handling of on site bedrock and associated spoils. The contractor shall implement the recommendations by the industrial hygienist in order to minimize potential exposure of construction personnel to metals concentrations in bedrock/sediments during construction. All recommendations shall be completed in accordance with Occupational Safety and Health Administration (OSHA) Training Requirements (29 CFR 1910.132 and 1910.134, Subpart I – Personal Protective Equipment).

Cumulative Impacts and Mitigation Measures

Cumulative impacts related to hazards and hazardous materials would result from projects that combine to increase exposure to hazards and hazardous materials. Potential impacts associated with the Project include potential release of petroleum products and hazardous materials during construction and operation. Although potential spills could result in downstream water quality impacts, implementation of a project-specific construction SWPPP and implementation of a spill contingency/containment plan would reduce potentially significant impacts to less than significant levels. In addition, the proposed Project would comply with all federal, state, and local regulations pertaining to the use, transport, handling, and release of hazardous materials. Although none of the cumulative projects listed in Table 4-1 have the potential to result in significant impacts related to hazards and hazardous materials, these projects would also be subject to federal, state, and local regulations that would help reduce potential impacts. Cumulative projects may also require similar

mitigation measures to help further reduce potential impacts. Therefore, the proposed Project, combined with the listed cumulative projects, would not result in a cumulative significant impact related to hazards and hazardous materials.

4.7.3 References

AECOM.

- July 2018. "Newell Creek Dam Outlet Replacement Project Submerged Spoil Disposal Technical Memorandum." Included in Appendix G – Construction Considerations, of AECOM (July 2018), *Newell Creek Dam Inlet/Outlet Replacement Project, 50% Design Report, Final Draft Memorandum.*
- February 2018. "Newell Creek Dam Outlet Replacement Project, Spoil Disposal Technical Memorandum." Included in Appendix G – Construction Considerations, of AECOM (July 2018), *Newell Creek Dam Inlet/Outlet Replacement Project, 50% Design Report, Final Draft Memorandum.*

4.8 HYDROLOGY AND WATER QUALITY

This section analyzes hydrology and water quality conditions in the study area for the proposed Newell Creek Dam Inlet/Outlet Replacement Project (proposed Project). The section is based on review of the City's Draft Watershed Lands Management Plan (City of Santa Cruz Water Department, 2013) and other relevant documents regarding hydrology and water quality in the Project area. Information about relevant Federal, State, and local regulations that pertain to hydrology and water quality is provided in Section 4.8.1, Environmental Setting.

4.8.1 Environmental Setting

Regulatory Setting

Federal Regulations

The U.S. Environmental Protection Agency (EPA) is the lead federal agency responsible for water quality management. The Clean Water Act of 1972 (CWA, codified at 33 United States Code Section 1251-1376) is the primary federal law that regulates the discharge of pollutants to waters of the United States from any point source. Section 401 of the CWA requires water quality certification for any activity, including the construction or operation of a facility, which may result in any discharge into navigable waters. Section 404 of the CWA requires a permit for the discharge of dredged fill material into navigable waters at specified disposal sites. In 1987, amendments to the CWA added Section 402(p), which establishes a framework for regulating municipal and industrial stormwater discharges, under the National Pollutant Discharge Elimination System (NPDES). Various elements of the CWA address water quality, as discussed below.

State Regulations

The California State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs) have the responsibility in California to protect and enhance water quality, both through their designation as the lead agencies in implementing the Section 319 non-point source program of the federal CWA, and through the state's primary water pollution control legislation, the Porter-Cologne Water Quality Control Act of 1969, codified in Division 7 of the California Water Code. Under this act, the State must adopt water quality policies, plans, and objectives that protect the State's waters for the use and enjoyment of the people. Such "waters of the State" include streams, groundwater, isolated wetlands, and other bodies of water that are not under federal jurisdiction as "waters of the United States" (under the CWA).

The Porter-Cologne Water Quality Control Act sets forth the obligations of the SWRCB and RWQCBs to adopt and periodically update water quality control plans (Basin Plans), in which beneficial uses, water quality objectives, and implementation programs are established for each of the nine regions in California. The Act also requires waste dischargers to notify the RWQCBs of their activities

through the filing of Reports of Waste Discharge and authorizes the SWRCB and RWQCBs to issue and enforce waste discharge requirements (WDRs), NPDES permits, Section 401 water quality certifications, or other approvals.

Construction activity on projects that disturb one or more acres of soil must obtain coverage under the State's General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit, 99-08-DWQ). Construction activity subject to this permit includes clearing, grading, and disturbances to the ground, such as stockpiling or excavation. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP), which includes Best Management Practices (BMPs) that the discharger would use to minimize sediments and contaminants in stormwater runoff.

Regional Setting

The Project site is located on the southwestern flank of the Santa Cruz Mountains. The Santa Cruz Mountains covers an area of approximately 1,400 square miles on the central coast (San Lorenzo Valley Water District, 2009). The Project site is located within the Newell Creek watershed that is part of the larger San Lorenzo River watershed. The San Lorenzo River watershed covers an approximate 138- square mile area extending from the Santa Cruz Mountains to the Pacific Ocean. Notable tributaries of the river include Kings, Boulder, Bear, Bean, Fall, Newell, Zayante and Branciforte Creeks.

The Project site is part of the City of Santa Cruz watershed lands that consist of approximately 4,000 acres within three tracts of the Newell, Upper Zayante and Laguna Creek watersheds. Newell and Zayante Creeks are tributaries to the San Lorenzo River, while Laguna Creek drains off the west slope of Ben Lomond Mountain and flows into the Pacific Ocean along the north coast area of Santa Cruz County. The City's watershed lands are shown on Figure 4.8-1.

Newell Creek is the largest of the City's watershed tracts (approximately 2,880 acres) and is located in the middle portion of the Newell Creek watershed; a small portion of ridgetop land on the western edge of the property drains into the Love and Bear Creek watersheds. This tract surrounds Loch Lomond Reservoir (Reservoir), which serves as the City's principal water supply during late summer and drought conditions. City ownership covers the middle part of the watershed while, with the exception of a small City-owned parcel near the headwaters, the remaining 2700 acres up to the headwaters and crest of the Santa Cruz Mountains are privately held.

Project Setting

Newell Creek Watershed

The Project site is located within the Newell Creek watershed. The City-owned tract comprises approximately 46 percent of the total watershed area as shown on Figure 4.8-2. Newell Creek is the largest drainage within this tract, entering the Reservoir at the north end. Three other tributaries,

including McFarland Creek and two unnamed tributaries (northern tributary and southern tributary) enter the Reservoir from the west. Terrain within the watershed consists of rugged, ridge and valley terrain, including narrow crested, steep-sided ridges and deeply incised, v-shaped valleys. The watershed is underlain by sedimentary rocks, which generally are less cohesive than nearby granitic and metamorphic rocks and therefore more sensitive to disturbance, which affects streambank erosion (City of Santa Cruz Water Department, 2013).

Streams within the watershed are dominated by riffle and pool sequences, with boulder-cobble-sand substrates. Little floodplain storage exists in the narrow, steep valleys of the Santa Cruz Mountains. Thus, downcutting of stream valleys has created channel banks that are typically steeper than the remainder of the slopes. The section of the hill slope that is very steep due to channel downcutting is referred to as the "inner gorge." These inner gorge areas are sensitive to disturbance and have a direct impact on stream channel morphology. Mass wasting and erosion from road development and other types of land disturbance occurring within the inner gorge can deliver high volumes of sediment directly from the hill slope to the stream channel (City of Santa Cruz Water Department, 2013).

Project Study Area

Aquatic resources in the Project study area include the Reservoir, Newell Creek, and a number of small types of wetlands and non-wetland waters that were identified in the study area during the formal jurisdictional delineation conducted in April 2018.

Newell Creek is a tributary to the San Lorenzo River; the confluence is near Ben Lomond, approximately 1.7 miles downstream of the NCD. Downstream of the Reservoir and spillway plunge pool, Newell Creek is relatively undisturbed for approximately 0.8 miles; it is then bordered by residential development for the next 0.9 miles to the confluence with the San Lorenzo River. The creek is adjacent to the southern portion of Staging Area 5 (see Figure 3-6 in Chapter 3, Project Description).

Newell Creek holds water on a year-round basis. At least one cubic foot per second (cfs) of water from perennial Newell Creek is released from the Reservoir on a continuous basis, maintaining water flow into the seepage channel (a portion of Newell Creek's original alignment) at the toe of the dam, the spillway plunge pool, and the channel of Newell Creek. The bed of Newell Creek is comprised of large boulders and cobbles, and evidence of an OHWM includes debris wracking, undercut banks, and changes in vegetation and sediment texture. The seepage channel conveys water from the outlet structure to the spillway plunge pool and maintains water on an annual basis due to the continuous discharge from the Reservoir. This channel has an average width of five feet and is relatively shallow. The substrates in the channel are a mixture of cobbles and gravel and the OHWM is evidenced by the change in vegetation and sediment texture in the channel (Dudek, September 2018).

Four ephemeral drainages occur within the southern portion of the study area. All four features are tributary to Newell Creek, and convey water from the surrounding hillslopes either directly or

indirectly to Newell Creek. All of these features exhibit evidence of an OHWM, based on shelving, watermarks on boulders, debris wracking, or changes in sediment texture or vegetation cover, however, none of the three drainages exhibited signs of continuous flows (Dudek, September 2018).

The total drainage area flowing into Loch Lomond Reservoir is approximately 8.3 square miles. Four large streams flow into the Reservoir, including Newell Creek, McFarland Creek, and two unnamed tributaries (northern and southern tributaries (Figure 4.8-2, Newell Creek Tract). Loch Lomond Reservoir serves as the City's primary water supply storage area and is the primary water supply during late summer and drought conditions. As a result, the Reservoir is typically kept as full as possible. However, the water surface elevation of the Reservoir is highly variable, as a result of variability in natural inflow from Newell Creek, pumping to the Graham Hill Water Treatment Plant, pumping from the Felton Diversion, evapotranspiration, and regulated instream flow releases for fisheries downstream of the dam. The Reservoir does not act as flood control. During the rainy season, the Reservoir fills, and in some years spills into Newell Creek below the dam. In addition to any spillover, bypass flows are released to ensure year-round flow of at least 1 cubic foot per second (cfs) below the Reservoir. This bypass is increased in July and August if the upstream flow is more than the 1 cfs, to ensure that downstream flows match the natural inflow into the Reservoir (City of Santa Cruz Water Department, 2013).

Surface Hydrology

Newell Creek is a tributary to the San Lorenzo River, and is the largest stream entering the Reservoir. This creek consists of two main branches, the main stem and the West Fork, above the Reservoir. Upstream of the Reservoir, Newell Creek initially flows through a narrow inner gorge that consists of variable width bedrock walls.

Although Newell Creek is perennial, tributary surface water flows within the watershed are seasonal with rainfall. The flow regime is characterized as flashy, with periodic high flow events that coincide with winter storms and low summer base flows. This results in high energy systems that have the potential to move a substantial quantity of sediment. Stream base flow levels, sustained by groundwater flow, rise in the winter and decline steadily through the spring and early summer months. The lowest flows typically occur in the late summer and fall months, before winter rains (City of Santa Cruz Water Department, 2013).

Water Quality

The Porter-Cologne Water Quality Control Act of 1969 is California's statutory authority for the protection of water quality. Under the Act, the State must adopt water quality policies, plans, and objectives that protect the State's waters for the use and enjoyment of the people. The Act sets forth the obligations of the State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards (RWQCBs) to adopt and periodically update water quality control plans for all the waters of an area. The water quality control plan is defined as having three components:

beneficial uses which are to be protected, water quality objectives which protect those uses, and an implementation plan which accomplishes those objectives.

The September 2017 *Water Quality Control Plan for the Central Coastal Basin* (Basin Plan) is the Central Coast RWQCB's current master water quality control planning document. The Basin Plan establishes beneficial uses, which are divided into 23 standard categories, and water quality objectives for each of the water bodies in the Central Coast Region. The Basin Plan identifies 13 beneficial uses for Newell Creek and 16 beneficial uses for Loch Lomond Reservoir. Both water bodies have the following beneficial uses: municipal and domestic supply; agricultural supply; industrial service supply; groundwater recharge; freshwater replenishment; water contact recreation; non-contract water recreation; commercial and sport fishing; cold fresh water habitat; wildlife habitat; migration of aquatic organisms; and spawning, reproduction, and/or early development. Newell Creek also has the beneficial use of hydropower generation. Loch Lomond Reservoir also has the beneficial uses of navigation; warm fresh water habitat; rare, threatened, or endangered species; and shellfish harvesting. It is noted, however, that water contact recreation is not permitted at the Loch Lomond Recreational Area.

Upper and lower Newell Creek are listed on the Clean Water Act Section 303(d) list of impaired water bodies, based on sedimentation/siltation (Cal EPA/SWRCB, 2016). The lower portion of Newell Creek is listed based on pH levels, as 26 of 146 water samples exceeded the Cold Freshwater Habitat water quality objective for pH. The Clean Water Act requires states to identify and prepare a list of water bodies that do not meet water quality objectives, and to establish Total Maximum Daily Loads (TMDLs) for each water body to ensure attainment of water quality objectives. The estimated TMDL completion date for pH in lower Newell Creek is 2021 (SWRCB, 2017).

Past observations north (upstream) of the Reservoir have revealed evidence of chronic fine sediment being deposited in the Newell Creek channel and heavy sedimentation of both pools and riffles. The pools throughout this reach are confined by bedrock that sometimes narrows to 10 feet across, with vertical walls on both sides. During high flow conditions, pool scour is likely to occur; however, under chronic sediment input, turbidity would remain high even as flows recede. This would result in sediment dropping out of the water column in low velocity areas, such as pools (City of Santa Cruz Water Department, 2013).

Turbidity, a measure of the ability of light to pass through water, which is affected by the amount of fine sediment suspended within the water column, is high during peak flow events for streams in the Santa Cruz Mountains, even in undisturbed conditions. When a watershed is impacted by human-induced land disturbances, the magnitude and duration of turbid conditions increase and become a chronic problem, resulting in poor water quality for an extended period of time. Other water quality impairments in the Newell Creek Tract include fecal coliform bacteria, nitrate, and organic/inorganic sediment particulates. These contaminants have an impact on the availability and treatment cost of municipal water. Nitrates and pathogen concentrations correlated with urbanized areas and septic systems are relatively low in the Newell Creek Tract compared to the Zayante Creek and Laguna Creek tracts, as a result of the sparse population density upstream of

Reservoir. However, the Newell Creek Tract does have higher levels of naturally occurring total organic carbon concentrations, in comparison to the other tracts. Sewage generated by recreational use at the Reservoir is transported by truck out of the basin (City of Santa Cruz Water Department, 2013).

The extensive road networks within the Newell Creek Tract has had a detrimental impact on the stream hydrology and geomorphology. Roads represent the greatest long-term source of sediment on the watershed lands, by intercepting and concentrating storm runoff, modifying the hydrology of the hill slopes and streams, and exposing soils to erosion. The high amount of fine sediment introduced to the stream channels has impaired the hydrologic function and altered the natural channel morphology, through increased fine sediment loads, pool filling, and bed-sorting. Bank erosion has also been accelerated in many locations due to the combined effects of stream-side roads; removal of native vegetation and in-stream woody debris; road crossings; and exposure of the stream banks to erosion. In some areas, loss of woody debris has reduced hydraulic complexity and induced channel downcutting (City of Santa Cruz Water Department, 2013).

Nearly all of the stream flow in the Newell Creek Tract flows into the Reservoir, where fine sediments settle. While this sedimentation of the Reservoir improves outflow turbidity values downstream, it negatively affects Reservoir capacity and water quality, as nutrient-rich sediment can act as a catalyst for algal growth, increased total organic carbon, and odor. This in turn results in increased treatment costs and the potential for increased disinfectant by-products in the finished water (City of Santa Cruz Water Department, 2013).

Flood Hazards

Flood mapping by the Federal Emergency Management Agency (FEMA, 2012) indicates that the 100-year flood would flow over the southeast portion of the dam, in the vicinity of the existing control house and dam access road, encompassing and overflowing the existing spillway (Figure 4.8-3). The floodplain also extends onto the southwest corner of Staging Area 5. Similarly, a 2016 Project Baseline Data Report by AECOM indicated that the dam's existing outlet structure appears to be in a flood zone, due to its proximity to the spillway discharge point to Newell Creek (AECOM, 2018).

Dam failure can occur as a result of earthquakes, seiches, structural instability, or intense rain in excess of design capacity. Timber, rock, concrete, earth, steel, or a combination of these materials may be used to build the dam. Dams must have spillway systems to safely convey normal stream and flood flows over, around, or through the dam. Spillways are commonly constructed of non-erosive materials, such as concrete. Dams also have a drain or other water withdrawal facility to control the reservoir level and to lower or drain the reservoir for normal maintenance and emergency purposes (City of Santa Cruz, 2017). Accumulated data, ongoing analyses, and monitoring of critical dam infrastructure (e.g., spillway) give no indication that the dam would fail or otherwise sustain damage under normal circumstances including historic flood events, potential earthquakes, and other hazards (Ibid.).

The City maintains an Emergency Action Plan with respect to potential or actual emergency situations associated with Newell Creek Dam (City of Santa Cruz, December 2017). In addition, the City maintains monitoring protocols for structural integrity at the dam, including:

- Monitoring of seepage and water pressures within the dam, monthly and after established rainfall and earthquake triggers;
- Monitoring of horizontal and vertical movement; and
- Periodic seismic reviews to ensure stability with respect to current seismic standards (City of Santa Cruz 2011).

4.8.2 Impacts and Mitigation Measures

Thresholds of Significance

In accordance with the California Environmental Quality Act (CEQA); State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies, and/or guidelines; and agency and professional standards, a project impact would be considered significant if the project would:

HYDRO-1 Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted;

HYDRO-2 Substantially alter the existing drainage pattern of the site or area, including through alteration of the course of a stream or river or a substantial increase in the rate or amount of surface runoff, in a manner that could result in substantial erosion, siltation or flooding on or off the site;

HYDRO-3 Create or contribute runoff water, which would exceed the capacity of existing or planned storm drain facilities or planned stormwater drainage systems or provide substantial additional sources of pollutant runoff;

HYDRO-4 Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water quality;

HYDRO-5 Result in construction of habitable structures within a 100-year floodplain, as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map, or other flood hazard delineation map, which would expose people or structures to a significant risk of loss, injury, or death to flooding;

HYDRO-6 Locate structures within a 100-year flood hazard area that would impede or redirect flood flows;

HYDRO-7 Expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of the failure of a levee or dam; or

HYDRO-8 Expose people or structures to a significant risk of loss, injury, or death as a result in inundation by seiche, tsunami, or mudflow.

Analytical Method

The following analysis considers whether the proposed Project would directly or indirectly cause hydrologic and water quality impacts, taking into account hydrology and water quality management guidelines and actions implemented in the City's Draft Watershed Management Plan. Construction-related impacts are considered for each component of the proposed Project. Operational-related impacts of the proposed Project are considered in the context of long-term hydrologic and water quality impacts.

Impacts and Mitigation Measures

Areas of No Project Impact

HYDRO-1 *Groundwater Impacts*. The Project does not propose use of groundwater and does not proposed structural development in an area of groundwater recharge. Therefore, the Project would have no impacts to groundwater resources or recharge.

HYDRO-6: *Dam Failure***.** By increasing the capacity of the Reservoir outflow to Newell Creek in an emergency situation, the Project would reduce exposure of people and structures to a significant risk of loss, injury, or death involving flooding as a result of the failure of the Newell Creek Dam. This is considered a *beneficial impact*.

The proposed Project would address DSOD drawdown requirements by increasing the capacity of the Reservoir outflow to Newell Creek. The approximate volume in the Reservoir from spillway elevation (577.2 feet) to the 10 percent drawdown level (563 feet) is 2,272 AF (740 MG). Lowering the Reservoir from the spillway water surface elevation by 10 percent of the hydraulic head to elevation 563 feet in 7 days would require an average flow rate of 106 MGD (164 cfs). The proposed intake, conduit, and outlet structure has been designed to accommodate this flow rate.

The City maintains an Emergency Action Plan with respect to potential failure of the Newell Creek Dam (City of Santa Cruz. December 2017). However, the Project would not increase the potential for failure of the dam. Conversely, the Project would reduce exposure of people and structures downstream of Newell Creek Dam to significant risk of loss, injury, or death involving flooding as a result of failure of the Newell Creek Dam, by reducing the drawdown time in the event of a potential emergency (e.g., an earthquake). This impact is considered *beneficial* with respect to existing conditions.

Project Impact Analyses

Impact HYDRO-2: Alteration of Drainage Patterns. Diversion of downstream flows during periods of emergency Reservoir drawdown to Newell Creek would not alter the existing drainage pattern at the Project site, in a manner that would potentially result in substantial off-site erosion or siltation. This is a *less-than-significant* impact.

New Intake Structure and Conduit Tunnel. Dredging, borehole drilling, intake construction, conduit tunnel excavation, and conduit pipeline construction would not substantially alter the existing drainage pattern of the site or area. As a result, *no impacts* would occur.

New Outlet Structure. Currently, the 24-inch diameter sloping intake pipeline enlarges to a 30-inch diameter conduit, which is connected to a 36-inch diameter inlet/outlet conduit. The 36-inch inlet/outlet conduit extends under the dam and terminates at a vault at the downstream toe of the dam. At the vault, the 36-inch conduit bifurcates to a 22-inch pipe connected to the Newell Creek Pipeline (NCP) and a 24-inch pipe for making emergency releases. The existing beneficial flow release (one cfs), as well as existing dam seepage, flows into a seepage channel that flows into the spillway plunge pool.

The proposed conduit tunnel portal would be located on the ridge adjacent (to the west) to the existing outlet structure. The ridge would be excavated and the area downstream of the outlet structure would be filled in to a matching grade to create a "construction platform". The southeastern edge of the platform would have a 1.5:1 (horizontal to vertical) slope down to the spillway plunge pool and would be protected by riprap, thus minimizing the potential for slope erosion. The southwestern edge of the platform would be constructed adjacent to an ephemeral drainage. To prevent this drainage from flooding the platform, a 5–foot-wide "berm" would be constructed at a minimum of 5 feet above the base of the creek. The slope from the top of the berm to the platform would be constructed at 2:1 for stability. Construction of the berm would minimize flooding of the construction platform. Although the local drainage pattern in the vicinity of the proposed construction platform would be altered as a result of cut-and-fill grading, such grading would be completed in accordance with California Building Code requirements, including controlled slope drains and protective rip-rap. As a result, creation of the construction platform would not result in substantial off-site erosion or siltation during project operations. Impacts are considered *less than significant*.

The proposed new outlet structure and valves would be located on the construction platform at the toe of the dam. A 48-inch inlet/outlet conduit in the tunnel would bifurcate into two main lines at the outlet structure, including a pipe that connects to the NCP and another pipe that would direct emergency release flows to an energy dissipation chamber, and ultimately to the spillway plunge pool. Because both the existing and proposed reservoir drawdown outlets would feed into the same spillway plunge pool, which in turns flows into Newell Creek, the drainage pattern from the reservoir to the creek would not be substantially altered. In addition, potential erosion at the outlet

and Newell Creek, associated with project related increases in emergency flow volume and flow rates (average flow rate of 106 million gallons per day [mgd] or 164 cfs), would be minimized as a result of the energy dissipation chamber and spillway plunge pool. As a result, impacts are considered *less than significant*.

All Other Project Facilities. Construction of all other facilities, including the control houses, Newell Creek Pipeline, and access road improvements would not alter the existing drainage pattern of the site or area. Structural development would result in minor increases in impervious surfaces (less than 2,000 square feet) and roadways would not be paved. As a result, *less than impacts* would occur.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact HYDRO-3: Increased Surface Flows. Increased surface flows associated with 10 percent Reservoir drawdown requirements, from 10 days to 7 days, would increase the rate or amount of surface runoff, which would potentially exceed capacity of existing or planned storm drain facilities, cause downstream or off-site drainage problems, or increase the risk or severity of flooding in downstream areas. This is a *less-than- significant* impact.

New Intake Structure and Conduit Tunnel. Dredging, borehole drilling, intake construction, conduit tunnel excavation, and conduit pipeline construction would not increase surface runoff, resulting in downstream drainage/flooding problems. As a result, *no impacts* would occur.

New Outlet Structure. As previously discussed, the outlet structure at the toe of the dam is a point of control for flows to and from the Reservoir. From the outlet structure control, the City would be able to adjust instream beneficial flows, isolate the Newell Creek Pipeline from the inlet/outlet conduit, and make emergency releases. Emergency reservoir drawdown would be released to Newell Creek via a pipe to the spillway plunge pool. Lowering the Reservoir from the spillway water surface elevation by 10 percent of the hydraulic head, to elevation 563 feet in 7 days, would require an average flow rate of 106 mgd, or 164 cfs, which would be a slightly higher flow than lowering for 10 days. Increased flow rates required to reduce the drawdown time from 10 days to 7 would be regulated through the drawdown period and would be would be less than peak flows within the creek. Therefore, the increased flow rate would not substantially change from existing drawdown conditions and would be within recorded peak flows. Therefore, a 7-day emergency drawdown would not be expected to exceed the capacity of downstream Newell Creek or result in increased risk or severity of flooding in downstream areas.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact HYDRO-4: Water Quality. Proposed dredging, tunneling, excavations, and grading would potentially violate water quality standards or waste discharge requirements or otherwise substantially degrade surface water quality due to potential erosion or inadvertent transport of construction debris or materials into Newell Creek or the Reservoir. This is considered a *potentially significant* impact.

New Intake Structure. Three new structures would be installed within the Reservoir and would connect to an operational structure and valves at the toe of the dam via the inlet/outlet conduit in the proposed tunnel (see Figure 3-7). The structures would be placed on the west abutment of the Reservoir and would be set on foundation. Up to 26,000 cubic yards of reservoir bottom sediments would be dredged to provide an adequate foundation for the new inlets and connecting piping (air vent). Bedrock is anticipated to be approximately 13 to 30 feet deep. Excavation within the Reservoir would occur using either mechanical or hydraulic dredging equipment. Examples of potential dredging equipment include a grab or clamshell dredger, hydraulic crane, suction dredger, and cutter suction dredger. Mechanical dredging uses draglines or clamshells mounted on barges. Hydraulic dredging pumps water and spoils from the head of the dredge back through a vessel and through a pipeline to a dewatering area. The pumped water creates a negative pressure that allows the sediment to be moved in a slurry form through the pump and pipeline system. Hydraulic dredging requires a larger settling basin to accommodate the slurry mixture. Although hydraulic dredging could be used, mechanical dredging with a clam shell dredger may be more appropriate due to the depth of water within the Reservoir during dredging.

The dredged material would be disposed within the Reservoir. The bottom sediments to be dredged are very fine-grained clays and silts, which would be readily suspended in the water column during dredging activities, temporarily resulting in turbid water quality. Excessive turbidity could temporarily result in an inability of the water treatment plant to treat the water for use as drinking water. In addition, dredging could result in violation of water quality standards and may exacerbate water quality problems in receiving waters already impaired by sediment. As previously discussed, upper Newell Creek is listed on the Clean Water Act Section 303(d) list of impaired water bodies, based on sedimentation/siltation.

However, all dredging and spoils placement in the Reservoir would be performed within the confines of silt curtains to minimize temporary turbidity impacts to the Reservoir. Silt curtains would be necessary at both the excavation area and at the disposal site to contain the area of high turbidity and to maintain water quality elsewhere in the Reservoir. Silt curtains can be made from semi-porous material or from material with nearly no porosity. Assuming that the Reservoir is full (water surface elevation at El. 577.2 feet) and that the silt screens would need to extend down to the bed of the Reservoir, approximately 100,000 square feet of silt screen would be required to enclose an area of approximately 2.4 acres. Dredged materials could be placed up to Elevation 460 feet or approximately the top elevation of the vertical shaft. The area required to place dredged material in the thalweg (i.e., deepest point of the Reservoir) up to that elevation would be approximately one acre. With construction of silt curtains surrounding both dredging and disposal

areas, water quality impacts associated with construction of the new intake structure are considered *less than significant*.

New Conduit Tunnel and Outlet Structure. The tunnel would be excavated by conventional means to intersect the vertical intake standpipe. Conventional tunneling would be carried out in a series of repeated excavation steps, using mechanical excavators followed by temporary ground support and initial lining.

Currently, the area at the toe of the dam in the vicinity of the proposed outlet structure excavation is very limited. Construction vehicles would not be able to turn around in the existing area and there would be almost no room for staging. Therefore, a 20,000 square-foot fill pad would be constructed adjacent to the portal to allow for a turn-around and staging during construction. The tunnel portal/outlet structure construction platform would be constructed by excavating the adjacent ridge down to an elevation of about 392 feet, and creating a fill pad with variable slope gradients on each side of the pad.

Tunnel construction and excavations for the tunnel portal and other structures would generate loose (bulked) earth and rock materials, commonly referred to as spoils. These materials would primarily be siltstone rock, which is generally weak rock. Section 3.5.3, Spoils Disposal, provides estimated spoil quantities, assuming a bulking factor of 1.5. The amount of excess material from the portal staging area could be as much as 13,600 cy. These spoil piles would be temporarily stockpiled, pending on-site use or off-site disposal.

Ground disturbance in the vicinity of the tunnel portal, temporary stockpiling of soil during tunnel boring activities, excavation and grading for the construction platform, and construction of the new outlet structure would result in exposure of soils to erosion and associated downstream sedimentation of Newell Creek, which is listed on the CWA 303(d) list of impaired water bodies for sedimentation. In addition, incidental spills of petroleum products (such as fuel, oil, grease, and solvents) into Newell Creek could occur during fueling and maintenance of the vehicles and equipment. Such spills could result in water quality degradation of Newell Creek. Impacts from construction-related activities would generally be short term and of limited duration.

Groundwater from the tunnel excavation would be captured and treated to remove suspended solids, oil, grease, and other contaminants introduced by or resulting from construction operations. Discharge of this “dewatered” water from the tunneling excavation would be discharged in the spillway plunge pool or ephemeral drainage/Newell Creek at the toe of the dam or alternately within the Reservoir within the area contained by the silt curtains. All water discharges would be subject to approval of a NPDES Permit. The water treatment system would be designed and selected to satisfactorily treat all discharged water including groundwater inflows and water resulting from the construction process. Treatment would reduce potential contaminants in the discharged water to the levels specified in the applicable permits, NPDES Waste Discharge Requirements Order, and applicable discharge water quality requirements.

As described in Section 4.8.1, Regulatory Setting, construction activities within the Project area would be required to obtain coverage under the Construction General Permit, which pertains to pollution from grading and project construction. Coverage under the Construction General Permit requires a qualified individual (as defined by the SWRCB) to prepare a SWPPP to address the potential for construction-related activities to contribute to pollutants within the Project's receiving waterways. The SWPPP must describe the type, location, and function of stormwater BMPs to be implemented during construction, and must demonstrate that the combination of BMPs selected is adequate to meet the discharge prohibitions, effluent standards, and receiving water limitations contained in the Construction General Permit.

The following list includes examples of construction water quality BMPs that are standard for most construction sites subject to the Construction General Permit, and will be implemented:

- Silt fences and/or fiber rolls installed along limits of work and/or the construction site;
- Stockpile containment and exposed soil stabilization structures (e.g., Visqueen plastic sheeting, fiber rolls, gravel bags, and/or hydroseed);
- Runoff control devices (e.g., fiber rolls, gravel bag barriers/chevrons, etc.) used during construction phases conducted during the rainy season;
- Wind erosion (dust) controls, including use of a water truck;
- Prevention of fluid leaks (inspections and drip pans) from construction vehicles;
- Materials pollution management;
- Proper waste/trash management; and
- Regular inspections and maintenance of BMPs.

To obtain coverage under the Construction General Permit, the Project applicant would submit to the SWRCB a Notice of Intent and associated permit registration documents, including a SWPPP and site plan, and would obtain a Waste Discharge Identification Number. As each phase of the Project site is developed (i.e., construction and subsequent abandonment of existing facilities), and as part of the process of obtaining permits from the City, these BMPs would be refined and/or added to as necessary in the SWPPP to meet the performance standards in the Construction General Permit.

BMPs to be implemented would include, but not be limited to, sediment and erosion control BMPs; waste and materials management; non-stormwater management, training, and education; and inspections, maintenance, monitoring, and sampling during qualifying rain events. As a result, water quality impacts associated with new conduit tunnel and outlet structure construction would be *less than significant*.

Pipeline Replacement. An approximate 2,000 linear foot segment of the existing Newell Creek Pipeline would be replaced, between the outlet structure and the first isolation valves. The replacement pipeline would be 30 inches in diameter and would be constructed of ductile iron pipe

with restrained joints, using conventional (open cut) trenching with small excavators and loaders. Excavated soils would be temporarily stockpiled pending backfill and compaction of soils in the pipeline trench. The pipeline would traverse locally steep slopes along Newell Creek, which could enhance the potential for erosion induced sedimentation of the creek, as steep slopes with increased surface water runoff velocities and exposed unconsolidated soil, are prone to excessive erosion. During construction activities in Newell Creek, the existing beneficial flow release and dam seepage would be released into Newell Creek.

However, as discussed above for the new pipeline conduit and outlet structure, the BMPs required for coverage under the Construction General Permit and National Pollution Discharge Elimination System Permit would require measures to minimize construction-related contaminants from reaching Newell Creek. As a result, water quality impacts associated with new pipeline construction would be *less than significant*.

Access Road Improvements. Newell Creek Road functions as the access road to the dam crest. Access to the toe of the dam is currently provided by a dirt and gravel-surfaced road that branches off of Newell Creek Road, approximately 1,400 feet downstream from the dam crest. This dam toe access road crosses a concrete ford (a broad crested weir) at the spillway stilling basin and continues towards the seepage channel at the toe of the dam. From the dam crest, equipment and materials can be taken along the west abutment via the emergency access road (Haul Road). Road widening and slope stabilization measures would be needed to allow open areas along the Haul Road to be used for staging.

The extensive road networks within the Newell Creek Tract has had a detrimental impact on the stream hydrology and geomorphology (City of Santa Cruz Water Department, 2013). Roads represent the greatest long-term source of water quality impacts for the sediment on the watershed lands, by intercepting and concentrating storm runoff, modifying the hydrology of the hill slopes and streams, and exposing soils to erosion. However, the City utilizes water bars and other erosion control features to minimize such erosion.

The high amount of fine sediment introduced to the stream channels has impaired the hydrologic function and altered the natural channel morphology, through increased fine sediment loads, pool filling, and bed-sorting (City of Santa Cruz Water Department, 2013). Bank erosion can also be accelerated in many locations due to the combined effects of stream-side roads; removal of native vegetation and in-stream woody debris; road crossings; and exposure of the stream banks to erosion. Therefore, Project-related grading required for access road improvements could result in disturbance and exposure of unconsolidated soils to erosion induced sedimentation of Newell Creek. The existing road to the toe of the dam is proposed for grading and resurfacing. An existing, unmaintained dirt road to Staging Areas 6 and 7 likely would require improvement to provide access to these sites, which could also result in erosion during construction and post-construction if improperly designed or maintained. Therefore, potential erosion from improved access roads could result in a *potentially significant* impact.

Turbidity, a measure of the ability of light to pass through water, and which is affected by the amount of fine sediment suspended within the water column, is high during peak flow events for streams in the Santa Cruz Mountains, even in undisturbed conditions. When a watershed is impacted by human-induced land disturbances, the magnitude and duration of turbid conditions increase and become a chronic problem, resulting in poor water quality for an extended period of time. However, as discussed above, the BMPs required for coverage under the Construction General Permit would require measures to minimize construction-related contaminants from reaching Newell Creek. The Project includes BMPs/Construction Specifications to avoid/minimize erosion and water quality impacts; see Section 3.8 of Chapter 3, Project Description. Adherence to the Hydrology and Water Quality Management Guidelines and Actions in the City's Draft Watershed Lands Management Plan pertaining to road system maintenance also would minimize potential water quality impacts.

Construction Staging Areas. Staging areas would be used for storage of materials and products, treatment and temporary storage of spoils, tunnel equipment laydown, boat launch, and potentially a concrete batch plant. Staging areas would be required for tunnel, outlet structure, and inlet construction. The proposed staging areas are shown on Figure 3-6 in Chapter 3. These staging areas are in various locations along Newell Creek Road, the outlet structure access road, and the Haul Road. Relatively flat sections of the staging areas would be cleared and grubbed to provide usable staging areas. Clearing and grubbing would result in exposure of soils to erosion, which in turn could result in erosion induced sedimentation of Newell Creek. In addition, incidental spills of petroleum products and hazardous materials (e.g., fuels, lubricants, and solvents) used during fueling and maintenance of equipment, could result in degradation of Newell Creek water quality. As indicated above, existing dirt roads in Staging Area 5, 6 and 7 likely would require improvements to accommodate construction vehicles, which have not yet been identified. Improvements and subsequent maintenance would be needed to prevent erosion.

However, as discussed above, the BMPs required for coverage under the Construction General Permit and the erosion control provisions contained in the Municipal Code and City Grading Ordinance would require measures to minimize construction-related contaminants from reaching Newell Creek. As a result, water quality impacts associated with construction staging areas would be *less than significant*.

All Other Project Facilities and Activities. Grading and construction associated with all other project facilities, including the control houses, spillway plunge pool crossing, temporary boat launch facility, and utility improvements, would result in temporary disturbance and exposure of soils to erosion induced sedimentation of Newell Creek. Similarly, decommissioning of existing inlet/outlet works would include dewatering, plugging, and grouting the 36-inch inlet/outlet pipeline; backfilling the existing outlet structure with excess material from the tunnel and portal; and buttressing the dam at the lower embankment and toe with excess material from the tunnel and portal. These activities would result in soil disturbance and exposure of unconsolidated soils to erosion induced sedimentation of Newell Creek.

However, as discussed above for the new pipeline conduit and outlet structure, the BMPs required for coverage under the Construction General Permit and the erosion control provisions contained in the Municipal Code would require measures to minimize construction-related contaminants from reaching Newell Creek. BMPs to be implemented would include, but not be limited to, sediment and erosion control BMPs; waste and materials management; non-stormwater management, training, and education; and inspections, maintenance, monitoring, and sampling during qualifying rain events. As a result, water quality impacts associated with all other Project facilities and activities would be *less than significant*.

Mitigation Measures

Implementation of the Project BMPs and Mitigation Measures HYDRO-4-1 and HYDRO-4-2 would reduce impacts to a *less-than-significant* level.

MITIGATION HYDRO-4-1 Develop and maintain construction access roads to minimize erosion and sediment generation in accordance with recommendations in the Draft Watershed Lands Management Plan, including, but not limited to:

a) Install and maintain effective water bars and rolling drain dips.
b) Maintain out-sloped roads wherever possible.
c) Surface and/or resurface Project access roads with rock or other appropriate material to reduce erosion where road surface is visibly eroding and being transported off of the road, particularly where sediment can enter a watercourse.
d) Reduce the use of inside ditches and culverts by installing rolling dips at appropriate intervals.

MITIGATION HYDRO-4-2 Conduct field inspections of roads and drainage systems, including:

a) Conduct field inspections prior to the rainy season, and during rainfall events greater than 2 inches, as needed.
b) Clear road inlets, culverts, and other stream crossing structures of obstructions prior to and throughout the wet season.

Impact HYDRO-5: Flood Hazard Area. The Project would locate at least one of two proposed control houses within a 100-year flood hazard area. However, flooding of this structure would not substantially impede or redirect flood flows. This is considered a *less-than-significant impact* would occur.

All Project Facilities. Flood mapping by FEMA indicates that the 100-year flood would flow over the southeast portion of the dam, in the vicinity of the existing control house and dam access road, encompassing and overflowing the existing spillway (Figure 4.8-3). The floodplain also extends onto the southwest corner of Staging Area 5. Similarly, a 2016 Project Baseline Data Report by AECOM

indicated that the dam's existing outlet structure appears to be in a flood zone, due to its proximity to the spillway discharge point to Newell Creek. Based on this Project Baseline Data Report, the project has been designed to include a construction platform at the outlet structure location and a culvert bridge across the spillway pool, thus elevating these structures above 100-year flood flows. A subsequent flood analysis incorporated flow measurements from a creek gage downstream of the spillway pool. In these subsequent model runs, neither the outlet structure nor the spillway pool culvert bridge, with 7x7 foot culverts, would be overtopped in the 100-year storm (AECOM, 2018).

The Project would include replacement of one control house on the dam spillway and construction of a new control house adjacent to the new outlet structure. Flood mapping by FEMA (2012) indicates that the 100-year flood would overflow the southeast portion of the dam, in the vicinity of the existing control house and dam access road, encompassing and overflowing the existing spillway (Figure 4.8-3). The proposed control house on the dam crest would similarly be located within the flood zone. The outlet structure would not be located within the flood plain, as the construction platform at the outlet structure has been designed to be above the 100-year flood plain. A new culvert bridge would be constructed over the existing concrete spillway ford. This bridge would be constructed 0.6 feet higher than the 200-year flood elevation.

Although the new control house on the crest of the dam would be located within the 100-year floodplain, the structure would be sufficiently small such that it would not substantially impede or redirect flood flows. As a result, downstream flood related impacts would be *less than significant*.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact HYDRO-7: Seiches, Tsunamis, and Mudflows. The Project would not expose people or structures to a significant risk of loss, injury, or death as a result in inundation by seiche, tsunami, or mudflow. This is considered a *less-than-significant* impact.

All Project Facilities. The Newell Creek Dam spillway is located in the Santa Cruz Mountains, at an elevation of 577.2 feet above mean sea level. Therefore, tsunamis would not impact the Project site.

Seiches are seismically induced waves in an enclosed body of water, such as reservoir, which can result in sloshing, wave overtopping, and damage to immediately adjacent structures. Seiche-induced waves would not adversely impact the new intake structure and conduit tunnel, which would be located on the bottom of the Reservoir. The control house to be replaced at the crest of the dam could be damaged by seiche-induced waves. However, the Project would not increase or exacerbate the potential for seiches to adversely affect the control house. (See Section 4.4.2, Geology and Soils Significance Criteria, regarding California Supreme Court ruling in California

Building Industry Association v. Bay Area Air Quality Management District [2015] 62 Cal.4th 369, regarding geologic impacts). As a result, impacts are considered *less-than-significant*.

The Project is located in a relatively steep-sided canyon with slopes that are prone to failure. In the event that a wildfire removes vegetation upslope of the Reservoir, subsequent heavy rains could result in mudflows and debris flows that could damage the intake structure, outlet structure, new lower control house, and Newell Creek Pipeline. However, the Project would not increase or exacerbate the potential for mudflows or debris flows to affect these proposed structures. As a result, impacts are considered *less-than-significant*.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

4.8.3 Cumulative Impacts

Water Quality

The geographic context for the analysis of cumulative impacts associated with water quality is the encompassing Newell Creek Watershed. The analysis accounts for projects identified in Table 4-1, Cumulative Projects. Cumulative development in the watershed could add new sources of stormwater runoff. Construction activities associated with development could temporarily increase the amount of exposed surfaces that could contribute to sediments in stormwater runoff. Additionally, materials associated with construction activities could be deposited on surfaces and carried to receiving waters in stormwater runoff.

Continued development and redevelopment within the watershed could also increase the amount of impervious surfaces that could increase stormwater runoff rates and amounts, as well as changes in land use that may increase the amount of pollutants in stormwater runoff. However, all cumulative development in the watershed would be subject to the existing regulatory requirements to protect water quality and minimize increases in stormwater runoff. For example, the Construction General Permit requires development and implementation of a SWPPP for all construction sites larger than 1 acre to mitigate potential impacts to water quality from polluted stormwater runoff.

Every two years, the Central Coast RWQCB must reevaluate water quality within its geographic region and identify those water bodies not meeting water quality standards. For those impaired water bodies, a TMDL must be prepared and implemented to reduce pollutant loads to levels that would not contribute to a violation of water quality standards. All development within the watershed is subject to the water quality standards outlined in the Basin Plan and has to comply with any established TMDLs. The continuing review process would ensure that cumulative development within the watershed would not substantially degrade water quality. Furthermore,

the Municipal SWMP and associated Storm Water and Urban Runoff Pollution Control ordinance, as well as other regulatory requirements, would continue to protect water quality.

In addition, the proposed Project would comply with existing and future regulations to protect water quality, including the Construction General Permit. Compliance with existing regulations would prevent violation of water quality standards and minimize the potential for contributing additional sources of polluted runoff. Therefore, Project impacts associated with water quality standards and polluted runoff would be minimized, and the Project's contribution to cumulative impacts would not be cumulatively considerable.

Stormwater Drainage

The geographic context for the analysis of cumulative impacts related to storm drainage is the Newell Creek Watershed. None of the cumulative projects identified in Table 4.0 are located within this watershed except for portions of future NCP replacement, and thus no significant cumulative impacts are expected. Cumulative development within the watershed could potentially increase the amount of impervious surfaces that could cause or contribute to creek bed capacity exceedance, alter the existing creek bed profile (i.e., from erosive downcutting and bank failure), and/or require construction of new or expanded flood control infrastructure. New development within the watershed would be subject to the environmental review process and compliance with local stormwater regulations, such as the Construction General Permit, California Fish and Game Section 1602, the CWA Section 404 permit process, and others. Potential cumulative impacts related to stormwater runoff would not be significant.

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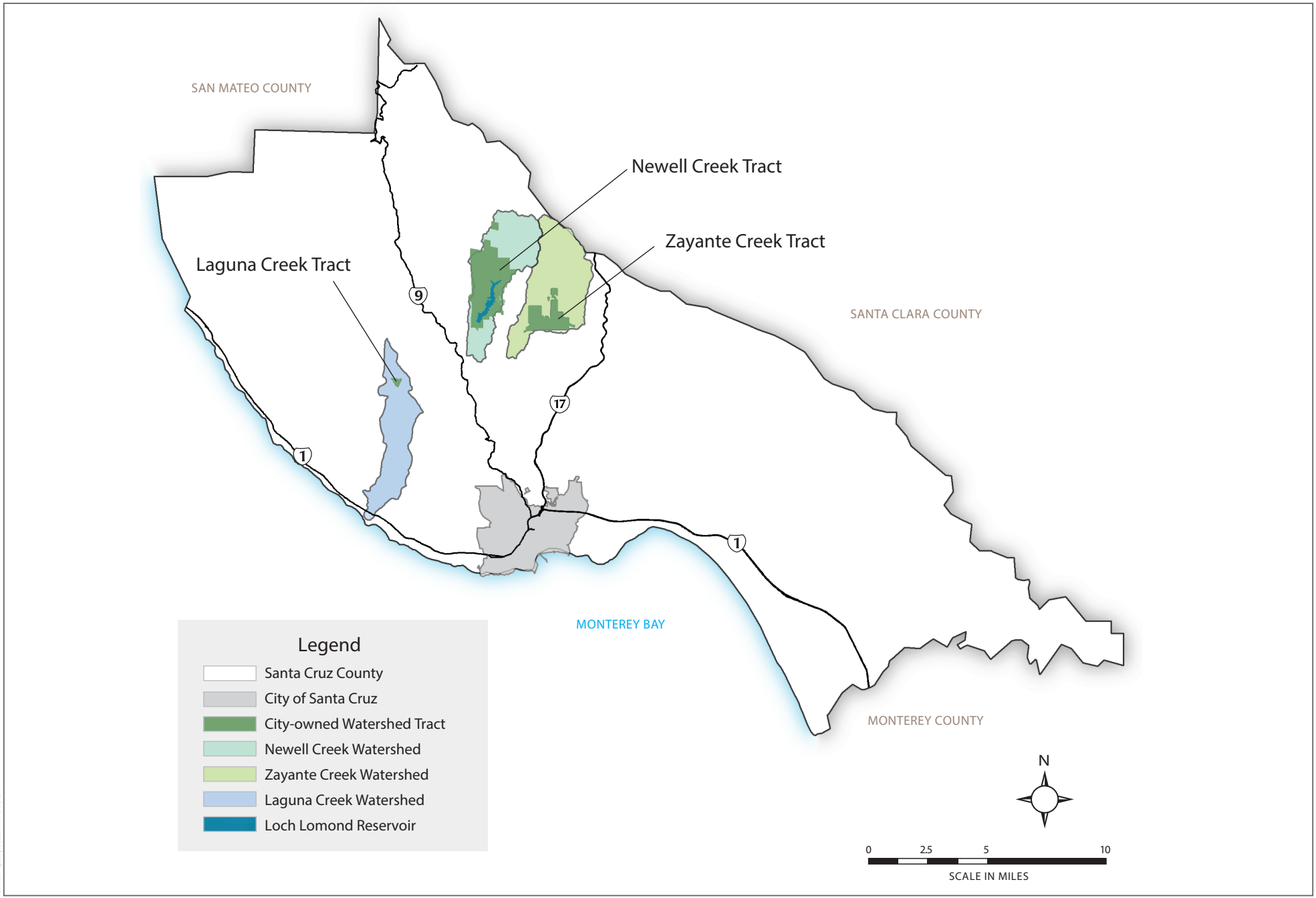


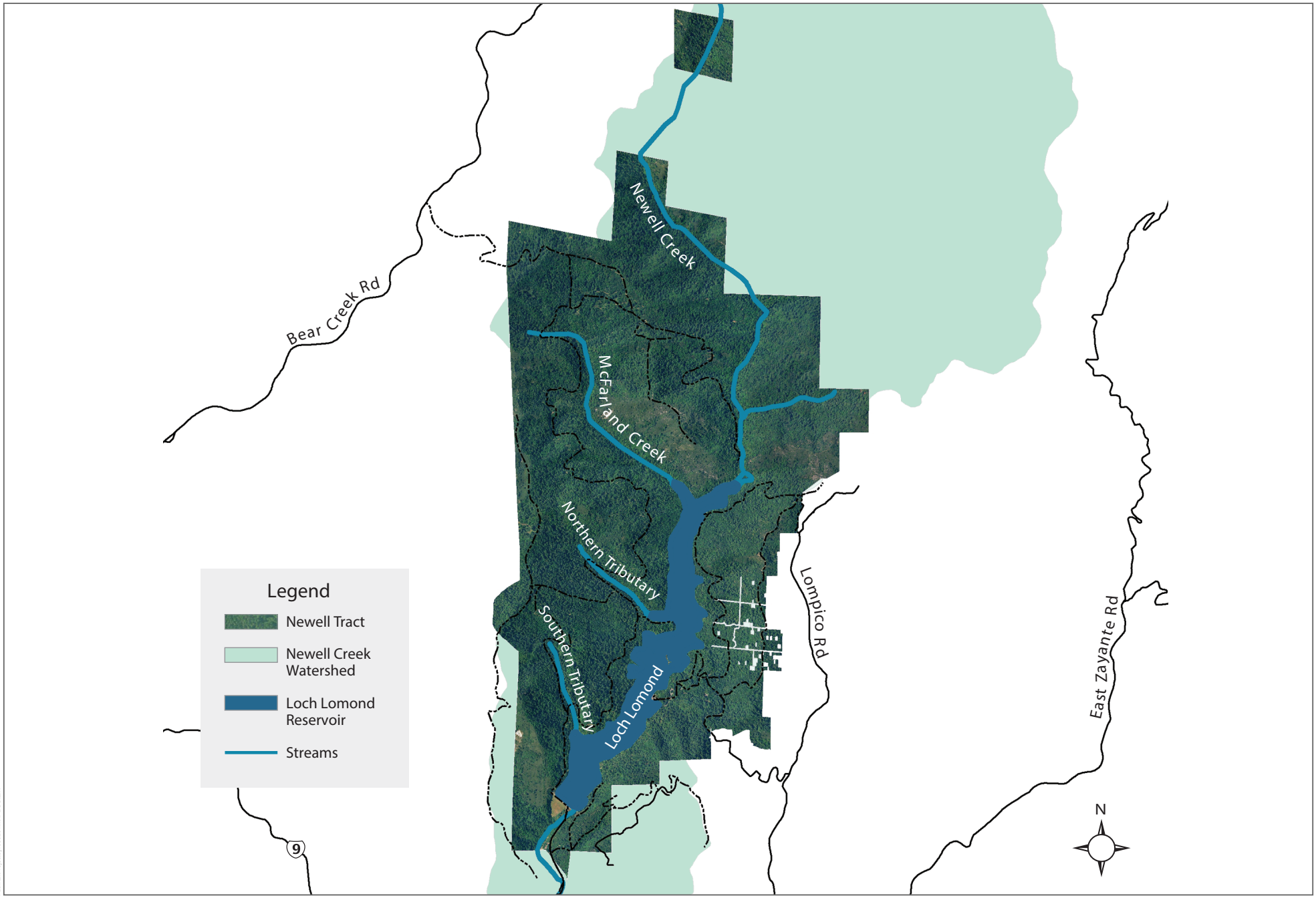
SOURCE: City of Santa Cruz 2013

FIGURE 4.8-1

City of Santa Cruz Water Department Watershed Lands

Newell Creek Dam Inlet/Outlet Replacement Project

DUDEK



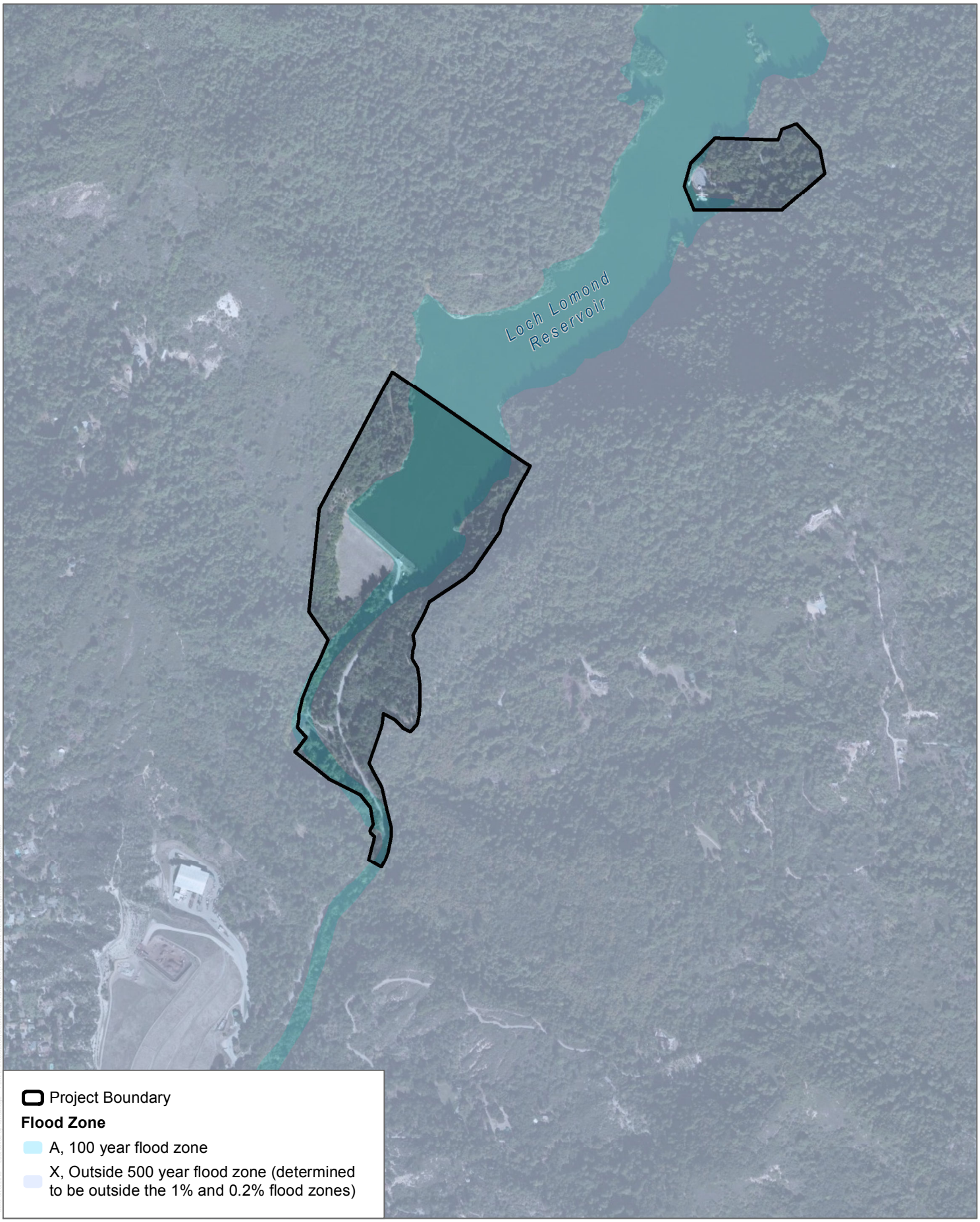
SOURCE: City of Santa Cruz 2013

FIGURE 4.8-2

Newell Creek Watershed

Newell Creek Dam Inlet/Outlet Replacement Project

DUDEK



SOURCE: Bing Maps 2018; USDA 2017; FEMA 2017

DUDEK

0 500 1,000 Feet

FIGURE 4.8-3

FEMA Floodplain

Newell Creek Dam Inlet/Outlet Replacement Project

4.9 NOISE

4.9.1 Environmental Setting

This section analyzes noise impacts of the proposed Newell Creek Dam (NCD) Inlet/Outlet Replacement Project (Project), based on noise measurements and noise modeling conducted as part of the preparation of this EIR. The results of construction noise modeling are summarized in this section, and are included in Appendix E. The section describes federal, state, and local regulations related to noise and applicable to the proposed Project. Background information on the science of sound and noise is included to provide a base of knowledge for a reader unfamiliar with terms and concepts related to sound. Finally, the existing conditions in the study area are described, and the resources that could be affected by the proposed Project are identified.

Regulatory Setting

Federal

No federal laws, regulations, or policies for construction-related or operational noise and vibration apply to the proposed Project.

State

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act of 1973, declare that excessive noise is a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. It also identifies a continuous and increasing bombardment of noise in the urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the State to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

The State of California requires each local government entity to implement a noise element as part of its general plan. California Administrative Code, Title 4, presents guidelines for evaluating the compatibility of various land uses as a function of community noise exposure.

Local: County of Santa Cruz

The Project is located within an unincorporated of Santa Cruz County. Santa Cruz County Municipal Code. Chapter 8.30 (Noise) establishes noise regulations within Santa Cruz County. Section 8.30.010 of the County's Municipal Code states that "offensive noise," which includes construction, shall not be permitted. The following factors shall be considered when determining whether a violation of the provisions of this section exists:

(1) Loudness (Intensity) of Sound.

(a) Day and Evening Hours. A noise shall be automatically considered offensive if it occurs between the hours of 8:00 a.m. and 10:00 p.m. and it is:

(i) Clearly discernible at a distance of 150 feet from the property line of the property from which it is broadcast; or

(ii) In excess of 75 decibels at the edge of the property line of the property from which the sound is broadcast, as registered on a sound measuring instrument meeting the American National Standard Institute's Standard S1.4-1971 (or more recent revision thereof) for Type 1 or Type 2 sound level meters, or an instrument which provides equivalent data.

A noise not reaching this intensity of volume may still be found to be offensive depending on consideration of the other factors outlined below.

(b) Night Hours. For purposes of this factor, a noise shall be automatically considered offensive if it occurs between the hours of 10:00 p.m. and 8:00 a.m. and it is:

(i) Made within 100 feet of any building or place regularly used for sleeping purposes; or

(ii) Clearly discernible at a distance of 100 feet from the property line of the property from which it is broadcast; or

(iii) In excess of 60 decibels at the edge of the property line of the property from which the sound is broadcast, as registered on a sound measuring instrument meeting the American National Standard Institute's Standard S1.4-1971 (or more recent revision thereof) for Type 1 or Type 2 sound level meters, or an instrument which provides equivalent data.

A noise not reaching this intensity of volume may still be found to be offensive depending on consideration of the other factors outlined below.

(2) Pitch (frequency) of the sound, e.g., very low bass or high screech;

(3) Duration of the sound;

(4) Time of day or night;

(5) Necessity of the noise, e.g., garbage collecting, street repair, permitted construction activities;

(6) The level of customary background noise, e.g., residential neighborhood, commercial zoning district, etc.; and

(7) The proximity to any building regularly used for sleeping purposes.

As indicated in Chapter 2.0, infrastructure construction and maintenance activities carried out by the City Water Department are not subject to Santa Cruz County zoning and building regulations.

However, it is noted that Policy 6.9.7 of the County General Plan requires mitigation of construction noise as part of project approvals.

Noise and Vibration Fundamentals

Definitions of Noise and Effects of Noise

The following is a brief discussion of fundamental noise concepts and terminology.

Sound, Noise, and Acoustics. Sound is a process that consists of three components: the sound source, sound path, and sound receiver. All three components must be present for sound to exist. Without a source to produce sound, there is no sound. Similarly, without a medium to transmit sound pressure waves, there is no sound. Finally, sound must be received; a hearing organ, sensor, or object must be present to perceive, register, or be affected by sound or noise. In most situations, there are many different sound sources, paths, and receptors rather than just one of each. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired.

Sound Pressure Levels and Decibels. The amplitude of a sound determines its loudness. Sounds pressure levels are measured in decibels (dB) and is typically expressed in dBA, which approximates human hearing. The A-scale weighting network approximates the frequency response of the average young ear when listening to ordinary sounds. When people make judgments about the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Other weighting networks have been devised to address high noise levels or other special situations (e.g. C-scale), but these scales are rarely used in conjunction with most environmental noise. All sound levels discussed in this report are A-weighted decibels (dBA). For reference, ordinary conversation is about 60 dBA. People can tolerate some noise, but brief exposure to intense sounds of 120 to 140 dBA can threaten physical or psychological well-being (City of Santa Cruz April 2012, DEIR). Loudness of sound increases with increasing amplitude.

Sound pressure level alone is not a reliable indicator of loudness. The frequency, or pitch, of a sound (described in hertz, or hz) also has a substantial effect on how humans would respond. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness, or human response, is determined by the characteristics of the human ear.

Human hearing is limited not only in the range of audible frequencies, but also in the way it perceives the sound in that range. In general, the healthy human ear is most sensitive to sounds between 1,000 and 5,000 hertz, and it perceives a sound within that range as more intense than a sound of higher or lower frequency with the same magnitude. To approximate the frequency response of the human ear, sound level meters use the A-weighted scale. The adjustments (referred to as a weighting network) are frequency-dependent.

Examples of typical noise levels for common indoor and outdoor activities are depicted in Table 4.9-1.

Table 4-9-1: Typical Sound Levels in the Environment and Industry

Common Outdoor Activities	Noise Level (dB)	Common Indoor Activities
—	110	Rock band
Jet fly over at 300 meters (1,000 feet)	100	—
Gas lawn mower at 1 meter (3 feet)	90	—
Diesel truck at 15 meters (50 feet), at 80 kilometers per hour (50 miles per hour)	80	Food blender at 1 meter (3 feet); garbage disposal at 1 meter (3 feet)
Noisy urban area, daytime; gas lawn mower at 30 meters (100 feet)	70	Vacuum cleaner at 3 meters (10 feet)
Commercial area; heavy traffic at 90 meters (300 feet)	60	Normal speech at 1 meter (3 feet)
Quiet urban, daytime	50	Large business office; dishwasher next room
Quiet urban, nighttime	40	Theater; large conference room (background)
Quiet suburban, nighttime	30	Library
Quiet rural, nighttime	20	Bedroom at night; concert hall (background)
—	10	Broadcast/Recording studio
Lowest threshold of human hearing	0	Lowest threshold of human hearing

Source: Caltrans 1998

Human Response to Changes in Noise Levels. "It is generally accepted that the average healthy ear … can barely perceive a noise level change of 3 dB" (Caltrans 2013a). A change of 5 dBA is readily perceptible, and a change of 10 dBA is perceived as twice or half as loud. A doubling of sound energy results in a 3 dBA increase in sound, which means that a doubling of sound energy (e.g., doubling the average daily traffic trips on a given road segment) would result in a barely perceptible change in sound level.

Noise Descriptors. Additional units of measure have been developed to evaluate the long-term characteristics of sound. The equivalent sound level (L_{eq}) is also referred to as the time-average sound level. The equivalent steady-state sound level that in a stated period of time would contain the same acoustical energy as the time-varying sound level during the same time period. The 1-hour A-weighted equivalent sound level, L_{eq} (h), is the energy average of the A-weighted sound levels occurring during a 1-hour period.

People are generally more sensitive and annoyed by noise occurring during the evening and nighttime hours. Thus, another noise descriptor used in community noise assessments—the community noise equivalent level (CNEL)—was introduced. The CNEL scale represents a time-weighted, 24-hour average noise level based on the A-weighted sound level. The CNEL accounts for the increased noise sensitivity during the evening hours (7 p.m. to 10 p.m.) and nighttime hours (10 p.m. to 7 a.m.) by adding 5 dBA and 10 dBA, respectively, to the average hourly sound levels occurring during the evening and nighttime hours.

Sound Propagation and Attenuation. Sound propagation (i.e., the passage of sound from a noise source to a receiver) is influenced by geometric spreading, ground absorption, atmospheric effects, and shielding by natural and/or built features. Sound levels attenuate (or diminish) at a rate of approximately 6 dBA per doubling of distance between the noise source and a receiver, for an outdoor point source due to the geometric spreading of the sound waves. This rate is applicable where "hard site" conditions exist, namely sites with paving or hard packed earth ground surfaces. For "soft sites" where vegetation covers the ground surface, or where loose soil exists, the attenuation increases to 7.5 dBA for each doubling of distance from the point source. Atmospheric conditions such as humidity, temperature, and wind gradients can also temporarily either increase or decrease sound levels. In general, the greater the distance the receiver is from the source, the greater the potential for variation in sound levels due to atmospheric effects. Additional sound attenuation can result from built features such as intervening walls and buildings, and by natural features such as hills and dense woods.

Groundborne Vibration Fundamentals

Groundborne vibration is a small, rapidly fluctuating motion transmitted through the ground. The strength of groundborne vibration attenuates rapidly over distance through encountered soils and rock strata. Some strata and soil types transmit vibration quite efficiently; other types (primarily sandy soils) do not. Several basic measurement units are commonly used to describe the intensity of ground vibration. The common descriptors used by the California Department of Transportation (Caltrans) and the Federal Transit Administration (FTA) include peak particle velocity (PPV), in units of inches per second (ips). The velocity parameter (instead of acceleration or displacement) best correlates with human perception of vibration. Thus, the response of humans, buildings, and sensitive equipment to vibration is described in this section in terms of the root-mean square velocity level in VdB units relative to 1 microinch per second. As a point of reference, the average person can just barely perceive vibration velocity levels below 70 VdB (typically in the vertical direction). Typical background vibration levels are between 50 and 60 VdB, and the level for minor cosmetic damage to fragile buildings or blasting generally begins at 100 VdB.

Existing Noise Sources and Noise Levels

Sensitive Noise Receptors

Certain land uses are particularly sensitive to noise, such as schools, hospitals, and rest homes. Residential areas are also considered noise sensitive, especially during the nighttime hours. Residential land uses exist in the vicinity of the Project. The nearest residence is approximately 800 feet south of the toe of the NCD. This approximate 20-acre parcel located at the southern end of the Project area was recently acquired by the City. The residence is currently unoccupied. There are six other properties adjacent to the NCD parcel, five of which have single-family homes. The next closest residences are approximately 1,900 feet away from the Project work areas and are screened from the work areas by intervening topography and vegetation that would provide some shielding

from construction noise. Figure 4.9-2 shows location of sensitive residential receptors in the vicinity of the Project.

Existing Ambient Noise Levels

Dudek staff visited the Project site on June 21, 2018 to measure ambient sound levels in the vicinity. Short-term (ST) measurements were conducted with a calibrated Rion NL-62 sound level meter placed on a tripod with the microphone positioned approximately 5 feet above the ground. The short-term measurements were 10 or 30 minutes long depending on the location. Figure 4.9-1 shows the measurement locations. Table 4.7-2 presents the results of the short-term noise measurements. Additional measurement details can be found in Appendix E, Sound Measurement Data Sheet.

Table 4.9-2: Short-Term Sound Level Measurements

Site	Description/ Noise Sources Observed	Time	L_{eq}[1] (dBA)
ST1: Residential Driveway	Running water in creek, birds, leaves, distant aircraft	10:17 AM to 10:47 AM	39
ST2: Proposed Staging Area	Water running in stream, Birds, bugs	10:53 AM to 11:23 AM	39
ST3: Near Existing Bridge	Running water in creek, birds, leaves	11:33 AM to 12:03 PM	49
ST4: Top of Dam	Noise from Mechanical Building, birds, leaves, aircraft, distant back up alarm	12:09 PM to 12:39 PM	40

Notes:

1 Equivalent Continuous Sound Level (Time-Average Sound Level)

* Conditions: Temperature: 66° Fahrenheit, clear sky, 1 mile-per-hour calm wind

Results shown in Table 4.9-2 show generally low sound levels with all results less than 50 dBA L_{eq} across 30 minutes periods. The highest level measured in the site vicinity was 49 dBA at the top of the dam. At this location, mechanical equipment operations in a dam-related building were primarily responsible for the measured ambient noise levels.

Existing Sources of Noise

The Project site is in an area characterized as being a quiet, rural setting. As described in the observed noise sources column of Table 4.9-3, common sound sources in the site vicinity include sounds in nature, such as flowing streams and birds. Other vicinity noise sources are described below. No railroads are located near the Project site.

Aircraft Noise. Overhead flights are an occasional occurrence in the project vicinity associated with flights arriving or departing San Francisco International Airport, approximately 40 miles to the north. Such aircraft are typically at high altitudes, reducing the potential for aircraft noise impacts to less than significant.

Industrial Noise. The Ben Lomond Refuse Transfer Station, operated by the County of Santa Cruz, is located approximately 0.3 miles south of the Project site. Occasional backup alarms were heard during sound level measurements that were likely associated with the landfill. No other industrial noise sources are known in the project vicinity.

Roadway Traffic Noise. Access to NCD is provided by Newell Creek Road off of Glen Arbor Road from Highway 9. In the vicinity of Glen Arbor Road average daily traffic (ADT) along Highway 9 ranges from 15,400 to 20,900 vehicles, with 1,900 to 2,100 vehicles during the peak hour. The most recent County data identify approximately 4,500 ADT on Glen Arbor Road. Cars and trucks are the main source of noise in the proximity of the road leading to the Ben Lomond Refuse Transfer Station south of the Project site. Table 4.9-3 shows the results of a traffic noise measurement near the landfill entrance.

Table 4.9-3: Short-Term Sound Level Measurement With Traffic Count

Site	Description/ Noise Sources Observed	Time	L_{eq}[1]	Cars	MT[2]	HT[3]
ST5: Road to Refuse Transfer Station	Traffic, Birds, distant Aircraft, distant Traffic, 3 feet from the	12:52 PM to 1:02 PM	62.5	15	1	1

Notes:

1 Equivalent Continuous Sound Level (Time-Average Sound Level)

2 Medium Trucks

3 Heavy Trucks

* Conditions: Temperature: 66° Fahrenheit, clear sky, 1 mile-per-hour calm wind

4.9.2 Impacts and Mitigation Measures

Thresholds of Significance

In accordance with the California Environmental Quality Act (CEQA); State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies, and/or guidelines; and agency and professional standards; a project impact would be considered significant if the project would:

NOISE-1 Expose persons to noise levels in excess of "normally acceptable" standards established in the State of California General Plan Guidelines' (2003) "Noise Element Guidelines" for compatible community noise levels;

NOISE-2 Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project if it would expose outdoor activity areas of noise-sensitive land uses to:

- A 5 dB increase in noise where existing noise levels are below 60 dBA L_{dn}, or
- A 3 dB increase in noise where existing noise levels are above 60 dBA L_{dn}.

NOISE-3 Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project; or

NOISE-4 Expose persons to or generate excessive groundborne vibration.

NOISE-5 Expose persons to excessive noise due to location within two miles of an airport or air strip.

For permanent noise increases, an increase of 5 dB is considered significant where existing noise levels are below 60 dBA L_{dn}.

For temporary noise from construction, the assessment considers applicable local noise standards as a basis for significance thresholds. Specifically, the Santa Cruz County Code (Section 8.30.010) establishes daytime and nighttime noise levels that would be considered offensive. These include: 1) being in excess of 75 decibels at the property line between 8 AM and 10 PM and 2) being in excess of 60 decibels at the property line between 10 PM and 8 AM.

Groundborne vibration information related to construction activities that has been collected by Caltrans (2013) indicates that transient vibrations with a PPV of approximately 0.035 inches per second may be characterized as barely perceptible, and vibration levels of 0.24 inches per second (ips) may be characterized as distinctly perceptible. The threshold of 0.24 inches per second (distinctly perceptible) is used for this project as the significance threshold for the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels. For building damage risk with respect to "older residential structures", Caltrans suggests a threshold of 0.5 ips PPV for "transient" events such as a demolition blast.

Analytical Method

The noise and vibration impact assessment evaluates short-term impacts associated with construction of the proposed Project, as well as long-term operational impacts once the proposed Project improvements have been constructed. The assessment of potential noise impacts was conducted using information on existing ambient noise levels and the anticipated noise that would be produced during construction. The FHWA's RCNM construction noise model was used to estimate construction noise levels with identified construction equipment.

The proposed Project would entirely replace the NCD existing inlet/outlet works in a new location at the Loch Lomond Reservoir (Reservoir) and includes other associated improvements. See Chapter 3, Project Description, for a summary of the Project components, construction schedule, equipment, and phasing. Construction would involve several phases over an approximate 24-month period. Construction equipment estimates, including daily use during each project phase/sequence, were provided by the City's consulting engineer. The type and amount of equipment used in each construction phase, as well as other construction assumptions, are summarized in Appendix B.

As currently proposed, construction would occur on weekdays with a typical 10-hour work shift. Construction activities would typically occur during normal weekday work hours, generally between the hours of 7 AM and 7 PM with potential work on Saturdays. The City has indicated that there may be occasional work during evening/nighttime periods.

The City has also indicated that there may be an "accelerated" construction schedule in which some work activities/sequences are scheduled during consecutive evening/nighttime periods to complete a particular phase in a shorter amount of time. Under this scenario, a 16-hour work day is anticipated with two work shifts. The tunnel excavation construction may include 24-hour construction with three 8-hour shifts. If an accelerated construction schedule were to be implemented, there could be a brief overlap of construction workers arriving to and leaving the site. However, the amount of equipment would remain the same, although the duration of use would be extended throughout the day.

Since the public review period for the Draft EIR, the City and its consulting engineers have clarified that there may situations in which "controlled detonation" would be necessary for portions of the tunnel excavation; see description in Chapter 3, Project Description. It is anticipated that controlled detonation would be considered as an alternative to supplement roadheader excavation where particularly hard rock is encountered or where the equipment is not effective or productive. Controlled detonation is expected to be required in this manner approximately three to six times during the seven to eight months the tunnel is being excavated, but requirements may vary based upon conditions encountered. When utilized, controlled detonation would typically occur twice per day (morning and evening) for a number of consecutive days, with each blast event lasting about 13 seconds. Airborne noise and vibration from blast events during such opportunities can be predicted with mathematical expressions (Dyno Nobel, 2010) that depend on charge weight (i.e., the amount

of explosive material) and its state of confinement, the distance between the detonation origin and the receiver location, and coefficients that describe the ground surrounding the confined charge prior to detonation.

Impacts and Mitigation Measures

Areas of No Project Impact

NOISE-1 *Expose Persons to Noise Levels in Excess of Standards Due to Project Operations*. The proposed Project would result in replacement of the Newell Creek Dam inlet/outlet facilities with a new inlet control. The outlet structure at the toe of the dam would include pipelines, valves and controls. Noise-land use compatibility standards developed by the state of California are generally used to evaluate siting of new facilities and potential conflicts with land uses that may exceed a noise compatibility standard. None of the new facilities include equipment that would generate excessive sound levels. Utilities are normally acceptable in areas where ambient noise levels are up to 70 dBA, Ldn or CNEL County of Santa Cruz, 1994). Ambient noise levels in the Project area are well below this level as shown on Table 4.98-2. Thus, Project operations would not expose employees to noise levels that exceed standards.

NOISE-4 *Expose People to Vibration*. There is no major rotating or impact equipment expected to be utilized for the project after construction is completed. Consequently, with no major sources of vibration, no impact is expected from operational vibration.

NOISE-5 *Expose People to Aircraft Noise*. There are no public airports or private airstrips within or near the Project site. The closest airport is the Watsonville Municipal Airport, approximately 35 miles to the south. Furthermore, the proposed Project would not involve development of habitable structures or introduce sensitive land uses on the site. Therefore, the Project would not result in exposure of people to excessive noise related to aircraft use at airports or airstrips, and there would be no impacts associated with exposure to airport or aircraft noise.

Project Impact Analyses

Impact NOISE-2: Permanent Noise Increases. The Project would not result in a substantial permanent increase in ambient noise levels. This is a *less than significant* impact.

The proposed Project would result in replacement of the NCD inlet/outlet facilities with a new inlet control structure and an outlet structure. None of the new facilities include equipment that would generate excessive sound levels. The inlet controls would be located within an enclosed structure. There are no noise-generating features at the outlet structure, which would house the pipelines through the conduit tunnel with the beneficial flow release pipeline passing through a dissipation chamber before discharge into the spillway plunge pool. Once the Project improvements have been

constructed, operations and maintenance (O&M) activities would be on the same order of magnitude as currently exists. Operational requirements are not expected to change, although there would be additional components that would be monitored. There also would be provisions for hookup of one of the City's emergency generators, but an emergency generator is not planned to be permanently located at the site. Therefore, no significant change in operational noise levels is expected from implementation of the proposed Project.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact NOISE-3: Temporary Noise Increases. The Project would result in a temporary increase in ambient noise levels during construction, but would not exceed the County's 75 dBA L_{eq} daytime and 60 dBA L_{eq} nighttime thresholds This is considered a *less-than-significant* impact.

The Project would be constructed in phases over a period of approximately 24 months. As currently proposed, construction would occur on weekdays with a typical 10-hour work shift. Construction activities would typically occur during normal weekday daytime work hours, generally between the hours of 7 AM and 7 PM with potential occasional work during evening/nighttime periods. The City has also indicated that there may be an "accelerated" construction schedule in which some work activities/sequences are scheduled during consecutive evening/nighttime periods to complete a particular phase in a shorter amount of time. Under this scenario, the amount of equipment would remain the same, although the duration of use would be extended throughout the day.

Construction noise and vibration are temporary phenomena. Construction noise and vibration levels vary from hour-to-hour and day-to-day, depending on the equipment in use at a given time, the operations being performed, and the distance between the source and receptor. The average sound level at construction sites is typically less than the maximum noise level because the equipment operates in alternating cycles of full power and lower power. Also, the equipment moves in various directions, and moves around the construction site. Thus, the average noise levels produced are less than the maximum level. Additionally, due to the dynamic nature of a construction site, noise levels are presented for both the nearest construction work-receiver distance (which would occur for relatively brief periods of time) as well as for the more typical conditions in which work would emanate from the approximate center of the Project site.

Construction Equipment Noise Data

The typical noise levels for various pieces of construction equipment at a distance of 50 feet are presented in Table 4.9-4. For example, measured backhoe maximum sound levels are 78 dBA at a distance of 50 feet.

In addition to the Project site visit, Dudek staff also visited a construction site in central California in July 2018 where tunnel excavation was occurring, using a similar approach as proposed for the

proposed Project. The observed tunneling project was deeper than the proposed Project, but equipment and construction activities are expected to be generally similar to those that would be used at the Project site. Construction noise measurements were taken at this tunneling site; the results are shown in Table 4.9-5. The measured sound levels are generally within the expected range for construction equipment, and are expected to be representative of the construction work proposed at NCD.

Table 4.9-4: Typical Construction Equipment Noise Emission Levels and Usage Factors

Equipment Description	Impact Device	Acoustical Use Factor (%)	Spec 721.560 Lmax @ 50ft (dBA, slow)	Actual Measured Lmax @50ft (dBA, slow) samples averaged*
All Other Equipment > 5 HP	No	50	85	-- N/A --
Auger Drill Rig	No	20	85	84
Backhoe	No	40	80	78
Bar Bender	No	20	80	-- N/A --
Compressor (air)	No	40	80	78
Concrete Pump Truck	No	20	82	81
Crane	No	16	85	81
Dozer	No	40	85	82
Dump Truck	No	40	84	76
Excavator	No	40	85	81
Flat Bed Truck	No	40	84	74
Front End Loader	No	40	80	79
Generator	No	50	82	81
Generator (<25KVA, VMS signs)	No	50	70	73
Hydra Break Ram	Yes	10	90	-- N/A --
Man Lift	No	20	85	75
Pickup Truck	No	40	55	75
Pneumatic Tools	No	50	85	85
Pumps	No	50	77	81
Roller	No	20	85	80
Sand Blasting (Single Nozzle)	No	20	85	96
Scraper	No	40	85	84
Tractor	No	40	84	-- N/A --
Welder / Torch	No	40	73	74

Source: DOT 2006

The results in Table 4.9-5 show that the tunneling laydown/staging area had a L_{eq} of 62 dBA due to truck traffic, generator(s) operating, and people talking. The area inside the tunnel where rock breaking and digging was occurring had a high noise level in the mid-90s dBA. Outside the tunnel

many hundreds of feet from the digging operations, the tunneling noise was not audible. At the entrance to the tunnel, the fans pushing air into the tunnel produced noise levels that ranged from 62 to 73 dBA near the entrance.

Table 4.9-5: Short-Term Construction Noise Level Measurements

Location	Description/ Noise Sources Observed	Time	L_{eq}[1] (dBA)
Laydown Area	Generator running, Trucks Driving by, Occasionally people talking	11:00 am to 12:30 pm	62
At Tunneling Drill Inside Tunnel	Drill Operating near the operators ear inside the tunnel, hundreds of feet from the entrance	12:15 p.m. to 12:18 p.m.	94-95
At Entrance to Tunnel	Air Vent Fans near the Entrance to the tunnel (approximately 50 feet from the fans above)	12:25 p.m. to 12:26 p.m.	62-73

Notes:

1 Equivalent Continuous Sound Level (Time-Average Sound Level)

* Conditions: Temperature: 82 to 95° Fahrenheit, clear sky, 10 miles-per-hour gusty wind

Construction Noise Modeling Results

Using the FHWA's RCNM construction noise model and construction information (construction equipment use by phase), the estimated noise levels from construction were calculated. The results are summarized in Table 4.9-6. The RCNM inputs and outputs are provided in Appendix E.

Noise levels were calculated at four locations, which are shown on Figure 4.9-2. These locations provide representative distances from the construction areas, including distances to off-site residences as well as the City-owned residence. These locations include:

A. Within Staging Area 5, which is also within 100 feet of the City-owned residence;

B. 800 Feet from the tunnel portal construction area;

C. 680 feet from the tunnel portal construction area; and

D. At the property line closest to off-site residences. However, the nearest off-site residences are further way, located approximately 1,900 feet northwest of the tunnel portal construction area and a little over 2,000 feet southeast of the tunnel portal. Other residential receptors in the Project vicinity are many hundreds of feet farther away with substantial topography offering shielding from the construction area.

Modeled construction noise levels are summarized on Table 4.9-6 at four locations shown on Figure 4.9-2. At Location A, construction noise levels would generally range between 70 and 76 dBA L_{eq}.

The noise from tunneling operations would range from 55 to 63 dBA L_{eq} at a distance of approximately 800 feet (Location B), and would range from 58 to 65 dBA L_{eq} at a distance of approximately 580 feet (Location C). At the Project property line closest to off-site residences, Location D, the highest noise levels of 56 dBA L_{eq} are predicted to occur during the Start Tunnel Excavation and Complete Tunnel Excavation. During other phases of construction work and more typically, the noise levels would range from approximately 42 to 55 dBA L_{eq} at the Project property line closest to off-site residences.

Table 4.9-6
Construction Noise Modeling Summary Results

Construction Phase	L_{eq} (dBA)			
	Location A	*Location B*	*Location C*	*Location D*
Year 1				
Mobilization	70	55	58	48
Develop Staging Areas	76	61	64	54
Construct NCP	76	61	64	54
Access Road Improvement	76	61	64	54
Grade Portal Construction Platform	N/A	61	64	54
Install Culvert Bridge	N/A	61	61	51
Install Temporary Boat Launch & Silt Curtain	N/A	62	64	55
Dredge Material & Drill Shafts	N/A	57	60	51
Construct Intake & Air Vent	N/A	55	58	48
Inlet Control House	N/A	61	64	54
Start Tunnel Excavation	N/A	63	66	56
Work Boats	N/A	N/A	49	39
Diving Equipment	N/A	N/A	58	48
Year 2				
Complete Tunnel Excavation	N/A	63	66	56
Install Inlet/Outlet Conduit	N/A	61	63	54
Start Outlet Yard Construction	N/A	62	65	55
Year 3				
Complete Outlet Yard Work	N/A	62	65	55
Complete Electrical & Controls Installation	N/A	59	62	53
Perform Start-Up Testing	N/A	49	51	42
Decommission Existing outlet	74	57	59	50

NOTE: See Figure 4.9-2 for Locations A-D.

For the nearest off-site residences that are approximately 1,900 feet (see Figure 4.9-2) from the Project construction areas, the expected construction noise would reach up to 15 dB above the existing ambient noise levels (measured to be approximately 40 dBA L_{eq} as shown on Table 4.9-2). However, the County Noise Ordinance specifies 75 dBA during the daytime and 60 dBA during the nighttime as standards to establish if construction noise that would be considered potentially 'offensive'. Thus, construction noise levels during daytime and nighttime periods as calculated at the Project property line closest to off-site residences would comply with County standards of 75 dBA L_{eq} during the daytime and 60 dBA L_{eq} during nighttime. Although construction noise may at times be noticeable at the closest residences, the expected construction noise levels at these receivers would be below County standards for noise that would create a nuisance. Therefore, construction noise impacts are expected to be less than significant.

Noise levels at 100 feet from the City-owned residence would generally comply with daytime construction noise limits established in the County regulations, but could marginally exceed the limits (up to 76 dBA L_{eq}) at times during construction mobilization and construction of a portion of the Newell Creek Pipeline). Overnight construction activities would be anticipated to regularly exceed the 60 dBA L_{eq} limit at this property. This residence currently is unoccupied and if it were to become occupied, it would be by a City employee or by a worker associated with construction of the Project, either of which would have full knowledge of the Project and voluntarily agreeing to the terms of residency during construction. Therefore, construction noise impacts at this residence would be considered less than significant.

Predicted Noise from Controlled Detonation

If controlled detonation is used, the anticipated noise level at the nearest project property line, approximately 800 feet from a potential detonation origin point at the southern-most end of the propose tunnel, is predicted to be 55 dBA hourly L_{eq} based on the following composite calculation (Dyno Nobel, 2012; Richards, 2019; OSMRE, 1981):

> Blast event hourly L_{eq} (dBA) = $20*LOG(((K*(R/(Q^{0.33}))^{-1.2})/6.8947)/2.9/10^{-9})-25+10*LOG(1/3600)$where K is the state of confinement (3.3), Q is the maximum instantaneous charge weight (12.27 kilograms, or 27 pounds), R is the distance from the charge (244 meters, or 800 feet), and the duration of a detonation is normalized to one second.

This predicted air blast noise level of 55 dBA is far less than the 75 dB threshold (at the property line) during daytime hours (8 AM to 10 PM) per Section 8.30.010 of the Santa Cruz County Code, and also less than the 60 dBA nighttime limit (10 PM to 8 AM). The predicted blast noise level, if combined with other construction noise during Year 2 activities as shown in Table 4.9-6, would not exceed County noise standards established in Section 8.30.010 of the County Code. Thus, at this studied frequency of occurrence and blast type for the project (i.e., no more than one 27-pound, fully-confined blast event per hour during allowable daytime construction periods), noise resulting from controlled detonation is expected to result in a less-than-significant noise impact.

Construction Traffic-Related Noise Impacts

During construction, the proposed Project would also result in a short-term increase in noise levels associated with off-site construction traffic travelling along the local roadway network, but this increase would not constitute a substantial increase. Construction-related traffic would access the site from Highway 9, Glen Arbor Road and Newell Creek Road. Trip generation and distribution for workers and delivery trucks would ultimately vary depending on the phase of construction; however, the maximum daily construction-related activities would generate approximately 102 one-way vehicle trips based on daily construction worker, vendor trip, and haul truck estimates.

Based upon the traffic counts conducted during the 10 minute sound level measurement along Newell Creek Road, the existing hourly traffic volume along the segment leading to the dam site is approximately 102 vehicle trips. Assuming an hourly traffic volume during the day represents roughly 10% of the average daily volumes on the roadway segment, the existing traffic volume along Newell Creek Road is estimated to be 1,020 ADT.

Typically, traffic volumes must double to create an increase in perceptible (3 dBA) traffic noise (Caltrans, 2011). Some residences located along Newell Creek Road between the County's Ben Lomond Refuse Transfer Station and Glen Arbor Road and along Glen Arbor Road currently experience automobile and truck traffic accessing the Transfer station. The vehicles added to the local roadway network from the proposed Project's construction-related traffic would not double existing traffic volumes on Newell Creek Road (south of the gated private road segment to NCD) or Glen Arbor Road as discussed in Chapter, 4.10, Transportation and Traffic. Thus, the construction traffic would not result in a 3 dBA increase in the daily or peak hour traffic noise levels. Therefore, the additional construction-related traffic would result in a less-than-significant temporary impact related to overall traffic noise levels. Although the threshold of significance would not be met, it is possible that some residents along local roads may notice passing truck trips, which would be variable thought out a given day and the construction period.

Construction truck traffic along Newell Creek Road north of the Ben Lomond Transfer Station would be along a private road in which residences are set back from the road and screened to varying degrees by topography and vegetation. Residents may at times notice construction-related traffic, however, this would be intermittent over a given day and reaching the peak levels only for limited durations during certain construction phases as indicated above.

Accelerated Construction Schedule

The City has indicated that there may be an "accelerated" construction schedule in which some work activities/sequences are scheduled during consecutive evening/nighttime periods to complete a particular phase in a shorter amount of time. Under this scenario, a 16-hour work day is anticipated with two consecutive work shifts. The tunnel excavation construction may include 24-hour construction with three 8-hour shifts. If an accelerated construction schedule were to be implemented, there could be a brief overlap of construction workers arriving to and leaving the site.

However, the amount of equipment would remain the same, although the duration of use would be extended per day.

With an accelerated construction schedule, sensitive receptors would not be exposed to noise levels that exceed County standards during the daytime (75 dBA L_{eq}). While noise levels at the property line of the nearest off-site residents would be below the County's noise threshold for evening and nighttime noise levels (60 dBA L_{eq}), the daily extended construction noise into evening and/or nighttime hours could be noticeable to some residents during limited night-time construction if there is an extended nighttime construction period. An extended duration of nighttime construction under the accelerated construction schedule could be a considered a nuisance. However, the noise levels at the property line would generally be 55 dB, and much lower at the distance of the homes. This level would not be highly noticeable or at a level that would result in sleep disturbance. The Project includes a Best Management Practice (BMP) to notify adjacent residents of nighttime construction schedules and to set up a contact for neighbors to report noise-related complaints. The City-owned residence currently is unoccupied and if it were to become occupied, it would be by a City employee or by a worker associated with construction of the Project, either of which would have full knowledge of the Project and voluntarily agreeing to terms of construction. Therefore, construction noise impacts would be considered less than significant.

Impact NOISE-4: Temporary Construction Vibration. The Project could generate groundborne vibration during periods of controlled detonation, but would not expose residents to or generate excessive groundborne vibration. This is considered a *less-than-significant* impact.

Should controlled detonation be applied as an alternative to mechanical excavation, groundborne vibration peak particle velocity (PPV) attributed to a blast event can be estimated at the closest sensitive location ("A", the City-owned unoccupied residence mentioned under Impact NOISE-3) with the following expression (Dyno Nobel, 2010):

> Blast groundborne vibration PPV, in units of millimeters per second (mm/s) = 5.63 = K * $(R/(Q^{0.5}))^{B}$ where K is the site and rock factor constant (5,000), Q is the maximum instantaneous charge weight (12.27 kg, or 27 pounds), and R is the distance from the charge (244 m, or 800 feet), and B is another constant (-1.6) related to the encountered rock and site conditions.

The predicted value of 5.63 mm/s converts to 0.22 inches per second, which is less than both the 0.24 ips PPV threshold with respect to human annoyance and the 0.5 inches per second PPV building damage risk threshold for "older residential structures" (Caltrans, 2013b). At the nearest occupied residence, approximately 1,900 feet from the tunnel construction site, controlled detonation would produce an estimated 0.056 inches ips PPV, which is well below the "distinctly perceptible" Caltrans threshold of 0.24 ips PPV, although it is slightly more than the Caltrans "barely perceptible" level of 0.035 ips PPV for "transient" vibration of this kind. Since the controlled

detonation activity is temporary and short-term, rather than a continuous or frequent potential disturbance, the impact would be considered less than significant. Therefore, on the basis of this comparison with Caltrans guidance, the vibration from controlled detonation at this frequency of occurrence for the project would not be expected to create a significant vibration impact.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

4.9.3 Cumulative Impacts

The geographic scope for cumulative impact analysis of noise and vibration effects consists of the proposed Project and the immediate vicinity around each of these sites, including vicinity roadways, which could contribute to combined noise effects at sensitive receptors. Based on the list of cumulative projects provided on Table 4-1 (see Section 4.0), there the only potential cumulative projects with potential noise impacts would be construction of future planned Newell Creek Pipeline segments. At this time, replacement segments and/or alignment locations have not been identified or designed. It is assumed that new pipeline would be in the general location of the existing pipeline, which would include vicinity roadways and adjacent neighborhoods, including Highway 9 and Graham Hill Road. Construction noise in these areas would be sufficient distance from the Project site and that no cumulative noise impacts would be expected.

The potential overlap in construction schedules could result in cumulative construction traffic. It is not known what the construction traffic levels would be with the other cumulative projects, but other cumulative projects are smaller in scope than the proposed Project and would be expected to result in fewer construction-related trips than the Project as there would be fewer construction components. Even if the cumulative construction traffic was doubled from the Project estimate (approximately 400 daily trips), this would not be of a magnitude to cause a discernible increase in daily noise levels, i.e., traffic volumes must double to create an increase in perceptible (3 dBA) traffic noise. Therefore, no potentially significant cumulative impacts are expected.

4.9.4 References

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SOURCE: Bing Maps 2018

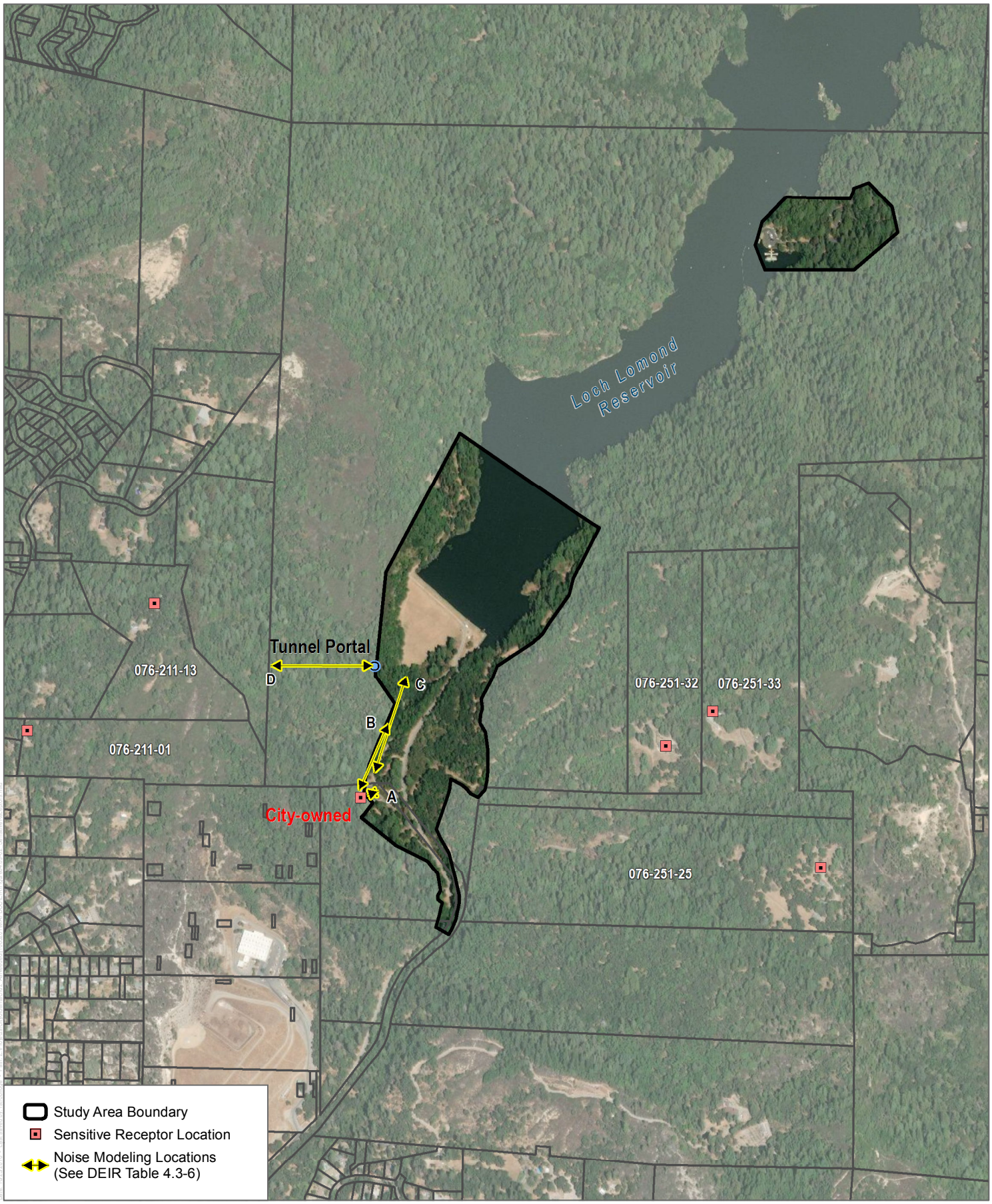
DUDEK

0 500 1,000 Feet

FIGURE 4.9-1

Ambient Sound Measurement Locations

Newell Creek Dam Inlet/Outlet Replacement Project



SOURCE: Bing Maps 2018

DUDEK

0 500 1,000 Feet

FIGURE 4.9-2

Sensitive Receptor Locations

Newell Creek Dam Inlet/Outlet Replacement Project

4.10 TRANSPORTATION AND TRAFFIC

This section analyzes transportation and traffic impacts of the proposed Newell Creek Dam (NCD) Inlet/Outlet Replacement Project (Project). It includes a description of transportation and traffic conditions in the vicinity of the project site, presents an assessment of the transportation impacts associated with construction activities, and identifies mitigation measures to mitigate potentially significant impacts. The section is based on review of existing documents and studies and recent available traffic counts from the Santa Cruz County Regional Transportation Commission.

4.10.1 Environmental Setting

Regulatory Setting

Federal and State

There are no known federal regulations that are applicable to the proposed Project.

The California Department of Transportation (Caltrans) manages the state's highway facilities. Caltrans is responsible for constructing, enhancing, and maintaining the state highway and interstate freeway systems. Any change to the state roadway system requires an encroachment permit from Caltrans.

Regional and Local

A number of regional and local agencies are involved with transportation planning and implementation of transportation programs and improvements within the Santa Cruz County. The County maintains local roadways and transportation facilities. The California Department of Transportation (Caltrans) has jurisdiction over state highway segments that traverse the County, including portions of State Routes 9 and 17 (hereinafter referred to as Highways).

The Association of Monterey Bay Area Governments (AMBAG) is the federally designated Metropolitan Planning Organization (MPO) for transportation planning activities in the tri-county Monterey Bay region (Santa Cruz, Monterey, and San Benito counties). It is the lead agency responsible for developing and administering plans and programs to maintain eligibility and receive federal funds for the transportation systems in the region. AMBAG conducts regional transportation planning activities through its Metropolitan Transportation Plan (MTP), the Metropolitan Transportation Improvement Program (MTIP), maintenance of a regional travel demand model, and demographic forecasts. AMBAG works with regional transportation planning agencies, transit providers, the Monterey Bay Unified Air Pollution Control District (MBUAPCD), state and federal governments, and organizations having interest in or responsibility for transportation planning and programming.

The Santa Cruz County Regional Transportation Commission (SCCRTC) is the state-designated Regional Transportation Planning Authority (RTPA) for transportation planning activities in Santa Cruz County. SCCRTC oversees planning and funding programs for local and countywide projects within Santa Cruz County using state and federal transportation funds.

Access to Project Area

The 518-acre Project site is located in unincorporated Santa Cruz County, approximately 10 miles north of the City of Santa Cruz and 2 miles east of the community of Ben Lomond. Newell Creek Road provides local access to the Project site off of Glen Arbor Road, which extends east from Highway 9. Both Graham Hill Road and Mount Hermon Road provide access to Highway 9. Highways 1 and 17 provide the principal regional access to Graham Hill Road and Mount Hermon Road, respectively.

Loch Lomond Recreation Area (LLRA) is located on the east side of the Reservoir about 4,000 feet upstream of the dam crest. Access to the LLRA is provided via E. Zayante and Lompico Roads from Graham Hill Road and then is via a series of curving mountain roads through residential areas.

Roadway Network

Santa Cruz County's transportation network includes facilities for private automobiles, transit, bicycles, pedestrians, specialized transportation for seniors and people with physical or mental disabilities, transport of goods and services, and emergency vehicles. Santa Cruz County's main transportation corridors and facilities are limited by the area's physical barriers of mountains and the sea (SCCRTC, 2018). Four functional street classifications are as follows in the County of Santa Cruz General Plan (1994):

- Freeway: a multi-lane roadway with controlled access that provides regional access to the area.
- Arterial: a signalized street that serves through-traffic and provides access to major destinations.
- Collector: a street that collects traffic from local residential streets and distributes it to arterials.
- Local: a street that provides access to adjacent properties.

Local Streets and Roads

Newell Creek Road is a two-lane north-south local road extending approximately 1.5 miles from Glen Arbor Road in Ben Lomond to its terminus at the Newell Creek Dam. Newell Creek Road is a private road and access is restricted by a gate for approximately 0.8 miles south of the dam.

Glen Arbor Road is a two-lane north-south collector road with one travel lane in each direction conveying vehicular traffic from the San Lorenzo Valley to the Zayante area. The road extends east from Highway 9, which is a signalized intersection. The road is an emergency evacuation route and bypass for a segment of Highway 9, extending approximately 1.75 miles through the community of Ben Lomond.

Mount Hermon Road is a four-lane, east-west major arterial, with two travel lanes in each direction separated by an intermittent raised median. Mount Hermon road extends from Highway 17 in the east to Graham Hill Road in the west. It serves as the primary commercial street through the City of Scotts Valley and provides regional access between Highway 17 and Highway 9 in Felton and Ben Lomond.

Graham Hill Road is a two-lane north-south arterial with three-foot shoulders and no parking. The road extends approximately 6 miles from the Santa Cruz city limits to Highway 9 in Felton. Graham Hill Road provides access to Henry Cowell State Park, Felton, and the San Lorenzo River in unincorporated Santa Cruz County, and serves as an alternative route to Highway 9.

East Zayante Road is a two-lane north-south collector road extending 2.6 miles from Graham Hill Road in Felton to Lompico Road. The road has one travel lane in each direction and no shoulders.

Lompico Road is a two-lane north-south collector road extending from East Zayante Road to the community of Lompico to the east of the dam. The road travels through forested areas, with one travel lane in each direction and no shoulders.

State Highways

Highway 9 is a two-lane rural highway as it enters the region from San Mateo County in the Santa Cruz Mountains. It is a 27-mile route between the cities of the Santa Clara Valley and Santa Cruz at its junction with Highway 1. It is considerably curvy and traverses forested areas, which limits travel speeds. Highway 9 serves communities in the San Lorenzo Valley, including Boulder Creek, Ben Lomond, and Felton, and is a heavily used commuter and recreational travel route (AMBAG, 2018a).

Highway 17 is a four-lane north-south freeway providing the shortest travel distance between the Santa Clara Valley and Santa Cruz County, extending from Interstate 880 in San Jose in the north to its terminus at Highway 1 in Santa Cruz to the south. Starting at the Santa Clara/Santa Cruz County line, Highway 17 is a winding, mountainous road, with slopes from four percent to six percent. Segments along this route are narrow, do not have shoulders, or have a narrow median with guard rail. Although this road does not have signalized intersections, there are several unsignalized intersections with acceleration/deceleration lanes as well as t-intersections with local roads. Just south of Scotts Valley, Highway 17 becomes a freeway with shoulders, terminating at the interchange with Highway 1 in the City of Santa Cruz. Highway 17 reached its design capacity of 40,000 vehicles per day in 1968. The route is heavily used for recreational travel on weekends and for commuter travel on weekdays and is, therefore, subject to delay (AMBAG, 2018a). In addition to

its challenging roadway configuration, weather-related conditions such as thick fog, heavy rains, and mudslides affect roadway operations on Highway 17.

Other Transportation Modes

Pedestrian and Bicycle Facilities

No sidewalks or bicycle lanes are located in the vicinity of the Project site.

Public Transit Service

The Santa Cruz Metropolitan Transit District (SCMTD) provides public transit services throughout Santa Cruz County. Three main types of services provided by SCMTD are local fixed-route bus service, Highway 17 Express Bus service, and specialized ParaCruz services for people with disabilities. The nearest SCMTD transit center to the Project site is the Cavallaro Transit Center in the City Scotts Valley, located approximately 4.5 miles southwest of the Project site. SCMTD Routes 33-35 serve the San Lorenzo Valley, though only Route 35/35A provides year-round service (Routes 33 and 34 serve San Lorenzo Valley schools). Route 35/35A offers frequent, 30-minute service and operates several bus stops along Glen Arbor Road over 1 mile southwest of the Project site; weekday boardings were over 1,300 in 2016 (Caltrans, 2016b).

Existing Traffic Conditions

Vehicle Traffic

Vehicle traffic conditions are measured by average daily traffic (ADT), peak-hour traffic volumes, level of service (LOS), average delay, and/or volume-to-capacity (V/C) ratio. Average daily traffic is the total number of cars passing over a segment of the roadway, in both directions on an average day. Peak-hour volumes are the total number of cars passing over a roadway segment during the peak hour in the morning (AM) or afternoon/evening (PM).

To evaluate the performance of roadways and levels of traffic congestion, many jurisdictions, including Santa Cruz County, use a measurement known as LOS. LOS is a scale that describes the level of traffic congestion and delay at intersections or on roadway segments based on the amount of auto traffic that a roadway or intersection can accommodate and factors such as maneuverability, driver dissatisfaction, and delay. Traffic flows along local streets typically are controlled by the volume and capacity of the nearest intersection. Intersections are rated based on a scale of LOS A through LOS F, with LOS A representing free-flowing conditions and LOS F representing congested conditions. The intermediate levels of service represent incremental levels of congestion and delay between these two extremes.

The Santa Cruz County General Plan Policy 3.12.1 considers LOS C as its objective and LOS D as the minimum acceptable LOS (Santa Cruz County, 1994). Caltrans, which has jurisdiction over state highways, endeavors to maintain a target LOS at the transition between LOS C and D. However,

Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. If a state highway facility is operating at less than the appropriate target LOS under existing conditions, the existing LOS should be maintained (Caltrans, 2002).

Existing Annual Average Daily Traffic Volumes

Traffic count data are available for state highways and arterials within Santa Cruz County. According to the most recent available traffic count data from Caltrans, average daily traffic volumes for the most-traveled segments of Highways 9 and 17 within Santa Cruz County were 26,000 and 70,000 vehicles, respectively (Caltrans, 2016a). Mount Hermon Road and Graham Hill Road carried 33,741 and 27,896 vehicles per day, respectively (SCCRTC, 2018). Truck volumes on the most-traveled segments of Highways 9 and 17 within Santa Cruz County were 1,820 and 2,100 trucks per day, respectively (Caltrans, 2016a). The most recent County data (2015) identify approximately 4,500 ADT on Glen Arbor Road. Traffic counts conducted by the SCCRTC identified approximately 2,900 PM peak hour trips at the Mount Hermon Road/Highway 9 intersection in Felton.

State Highway Operations

Based on the most recent (2016) Caltrans Traffic Census Program data (Caltrans 2016a), the ADT on state highways within Santa Cruz County near the Project site and proposed construction access routes is as follows:

- Highway 9:
  - At San Lorenzo Avenue, ADT ranges from 6,300 to 7,600 vehicles, with 830 to 1,050 during the peak hour.
  - At Graham Hill Road, ADT ranges from 12,200 to 20,900 vehicles, with 1,750 to 2,100 during the peak hour.
  - At Glen Arbor Road, ADT ranges from 15,400 to 20,900 vehicles, with 1,900 to 2,100 during the peak hour.
- Highway 17:
  - At Sims Road, ADT is approximately 67,000 vehicles, with 5,700 to 6,300 during the peak hour.
  - At Scotts Valley Drive, ADT ranges from 60,000 to 67,000 vehicles, with 5,800 to 6,300 during the peak hour.
  - At Granite Creek Road, ADT ranges from 60,000 to 61,000 vehicles, with approximately 5,800 during the peak hour.
- Highway 1:
  - At Highway 17, AADT is approximately 61,000 to 86,000 trips with 4,950 to 6,300 trips occurring during the peak hour.
  - At Morrissey Boulevard, AADT is approximately 85,000 to 94,000 trips with 5,900 to 6,300 trips occurring during the peak hour.

Planned Transportation System Improvements

Metropolitan Transportation Improvement Program

AMBAG, as a MPO, is required by state and federal laws to develop and adopt a MTIP, a multi-year transportation project program that includes multi-modal projects, including but not limited to major highway, arterial, transit, bikeway, and pedestrian projects. The 2016 MTIP is a four-year program that covers the federal fiscal years from October 1, 2016 through September 30, 2020. The MTIP implements the 2040 Monterey Bay Area Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS) adopted by the AMBAG Board of Directors in June 2018. The 2040 MTP/SCS is a financially constrained document and includes identified transportation improvement projects for the region. Planned projects along access routes to the NCD include: pavement maintenance and replacement along a segment of Mt. Hermon Road; pavement maintenance on Glen Arbor Road; and multimodal improvements on Graham Hill Road from the City of Santa Cruz to Highway 9.

Santa Cruz County Planned Improvements

The County's Final 2017-2018 Capital Improvement Program (CIP) presents a five-year financing implementation plan for capital improvements within the unincorporated County. The CIP represents the best efforts to allocate available resources toward projects that provide the most benefit for the people of Santa Cruz County. A total of 73 projects are programmed in the 2017-2018 CIP, the majority of which are disaster recovery projects (49 percent), followed by bridges (22 percent), and road improvements (20 percent). Pedestrian safety improvements comprise 4 percent of the projects. Programmed projects nearest to the Project site include the Lompico Road Bridge Replacement over Lompico Creek north of Felton, Quail Hollow Road Bridge Replacement over Zayante Creek northeast of Felton, and the Rancho Rio Avenue Bridge Replacement over Newell Creek in Ben Lomond.

Regional Transportation Plan Improvements

The SCCRTC periodically completes a Regional Transportation Plan (RTP) and Regional Transportation Improvement Program (RTIP) according to state guidelines to guide short- and long-range transportation planning and project implementation for the County. The 2018 RTP provides guidance for transportation policy and projects through the year 2040. Projects identified in the RTP that are within the project vicinity include:

- Glen Arbor Road Improvements: Roadway and roadside improvements on the entire length of Glen Arbor Road, including bicycle lanes, transit turnouts, left turn pockets, merge lanes, and intersection improvements. Roadwork includes major rehabilitation of the road and roadsides.
- Glen Arbor Road Recycle, Overlay, and Chip Seal: Pavement recycling, asphalt overlay, ship seal, restriping, and installation of a subdrain on 0.52 miles of Glen Arbor Road from Highway 9 to Quail Hollow Road.

- Graham Hill Road Multimodal Improvements: From the City of Santa Cruz to Highway 9, bicycle lanes, sidewalks, transit turnouts, merge lanes, traffic signals, major rehabilitation and maintenance, drainage improvements, and a signal upgrade at Highway 9 (also listed in MTP/SCS).
- Lompico Road Bridge Replacement: Replacement of the existing steel stringer bridge with a reinforced concrete slab bridge (also listed in CIP).
- Lompico Road Improvements: Roadway and roadside improvements from East Zayante Road to the end of Lompico Road, including bicycle lanes, transit turnouts, left turn pockets, merge lanes, and intersection improvements. Roadwork includes major rehabilitation of the road and roadsides.
- Mount Hermon Road Improvements: Roadway and roadside improvements from Lockhart Gulch to Graham Hill Road, including bicycle lanes, transit turnouts, left turn pockets, merge lanes, and intersection improvements (also listed in MTP/SCS).
- Quail Hollow Road Bridge Replacement Project: Complete replacement of the existing two-lane structure and roadway approaches with a two-lane, clear-span, concrete bridge and standard bridge approaches (also listed in CIP).
- Quail Hollow Road Improvements: Road rehabilitation, maintenance, and improvements along the entire length of Quail Hollow Road from East Zayante Road to Glen Arbor Road, including left lane pockets, sidewalks, bicycle lanes, and transit turnouts.
- Rancho Rio Ave at Newell Creek Bridge Replacement Project: Complete replacement of the existing one-lane structure and roadway approaches with a two-lane, clear-span, concrete slab bridge and standard bridge approaches (also listed in CIP).
- San Lorenzo River Valley Trail: 15-mile, paved multi-use path for bicyclists and pedestrians from Boulder Creek to Santa Cruz.
- San Lorenzo Valley Trail: Highway 9 – Downtown Felton Bike Lanes & Sidewalks: Installation of sidewalks and bicycle lanes on Highway 9 through downtown Felton (also listed in MTP/SCS).
- San Lorenzo Valley Trail: Highway 9 – North Felton Bike Lanes & Sidewalks: Installation of sidewalk/pedestrian path, shoulder widening to 5 feet to accommodate bicycle lanes from Felton-Empire/Graham Hill Road to Glen Arbor Road, Ben Lomond, including new and replacement bicycle and pedestrian bridges (also listed in MTP/SCS).
- San Lorenzo Way Bridge Replacement Project, consisting of completely replacing the existing one-lane structure and roadway approaches with a two-lane, clear-span bridge and standard bridge approaches (also listed in MTP/SCS).
- Upper Zayante Road improvements, including bike lanes, sidewalks, transit turnouts, left turn pockets, merge lanes, and intersection improvements.
- Upper East Zayante Road rehabilitation from Quail Hollow to Highway 35 (up to 9.07 miles), including digouts, chip seal, and restriping.

- Highway 17 Access Management: Operational improvements to existing facilities, including ramp modifications, acceleration/deceleration lanes, turning lanes, driveway consolidation, driveway channelization, etc.

Planned State Highway Improvements

Highway 17. Highway 17 connects Santa Cruz with Scotts Valley and San Jose and other Santa Clara County communities. According to the *Transportation Concept Report for State Route 17* (Caltrans, 2015), Highway 17 operates and functions similar to many urban expressways or freeways; however, it is located within an area that is predominantly rural. Unlike other expressways or freeways, Highway 17 provides local access to many neighborhoods via local street intersections and driveways. Because of this contrast, several challenges stem from an imbalance between access and mobility, and mountainous terrain further limits many standard transportation projects. As a result of these issues, Caltrans has partnered with SCCRTC and Santa Cruz County on the Highway 17 Access Management Plan to address these challenges. The Highway 17 Access Management Plan represents a long-range planning-level study, which is the first step in a long process. The preliminary objectives of the plan include reducing conflict points and preserving the function and operation of the Highway 17 corridor as well as the local road network.

Highway 9. The *Transportation Concept Report for State Route 9* (Caltrans, 2016b) identifies long-range needs for active transportation on Highway 9, including enhancing sidewalk connectivity, widening paved shoulders to accommodate bicycle lanes, and improving bus stop access and amenities.

4.10.2 Impacts and Mitigation Measures

Thresholds of Significance

In accordance with the California Environmental Quality Act (CEQA); State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies, and/or guidelines; and agency and professional standards; a project impact would be considered significant if the project would:

TRAF-1 Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit (see discussion of City standards below);

TRAF-2 Conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;

TRAF-3 Substantially increase hazards due to a design feature (for example, sharp curves or dangerous intersections) or incompatible uses (for example, farm equipment);

TRAF-4 Result in inadequate emergency access;

TRAF-5 Conflict with adopted policies, plans, or programs regarding public transit, bicycle or pedestrian facilities, or otherwise decrease the performance or safety of such facilities; or

TRAF-6 Result in a change in air traffic patterns, including either an increase in traffic levels or a change in locations that results in substantial safety risks.

Vehicle Miles Traveled

In September 2013, Governor Brown signed Senate Bill 743 which made significant changes to how transportation impacts are to be assessed under CEQA. SB 743 directs the Governor's Office of Planning and Research (OPR) to develop a new metric to replace LOS as a measure of impact significance and suggests vehicle miles traveled (VMT) as that metric. SB 743 also creates a new CEQA exemption for certain projects that are consistent with the regional Sustainable Communities Strategy.

OPR has released draft CEQA Guidelines to address this requirement; however, at the time this EIR analysis was completed the Guidelines have not been finalized or adopted. It is anticipated that the revisions to the CEQA Guidelines will be finalized in 2018. Because there are no adopted thresholds and the State CEQA Guidelines' revisions have not yet been finalized, VMT is not analyzed as a standard of significance in this EIR. However, it is noted that VMT per capita within Santa Cruz County is estimated to decrease by approximately 11% between 2005 and 2040 (Santa Cruz County Regional Transportation Commission, 2018).

Analytical Method

The impact analyses in this section evaluate the potential for short-term construction-related traffic impacts that may result in increased traffic delays or hazards, or that may impede pedestrian, bicycle and transit access. The analysis included review of existing traffic counts and estimated Project construction schedules and assumptions by Dudek's traffic engineer. Long-term traffic impacts associated with Proposed Project operations are also addressed.

Project construction would involve several phases over an approximate 24-month period. Construction equipment was identified by the City's consulting engineer with an indication of daily use for each of the identified project phases/sequences. As currently proposed, construction would occur on weekdays with a typical 10-hour work shift. Construction activities would typically occur during normal weekday work hours, between 7 AM and 6 PM with potential work on Saturdays. The City has indicated that there may be occasional work during evening/nighttime periods. See Chapter 3, Project Description, for a summary of the Project construction schedule, equipment and

phasing. The type and amount of equipment used in each construction phase, as well as other construction assumptions, are summarized in Appendix B.

The City has also indicated that there may be an "accelerated" construction schedule in which some work activities/sequences are scheduled during consecutive evening/nighttime periods to complete a particular phase in a shorter amount of time. Under this scenario, a 16-hour workday is anticipated with two work shifts. The tunnel excavation construction may include 24-hour construction with three 8-hour shifts. If an accelerated construction schedule were to be implemented, there could be a brief overlap of construction workers arriving to and leaving the site. However, the amount of equipment would remain the same, although the duration of use would be extended.

Impacts and Mitigation Measures

Areas of No Project Impact

TRAF-2 *Conflicts with Congestion Management Plan*. In 2000, at the request of the SCCRTC, the County of Santa Cruz and other local jurisdictions exercised the option to be exempt from preparation and implementation of a Congestion Management Plan (CMP) per Assembly Bill 2419. As a result, the County of Santa Cruz no longer has a Congestion Management Agency or CMP. Therefore, the Project would not result in conflicts with CMP.

TRAF-3 *Substantially Increase Hazards Due to Design Features.* The proposed Project does not include improvements on public roadways. The Project does not include new road designs or alterations of existing features (e.g., road realignment) that could substantially increase hazards. Access roads on the Project site would be re-graded and improved to accommodate construction vehicles, but no improvements or new access is proposed to other existing roads. Therefore, the Proposed Project would not result in hazards caused by a design feature or use that is incompatible with roadway designs.

TRAF-4 *Emergency Access.* The proposed Project would not result in development of new uses that would require emergency access. As indicated above, access roads on the Project site would be re-graded and improved to accommodate construction vehicles, which would also improve access for emergency vehicles. Therefore, the Proposed Project would not result in inadequate emergency access to the site.

TRAF-5 *Conflict with Adopted Policies Regarding Transit, Bicycle or Pedestrian Facilities.* The intent of threshold is to account for potential project conflicts with adopted policies, plans, and programs regarding public transit, bicycle or pedestrian facilities or otherwise decrease the performance or safety of such facilities. The proposed Project does not include changes in policies or programs that support alternative

transportation, and neither construction nor operation of the proposed Project operation would conflict with adopted policies, plans, or programs supporting alternative transportation. The Proposed Project would not directly or indirectly eliminate, alter or conflict with alternative transportation corridors or facilities (e.g., bike paths, lanes, bus turnouts, etc.).

TRAF-6 *Change in Air Traffic Patterns*. There are no public airports or private airstrips within or near the Project site. The closest airport is the Watsonville Municipal Airport, approximately 40 miles to the south. Permanent, above-ground structures that would be constructed at the Project site would not be within a designated protected area of this airport. Therefore, the Project would have no effect on air traffic patterns.

Project Impact Analyses

Impact TRAF-1: Traffic Circulation System Impacts. Project construction would result in temporary increases in vehicular traffic on area roads, but would not conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the transportation circulation system. This is a *less-than-significant* impact.

Construction activities would result in a temporary increase in traffic on the regional road during the construction period. Traffic generated during construction activities would include the daily arrival and departure of construction work crews; trucks hauling equipment and materials to the work sites; and hauling of excavated debris and spoils from the site. Upon completion of construction, operations of the NCD and Reservoir would not change in that no additional employees or maintenance requirements would be required, except for sporadic visits to the site for monitoring.

Project construction would result in trips associated with worker commutes, deliveries of materials and equipment, and hauling of construction spoils. Approximately 10 construction workers are estimated to be working at the Project site each day with a maximum of 20 during peak construction periods (AECOM, February 2018). The Project is currently proposed with one 8- to 10-hour daily work shift, generally between 7 AM and 6 PM on weekdays.

Estimated daily trips at the peak of the construction phase are shown on Table 4.10-1. Table 4.10-2, shows the daily, and AM and PM peak hour peak construction phase trip generation, along with truck trip volume adjustments in Passenger-Car Equivalence (PCE) volumes. PCE volumes account for the adjustment of truck trips into equivalent passenger-car trips. The actual number of other construction-related vehicle trips would vary each day depending on the construction phase.

The peak construction phase would generate 204 daily trips, 16 AM peak hour trips, and 36 PM peak hour trips. With PCE factors applied to project-related trucks, the peak construction phase would generate a total of 504 daily PCE trips, 46 AM PCE trips, and 66 PM PCE trips.

Table 4.10-1: Estimated Daily Project Construction Trips

Type of Trips	Number of Trips To the Site	Number of Trips From the Site	Total Daily Trips
Construction Workers: 20 Maximum	20	20	40
Materials Delivery			
• Rip-rap/Gravel: 500 total trips	18	18	36
• Concrete: 250 total trips	12	12	24
• Reinforced Steel	30	30	60
Other Deliveries	2	2	4
Haul Materials Off-site: 670 total trips	20	20	40
TOTAL	**102**	**102**	**204**

Table 4.10-2: Estimated Daily and Peak Hour Project Construction Trips

Vehicles Generated		Daily	AM Peak Hour			PM Peak Hour		
Type	**Amount**	**Trips**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Workers	20 cars	40	0	0	0	0	20	20
Materials Delivery								
- Rip-rap/Gravel	18 trucks	36	2	2	4	2	2	4
- Concrete	12 trucks	24	1	1	2	1	1	2
- Reinforced Steel	30 trucks	60	3	3	6	3	3	6
Other Deliveries	2 trucks	4	0	0	0	0	0	0
Haul Materials	20 trucks	40	2	2	4	2	2	4
TOTAL TRIPS	**102 vehicles**	**204**	**8**	**8**	**16**	**8**	**28**	**36**
PASSENGER-CAR EQUIVLAENCE (PCE)								
Workers (1.0 PCE)	20 PCE	40	0	0	0	0	20	20
Materials Delivery								
- Rip-rap/Gravel (3.0 PCE)	54 PCE	108	6	5	11	5	6	11
- Concrete (2.0 PCE)	24 PCE	48	3	2	5	2	3	5
- Reinforced Steel (3.0 PCE)	90 PCE	180	9	9	18	9	9	18
Other Deliveries (2.0 PCE)	4 PCE	8	0	0	0	0	0	0
Haul Materials (3.0 PCE)	60 PCE	120	6	6	12	6	6	12
TOTAL PCE TRIPS	**252 PCE**	**504**	**24**	**22**	**46**	**22**	**44**	**66**

Construction workers and construction vehicles would use regional highways and local roadways to access the construction work areas. Figure 3-16 in Chapter 3, Project Description identifies anticipated access routes to the Project site. Most construction-related worker trips are expected to occur before the weekday AM peak traffic periods of 7:00 AM to 9:00 AM, but could occur during the weekday afternoon peak traffic periods given the anticipated work shifts.

Most traffic analyses rely on an analysis of changes in an intersection or roadway LOS operations to evaluate the long-term effects of projects on the operations of roadways and intersections. However, construction projects that increase traffic only temporarily, or that result in traffic fluctuations, do not have a long-term effect on level of service. In addition, most LOS analyses focus

on the peak hours of traffic (typically morning and evening commute times). It is likely that many of the worker trips for the construction period would be outside of the typical AM peak hour as discussed above. Construction workers also are expected to commute to and from the construction work areas earlier and/or later than project-related construction truck trips, which are expected to be distributed throughout the day.

Additionally, daily traffic volumes on public roads typically vary from day to day by 5 to 10%, and any temporary increase in traffic due to construction would be within the typical daily fluctuation and would not be perceptible to the average motorist. Table 4.10-3 presents existing daily and/or peak hour traffic volumes for highways and local roadways and intersections in the Project vicinity based on available traffic data. The table also compares the total Project traffic volume, in PCE volumes, with the existing volumes, and determines the Project's percent of traffic related to the existing roadway and/or intersection traffic volumes. Although published traffic counts are not available for Newell Creek Road, daily traffic at the northern end where the road becomes a private gated road are estimated at approximately 1,020 trips based on short-term counts conducted as part of the noise analysis.

Based on the data in Table 4.10-3, construction-related vehicle trips on local, two-lane roadways, and highways, in the Project area would not substantially affect traffic flow as their increases are generally below 10% of daily and peak hour traffic volume fluctuations. The exception would be Glen Arbor Road, where Project-related peak construction traffic would be slightly higher at 11.2%, and along Newell Creek Road, which is expected to have lower existing volumes than Glen Arbor Road. However, as previously, noted, construction traffic would be temporary, and the peak phase of construction in which more truck trips would be generated, would occur for a limited duration within a limited timeframe within the entire construction phase. The estimated maximum daily trips would not be occurring every day of the construction period.

Therefore, Project-related construction activities would result in a temporary increase in traffic from construction workers and trucks traveling to and from the construction work areas. The number of onsite workers would vary throughout the construction phases, and truck and equipment-related deliveries would be spread out over the construction work day. Given the anticipated split worker shifts, most of the daily traffic would be outside of the peak traffic periods, except for construction worker traffic in the morning. Given the above, temporary construction traffic would not cause a substantial increase in traffic relative to existing conditions and roadway capacity, or contribute substantial volumes of traffic during peak hours at all of the Proposed Project sites. Generally, the estimated maximum increase in traffic along regional roadways would remain within the carrying capacities of the regional roadways and would not substantially affect traffic flow, and the impact is less-than-significant. No mitigation measures are required.

Therefore, Project-related construction activities would result in a temporary increase in traffic from construction workers and trucks traveling to and from the construction work areas. The number of onsite workers would vary throughout the construction phases, and truck and equipment-related deliveries would be spread out over the construction work day. Given the

anticipated split worker shifts, most of the daily traffic would be outside of the peak traffic periods, except for construction worker traffic in the morning. Given the above, temporary construction traffic would not cause a substantial increase in traffic relative to existing conditions and roadway capacity, or contribute substantial volumes of traffic during peak hours at all of the Proposed Project sites. Generally, the estimated maximum increase in traffic along regional roadways would remain within the carrying capacities of the regional roadways and would not substantially affect traffic flow, and the impact is less-than-significant. No mitigation measures are required.

Table 4.10-3: Existing Traffic Volumes

Roadway Segment or Intersection	Existing Volume	Project Total Volume (PCE)	Percent Project Traffic
Highway 9 at San Lorenzo Avenue [1]	6,300 (Daily) 830 (Peak Hour)	504 66	8.0% 8.0%
Highway 9 at Graham Hill Road [1]	12,200 (Daily) 1,750 (Peak Hour)	504 66	4.1% 3.8%
Highway 9 - Glen Arbor Road [1]	15,400 (Daily) 1,900 (Peak Hour)	504 66	3.3% 3.5%
Highway 17 - Sims Road [1]	67,000 (Daily) 5,700 (Peak Hour)	504 66	0.8% 1.1%
Highway 17 - Scotts Valley Drive [1]	60,000 (Daily) 5,800 (Peak Hour)	504 66	0.8% 1.1%
Highway 17 - Granite Creek Road [1]	60,000 (Daily) 5,800 (Peak Hour)	504 66	0.8% 1.1%
Mount Herman Road [2]	33,741 (Daily)	504	1.5%
Graham Hill Road [2]	27,896 (Daily)	504	1.8%
Glen Arbor Road [3]	4,500 (Daily)	504	11.2%
Highway 9/Graham Hill Road [4]	2,980 (PM Peak Hour)	66	2.2%
Mount Herman/Whispering Pines – Scotts Valley Drive [4]	3,969 (PM Peak Hour)	66	1.7%
Granite Creek Road/Scotts Valley Drive [4]	2,099 (PM Peak Hour)	66	3.1%
Highway 9/Fall Creek Drive [4]	1,891 (AM Peak Hour)	46	2.4%
Highway 9/Highway 236 [4]	1,270 (PM Peak Hour)	66	5.2%
Highway 9/Brackney Road/Glen Lomond Lane [4]	1,398 (AM Peak Hour)	46	3.3%

Sources:
[1] Caltrans Traffic Census Program data (Caltrans, 2016a)
[2] Santa Cruz County Regional Transportation Commission (SCCRTC, 2018)
[3] County of Santa Cruz (2015)
[4] May 22-24, 2018 traffic counts

Project construction would not require closure of any roads or travel lanes on state highways. There may be short-term lane closures on Newell Creek Road during construction of the Newell Creek Pipeline, but this road is a private road with limited access. Nonetheless, the Project construction specifications include preparation and implementation traffic controls. There may also be limited

lane closures along the route to the Loch Lomond Recreation Area for the one-time delivery of barge components.

Loch Lomond Recreation Area (LLRA) is located on the east side of the Reservoir about 4,000 feet upstream of the dam crest. Barges and boats could be launched from the boat ramp. Minor improvements such as paving and resurfacing may be needed along the route (e.g., at Sequoia Ave), if used for heavy equipment. The road would be restored to its original condition when construction is complete. Note, at a water elevation below normal operational levels, the boat ramp and recreation area would be closed.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

4.10.3 Cumulative Impacts

The geographic scope for the cumulative impact analysis of traffic impacts consists of the proposed Project and vicinity roadways on which trips to the Project site would be made. Based on the list of cumulative projects provided on Table 4-1 (see Section 4.0), cumulative projects with potential construction traffic during the same time as the proposed Project would be upgrades at the Graham Hill Water Treatment Plant and future construction of future planned Newell Creek Pipeline (NCP) segments. Current schedules show potential overlap in construction schedules, although the design/environmental phase for the NCP have not yet been initiated so the actual extent of potential construction period overlaps is not known. At this time, replacement segments and/or alignment locations have not been identified or designed for the NCP. It is assumed that new pipeline would be in the general location of the existing pipeline, which would include vicinity roadways and adjacent neighborhoods, including Highway 9 and Graham Hill Road. Depending on the ultimate construction schedule for cumulative projects, cumulative construction trips could occur on these two roads. However, trips would be temporary and variable throughout a given day and construction period and would not be considered significant. Therefore, there are no identified significant cumulative impacts.

4.10.4 References

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